Use of *DIVAYANA* Formula in Determining *Discrepancy* *Asuri Daiwi Sampad* in the Evaluation Process of Flipped Learning

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**Abstract.** The purpose of this research was to show the process of calculating the *DIVAYANA* formula in obtaining alternatives that were the most dominant positive and negative imbalances supporting the effectiveness of the flipped learning implementation. Imbalance data in the flipped learning implementation refers to the *Daiwi Sampad* and *Asuri Sampad* concepts. Positive imbalance refers to the *Daiwi Sampad* concept, while negative imbalance refers to the *Asuri Sampad* concept. The method used in this research was the simulation method of calculating the *DIVAYANA* formula in the evaluation process of flipped learning. The value of imbalance was obtained from the difference between the percentage of the respondents’ assessment and the percentage of the effectiveness standards. A total of 20 respondents were involved in conducting an assessment to obtain the percentage of respondents’ assessments. A total of four experts were involved in determining the percentage of effectiveness standards. The tools used to obtain the results of the respondents’ assessment and the percentage of effectiveness standards were questionnaires. This research was conducted at several IT vocational schools in Bali. The technique used to analyze the simulation results of the *DIVAYANA* formula calculation was by comparing the categorization of effectiveness based on the five’s scale with the percentage results of the effectiveness level of using that formula. The results of this research indicate the effectiveness of the *DIVAYANA* formula to determine which alternatives were the most dominant positive and negative imbalances in the flipped learning implementation.

# Keywords: *DIVAYANA* Formula; *Discrepancy*; *Daiwi Sampad*; *Asuri Sampad*; Evaluation of Flipped Learning.

# INTRODUCTION

Evaluation activities were very important to carry out in a *Covid-19* pandemic situation to find out positive and negative gaps that affect the effectiveness of the flipped learning implementation. Positive imbalances are things that support the effectiveness of the flipped learning implementation. Negative imbalances are things that tend to hinder the effectiveness of the flipped learning implementation.

One evaluation model that is often used to evaluate the imbalance between the evaluation results and the evaluation standards set is the *Discrepancy* evaluation model [1-5]. However, this evaluation model specifically cannot be used to evaluate the most dominant positive and negative imbalances that affect the effectiveness of the flipped learning implementation.

Based on those problems, it was necessary to develop an evaluation model that was able to evaluate the most dominant positive and negative imbalances in the flipped learning implementation. The innovation was in the form of a *DIVAYANA* evaluation model based on the *Discrepancy Asuri Daiwi Sampad*.

This evaluation model innovation is a combination of the *DIVAYANA* model, the *Discrepancy* model, the *Asuri Sampad* concept, and the *Daiwi Sampad* concept. The principle of the *Discrepancy* model is used as the basis for determining imbalance. The principle of *Asuri Sampad* is used in determining indicators that hinder the effectiveness of the flipped learning implementation. The principle of *Daiwi Sampad* is used to determine indicators that support the effectiveness of the flipped learning implementation. The *DIVAYANA* model is used as a basis for determining the alternative of the most dominant positive imbalance and the most dominant negative imbalance. This is because the *DIVAYANA* model has a formula that can be used to determine the most dominant positive and negative imbalances accurately. Based on that innovation, the research question is how the process of calculating the *DIVAYANA* formula in determining positive (*Daiwi Sampad* based) and negative (*Asuri Sampad* based) imbalance is the most dominant in supporting the effectiveness of flipped learning?

Several previous studies triggered this research, including research conducted by Ambida and Cruz in 2017 [6], Jayanta et al.’s research in 2017 [7], Rahman et al.’s research in 2018 [8], and Marsiningsih et al.’s research in 2019 [9]. Ambida and Cruz’s research showed the determinant of imbalances in the university systems that refer to the *Commission on Higher Education* (*CHED*) guidelines. The limitation of Ambida and Cruz’s research was that it had not shown the most dominant positive and negative imbalances in supporting the effectiveness of the university system. Research by Jayanta et al. had shown several *Discrepancy* indicators in the evaluation activities of the plan and the Curriculum of 2013 implementation in the learning process. The limitation of Jayanta et al.’s research was that it had not shown the dominant indicators that become positive and negative imbalances in the learning process.

Rahman et al.’s research showed the conceptual framework form of the *Discrepancy* evaluation model to obtained indicators of imbalances in the learning process in schools. The limitation of Rahman et al.’s research was that it had not shown the most dominant indicators of positive and negative imbalances in the learning process in schools.

Marsiningsih et al.’s research showed a ranking process of imbalance aspects from the highest to the lowest level in the evaluation process using the *Discrepancy* model. Rahman et al.’s research equation with this research is the use of the *Discrepancy* evaluation model. The difference is in the calculation process of determining the imbalance aspects. This research used the *DIVAYANA* formula to determine the most dominant positive and negative imbalances, while Marsiningsih et al.’s research used the *AHP* (*Analytic Hierarchy Process*) method in ranking the imbalance aspects.

# Method

This research approach was quantitative research. The method used was the simulation method of calculating the *DIVAYANA* formula. The *DIVAYANA* formula has 3 equations, included: equation (1) to determine the improvement of the weights average, equation (2) to determine the normalized value known as the Vector-D, and equation (3) to determine the ranking value known as the Vector-R [10,11].



(1)

Notes:

WYack = Repair of weights average

x = The average weight given by each expert and evaluator based on the results of the joint discussion



(2)

With i = 1, 2, 3, 4, 5, ..., n; and ∑ (WYack)j must be the value of 1.

Notes:

D = Vector-D

x = Assessment score for each criterion

m = Total of all experts and evaluators



(3)

Notes:

*D* = Vector-D

*R* = Vector-R

Imbalance data in the flipped learning implementation was obtained from the difference between the percentage of respondents’ perceptions and the percentage of effectiveness standards. The percentage of respondents’ assessment was obtained from the results of filling out the questionnaires by 20 respondents. Those respondents were teachers from several IT vocational schools in Bali. The percentage of effectiveness standards and weights were given by four experts through filling out questionnaires. Data collection in this research was carried out at several IT vocational schools in Bali.

The simulation analysis technique for calculating the *DIVAYANA* formula was carried out by comparing the results of the percentage level of effectiveness with the categorization of effectiveness according to a five’s scale. The percentage level of effectiveness is determined using the formula shown in equation (4) [12-17]. The categorization of effectiveness based on a five’s scale can be seen in Table 1 [18-23].

**P = (f/N) × 100%** (4)

Notes:

P : percentage of effectiveness

f : the total of acquisition scores

N : the total of maximum scores

**TABLE 1**. Effectiveness categories based on five’s scale.

|  |  |
| --- | --- |
| Category of effectiveness | Range of percentage (%) |
| Poor | 0 to 54 |
| Less | 55 to 64 |
| Moderate | 65 to 79 |
| Good | 80 to 89 |
| Excellent | 90 to 100 |

# Results and discussion

Some of the initial data needed in carrying out the calculation process using the *DIVAYANA* formula, included: 1) data about constraints that occur in the flipped learning implementation, 2) alternatives data for solving constraints in the implementation of flipped learning, 3) standards data about the effectiveness of the flipped learning implementation, 4) data of positive imbalance based on *Daiwi Sampad* and negative imbalance based on *Asuri Sampad* that occurred in the flipped learning implementation, and 5) data of experts’ weights given to each effectiveness standard. The initial data can be seen completely in Table 2 to Table 6.

**TABLE 2.** Data of constraints in the flipped learning implementation

|  |  |
| --- | --- |
| Codes of constraints | Constraints |
| CS1 | The school community has no understanding of the regulations from the government regarding the flipped learning implementation |
| CS2 | Unclear school regulations in implementing government regulations |
| CS3 | Limited budget for conducting flipped learning |
| CS4 | Limitations of hardware and software that support flipped learning |
| CS5 | The low ability of the flipped learning management teams |
| CS6 | The low ability of flipped learning users |
| CS7 | Unstable internet access |
| CS8 | The low quality of the material contents available in flipped learning |

**TABLE 3.** Data of constraints solution alternatives in implementing flipped learning

|  |  |
| --- | --- |
| Codes of alternatives | Alternatives |
| AL1 | School leaders carry out outreach activities to school members about the existence of government regulations controlling the flipped learning implementation |
| AL2 | School leaders and their staff make clear rules about the implementation of government regulations related to the flipped learning |
| AL3 | School leaders seek funding sources for the implementation of flipped learning from various parties, both from internal schools and external parties |
| AL4 | School leaders strive to provide adequate hardware and software to support flipped learning |
| AL5 | School leaders provide opportunities for the flipped learning management team to take part in training that support the management of flipped learning |
| AL6 | School leaders provide opportunities for flipped learning users to take part in workshops on operating flipped learning |
| AL7 | School leaders try to facilitate an increase in internet bandwidth so that internet access is more stable |
| AL8 | School leaders try to facilitate teachers to take part in workshops on the creation of material contents so that the material contents available in flipped learning becomes of higher quality and attractive to learn of students |

**TABLE 4.** Data of effectiveness standards of the flipped learning implementation

| Codes of standards | Effectiveness standards |
| --- | --- |
| EF1 | Percentage of effectiveness > 92% as a measurement standard of the success of the outreach activities implementation to school members about government regulations controlling the flipped learning implementation |
| EF2 | Percentage of effectiveness > 92% as a measurement standard of the success of school leaders and their staff in making clear rules about the implementation of government regulations related to the flipped learning implementation |
| EF3 | The percentage of effectiveness > 85% as a measurement standard of the success of school leaders in seeking funding sources for the flipped learning implementation |
| EF4 | Percentage of effectiveness > 90% as a measurement standard of the success of school leaders in seeking the availability of adequate hardware and software to support flipped learning |
| EF5 | Percentage of effectiveness > 88% as a measurement standard of the success of school leaders in providing opportunities for the flipped learning management team to take part in training that support the management of flipped learning |
| EF6 | Percentage of effectiveness > 88% as a measurement standard of the success of school leaders in providing opportunities for flipped learning users to attend workshops on operating flipped learning |
| EF7 | Percentage of effectiveness > 90% as a measurement standard of the success of school leaders in facilitating an increase in internet bandwidth so that internet access is more stable |
| EF8 | Percentage of effectiveness > 88% as a measurement standard of the success of school leaders in facilitating teachers to attend workshops on making interesting and quality material contents in flipped learning |

**TABLE 5.** Data of positive imbalance based on *daiwi sampad* and negative imbalance based on *asuri sampad* that happened in the implementation of flipped learning

| Codes of alternatives | Percentage of effectiveness standards  (%) | Percentage of respondents’ assessment  (%) | *Discrepancy* | |
| --- | --- | --- | --- | --- |
| *Asuri Sampad*  (-) | *Daiwi Sampad*  (+) |
| AL1 | 92.000 | 89.000 | 3.000 | 0.000 |
| AL2 | 92.000 | 90.000 | 2.000 | 0.000 |
| AL3 | 85.000 | 88.000 | 0.000 | 3.000 |
| AL4 | 90.000 | 91.000 | 0.000 | 1.000 |
| AL5 | 88.000 | 91.000 | 0.000 | 3.000 |
| AL6 | 88.000 | 90.000 | 0.000 | 2.000 |
| AL7 | 90.000 | 89.000 | 1.000 | 0.000 |
| AL8 | 88.000 | 90.000 | 0.000 | 2.000 |
| Average |  | 89.750 |  |  |

**TABLE 6.** Data of experts’ weights that provided to each effectiveness standard

| Experts’ weights | Codes of standards | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EF1 | EF2 | EF3 | EF4 | EF5 | EF6 | EF7 | EF8 |
| Education Expert-1 | 5 | 5 | 4 | 4 | 4 | 5 | 4 | 4 |
| Education Expert-2 | 4 | 5 | 4 | 4 | 5 | 4 | 5 | 5 |
| Informatics Expert-1 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 4 |
| Informatics Expert-2 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 |
| Average | 4.250 | 5.000 | 4.000 | 4.250 | 4.500 | 4.500 | 4.750 | 4.250 |
| Repair of Weights’ Average (WYack) | 0.120 | 0.141 | 0.113 | 0.120 | 0.127 | 0.127 | 0.134 | 0.120 |
| Σ(WYack) | 1 | | | | | | | |

Based on the data in Table 5, then the initial positive and negative imbalance values were compiled, which were used as the main data in the process of calculating the *DIVAYANA* formula to determine the most dominant imbalance value. The compilation data for the initial positive and negative imbalance values can be seen in Table 7 and Table 8.

**TABLE 7.** Initial values data of the positive imbalance

| Codes of alternatives | Codes of standards | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EF1 | EF2 | EF3 | EF4 | EF5 | EF6 | EF7 | EF8 |
| AL1 | 89 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| AL2 | 10 | 90 | 10 | 10 | 10 | 10 | 10 | 10 |
| AL3 | 91 | 91 | 88 | 91 | 91 | 91 | 91 | 91 |
| AL4 | 92 | 92 | 92 | 91 | 92 | 92 | 92 | 92 |
| AL5 | 94 | 94 | 94 | 94 | 91 | 94 | 94 | 94 |
| AL6 | 92 | 92 | 92 | 92 | 92 | 90 | 92 | 92 |
| AL7 | 11 | 11 | 11 | 11 | 11 | 11 | 89 | 11 |
| AL8 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 90 |

The values in the gray and blue blocks in Table 7 were derived from the percentage values of the respondents’ assessment shown earlier in Table 5. The unblocked values in row “AL1” (11) in Table 7 were obtained by the following calculation: 100-89. The unblocked values in row “AL2” (10) were obtained by the following calculation: 100-90. The unblocked values in row “AL3” (91) were obtained by the following calculation: 88 + 3. Score 3 comes from the *Discrepancy* *Daiwi Sampad* value for alternative “AL3” shown earlier in Table 5. The unblocked values in row “AL4” (92) were obtained by the following calculation: 91 + 1. Score 1 comes from the *Discrepancy* *Daiwi Sampad* value for alternative “AL4” shown earlier in Table 5. The unblocked values in row “AL5” (94) were obtained by the following calculation: 91 + 3. Score 3 comes from the *Discrepancy* *Daiwi Sampad* value for alternative “AL5” shown earlier in Table 5. The unblocked values in row “AL6” (92) were obtained by the following calculation: 90 + 2. Score 2 comes from the *Discrepancy* *Daiwi Sampad* value for the alternative “AL6” shown earlier in Table 5. The unblocked values in row “AL7” (11) were obtained by the following calculation: 100-89. The unblocked values in row “AL8” (92) were obtained by the following calculation: 90 + 2. Score 2 comes from the *Discrepancy* *Daiwi Sampad* value for alternative “AL8” shown earlier in Table 5.

**TABLE 8.** Initial values data of the negative imbalance

| Codes of alternatives | Codes of standards | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EF1 | EF2 | EF3 | EF4 | EF5 | EF6 | EF7 | EF8 |
| AL1 | 89 | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| AL2 | 88 | 90 | 88 | 88 | 88 | 88 | 88 | 88 |
| AL3 | 12 | 12 | 88 | 12 | 12 | 12 | 12 | 12 |
| AL4 | 9 | 9 | 9 | 91 | 9 | 9 | 9 | 9 |
| AL5 | 9 | 9 | 9 | 9 | 91 | 9 | 9 | 9 |
| AL6 | 10 | 10 | 10 | 10 | 10 | 90 | 10 | 10 |
| AL7 | 88 | 88 | 88 | 88 | 88 | 88 | 89 | 88 |
| AL8 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 90 |

The values in the red and gray blocks in Table 8 were derived from the percentage values of the respondents’ assessment shown earlier in Table 5. The unblocked values in row “AL1” (86) in Table 8 were obtained by the following calculations: 89-3. Score 3 comes from the *Discrepancy* *Asuri Sampad* value for alternative “AL1” shown earlier in Table 5. The unblocked values in row “AL2” (88) were obtained by the following calculation: 90-2. Score 2 comes from the *Discrepancy* *Asuri Sampad* value for alternative “AL2” shown earlier in Table 5. The unblocked values in row “AL3” (12) were obtained by the following calculation: 100-88. The unblocked values in row “AL4” (9) were obtained by the following calculation: 100-91. The unblocked values in row “AL5” (9) were obtained by the following calculation: 100-91. The unblocked values in row “AL6” (10) were obtained by the following calculation: 100-90. The unblocked values in row “AL7” (88) were obtained by the following calculation: 89-1. Score 1 comes from the *Discrepancy* *Asuri Sampad* value for alternative “AL7” shown earlier in Table 5. The unblocked values in row “AL8” (10) were obtained by the following calculation: 100-90.

Based on equation (2), the initial positive imbalance data based on the *Daiwi Sampad* that shown in Table 7, and the experts’ weights data shown in Table 6, then the Vector-D values for positive imbalance were able to be determined. The Vector-D calculation process for positive imbalance can be seen as follows.

D1 (+) = ((890.120)(110.141)(110.113)(110.120)(110.127)(110.127)(110.134)(110.120))/4 = 3.532

D2 (+) = ((100.120)(900.141)(100.113)(100.120)(100.127)(100.127)(100.134)(100.120))/4 = 3.407

D3 (+) = ((910.120)(910.141)(880.113)(910.120)(910.127)(910.127)(910.134)(910.120))/4 = 22.777

D4 (+) = ((920.120)(920.141)(920.113)(910.120)(920.127)(920.127)(920.134)(920.120))/4 = 23.133

D5 (+) = ((940.120)(940.141)(940.113)(940.120)(910.127)(940.127)(940.134)(940.120))/4 = 23.492

D6 (+) = ((920.120)(920.141)(920.113)(920.120)(920.127)(900.127)(920.134)(920.120))/4 = 22.936

D7 (+) = ((110.120)(110.141)(110.113)(110.120)(110.127)(110.127)(890.134)(110.120))/4 = 3.638

D8 (+) = ((920.120)(920.141)(920.113)(920.120)(920.127)(920.127)(920.134)(900.120))/4 = 22.940

Based on equation (2), the initial negative imbalance data based on the *Asuri Sampad* that shown in Table 8, and the experts’ weights data shown in Table 6, then the Vector-D values for negative imbalance were able to be determined. The Vector-D calculation process for negative imbalance can be seen as follows.

D1 (-) = ((890.120)(860.141)(860.113)(860.120)(860.127)(860.127)(860.134)(860.120))/4 = 21.588

D2 (-) = ((880.120)(900.141)(880.113)(880.120)(880.127)(880.127)(880.134)(880.120))/4 = 22.070

D3 (-) = ((120.120)(120.141)(880.113)(120.120)(120.127)(120.127)(120.134)(120.120))/4 = 3.755

D4 (-) = ((90.120)(90.141)(90.113)(910.120)(90.127)(90.127)(90.134)(90.120))/4 = 2.968

D5 (-) = ((90.120)(90.141)(90.113)(90.120)(910.127)(90.127)(90.134)(90.120))/4 = 3.017

D6 (-) = ((100.120)(100.141)(100.113)(100.120)(100.127)(900.127)(100.134)(100.120))/4 = 3.303

D7 (-) = ((880.120)(880.141)(880.113)(880.120)(880.127)(880.127)(890.134)(880.120))/4 = 22.033

D8 (-) = ((100.120)(100.141)(100.113)(100.120)(100.127)(100.127)(100.134)(900.120))/4 = 3.252

Based on equation (3), the Vector-D values for positive imbalance, then the Vector-R values for positive imbalance were able to be determined. The process of calculating the Vector-R for positive imbalance can be seen as follows.

R1 (+) = 3.532 / (3.532 + 3.407 + 22.777 + 23.133 + 23.492 + 22.936 + 3.638 + 22.940) = 0.0281

R2 (+) = 3.407 / (3.532 + 3.407 + 22.777 + 23.133 + 23.492 + 22.936 + 3.638 + 22.940) = 0.0271

R3 (+) = 22.777 / (3.532 + 3.407 + 22.777 + 23.133 + 23.492 + 22.936 + 3.638 + 22.940) = 0.1810

R4 (+) = 23.133 / (3.532 + 3.407 + 22.777 + 23.133 + 23.492 + 22.936 + 3.638 + 22.940) = 0.1838

R5 (+) = 23.492 / (3.532 + 3.407 + 22.777 + 23.133 + 23.492 + 22.936 + 3.638 + 22.940) = 0.1867

R6 (+) = 22.936 / (3.532 + 3.407 + 22.777 + 23.133 + 23.492 + 22.936 + 3.638 + 22.940) = 0.1822

R7 (+) = 3.638 / (3.532 + 3.407 + 22.777 + 23.133 + 23.492 + 22.936 + 3.638 + 22.940) = 0.0289

R8 (+) = 22.940 / (3.532 + 3.407 + 22.777 + 23.133 + 23.492 + 22.936 + 3.638 + 22.940) = 0.1823

Based on equation (3), the Vector-D values for negative imbalance, then the Vector-R values for negative imbalance were able to be determined. The process of calculating the Vector-R for negative imbalance can be seen as follows.

R1 (-) = 21.588 / (21.588 + 22.070 + 3.755 + 2.968 + 3.017 + 3.303 + 22.033 + 3.252) = 0.2633

R2 (-) = 22.070 / (21.588 + 22.070 + 3.755 + 2.968 + 3.017 + 3.303 + 22.033 + 3.252) = 0.2692

R3 (-) = 3.755 / (21.588 + 22.070 + 3.755 + 2.968 + 3.017 + 3.303 + 22.033 + 3.252) = 0.0458

R4 (-) = 2.968 / (21.588 + 22.070 + 3.755 + 2.968 + 3.017 + 3.303 + 22.033 + 3.252) = 0.0362

R5 (-) = 3.017 / (21.588 + 22.070 + 3.755 + 2.968 + 3.017 + 3.303 + 22.033 + 3.252) = 0.0368

R6 (-) = 3.303 / (21.588 + 22.070 + 3.755 + 2.968 + 3.017 + 3.303 + 22.033 + 3.252) = 0.0403

R7 (-) = 22.033 / (21.588 + 22.070 + 3.755 + 2.968 + 3.017 + 3.303 + 22.033 + 3.252) = 0.2687

R8 (-) = 3.252 / (21.588 + 22.070 + 3.755 + 2.968 + 3.017 + 3.303 + 22.033 + 3.252) = 0.0397

The highest value of Vector-R for positive imbalance was 0.1867 on R5 (+). This showed that the most dominant positive imbalance was alternative AL5. Therefore, it is very appropriate if school leaders continue to regularly provide opportunities for the flipped learning management team to take part in training that support the effectiveness of flipped learning management.

The highest value of Vector-R for negative imbalance was 0.2692 on R2 (-). This showed that the most dominant negative imbalance was alternative AL2. Therefore, it is very appropriate if school leaders and their staff are more focused on making improvements for the rules regarding the implementation of government regulations related to the flipped learning implementation so that it is more clearly understood and implemented by school communities.

The measurement of the percentage effectiveness of using the *DIVAYANA* formula was carried out by two informatics experts and two education experts by providing an assessment of the five questions in the questionnaire. The results of measuring the effectiveness percentage can be seen in Table 9.

**TABLE 9.** Measurement results of effectiveness percentage use of the *DIVAYANA* formula

| Experts’ assessment | Items of questions | | | | | Σ | Percentage of effectiveness (%) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| I1 | I2 | I3 | I4 | I5 |
| Education Expert-1 | 5 | 4 | 4 | 4 | 5 | 22 | 88.00 |
| Education Expert-2 | 4 | 5 | 4 | 4 | 4 | 21 | 84.00 |
| Informatics Expert-1 | 5 | 5 | 4 | 4 | 5 | 23 | 92.00 |
| Informatics Expert-2 | 5 | 5 | 5 | 5 | 4 | 24 | 96.00 |
| Average |  |  |  |  |  |  | 90.00 |

There were five questions used in assessing the effectiveness of the *DIVAYANA* formula in determining the most dominant positive and negative imbalances in supporting the effectiveness of flipped learning. Question-1 was about the validity of the compilation results of the initial positive imbalance values. Question-2 was about the validity of the compilation results of the initial negative imbalance values. The question-3 was about the accuracy of equation (1) in the *DIVAYANA* formula that was used to determine the improvement in the weights average. Question-4 was about the accuracy of equation (2) in the *DIVAYANA* formula that was used to determine the Vector-D. Question-5 was about the accuracy of equation (3) in the *DIVAYANA* formula that was used to determine the Vector-R.

If seen from the average results of effectiveness percentage of the *DIVAYANA* formula utilization. It was 90.00%. If compared with the categorization of the effectiveness level shown earlier in Table 1, it was able to be said that the *DIVAYANA* formula was categorized as effective. The *DIVAYANA* formula is effectively used to determine the most dominant positive and negative imbalances in supporting the successful implementation of flipped learning.

Generally, the results of this research can answer the limitations of Ambida and Cruz’s research [6], the limitations of Jayanta et al.’s research [7], by showing the most dominant positive imbalance based on the *Daiwi Sampad* concept and the most dominant negative imbalance based on *Asuri Sampad* concept. This research is also able to answer the limitations of Rahman et al.’s research [8], Khusniyah’s research [24], Nasution et al.’s research [25], Pandow et al.’s research [26], Maharsi et al.’s research [27], Otero-Saborido et al.’s research [28], Oh et al.’s research [29], Lee and Yeung’s research [30], Robert et al.’s research [31],and Zhamanov et al.’s research [32], by showing alternatives to trigger imbalances in the learning process.

Besides the advantages that had been shown from the research results, this research has several limitations, included: 1) formula testing only involved four experts, 2) evaluation application that applies the *DIVAYANA* formula has not been developed.

# Conclusions

Generally, the results of this research had shown the effectiveness of the *DIVAYANA* formula calculation process in determining the most dominant positive and negative imbalances in supporting the success/effectiveness of the flipped learning implementation. This is evidenced by the effectiveness percentage of use of the *DIVAYANA* formula was 90%. The values of positive imbalance triggers are seen in Table 5 in the section of *Discrepancy* *Daiwi Sampad* scores and negative imbalance triggers are seen in the section of *Discrepancy* *Asuri Sampad* scores. Future works that need to be done to overcome the limitations in this research, included: 1) increasing the number of experts involved in testing the *DIVAYANA* formula which is implemented in the evaluation of the learning process; 2) developing a mobile technology-based evaluation application that includes the *DIVAYANA* formula in the evaluation process.

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