The simulation of alkin evaluation model based on SAW to evaluate flip learning in IT vocational schools

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Abstract. The implementation of flip learning at SMK TI Bali Global Jimbaran experienced several obstacles such as not accustomed to independent learning students, teachers who are not used to making digital material and there is no official regulation of its implementation. This study aims to determine the percentage level of effectiveness and the constraints faced in implementing flip learning in schools using the Alkin evaluation model combined with SAW (Simple Additive Weighting). The samples in this study was taken using a simple random sampling technique, consisting of the principal, teachers, and students who actively carry out flip learning. The data in this study were collected using a questionnaire based on the components of the system assessment, program planning, program implementation, program improvement, and program certification. This study obtained calculations from the evaluation aspect from the highest to the lowest values with the SAW calculation. The highest score was the legality aspect in system assessment with a value of 0.4265 and the lowest score was hardware maintenance aspects of the program improvement with a value of 0.3996. This lowest aspect is recommended to be a priority for improvement.

1. Introduction

In general, schools require their students to come to school every day to take face-to-face learning, including students at the SMK TI Bali Global Jimbaran, Bali-Indonesia. In this conventional learning, the material presented by the teacher sometimes cannot be fully absorbed by students and needs to be repeated, but this is not possible because of the limited face-to-face time in class. Using too much paper for distributing material to students and for collecting assignments is very inefficient and requires high costs if it is passed on to students.

From the above constraints, schools have begun to take initiatives to take advantage of advances in digital and communication technology in the teaching and learning process. The learning model that is being applied is a mixture of face-to-face class and learning through digital media and utilizing internet media for distance communication. The mixed learning model that is applied is called flip learning. Flip learning as a part of blended learning [1] is a learning model that combines conventional learning concepts in class with learning that utilizes advances in information technology.

The program of the flip learning mode still finds many obstacles in its implementation. Students are not accustomed to accessing course material online is an obstacle that students often face. Students who are not used to learning independently without supervision are also a common student obstacle. On the teacher's side, the culture of creating digital lesson materials, both in the form of videos and presentations, sometimes becomes a separate obstacle for the implementation of flip learning. Each
subject still uses a different application and there is still lack of official regulations from schools for the implementation of flip learning.

From the several obstacles found above, it is deemed necessary to conduct a thorough evaluation of the implementation of flip learning at SMK TI Bali Global Jimbaran, so that the implementation of flip learning will be better and produce optimal benefits for all school elements.

Evaluation of the learning model can be done with various evaluation models, including Goal Oriented Evaluation Model, Formative Summative Evaluation Model, Goal Free Evaluation Model, Countenance Evaluation Model, Responsive Evaluation Model, CSE-UCLA Evaluation Model, CIPP Evaluation Model, and Discrepancy Evaluation Model [2]. The Alkin model or CSE-UCLA (Center for The Study of Evaluation - University of California Los Angeles) is used in the flip learning evaluation because this evaluation model is very suitable for evaluating education service programs [3]. This model has one advantage that did not exist in other evaluation models, in the stage of the program implementation component which is able to give initial knowledge/socialization to users of the program [4].

However, this evaluation model cannot provide evaluation results that describe the evaluation range from the highest to the lowest results for each evaluation component accurately and quantitatively. The model can only provide qualitative results and a quantitative general view of each evaluation component [2]. The weakness of the results provided by the CSE-UCLA evaluation model makes it difficult to provide recommendations for improvements to the program precisely and accurately [4]. To overcome these weaknesses the authors propose the SAW (Simple Additive Weighting) method which is a method in decision support systems.

The SAW method was chosen because this method can make a more precise assessment. After all, it is based on predetermined criteria values and preference weights, besides that SAW can also select the best alternative from a number of some existing alternatives because of the ranking process after determining the weight for each attribute [5], so that the evaluation results of the CSE-UCLA model produce an optimal recommendation.

Some previous research was conducted by Divayana et al. [6], and have similarities in the evaluation method using the CSE-UCLA model. The difference lies in the object of research on digital libraries while this research is about flip learning. In the method used, CSE-UCLA is also combined with weighted product (WP), while this study uses the CSE-UCLA model combined with simple additive weighting (SAW). Suyasa and Kurniawan [7], have similarities in their evaluation method using the Alkin or CSE-UCLA model. The difference lies in the object of research on blended learning and determining the level of effectiveness based on the Glickman quadrant, whereas in this study the object of flip learning is that the level of program effectiveness is calculated using the SAW method.

Based on the research background and related research, the authors were interested to simulate the Alkin model combined with SAW to evaluate flip learning at SMK TI Bali Global Jimbaran.

1.1 Program Evaluation

Evaluation is an activity to collect, analyze, and present information about a certain object under study and the results can be used for consideration in making decisions [8]. Evaluation is an activity to collect data, analyze data, and present data into information about the object of an object being studied so that the results can be used to make decisions. Evaluation is the activity of collecting, analyzing, and presenting information about the object of research and the results can be used to make decisions [9]. Evaluation is an activity that consists of the process of collecting, describing, and explaining various information about the effectiveness of something that can later be used as a consideration for making decisions and recommendations [10][11].

An evaluation activity is actually carried out not to look for mistakes or weaknesses based on the results of research on an object or program being evaluated, but the most important thing is to know the level of effectiveness of an object that can run well, so it is necessary to recommend to make improvements or refinements of the weaknesses that were found [8].
From the several definitions of program evaluation above, it can be concluded that program evaluation is an activity of collecting data from the object under study, analyzing the data obtained according to existing theories, reporting the results of data analysis, and in the end, being able to provide a recommendation to the program that is evaluated according to the purpose of the evaluation.

1.2 Flip Learning
Flip learning is a learning model that utilizes the integration of technology in the teaching and learning process that combines online learning from home and face-to-face learning in the class [1]. The flip learning model can be a breakthrough to increase student independence in learning and make positive use of technology that can make students more active and innovative in learning according to their respective abilities [12]. Flip learning can help students learn better in class and outside the classroom and indirectly teachers and students must follow the development and application of information technology [13].

Flip learning is a learning model that reverses the traditional face-to-face learning procedure in class and is given homework into a process that begins with the provision of material through the media that students learn independently in their respective homes before face-to-face in the class [14]. At face-to-face meetings, students are expected to be able to present what they have learned and discussed with teachers and other students.

From some of the above definitions, it can be argued that flip learning is a learning model that utilizes technological advances that are currently developing by prioritizing the active role of students to learn independently with electronic media from home, do assignments at home, discuss online, and face to face in class only for further discussion and presentation on student learning outcomes.

1.3 Alkin Model
The Alkin evaluation model or CSE-UCLA was developed by Marvin Alkin in 1969. CSE-UCLA stands for Center for the Study of Evaluation University of California in Los Angeles [15]. The CSE-UCLA model is an evaluation model consisting of five aspects of evaluation, including system assessment informing about the state of the system, program planning specific program plans according to program needs, program implementation is information that provides an introduction to the program, the program improvement is information about the performance/running of the program, program certification is information about the benefits of the program[16]. CSE-UCLA is one of the evaluation models used to evaluate service programs that help human life, where this model evaluates based on five components, namely: system assessment, program planning, program implementation, program improvement, and program certification [6].

From the above definitions, it can be concluded that the Alkin evaluation model or CSE-UCLA is an evaluation model that has five stages, namely: the system assessment presents information related to the state or status of the system being evaluated, program planning is an effective selection of the relevant program, program implementation is the presentation of information about program implementation following what is running, the program improvement is the presentation of information about program performance, and the program certification that displays information about the results of the significance of the program.

1.4 SAW (Simple Additive Weighting)
The Simple Additive Weighting method is often known as the weighted addition method. The basic concept of the SAW method is to find a weighted sum of the performance ratings for each alternative on all attributes [17]. The SAW method requires a decision matrix normalization process (X) to a scale that can be compared with all existing alternative ratings [18].

2. Method
This research was conducted with a qualitative research approach. A qualitative approach was taken because the object under study was a program that was directly assessed by the quality of the
The implementation of flip learning at SMK TI Bali Global Jimbaran. This research is also evaluative because it evaluates or assesses the sustainability of learning services [19].

This research begins by identifying the problem, namely listing the problems that are still an obstacle to the implementation of flip learning at SMK TI Bali Global Jimbaran which has the potential to be investigated regarding the gap between reality and the expected ideal conditions. This problem identification is carried out by interview and direct observation at school. Interviews were conducted with the principal as the policyholder to be asked for information on any aspects that affect the implementation of flip learning. Observations were made by direct observation in schools to determine the teaching and learning process and what aspects influenced the flip learning process.

After the problems can be formulated, the next step is to collect data. Data collection was carried out by distributing questionnaires as one of the data collections instruments in addition to observation, interviews, and literature studies.

The questionnaire was created referring to the five stages in the CSE-UCLA evaluation model. At the system assessment stage, an evaluation of the legality of implementing flip learning and the requirement for human resources is carried out. In the program planning stage, an evaluation of the readiness of existing human resources and the readiness of facilities and infrastructure is carried out, the program implementation stage is studied regarding the installation of hardware and software in implementing flip learning. The program improvement stage is evaluated on hardware maintenance and training for teachers and students. The results of the midterm exam and the results of the final semester exams are the things that are evaluated at the program certification stage.

In taking the research sample, a simple random sampling technique was used, namely the technique of random sampling in a population. This technique is used because it is very easy to implement and the population is homogeneous [20], because all students have implemented flip learning in their learning process. The number of samples taken was 30 students.

Data from the questionnaire that referred to the CSE-UCLA model were analyzed using quantitative descriptive analysis techniques. The data from the questionnaire is calculated using the SAW method to produce the level of effectiveness of the running program.

The complete process of this research method can be illustrated in Figure 1.

Figure 1. Research method diagram.
3. Results and Discussion
The questionnaire in this study aims to obtain a user assessment of the aspects under study using a five-Likert scale. The scores on a scale of five are: Very good = 5, Good = 4, Enough = 3, Bad = 2, Very bad = 1. This questionnaire consists of 10 questions, which are the aspects of evaluation that affect the implementation of flip learning. Of the 30 respondents, for example in the legality aspect, the total number of answers was 109, the maximum score was 30x5 = 150, so that a total score of 109/150 = 0.7267 or 72.67% was obtained. Average of quality score in the assessment system is obtained from the average score of the evaluation aspect on the assessment system. The complete data tabulation can be seen in Table 1.

Table 1. Tabulation of data from 30 questionnaires.

| No. | Evaluation Component   | Evaluation Aspects               | ∑ respondent score | Percentage score (%) | Average of quality (%) |
|-----|------------------------|----------------------------------|--------------------|----------------------|------------------------|
| 1   | System Assessment      | Legality                         | 109                | 72.67                | 72.00                  |
|     |                        | Human resource requirement       | 107                | 71.33                |                        |
| 2   | Program Planning       | Readiness of existing human      | 104                | 69.33                |                        |
|     |                        | resources                        |                    |                      |                        |
|     |                        | Readiness of facilities and      | 99                 | 66.00                | 67.67                  |
|     |                        | infrastructure                   |                    |                      |                        |
| 3   | Program Implementation | Hardware installation            | 104                | 69.33                | 70.67                  |
|     |                        | Software installation            | 108                | 72.00                |                        |
| 4   | Program Improvement    | Hardware maintenance             | 92                 | 61.33                | 65.67                  |
|     |                        | Training for teacher and student | 105                | 70.00                |                        |
| 5   | Program Certification  | Midterm exam result              | 103                | 68.67                | 70.00                  |
|     |                        | Final semester exam result       | 107                | 71.33                |                        |

For data calculation using the SAW method, the evaluation aspect is an alternative to look for the ranking and the evaluation component from CSE-UCLA as the criterion. The value of each evaluation aspect is from Table 1. will be entered in Table 2 according to the evaluation component. Columns other than the appropriate evaluation component are assigned a value of 20%. A value of 20% is given because the evaluation component column does not get a value from the questionnaire [21], so the smallest weight is taken, the weight of answers is 1x30 = 30 with a total score is 30/150 = 0.2 or 20%. Complete data for the calculation can be seen in Table 2.

Table 2. Data for SAW Calculation.

| No. | Evaluation Aspects               | System Assessment | Program Planning | Program Implementation | Program Improvement | Program Certification |
|-----|----------------------------------|-------------------|------------------|------------------------|---------------------|-----------------------|
| 1   | Legality                         | 72.67             | 20.00            | 20.00                  | 20.00               | 20.00                 |
| 2   | Human resource requirement       | 71.33             | 20.00            | 20.00                  | 20.00               | 20.00                 |
| 3   | Readiness of existing human      | 20.00             | 69.33            | 20.00                  | 20.00               | 20.00                 |
|     | resources                        |                   |                  |                        |                     |                       |
| 4   | Readiness of facilities and      | 20.00             | 66.00            | 20.00                  | 20.00               | 20.00                 |
|     | infrastructure                   |                   |                  |                        |                     |                       |
| 5   | Hardware installation            | 20.00             | 20.00            |                        | 69.33               | 20.00                 |
| 6   | Software installation            | 20.00             | 20.00            |                        | 72.00               | 20.00                 |
| 7   | Hardware maintenance             | 20.00             | 20.00            |                        | 61.33               | 20.00                 |
| 8   | Training for teacher and student | 20.00             | 20.00            |                        | 70.00               | 20.00                 |
| 9   | Midterm exam result              | 20.00             | 20.00            |                        | 20.00               | 68.67                 |
| 10  | Final semester exam result       | 20.00             | 20.00            |                        | 20.00               | 71.33                 |

The calculation of the SAW method stage as follows.
3.1 Determination of data normalization

At this stage, it begins with the identification of the evaluation aspects, which are the beneficial attributes and which are the cost attributes. In Table 2, all attributes are profit attributes. Calculation of normalization can be calculated with equation 1.

\[ r_{ij} = \begin{cases} \frac{x_{ij}}{\max_i(x_{ij})} & \text{if } j \text{ is benefit attribute} \\ \frac{\min_j(x_{ij})}{x_{ij}} & \text{if } j \text{ is cost attribute} \end{cases} \]  \hspace{0.5cm} (1)

Where: \( r_{ij} \) is normalized performance rating of the alternative on the attribute; \( ij = 1, 2, \ldots, n \)

The normalization calculation process can be shown as follows.

\[ r_{1-1} = \frac{72.67}{\max \{72.67; 71.33; 20.00; 20.00; 20.00; 20.00; 20.00; 20.00; 20.00; 20.00\}} = \frac{72.67}{72.67} = 1.00 \]  \hspace{0.5cm} (2)

and so on until \( r_{10-5} \)

3.2 Determination of the Matrix

The results of the normalization process above are mapped into the following normalized matrix.

\[
R = \begin{bmatrix}
1.00 & 0.29 & 0.28 & 0.29 & 0.28 \\
0.98 & 0.29 & 0.28 & 0.29 & 0.28 \\
0.28 & 1.00 & 0.28 & 0.29 & 0.28 \\
0.28 & 0.95 & 0.28 & 0.29 & 0.28 \\
0.28 & 0.29 & 0.96 & 0.29 & 0.28 \\
0.28 & 0.29 & 1.00 & 0.29 & 0.28 \\
0.28 & 0.29 & 0.28 & 0.88 & 0.28 \\
0.28 & 0.29 & 0.28 & 1.00 & 0.28 \\
0.28 & 0.29 & 0.28 & 0.29 & 0.96 \\
0.28 & 0.29 & 0.28 & 0.29 & 1.00 \\
\end{bmatrix}
\]

3.3 Stage of Ranking

The weight of each component in CSE-UCLA is based on previous research [17], system assessment is 20%, program planning is 20%, program implementation is 20%, program improvement is 20% and program certification is 20%. Based on weight and the R matrix, the ranking calculation using equation (2).

\[ V_i = \sum_{j=1}^{n} w_j r_{ij} \]  \hspace{0.5cm} (3)

where: \( V_i \) = preference values for each alternative, \( w_j \) = weight of component, \( r_{ij} \) = a performance rating that has been normalized, \( j \) = initial value of iteration, \( n \) = final limit value of iteration

The results of the ranking calculation, the ranking can be shown in Table 3.
Table 3. Ranking results recapitulation.

| Rank | Preference Value | Evaluation Aspects                  |
|------|------------------|-------------------------------------|
| 1    | 0.4265           | Legality                            |
| 2    | 0.4260           | Software installation               |
| 3    | 0.4254           | Final semester exam result          |
| 4    | 0.4244           | Training for teacher and student    |
| 5    | 0.4238           | Readiness of existing human resources|
| 6    | 0.4228           | Human resource requirement          |
| 7    | 0.4185           | Hardware installation               |
| 8    | 0.4180           | Midterm exam result                 |
| 9    | 0.4142           | Readiness of facilities and infrastructure |
| 10   | 0.3996           | Hardware maintenance                |

From Table 3, it can be explained that the Hardware maintenance evaluation aspect is the most dominant aspect and is a top priority for improvement because from the results of the SAW calculation this aspect has the lowest value. The Legality aspect has the best value from the SAW calculation, so this aspect needs to be retained in quality.

4. Conclusions and Future Work

The quality of the flip learning program at SMK TI Bali Global Jimbaran when viewed from the evaluation component of the Alkin model shows that system assessment with a value of 72.00%, program planning with a value of 67.67%, program implementation with a value of 70.67%, program improvement with a value of 65.67% and program certification with a value of 70.00%, but it is still possible to have the same value from each evaluation aspect.

The Alkin model evaluation simulation combined with the SAW method has been able to provide information on which aspects are most effective and which aspects need to be improved in the implementation of flip learning at SMK TI Bali Global Jimbaran based on the ranking results. So that from the results of this evaluation, recommendations can be given to related parties that the aspects that have the lowest value need to be improved so that the implementation of flip learning is better in the future.

For future development, it is necessary to explore more aspects that affect the implementation of this flip learning so that the results of the evaluation can be more detailed and more effective in improving the implementation of flip learning.

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