Amalgamation evaluation model design based on modification weighted product-*Provus-Alkin-Rwa Bhineda*

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ABSTRACT

The new normal era allowed learning at IT vocational schools to be carried out directly (synchronously) through online meeting platforms and indirectly (asynchronously) through email, WhatsApp groups, and learning management system (LMS). However, the reality showed that not all synchronous and asynchronous learning implementations were effective. Based on these problems, it was necessary to evaluate and used an appropriate evaluation model. A breakthrough was used, namely the Amalgamation evaluation model based on the modification of the weighted product with the *Provus* and *Alkin* models in view of the *Rwa Bhineda* concept. The purpose of this research was to show the Amalgamation evaluation model design based on weighted product modification with the *Provus* and *Alkin* models in view of the *Rwa Bhineda* concept as the basis for determining the dominant indicators that need to be maintained for the synchronous-asynchronous learning effectiveness. This research used a development approach that focused on the design, initial trial, and initial trial revision. The analysis of this study results used a quantitative descriptive technique, namely the percentage descriptive calculation. This research results showed the evaluation model design was good categorized as evidenced by the average percentage of effectiveness was 88.67%. The emerging significance and value of this research results was the existence of innovation in the educational evaluation field, which makes it easier for evaluators to determine the dominant indicators that need to be maintained in supporting the effectiveness of synchronous-asynchronous learning implementation in IT vocational schools generally, and specifically in IT vocational schools in Bali.

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1. INTRODUCTION

Synchronous-asynchronous learning was still suitable for use in the new normal. This learning makes it easier for students and teachers to interact and the learning process whenever and wherever they are without being bound by space or time [1], [2]. This learning also supports the implementation of the "*Merdeka Belajar*" (this term is interpreted as independent learning) policy in Indonesia. This is evidenced by the convenience obtained by students through synchronous and asynchronous learning without being pressured due to a lack of face-to-face learning time at school [3]. When viewed from the essence of the free learning policy, students were free to express, express ideas, be creative, innovate, and get learning resources whenever and wherever they were through face-to-face facilities directly online (synchronously), or indirectly via learning management system (LMS), email, WhatsApp-group, as well as other study groups (asynchronous). However, it should be realized that the reality showed the ineffectiveness of implemented synchronous-asynchronous learning in IT vocational schools, especially in Bali. This ineffectiveness occurs because of the unpreparedness of human resources, limited supported equipment, lack of socialization process for the implementation of the learning, as well as the monitoring and evaluation process that was not carried out using the right evaluation model so it was difficult for evaluators to provide optimal recommendations. Therefore, a suitable evaluation model was needed, so that the most dominant indicators can be found to be maintained in supporting the effectiveness of synchronous-asynchronous learning implementation at IT vocational schools in Bali. In general, several evaluation models can be used to evaluate synchronous-asynchronous learning, including the context-input-process-product (CIPP) model, the countenance model, the formative-summative model, and the center for the study of evaluation-University of California in Los Angeles (CSE-UCLA) model. However, those models have not been able to optimally determine the most dominant indicators that need to be maintained to support the effectiveness of synchronous-asynchronous learning.

The innovation that was suitable to be used was an Amalgamation evaluation model based on weighted product modifications with the *Provus* and *Alkin* models in view of the *Rwa Bhineda* concept. This evaluation model was expected to be able to present the right recommendation results by bringing up the most dominant indicators to be maintained in supporting the effectiveness of synchronous-asynchronous learning implementation at IT vocational schools in Bali. Determination of the dominant indicator was done by maximizing the measurement process carefully using the weighted product method and unifying the functions of the evaluation components of the two evaluation models (*Provus* and *Alkin*). The unification of these functions was based on the concept of *Rwa Bhineda* so that there was a balance of functions to facilitate the determination of the dominant indicators of evaluation. Based on the existing problems and innovation, the research question is “How is the design of the amalgamation evaluation model based on weighted product modification with the *Provus* and *Alkin* models in view of the *Rwa Bhineda* concept?” In order to show the position of this research, it is necessary to explain the research roadmap which is the basis for the emergence of this research. The research roadmap intended can be seen in Figure 1.

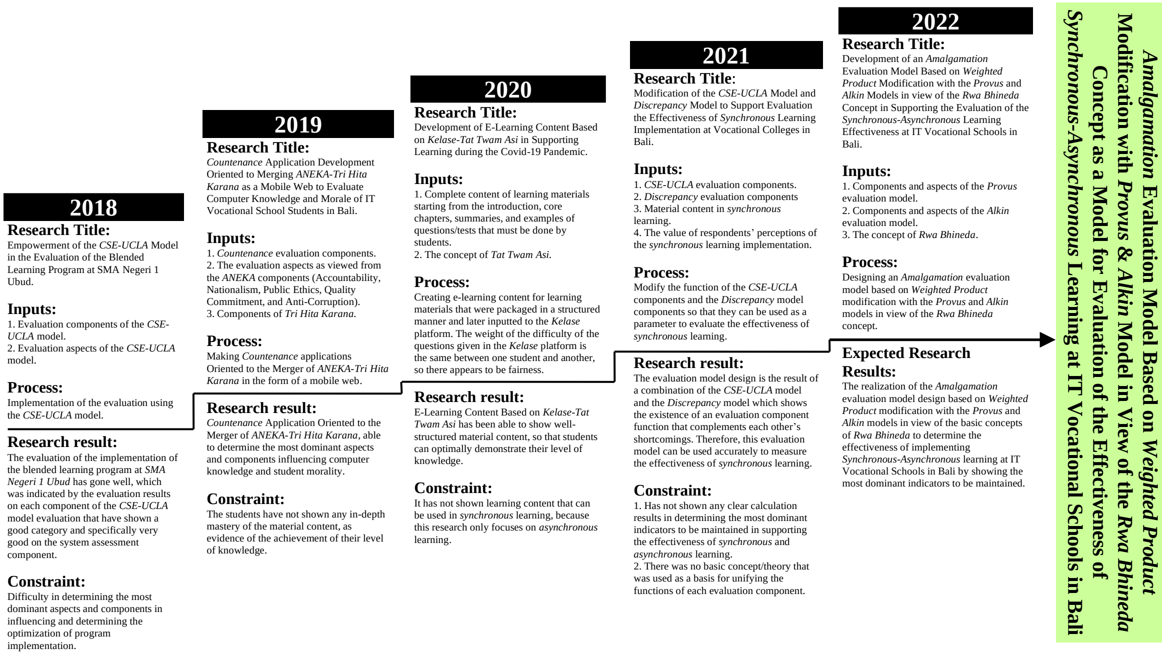

Figure 1. Research roadmap

The research of Suyasa and Kurniawan [4] concerning the empowerment of the CSE-UCLA model in the evaluation of the blended learning program at SMA Negeri 1 Ubud, showed that the evaluation of the implementation of the blended learning program had gone well. It was indicated by the evaluation results on each evaluation component of the CSE-UCLA model which had been categorized as good and in particular very good at system assessment components. The obstacle in this research was the difficulty in determining the most dominant aspects and components in influencing and determining the optimization of program implementation. The relationship of this research with the previous research of Suyasa and Kurniawan [4] is this research able to be a solution to determine the most dominant evaluation aspects and components that affect the optimization of program implementation.

Research by Divayana *et al*. [5] showed the realization of the countenance application oriented to the incorporation of *ANEKA-Tri Hita Karana* which can determine the most dominant aspects and components affecting computer knowledge and student morality. The obstacle in this research was that it has not shown any in-depth mastery of material content shown by students, as evidence of the achievement of their level of knowledge. The relationship of this research with the research of Divayana *et al*. [5] is this research also had the same concept, namely a combination of one evaluation model with other methods/concepts that were used as a basis for evaluating a program.

Research by Divayana *et al*. [6] regarding the development of e-learning content based on *Kelase-Tat Twam Asi* in supporting learning during the COVID-19 pandemic, showed the realization of e-learning content based on *Kelase-Tat Twam Asi* that was well structured so that students can optimally demonstrate a level of knowledge. The obstacle in this research was that it had not shown learning content that was able to be used in s*ynchronous* learning, because this research only focuses on asynchronous learning. The relationship of this research with the research of Divayana *et al*. [6] is this research can complement the focus of previous research only focused on asynchronous learning by attention to synchronous learning.

Suyasa and Divayana's research about the modification of the CSE-UCLA model and the discrepancy model to support the evaluation of the effectiveness of the synchronous learning implementation at vocational universities in Bali [7], shows the design of the evaluation model of the results of the combination of the CSE-UCLA model and the discrepancy model. The design shows the existence of an evaluation component function that complements each other's shortcomings. Therefore, the evaluation model can be used accurately to measure the effectiveness of synchronous learning. The obstacle in this research was that it has not shown clear calculation results in determining the most dominant indicators to be maintained in supporting the effectiveness of synchronous and asynchronous learning. In addition, there was no basic concept/theory that was used as a basis for unifying the functions of each evaluation component. The relevance of this research with the research of Suyasa and Divayana [7] is this research can be a solution to determine the most dominant indicators that need to be maintained in supporting the effectiveness of asynchronous and synchronous learning.

Then proceed with research planned for 2022 on the development of an amalgamation evaluation model design based on weighted product modifications with the *Provus* and *Alkin* models in view of the *Rwa Bhineda* concept. The results that were expected to be realized in the 2022 research were the design of an innovative evaluation model that can be used to support the evaluation of the effectiveness of synchronous-asynchronous learning at IT vocational schools in Bali. The things that were prepared in the input domain to realize the evaluation model design were the components and aspects of the evaluation of the *Provus* and *Alkin* models in view of the *Rwa Bhineda c*oncept. Things that have been done in the process dimension to realize the design of the evaluation model were to integrate the weighted product method into the *Provus* and *Alkin* models in view of the *Rwa Bhineda* concept that has been defined in the input domain.

Based on the research roadmap, the main purpose of this research was to show the design of an *Amalgamation* evaluation model based on weighted product modification with the *Provus* and *Alkin* models in view of the *Rwa Bhineda* concept to support the evaluation of the effectiveness of synchronous-asynchronous learning at IT vocational schools in Bali. The urgency of this research was to obtain an accurate evaluation model design to determine the effectiveness of synchronous-asynchronous learning at IT vocational schools through modification of the Weighted-Product method with the *Provus* and *Alkin* models integrated with the *Rwa Bhineda* concept.

The emergence of this research was motivated by several limitations of the results of previous studies. Research by Cahyadi *et al*. [8] showed evaluation activities of distance teaching processes in Indonesia during the COVID-19 pandemic. The research limitation of Cahyadi *et al*. was it had not shown the most dominant evaluation indicator as a trigger for the effectiveness of the distance teaching implementation. Durante's research [9] showed evaluation activities to obtain the effectiveness of synchronous and asynchronous learning. The limitation of Durante's research was that it had not shown the evaluation aspect which become the most dominant priority as a trigger for the effectiveness of synchronous and asynchronous learning implementation. The research of Pujiastuti *et al*. [10] showed the evaluation of learning during the COVID-19 pandemic using the CIPP model. The limitation of Pujiastuti's research was it had not shown the evaluation aspect that become the dominant parameter determining the success of learning implementation during the COVID-19 pandemic. Research by Tsimaras *et al*. [11] showed the evaluation of e-learning using the CIPP model. The research limitation of Tsimaras *et al*. was that it had not shown the dominant aspect that triggers the effectiveness of learning activities using e-learning.

2. RESEARCH METHOD

2.1. Research approach

The approach to this research was the development of the research and development method. The development model was Borg and Gall with 10 stages of development [12]–[18], including research and field data collection; planning; design development; initial trial; initial trial revision; field trials; revision of field trials; usage trials; final product revision; dissemination and implementation of the final product. In 2022, research focused on the design development stage, initial trials, and revision of the results of the initial trials on the evaluation model design developed. That was because the main purpose of this study was to show a quality evaluation model design.

2.2. Research subject

The subjects in this research were determined using the purposive sampling technique, where the parties involved in the research were determined from the start by the researcher, and the parties involved were directly related to the implementation of synchronous-asynchronous learning at IT vocational schools in Bali province, Indonesia. Based on the purposive sampling technique, researchers can select samples randomly according to the limits set by them [19]–[21]. Therefore, number of subjects involved was limited to two informatics experts, two education experts, and 40 teachers to simulate the calculation of the weighted product method and initial trials of the evaluation model design. Even though the number of subjects involved were limited, the subjects chosen were adequate, because those subjects were directly related and deeply involved in the implementation of synchronous-asynchronous learning at IT vocational schools in Bali province, Indonesia.

2.3. Research object

The object of research was the main topic that must be researched and solved through the implementation of research. The object of this research was more focused on the design of the evaluation model. The design intended was the design of the Amalgamation evaluation model based on the modification of the weighted product with the *Provus* and *Alkin* models in view of the *Rwa Bhineda* concept.

2.4. Data collection instruments

The data collection tool related to the simulation results of the weighted product method and the results of the initial trial in this study was in the form of a questionnaire. Questionnaires were used to obtain primary data in the form of quantitative data from respondents as a basis for making decisions regarding the percentage level of quality in the evaluation model design. The number of questionnaire items used in the initial trial was 12 items.

2.5. Research location

The location of this research was at IT vocational schools spread over six districts in Bali, Indonesia. The six districts included: Buleleng, Tabanan, Gianyar, Badung, Denpasar, and Klungkung. The reason for choosing research locations in several districts was based on considerations for equitable down streaming of research results in Bali, Indonesia.

2.6. Simulation steps for weighted product calculation method

The weighted product method is one of the methods in a decision support system that is used to make a decision. The simulation in the calculation of the weighted product method consists of three steps, including i) fixing the criteria weights; ii) determining the S-vector; and iii) determining the V-vector. The formula to improve the weight of the criteria uses in (1) [22]–[25]. The formula for determining the S-vector uses in (2) [26]–[29]. The formula for determining the V-vector uses in (3) [30]–[34].

$$w_j = \frac{w_j}{\sum w_j} \tag{1}$$

$$S_i = \prod_{j=1}^{n} x_{ij}{}^{w_j} \tag{2}$$

where i = 1,2,...,m

$\sum w_j$ must be 1. x is the criterion value. S is the criterion preference which is referred to as the S-vector. w_j is a negative power for the cost attribute and a positive value for the profit attribute.

$$V_i = \frac{S_i}{\sum S} \tag{3}$$

where i = 1,2,...,n

V is an alternative preference for ranking which is referred to as the V-vector.

2.7. Data analysis techniques

The data from the initial trial of the evaluation model design that has been collected were then analyzed using quantitative descriptive techniques using percentage descriptive calculations. The results of the descriptive percentage calculation were used as a basis for interpreting the results of the initial trial of this evaluation model design. The descriptive percentage calculation formula intended uses in (4) [35]–[39].

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

Notes:
P = Descriptive percentage
f = Total of the acquisition value
N = Total of maximum value

The percentage achievement results obtained from the formula were then converted to a five-scale categorization. This categorization consists of three pieces of information: effectiveness percentage, category effectiveness, and follow-up. The five-scale categorization can be seen in Table 1 [40]–[45].

Table 1. Five-scale categorization

Effectiveness percentage	Category effectiveness	Follow-up
90% to 100%	Excellence	No need to revised
80% to 89%	Good	No need to revised
65% to 79%	Moderate	Need to be revised
55% to 64%	Less	Need to be revised
0% to 54%	Poor	Need to be revised

3. RESULTS AND DISCUSSION

The results of this research indicate the form of the amalgamation evaluation model design based on weighted product modification with the *Provus* and *Alkin* models in view of the *Rwa Bhineda* concept. The weighted product method calculation simulation was used to determine the most dominant indicators maintained in supporting the effectiveness of implementing synchronous-asynchronous learning at IT vocational schools in Bali. The design of the evaluation model can be seen in Figure 2.

Figure 2 shows the initial design of the evaluation model that was formed based on the *Rwa Bhineda* concept to integrate the evaluation components, and the evaluation indicators owned by the *Alkin* model and the *Provus* model. The *Alkin* model consists of five evaluation components, including system assessment, program planning, program implementation, program improvement, and program certification. The *Provus* model consists of four evaluation components, including definition, installation, process, and product. Indicators in the system assessment component, such as: AL1 (the purpose of implementing synchronous-asynchronous learning); AL2 (support from the academic community in each IT vocational school in Bali); and AL3 (regulations that support the implementation of synchronous-asynchronous learning).

Indicators in the program planning component, such as: AL4 (readiness of students in providing internet data packages to support synchronous-asynchronous learning); AL5 (readiness of students in providing computer hardware to support the implementation of synchronous-asynchronous learning); AL6 (students' ability to operate platform used in the implementation of synchronous-asynchronous learning); AL7 (teacher readiness in providing internet data packages to support synchronous-asynchronous learning); AL8 (teacher's ability to provide interesting teaching materials and suitable for use in synchronous-asynchronous learning); AL9 (teacher readiness in providing computer hardware to support the implementation of synchronous-asynchronous learning); and AL10 (teacher's ability to operate the platform used in the implementation of synchronous-asynchronous learning).

Indicators in the program implementation component, such as: AL11 (teachers socialize the existence of synchronous-asynchronous learning by distributing platform links to students); AL12 (teachers socializing of teaching material links to students before or after the implementation of synchronous-asynchronous learning); and AL13 (socialization of the synchronous-asynchronous learning implementation guide to students is carried out by the teacher).

Indicators of the program improvement component, such as: AL14 (mechanism for creating attractive digital format teaching materials); AL15 (mechanism for creating account platforms used to support synchronous-asynchronous learning); and AL16 (mechanism for implementing synchronous-asynchronous learning).

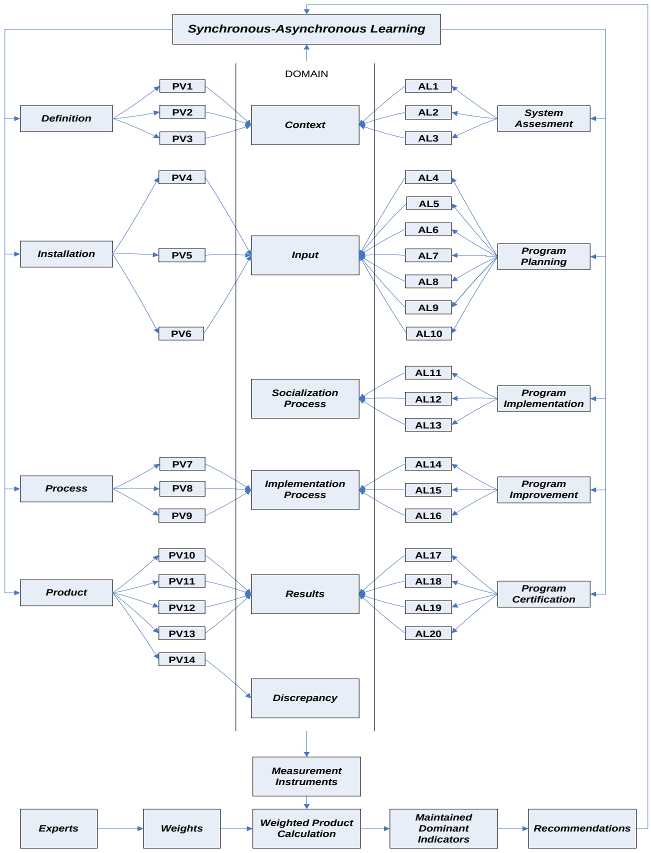

Figure 2. The initial design of the amalgamation evaluation model based on modification weighted product-*Provus-Alkin-Rwa Bhineda*

Indicators in the program certification component, such as: AL17 (student satisfaction due to the ease of operating the platform used to support the implementation of synchronous-asynchronous learning); AL18 (teacher satisfaction due to the ease of operation of the platform used to support the implementation of synchronous-asynchronous learning); AL19 (security teaching materials distributed to students in synchronous-asynchronous learning); and AL20 (students and teachers' satisfaction in interacting and communicating occurs through asynchronous-asynchronous learning support platform).

The indicators for the definition component, such as: PV1 (vision, mission, and objectives for implementing synchronous-asynchronous learning); PV2 (support from the academic community in each IT vocational school in Bali for the implementation of synchronous-asynchronous learning); and PV3 (legal legality of synchronous-asynchronous learning implementation).

Indicators on the installation component, such as: PV4 (readiness of students and teachers in the implementation of synchronous-asynchronous learning); PV5 (readiness of facilities and infrastructure to support the implementation of synchronous-asynchronous learning); and PV6 (readiness of the system/platform management team used to support the implementation synchronous-asynchronous learning).

Indicators of the process component, such as: PV7 (procedures for teachers in making digital format teaching materials distributed to students); PV8 (procedures for creating account platforms for teachers and students so that they can access the platform used for the synchronous-asynchronous learning process); and PV9 (procedures for implementing synchronous-asynchronous learning to run effectively).

Indicators on product component include PV10 (student and teacher satisfaction with the ease of operation of the platform for synchronous-asynchronous learning); PV11 (student and teacher satisfaction with the speed of access to platforms used in synchronous-asynchronous learning); PV12 (level of material security digital format teaching distributed by teachers to students); PV13 (students and teachers' satisfaction in communicating and interacting through synchronous-asynchronous learning support platforms); and PV14 (unequal scores of synchronous-asynchronous learning implementation).

This design was used as a basis for evaluating the implementation of synchronous-asynchronous learning at IT vocational schools in Bali. The results of the integration of evaluation components and indicators from the two evaluation models based on the *Rwa Bhineda* concept produce an evaluation domain.

The evaluation domain in this model design consists of context, input, socialization process, implementation process, results, and discrepancy. All evaluation indicators referring to the evaluation domain were measured using an instrument in the form of a questionnaire. The results were combined with the evaluation domain weights given by the experts so that the weighted product method calculation process can be carried out. The results of the weighted product calculation produce dominant indicators that need to be maintained to maintain the effectiveness of the synchronous-asynchronous learning implementation. These dominant indicators were used as the basis for determining recommendations to be given later to decision makers regarding the continuity of synchronous-asynchronous learning.

In addition to the design of the evaluation model, the results of this research also show a simulation of the calculation of the weighted product method to determine the dominant indicators of the *Alkin* evaluation model and the *Provus* evaluation model that need to be maintained to maintain the effectiveness of the synchronous-asynchronous learning implementation. The data needed to perform the simulation includes i) the weight of the evaluation domain given by the expert; and ii) the evaluation indicator score which refers to the evaluation domain. The expert weight on the evaluation domain was shown in Table 2. Respondent scores for evaluation indicators referring to the evaluation domain were shown in Table 3.

Table 2. Expert weight on domain evaluation

Evaluation domain	Expert-1	Expert-2	Expert-3	Expert-4	Σ	Experts' weight value
ED1 (context)	5	5	4	5	19	0.181
ED2 (input)	4	5	5	4	18	0.171
ED3 (socialization process)	4	4	4	5	17	0.162
ED4 (implementation process)	4	4	5	5	18	0.171
ED5 (results)	4	5	5	5	19	0.181
ED6 (discrepancy)	3	4	3	4	14	0.133
				Total	105	

Table 3. Respondent scores for evaluation indicators that refer to the evaluation domain

Evaluation	Evaluation domain					
indicators	ED1	ED2	ED3	ED4	ED5	ED6
AL1	0.873	0.200	0.200	0.200	0.200	0.200
AL2	0.895	0.200	0.200	0.200	0.200	0.200
AL3	0.891	0.200	0.200	0.200	0.200	0.200
AL4	0.200	0.864	0.200	0.200	0.200	0.200
AL5	0.200	0.877	0.200	0.200	0.200	0.200
AL6	0.200	0.891	0.200	0.200	0.200	0.200
AL7	0.200	0.873	0.200	0.200	0.200	0.200
AL8	0.200	0.877	0.200	0.200	0.200	0.200
AL9	0.200	0.882	0.200	0.200	0.200	0.200
AL10	0.200	0.882	0.200	0.200	0.200	0.200
AL11	0.200	0.200	0.873	0.200	0.200	0.200
AL12	0.200	0.200	0.864	0.200	0.200	0.200
AL13	0.200	0.200	0.886	0.200	0.200	0.200
AL14	0.200	0.200	0.200	0.882	0.200	0.200
AL15	0.200	0.200	0.200	0.873	0.200	0.200
AL16	0.200	0.200	0.200	0.891	0.200	0.200
AL17	0.200	0.200	0.200	0.200	0.873	0.200
AL18	0.200	0.200	0.200	0.200	0.891	0.200
AL19	0.200	0.200	0.200	0.200	0.895	0.200
AL20	0.200	0.200	0.200	0.200	0.859	0.200
PV1	0.886	0.200	0.200	0.200	0.200	0.200
PV2	0.877	0.200	0.200	0.200	0.200	0.200
PV3	0.859	0.200	0.200	0.200	0.200	0.200
PV4	0.200	0.895	0.200	0.200	0.200	0.200
PV5	0.200	0.891	0.200	0.200	0.200	0.200
PV6	0.200	0.850	0.200	0.200	0.200	0.200
PV7	0.200	0.200	0.200	0.873	0.200	0.200
PV8	0.200	0.200	0.200	0.895	0.200	0.200
PV9	0.200	0.200	0.200	0.864	0.200	0.200
PV10	0.200	0.200	0.200	0.200	0.868	0.200
PV11	0.200	0.200	0.200	0.200	0.891	0.200
PV12	0.200	0.200	0.200	0.200	0.886	0.200
PV13	0.200	0.200	0.200	0.200	0.868	0.200
PV14	0.200	0.200	0.200	0.200	0.200	0.873

Based on the expert weight data shown in Table 2 and the respondent scores shown in Table 3, the calculation process for the weighted product method can be carried out. There are three steps to simulate the weighted product calculation. Those three steps can be explained in the sub-section.

3.1. Fix criteria weight

Based on the formula shown in (1), the results of the improvements to the weight of the criteria can be seen previously in Table 2. The improvements can be seen specifically in the "experts' weight value" column. This value is obtained from the sigma weight of each expert toward the domain evaluation divided by the total sigma weight of the experts.

3.2. Determine the S-vector

Based on the formula shown in (2), it can be determined the S-vector. The results of S-vector calculations can be seen in Table 4. The table shows clearly and completely the calculations' process in determining the S-vector.

Table 4. Results of S-vector calculations

S-vector	Calculations' process	Results
S_1	$(0.873^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2616
S_2	$(0.895^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2627
S_3	$(0.891^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2625
S_4	$(0.200^{0.181}) \times (0.864^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2573
S_5	$(0.200^{0.181}) \times (0.877^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2579
S_6	$(0.200^{0.181}) \times (0.891^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2586
S_7	$(0.200^{0.181}) \times (0.873^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2577
S_8	$(0.200^{0.181}) \times (0.877^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2579
S_9	$(0.200^{0.181}) \times (0.882^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2582
S_{10}	$(0.200^{0.181}) \times (0.882^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2582
S_{11}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.873^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2543
S_{12}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.864^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2539
S_{13}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.886^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2549
S_{14}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.882^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2582
S_{15}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.873^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2577
S_{16}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.891^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2586
S_{17}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.873^{0.181}) \times (0.200^{0.133})$	0.2616
S_{18}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.891^{0.181}) \times (0.200^{0.133})$	0.2625
S_{19}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.895^{0.181}) \times (0.200^{0.133})$	0.2627
S_{20}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.859^{0.181}) \times (0.200^{0.133})$	0.2608
S_{21}	$(0.886^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2623
S_{22}	$(0.877^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2618
S_{23}	$(0.859^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2608
S_{24}	$(0.200^{0.181}) \times (0.895^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2588
S_{25}	$(0.200^{0.181}) \times (0.891^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2586
S_{26}	$(0.200^{0.181}) \times (0.850^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2566
S_{27}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.873^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2577
S_{28}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.895^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2588
S_{29}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.864^{0.171}) \times (0.200^{0.181}) \times (0.200^{0.133})$	0.2573
S_{30}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.868^{0.181}) \times (0.200^{0.133})$	0.2613
S_{31}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.891^{0.181}) \times (0.200^{0.133})$	0.2625
S_{32}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.886^{0.181}) \times (0.200^{0.133})$	0.2623
S_{33}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.868^{0.181}) \times (0.200^{0.133})$	0.2613
S_{34}	$(0.200^{0.181}) \times (0.200^{0.171}) \times (0.200^{0.162}) \times (0.200^{0.171}) \times (0.200^{0.181}) \times (0.873^{0.133})$	0.2437
ΣS		8.8028

3.3. Determine the V-vector

Based on the formula shown in (3), it can be determined the V-vector. The results of V-vector calculations can be seen in Table 5. The table shows clearly and completely the calculations' process in determining the V-vector. Based on the results of the V-vector calculation, ranking can be carried out to determine the most dominant indicators that need to be maintained in the *Alkin* model and the *Provus* model. The aim is to maintain the effectiveness of the synchronous-asynchronous learning implementation. The results of determining the most dominant indicators can be seen in Table 6.

Table 6 shows the most dominant indicators in the *Alkin* evaluation model were AL2 (support from the academic community in each IT vocational schools in Bali) and AL19 (safety of teaching materials distributed to students in synchronous-asynchronous learning). The most dominant indicators in the *Provus* evaluation model were PV1 (vision, mission, and objectives of implementing synchronous-asynchronous learning), and PV11 (students and teachers' satisfaction in the speed of access to platforms used in synchronous-asynchronous learning), and PV12 (level of security of teaching materials in digital format distributed by teachers to students). The selected indicators were the most dominant because their V-vector has the highest value when compared to other indicators.

Table 5. Results of V-vector calculations

V-vector	Calculations' process	Results	V-vector	Calculations' process	Results
V_1	$\frac{S_1}{\Sigma S}=\frac{0.2616}{8.8028}$	0.0297	V_{18}	$\frac{S_{18}}{\Sigma S}=\frac{0.2625}{8.8028}$	0.0298
V_2	$\frac{S_2}{\Sigma S}=\frac{0.2627}{8.8028}$	0.0299	V_{19}	$\frac{S_{19}}{\Sigma S}=\frac{0.2627}{8.8028}$	0.0299
V_3	$\frac{S_3}{\Sigma S}=\frac{0.2625}{8.8028}$	0.0298	V_{20}	$\frac{S_{20}}{\Sigma S}=\frac{0.2608}{8.8028}$	0.0296
V_4	$\frac{S_4}{\Sigma S}=\frac{0.2573}{8.8028}$	0.0292	V_{21}	$\frac{S_{21}}{\Sigma S}=\frac{0.2623}{8.8028}$	0.0298
V_5	$\frac{S_5}{\Sigma S}=\frac{0.2579}{8.8028}$	0.0293	V_{22}	$\frac{S_{22}}{\Sigma S}=\frac{0.2618}{8.8028}$	0.0297
V_6	$\frac{S_6}{\Sigma S}=\frac{0.2586}{8.8028}$	0.0294	V_{23}	$\frac{S_{23}}{\Sigma S}=\frac{0.2608}{8.8028}$	0.0296
V_7	$\frac{S_7}{\Sigma S}=\frac{0.2577}{8.8028}$	0.0293	V_{24}	$\frac{S_{24}}{\Sigma S}=\frac{0.2588}{8.8028}$	0.0294
V_8	$\frac{S_8}{\Sigma S}=\frac{0.2579}{8.8028}$	0.0293	V_{25}	$\frac{S_{25}}{\Sigma S}=\frac{0.2586}{8.8028}$	0.0294
V_9	$\frac{S_9}{\Sigma S}=\frac{0.2582}{8.8028}$	0.0293	V_{26}	$\frac{S_{26}}{\Sigma S}=\frac{0.2566}{8.8028}$	0.0291
V_{10}	$\frac{S_{10}}{\Sigma S}=\frac{0.2582}{8.8028}$	0.0293	V_{27}	$\frac{S_{27}}{\Sigma S}=\frac{0.2577}{8.8028}$	0.0293
V_{11}	$\frac{S_{11}}{\Sigma S}=\frac{0.2543}{8.8028}$	0.0289	V_{28}	$\frac{S_{28}}{\Sigma S}=\frac{0.2588}{8.8028}$	0.0294
V_{12}	$\frac{S_{12}}{\Sigma S}=\frac{0.2539}{8.8028}$	0.0288	V_{29}	$\frac{S_{29}}{\Sigma S}=\frac{0.2573}{8.8028}$	0.0292
V_{13}	$\frac{S_{13}}{\Sigma S}=\frac{0.2549}{8.8028}$	0.0290	V_{30}	$\frac{S_{30}}{\Sigma S}=\frac{0.2613}{8.8028}$	0.0297
V_{14}	$\frac{S_{14}}{\Sigma S}=\frac{0.2582}{8.8028}$	0.0293	V_{31}	$\frac{S_{31}}{\Sigma S}=\frac{0.2625}{8.8028}$	0.0298
V_{15}	$\frac{S_{15}}{\Sigma S}=\frac{0.2577}{8.8028}$	0.0293	V_{32}	$\frac{S_{32}}{\Sigma S}=\frac{0.2623}{8.8028}$	0.0298
V_{16}	$\frac{S_{16}}{\Sigma S}=\frac{0.2586}{8.8028}$	0.0294	V_{33}	$\frac{S_{33}}{\Sigma S}=\frac{0.2613}{8.8028}$	0.0297
V_{17}	$\frac{S_{17}}{\Sigma S}=\frac{0.2616}{8.8028}$	0.0297	V_{34}	$\frac{S_{34}}{\Sigma S}=\frac{0.2437}{8.8028}$	0.0277

Table 6. Results of determining the most dominant indicators on the *Alkin* model and *Provus* model

No	Evaluation indicators	V-vector	Dominant indicator	No	Evaluation indicators	V-vector	Dominant indicator
1	AL1	0.0297		18	AL18	0.0298	
2	AL2	0.0299	X	19	AL19	0.0299	X
3	AL3	0.0298		20	AL20	0.0296	
4	AL4	0.0292		21	PV1	0.0298	V
5	AL5	0.0293		22	PV2	0.0297	
6	AL6	0.0294		23	PV3	0.0296	
7	AL7	0.0293		24	PV4	0.0294	
8	AL8	0.0293		25	PV5	0.0294	
9	AL9	0.0293		26	PV6	0.0291	
10	AL10	0.0293		27	PV7	0.0293	
11	AL11	0.0289		28	PV8	0.0294	
12	AL12	0.0288		29	PV9	0.0292	
13	AL13	0.0290		30	PV10	0.0297	
14	AL14	0.0293		31	PV11	0.0298	V
15	AL15	0.0293		32	PV12	0.0298	V
16	AL16	0.0294		33	PV13	0.0297	
17	AL17	0.0297		34	PV14	0.0277	

Initial trials of the initial design of the evaluation model were carried out by 44 respondents. The instrument used to conduct the trial was a questionnaire consisting of 12 questions. The results of the initial trial of the initial design of the evaluation model can be seen in Table 7.

Table 7. Results of preliminary trial on the initial design of the amalgamation evaluation model based on modification weighted product-*Provus*-*Alkin*-*Rwa Bhineda*

Respondents	Items 1	2	3	4	5	6	7	8	9	10	11	12	∑	Effectiveness percentage (%)
Respondent-1	4	5	4	5	4	4	5	4	5	4	5	5	54	90.00
Respondent-2	5	4	5	4	5	5	4	5	4	4	4	5	54	90.00
Respondent-3	4	4	5	5	4	4	4	5	4	5	4	4	52	86.67
Respondent-4	4	5	5	4	4	4	5	5	5	4	4	5	54	90.00
Respondent-5	4	4	5	4	5	4	4	5	4	5	4	4	52	86.67
Respondent-6	4	5	5	4	4	4	5	5	5	5	4	5	55	91.67
Respondent-7	4	4	5	4	5	4	4	5	4	4	4	4	51	85.00
Respondent-8	4	5	4	4	4	4	5	5	5	4	4	4	52	86.67
Respondent-9	5	4	5	4	5	4	5	4	5	4	5	5	55	91.67
Respondent-10	4	4	5	4	4	5	4	5	4	4	4	5	52	86.67
Respondent-11	4	5	5	5	4	4	4	5	4	5	4	4	53	88.33
Respondent-12	4	4	5	4	5	4	5	5	5	4	4	5	54	90.00
Respondent-13	4	5	5	5	5	4	4	5	4	5	4	4	54	90.00
Respondent-14	4	4	5	4	5	4	5	4	5	5	5	5	55	91.67
Respondent-15	4	5	4	5	4	5	5	5	4	5	4	4	54	90.00
Respondent-16	5	4	5	4	4	4	5	4	4	4	4	4	51	85.00
Respondent-17	4	4	5	4	5	4	4	4	4	5	4	5	52	86.67
Respondent-18	4	5	5	5	4	4	4	5	4	5	4	5	54	90.00
Respondent-19	4	4	5	4	5	4	5	4	5	4	4	4	52	86.67
Respondent-20	4	5	5	5	5	4	4	4	5	4	5	4	54	90.00
Respondent-21	4	4	5	4	4	4	4	5	5	5	4	4	52	86.67
Respondent-22	4	5	4	5	4	5	4	5	5	5	5	4	55	91.67
Respondent-23	4	5	5	4	5	4	4	4	5	4	5	4	53	88.33
Respondent-24	5	4	4	4	5	4	5	4	5	4	5	4	53	88.33
Respondent-25	4	4	4	5	5	5	4	5	4	5	4	4	53	88.33
Respondent-26	4	5	4	4	5	4	5	4	4	5	4	5	53	88.33
Respondent-27	4	4	4	5	4	5	4	4	5	5	5	4	53	88.33
Respondent-28	4	5	4	4	5	4	5	4	4	5	4	5	53	88.33
Respondent-29	4	4	4	5	4	4	5	4	5	5	5	5	54	90.00
Respondent-30	4	5	4	4	4	5	5	4	4	5	4	4	52	86.67
Respondent-31	4	4	5	4	4	4	5	4	5	5	5	4	53	88.33
Respondent-32	4	5	4	5	4	5	5	5	4	5	4	4	54	90.00
Respondent-33	5	4	5	4	4	4	5	4	4	5	4	5	53	88.33
Respondent-34	4	4	5	4	5	4	4	4	5	5	5	5	54	90.00
Respondent-35	4	5	4	5	4	5	4	5	5	5	4	4	54	90.00
Respondent-36	4	4	5	4	5	4	4	4	5	4	5	4	52	86.67
Respondent-37	4	5	4	4	5	4	5	5	4	5	4	4	53	88.33
Respondent-38	4	4	4	5	5	5	4	4	4	5	4	5	53	88.33
Respondent-39	4	5	4	4	5	4	5	4	5	5	5	4	54	90.00
Respondent-40	4	5	4	5	4	5	5	4	4	5	4	5	54	90.00
Respondent-41	5	4	5	4	4	4	5	4	5	5	5	5	55	91.67
Respondent-42	4	4	5	4	5	4	4	4	4	5	4	4	51	85.00
Respondent-43	4	5	5	5	4	4	5	4	5	5	5	4	55	91.67
Respondent-44	4	4	5	4	5	4	4	4	4	5	4	4	51	85.00
										Average of effectiveness (%)				88.67

Item-1: question about the suitability of the evaluation indicators used at the system assessment component in the *Alkin* evaluation model; Item-2: question about the suitability of the evaluation indicators used at the program planning component in the *Alkin* evaluation model; Item-3: question about the suitability of evaluation indicators used at the program implementation component in the *Alkin* evaluation model; Item-4: question about the suitability of the evaluation indicators used at the program improvement component in the *Alkin* evaluation model; Item-5: question about the suitability of the evaluation indicators used at the program certification component in the *Alkin* evaluation model; Item-6: question about the suitability of the evaluation indicators used at the *definition* component in the *Provus* evaluation model; Item-7: question about the suitability of the evaluation indicators used at the Installation component in the *Provus* evaluation model; Item-8: question about the suitability of the evaluation indicators used at the Process component in the *Provus* evaluation model; Item-9: question about the suitability of evaluation indicators used in Product component in the *Provus* evaluation model; Item-10: question about the suitability of integrating each indicator of the *Alkin* and *Provus* evaluation models based on the *Rwa Bhineda* concept into the evaluation domain; Item-11: question about the suitability of the weighted product method calculation in determining the most dominant indicator in the *Alkin* model and the *Provus* model; Item-12: question about the suitability of the recommendations with the calculation results of the weighted product method.

In addition to providing quantitative assessments in the form of filling out questionnaires, respondents also provided qualitative assessments. Qualitative assessments in the form of suggestions for improvements to the evaluation model initial design. The suggestions given by respondents in the initial trial can be seen in Table 8.

Based on the suggestions shown in Table 8, a revision was made to the initial design of the evaluation model. The results of the revision can be seen in Figure 3. The figure shows the final design after revising the initial design of evaluation model. According to Figure 3, the suggestions from respondent-7, respondent-11, and respondent-44 were answered by showing different coloring in the evaluation components and evaluation indicators. The evaluation component of the *Alkin* model was indicated by a green box. *Alkin* model evaluation indicators were indicated by a light blue box. The evaluation components of the *Provus* model were indicated by the orange box. *Provus* model evaluation indicators are indicated by a yellow box. Suggestions from respondent-15 and respondent-37 were answered by showing the position of internalizing the concept of *Rwa Bhineda* in the evaluation domain, especially in the pink boxes named "socialization process" and "discrepancy". Suggestions from respondent-17 and respondent-25 were answered by showing the dividing line between the evaluation domain, evaluation components, and evaluation indicators. Suggestions from respondent-21 and respondent-42 were answered by showing the weighted product formula in the gray "weighted product calculation" box. Suggestions from respondent-19 were answered by showing the naming of evaluation components and evaluation indicators for each evaluation model.

Table 8. Respondents' suggestions on the initial trial

Respondents	Suggestion
Respondent-7	Please put a different color on the box showing the evaluation components and evaluation indicators
Respondent-11	It was necessary to give a different coloration to distinguish between the evaluation components and the evaluation indicators
Respondent-15	It was necessary to show the position of internalizing the concept of *Rwa Bhineda* in the design
Respondent-17	It was necessary to draw a line between the evaluation domain, evaluation components, and evaluation indicators
Respondent-19	It was necessary to give the name of the evaluation components and evaluation indicators for each evaluation model
Respondent-21	It was necessary to display the weighted product formula in the "weighted product Calculation" box
Respondent-25	It was necessary to draw a line that distinguishes between evaluation components, evaluation indicators, and evaluation domains
Respondent-37	It was necessary to show where the position of the *Rwa Bhineda* concept was in the design of this evaluation model
Respondent-42	The formula for the weighted product needs to be displayed in this design
Respondent-44	Distinguish coloring between components and evaluation indicators for *Alkin* and *Provus* models.

If it was seen from the average percentage of effectiveness shown in Table 7, the design of the amalgamation evaluation model was based on the modification of the weighted product with the *Provus* and *Alkin* models in terms of the *Rwa Bhineda* concept was categorized as good. That was because the percentage of 88.67% falls within the percentage range of 80-89% on the five-scale categorization shown in Table 1. The results of this study have been able to answer some of the constraints of previous research [4], [7] by showing the existence of a clear weighted product method in determining the most dominant indicator to be maintained in supporting the effectiveness of synchronous and asynchronous learning. The novelty of this research was the existence of a concept of *Rwa Bhineda* which was internalized into the evaluation domain so that each evaluation indicator in terms of functionality can complement each other.

Rwa Bhineda is one of the concepts of local wisdom of the Hindu community in Bali which reveals the emergence of different and even contradictory traits toward a balance of life [46]. Balinese people believe that a difference can create a balance. This is what is termed the concept of *Rwa Bhineda* [47].

The function of the socialization process that was not owned by the evaluation indicators in the *Provus* evaluation model can be completed by indicators AL11 to AL13 in the program implementation component of the *Alkin* evaluation model. The discrepancy function that was not owned by the evaluation indicators in the *Alkin* evaluation model can be completed by the PV14 indicator on the product components owned by the *Provus* evaluation model. In addition to novelty in the form of internalizing the concept of *Rwa Bhineda*, this research also applied the weighted product method in determining the dominant indicators in the *Alkin* and *Provus* evaluation models that needed to be maintained to support the successful implementation of Synchronous and Asynchronous learning.

Based on the simulation results of the weighted product calculation, it appears that an obstacle was found in this research. The obstacle of this research was that the weighted product calculation cannot provide optimal results if the respondent's score was zero. The obstacle of this research in principle has similarities with the constraints of other studies [48]–[57], which also used the weighted product method. The obstacle in their research was the difficulty of doing accurate calculations using the weighted product method if the criterion score was zero because the results of the calculation must be worth zero.

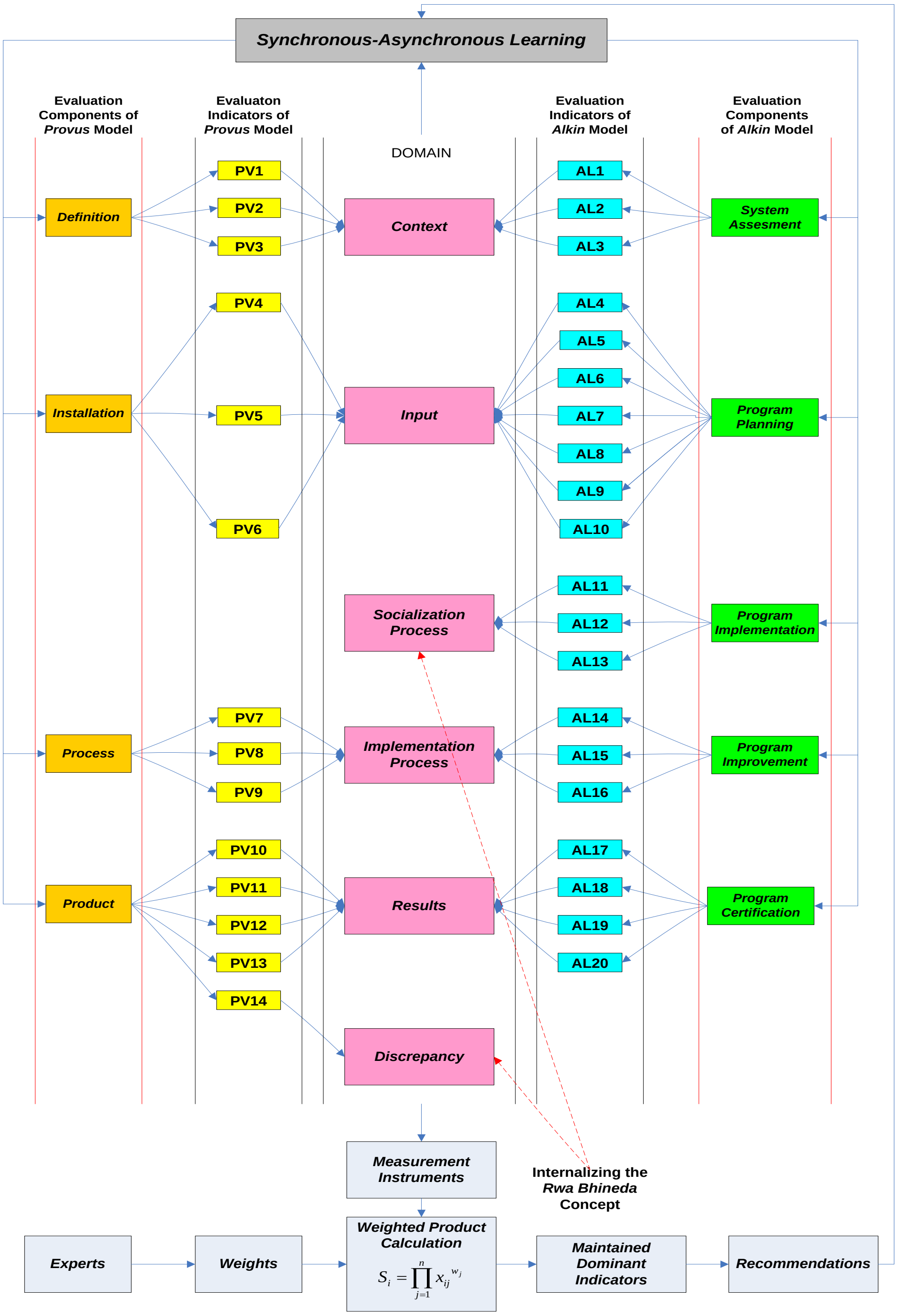

Figure 3. Final design after revising the initial design of evaluation model

4. CONCLUSION

This research had been able to show the design of an innovative evaluation model that was categorized as good. This design was called the Amalgamation evaluation model design based on weighted product modification with the *Provus* and *Alkin* models in view of the *Rwa Bhineda* concept. That good category evidenced by the average percentage of effectiveness was 88.67% based on the results of trials on the evaluation model design. The evaluation model design formed was the result of the integration of the *Rwa Bhineda* concept, the weighted product method, the *Alkin* evaluation model, and the *Provus* evaluation model. The concept of *Rwa Bhineda* is Balinese local wisdom, the weighted product method is one of the decision-making methods. The *Alkin* evaluation model and the *Provus* evaluation model are two types of evaluation models in the field of education. These four things can be well integrated and produce an innovation that has a positive impact on progress in the field of educational evaluation.

In general, the design of this innovative evaluation model can be used as a basis for conducting a comprehensive evaluation of the implementation of synchronous and asynchronous learning. In particular, it can be used as a basis for determining the dominant indicators that need to be maintained to maintain the effectiveness of the implementation of synchronous and asynchronous learning. Future work that can be done to overcome the constraints of this research was to insert another decision support system method to be able to normalize the criterion score which was zero. The advantage or positive impact of this research results on the advancement of the educational evaluation field is to present a new evaluation model that makes it easier for evaluators or teachers at IT vocational schools to determine the most dominant indicators that support the effectiveness of synchronous and asynchronous learning.

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