
**DEVELOPMENT OF CSE-UCLA EVALUATION MODEL MODIFIED BY
USING WEIGHTED PRODUCT IN ORDER TO
OPTIMIZE DIGITAL LIBRARY SERVICES IN
HIGHER EDUCATION OF COMPUTER IN BALI**

Dewa Gede Hendra Divayana
Faculty of Technical and Vocational, Universitas Pendidikan Ganesha
hendra.divayana@undiksha.ac.id

Agus Adiarta
Faculty of Technical and Vocational, Universitas Pendidikan Ganesha
agus.adiarta@undiksha.ac.id

Ida Bagus Gede Surya Abadi
Faculty of Education Science, Universitas Pendidikan Ganesha
surya.abadi@undiksha.ac.id

Abstract

This study aimed to obtain the draft of CSE-UCLA (Center for the Study of Evaluation- University of California in Los Angeles) evaluation model which is capable of measuring the level of optimization of digital library services, especially on higher education of computers in Bali. The method used in this research is the methods of research and development, the design of development is Walter Borg and Gall Meredith model. The overall study was conducted over three years, where research in the first year, especially up to design of the evaluation model is carried out for 3 months involving 2 education experts and 2 experts on informatics as research subjects in early trials that tested the design of the evaluation model and the accuracy calculation of the weighted product concept. The results of this study in the first year obtained a draft CSE-UCLA evaluation model modified using Weighted Product so as to measure the level of optimization of digital library services.

Keywords: *evaluation, CSE-UCLA, weighted product, digital library*

INTRODUCTION

Educational evaluation in education field was not something strange to the educational experts, education observers, educators and other interested parties to the education field. Educational evaluation is an activity to collect, analyze, and present information about the quality level of a particular object that is examined based on predetermined criteria or objectives and the results can be used as a consideration in taking a decision (Divayana, 2016, p. 19). It was also related to Divayana and Sugiharni's statement (2016, pp. 866-867) which stated that: "Evaluation is an activity to collect, interpret, and report the results of an analysis of a particular program/object so that the results can be used as consideration in taking a decision whether the program is continued or stopped".

According to Divayana & Sanjaya (2017, p. 152) stated that "evaluation is an activity for collecting, analyzing, and presenting, information about a particular object to be used for a consideration in making an appropriate and accurate decision". Another opinion was put forward by Divayana, Sanjaya, Marhaeni, & Sudirtha (2017, p. 1987), which stated that "evaluation is an activity to collect, analyze, and present information about an object to be evaluated, where the results of these evaluations are used for consideration in making a decision that is precise, accurate, and reliable".

Evaluation is an activity for collecting, analyzing, and explaining comprehensively information about a particular object/program/policy being studied and the results of an evaluation can be used for the consideration in making a decision to continue or to stop the object/program/policy (Divayana, Ardana, & Ariawan, 2017, p. 1964). Evaluation is an activity conducted by the evaluator to collect, analyze, and present complete and accurate information about a particular object/program/service/policy being studied, thus the results could be used as a recommendation in making a decision (Divayana et al., 2017, p. 3077).

Evaluation is an activity for data collecting, data analysing and data presenting into information about a particular object under study so that the results can be used to take a decision (Sanjaya & Divayana, 2015, p. 18). Evaluation is an activity that consists of

the process of gathering, describing, and explaining various pieces of information about the effectiveness of something that can be used later as the consideration for making a decision and a recommendation (Ariawan, Sanjaya, & Divayana, 2016, p.2).

Based on several definitions, the evaluation is an activity that collects, processes, and analyzes the data of evaluative research results to produce informations that can be used as a recommendation in taking a decision.

Some evaluation models were often used in education, such as: (1) *Goal Oriented Evaluation Model*, (2) *Goal Free Evaluation Model*, (3) *Formative Summative Evaluation Model*, (4) *Countenance Evaluation Model*, (5) *Responsive Evaluation Model*, (6) *CSE-UCLA Evaluation Model*, (7) *CIPP Evaluation Model*, and (8) *Discrepancy Evaluation Model*. From these models, there were those used to evaluate educational planning, educational processes, and also to evaluate educational services.

The development of information technology is now running very fast and plays an important role in various things (Sugiharni, & Divayana, 2017, p. 20). Advances in information and communication technology can penetrate into various fields, including education.

The impact of ICT development in the education field was remarkable (Divayana, Suyasa, & Sugihartini, 2016, p.149). The progress of ICT had also been able to overcome the important issues related to education services. Therefore, the government had made some efforts to promote education services through the utilization of ICT from the school level to universities level as government support in improving the learning quality in Indonesia. This was related with the opinion of Jampel, Widiani, & Divayana (2016, p. 33) stating that "Communication and information technology efficiency in school is one of the efforts to increase learning quality in Indonesia". The forms of ICT-based education services had been scattered in the form of e-learning, blended learning, mobile-learning, and others and also digital library services.

In general, digital library in universities was an example of educational service which was used to help and facilitate educators and learners in obtaining/accessing digital literature and collections for learning activities purpose without coming to the library room.

This was related to the opinion by Divayana, Ariawan, Sugiarta & Artanayasa (2015, p. 1) which stated that “in this era of globalization, the digital library is needed by students, faculty, and the community in the search for quick reference through internet access, so that students, faculty, and the community do not have to come directly to the library”.

The fact showed that digital library service from several universities were still not running optimally, and also especially in computer college in Bali, as a barometer of information technology-based colleges (both in state or private universities) was still not running optimally if it was viewed from several criteria to measure user satisfaction of digital library services. Currently, the existence and organization of digital libraries in universities was still limited as a complement in order to obtain a high value for the universities accreditation, in addition to the existence of digital library was considered as a venue to promote the superiority of a college in order getting a large number of students, regardless the main function of the digital library for the learning process in college. Other problems related to the implementation of digital library was the results of research conducted by Fadli S in 2014 about the Evaluation on Online Library in SMA Negeri 8 Semarang (Fadli, Kusumandari, & Nurussaadah, 2014, p. 85), it was found weakness that was on the utilization of the CIPP model used in the study was not able to show the level of effectiveness in depth about the program introduction aspects.

From some of these problems, it was necessary to evaluate the digital library services, so that it would be obtained a decision as the basis for recommendations for the improvement for a better and optimal digital library services. One of the most appropriate and suitable evaluation models was the *CSE-UCLA* evaluation model.

Divayana (2015, p. 166) stated that: “CSE-UCLA model is an evaluation model that has five evaluation dimensions (system assessment, program planning, program implementation, program improvement, program certification) and is suitable for evaluating service programs that help human life, such as: library programs, banks, cooperation, e-government, e-learning and others”.

CSE-UCLA model is an evaluation model that has five evaluation dimensions,

which include system assessment, program planning, program implementation, program improvement, and program certification that is suitable to be used to evaluate service programs that help human life (Ardana, Ariawan, & Divayana, 2017, p. 5).

It was related to the statement expressed by Divayana & Sugiharni (2016, p. 867) was: “CSE-UCLA model is an evaluation model that has five evaluation dimensions, such as an *system assessment* that provides information about the system circumstances, *program planning* that helps specific programs selection to meet the needs of the program, *program implementation* that provides information to introduce programs, *program improvement* that provides information about the function/performance of the programs, *program certification* that provides information about the benefits of the program”.

Based on these definitions, *CSE-UCLA* is one of the evaluation models used to evaluate service programs that help human life, where this model performs evaluation based on five components, such as: *system assessment*, *program planning*, *program implementation*, *program improvement*, and *program certification*.

However, the weaknesses found in this model were not able to show the highest to the lowest category of each evaluation component aspect accurately and quantitatively. This model was only able to provide a qualitative and quantitative general view for each evaluation component. For that we needed a new breakthrough model that could overcome these problems. The evaluation model that the researcher designed to overcome the problem was CSE-UCLA evaluation model that had been modified with the weighted product concept. This evaluation model was a modified evaluation model in the education sector with decision support system method, which was used in the informatics engineering field. The CSE-UCLA evaluation model was used to obtain evaluation results in the form of qualitative and quantitative general view for each evaluation component on digital library services in the terms of *system assesment*, *program planning*, *program implementation*, *program improvement* and *program certification components*. Meanwhile, the *weighted product* method was used to obtain accurate and detailed quantitative results showing the

highest to lowest category of each aspect in the CSE-UCLA evaluation component. The *weighted product* method used multiplication to relate the attribute rating, in which the rating of each attribute must be raised first with the attribute weights. This process was similar to the normalization process. Preferences for alternative A_i are given as follows (Divayana, 2014, p. 49; Divayana, 2016, p.16)

$$S_i = \prod_{j=1}^n x_{ij}^{w_j} \dots\dots\dots(1)$$

with $i=1,2,\dots,m$; where $\sum w_j = 1$. w_j is a positive rank for beneficial attributes, and is negative for cost attributes.

According to the explanation above, it could be defined some problems, such as: 1) What aspects of digital library should be evaluated based on the CSE-UCLA model component?, 2) How was the draft of CSE-UCLA evaluation model that had been modified with the weighted product?

Overall, this research took 3 years in order getting long term and short term objectives. The long-term objective of this research was to find an appropriate evaluation model to evaluate educational service programs, especially digital library services. The short-term objective of this study (especially in this first year) was to be able to design a draft of CSE-UCLA evaluation model modified with a *weighted product*.

The main advantages of this research were: 1) to contribute to the development of CSE-UCLA evaluation model modified with *weighted product* so that it could be used by education evaluator in evaluating education service 2) to be a reference that could help lecturers and students conducting research on the evaluation of education, especially those using the CSE-UCLA evaluation model.

Some research were used and referred to be the basic thinking in this study, they were: the research result on the evaluation of information retrieval effectiveness in digital library system at the library of UIN Sunan Kalijaga Yogyakarta (Syamsudin, 2013, p. 4). In general it had similarities with this research in the terms of research studies that discussed about digital libraries and research approach

used was qualitative. While, the difference was in the research method used, Syamsudin used the evaluative method with precision effectiveness formulation model and focused on evaluation of digital library service, whereas this research used development method with Borg Walter and Gall Meredith model, and focused on developing CSE-UCLA evaluation model for evaluating digital library services. Research about the evaluation on online library in SMA Negeri 8 Semarang (Fadli, Kusumandari, & Nurussaadah, 2014, p. 5), also had similarities with this research in the terms of research studies that was about digital libraries and research approach used was qualitative approach. While, the difference was in the research method used, Fadli, Kusumandari, and Nurussaadah used evaluative method with CIPP evaluation model while this research used development method with Borg Walter and Gall Meredith model. Research was conducted by Divayana (2017, p. 68) about evaluation of blended learning implementation at SMK TI Udayana using CSE-UCLA model also had similarities with this research. This research applied qualitative approach. The difference was in the research method used, where Divayana used evaluative method with CSE-UCLA evaluation model while this research used the development method with Borg Walter and Gall Meredith model in designing CSE-UCLA model through the modification of the *weighted product* concept.

Based on the problems and researches that had been done before, the researcher was interested in designing a draft of CSE-UCLA evaluation model by modifying it using the weighted product concept in order to optimize the digital library service, especially in the computer college in Bali.

RESEARCH METHOD

The approach used in this study was a qualitative approach. Research method used in this research was development method with Walter Borg and Meredith Gall model development design. Borg Walter and Gall Meredith model has 10 stages (Borg & Gall, 2008, p. 775). It could be seen in Figure 1.

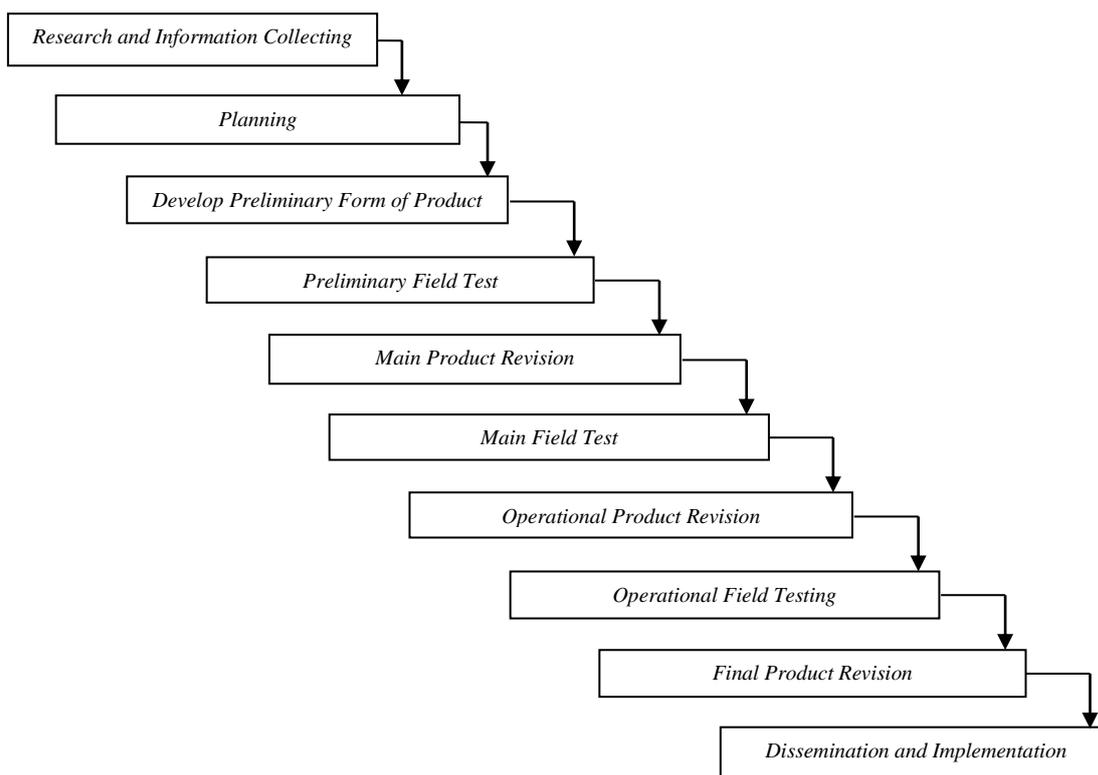


Figure 1. Borg & Gall (2008) Development Design

At the *research and information collecting* stage, could be regarded as a preliminary stage of the research. This stage included literature studies related to the issues being studied, and preparation for formulating the research framework. At the planning stage of the research, the activities such as: (a) deciding research objectives, (b) estimating funds, personnel and time, (c) formulating the qualification of the researchers and their role in the research. At the design development stage (developing preliminary form of product), the preliminary product draft was developed by the determining the design related to the topic of the subject matter. At the preliminary field test, a limited product test was performed. The things to do included: (a) conducting preliminary test on product design, (b) limited, both to the design substance and the parties involved, (c) preliminary field test conducted repeatedly in order to obtain a feasible design, both substance and methodology. The revision on the preliminary test results (main product revision), was an improvement model or design based on preliminary test. The main field test stage was larger scale product test. The result of field test was obtained by effective design, in terms of substance and methodology. The operational product revision stage

was the second improvement after field test which was wider than the preliminary test. At the operational field testing, it should be done on a large scale. This stage included: (a) testing for the effectiveness and adaptability of the product design, (b) testing the effectiveness and adaptability of design involving prospective users of product, (c) field test result obtained the design which was ready to be applied both in substance and methodology. At the final product revision stage, it will be more toward improving the product being developed. The problems found in the use trials, are fixed at this stage, so the solution is found and the product is ready to be applied. At the dissemination and implementation stage, final products were ready to be operated. The final products were expected to be spreaded for the right target user ie the parties concerned using the product.

The Borg Walter and Gall Meredith development model which was conducted in this study was limited to: *research and information collecting*, planning, developing preliminary form of product, and preliminary field test. This was because this research was limited to produce CSE-UCLA model modified with *weighted product* concept.

The object of the research was CSE-UCLA evaluation model modified with weighted product for optimalization of digital library. The overall time needed to produce an appropriate evaluation model was carried out for 3 years, but specifically only to produce CSE-UCLA model design modified with a weighted product concept, it required up to 3 months with a case study at STIKOM Bali.

The subjects of the study were 2 educational experts and 2 informatics experts to conduct preliminary tests on the design of CSE-UCLA evaluation model modified with weighted product. The subjects were chosen by using purposive sampling technique. They were party having characteristic or direct related and who were really understand about digital library service in college. Narbuko and Achmadi's remarks (2009, p. 118) stated that: "purposive sampling techniques are based on certain characteristics that are thought to have something to do with the characteristics of a previously known population". This is also in accordance with the statement expressed by Sholikhah & Soenarto (2014, p. 367), which states that: "purposive sampling technique is sampling technique whose sampling unit is selected based on certain considerations in order to obtain sampling units having desired

characteristics or criteria in sampling". Data collecting method was done by distributing questionnaires, interviews, observation, and documentation. Data analysis technique used in this research was using quantitative descriptive analysis technique. While data analysis about the constraints found in the design of CSE-UCLA evaluation model modified with weighted product used qualitative descriptive analysis technique.

RESULTS AND DISCUSSION

Based on short-term objective in this first year of the research and particularly to produce a design of CSE-UCLA evaluation model modified with weighted product for 3 months, it could be submitted and explained about the research results obtained from several stages of the Borg Walter and Gall development model, including research and field data collection, planning, model design development, and preliminary trials. In the *research and information collecting*, it was obtained data related to evaluation aspects used as parameters in measuring the optimization of digital library services based on CSE-UCLA model evaluation component. The aspects mentioned could be seen in Table 1.

Table 1. Evaluation Aspects Used in Measuring the Optimization of Digital Library Services Based on CSE-UCLA Model Evaluaton Components

No	Evaluation Components	Evaluation Aspects
1.	<i>System Assessment</i>	<ol style="list-style-type: none"> 1. Law regulation of digital library 2. Vission of digital library 3. Mission of digital library 4. Objectives of digital library 5. Benefits of digital library 6. Support of digital library management personnel 7. Support from entire academic community in the college
2.	<i>Program Planning</i>	<ol style="list-style-type: none"> 1. Organization structureof digital library management 2. Readiness of lectures' ability in using digital library services 3. Readiness of students' ability in using digital library services 4. Readiness of the ability of management personnel in organizing digital library services 5. Readiness of university's funding in organizing digital library services 6. Readiness of supporting facilities and infrastructure in organizing digital library services
3.	<i>Program Implementation</i>	<ol style="list-style-type: none"> 1. Socialization for users about features used in digital library 2. Socialization for management personnel about required hardware in digital library 3. Socialization for management personnel about required software in digital library
4.	<i>Program Improvement</i>	<ol style="list-style-type: none"> 1. Digital library operation for users 2. Process of hardware instalation and setting required for digital library 3. Process of software instalation and setting required for digital library 4. Management of document and file data collection by digital library management personnel 5. Funding and budgeting by digital library management personnel
5.	<i>Program Certification</i>	<ol style="list-style-type: none"> 1. Quality of digital library services from tangibles dimension 2. Quality of digital library services from reliability dimension 3. Quality of digital library services from responsiveness dimension 4. Quality of digital library services from assurance dimension 5. Quality of digital library services from empathy dimension

In the system assessment component there were several evaluation aspects used to measure the optimization of digital library services (Divayana, 2016, p. 144), including: (1) Law regulation for digital library implementation. This aspect was needed to find out how optimal the law and regulation used in the digital library implementation. The regulation generally used in the implementation of digital library is based on the Regulation of the Republic of Indonesia Number 43 Year 2007 regarding to Library; (2) Vision of organizing digital library. This aspect was needed to find out how optimal the vision of organizing digital library had been implemented. The vision of the organizing digital libraries adapted to the circumstance and goals by the university which organizing digital libraries as long as they did not deviate from the Regulation of the Republic of Indonesia Number 43 Year 2007 regarding to Library; (3) Mission of organizing digital library. This aspect was needed to find out how optimal the mission had been implemented in organizing digital library. The mission of organizing digital libraries was the steps/tips to reach the vision of digital library as long as their implementation did not deviate from the Regulation of the Republic of Indonesia Number 43 Year 2007 regarding Library; (4) The purpose of organizing digital libraries. This aspect was needed to find out how optimal the purpose of organizing the digital library had been realized. The purpose of organizing digital libraries should be able to realize the vision and mission that had been formed; (5) the benefits of organizing digital libraries. This aspect was needed to find out how optimal the benefits of the organizing digital libraries could be felt by all parties concerned about the digital libraries organization. It was expected that by organizing digital libraries, could provide positive benefits for the development of education through digital library services that remained based on prevailing laws and regulations; (6) The need of digital library management team. This aspect was needed to find out how optimal the support of digital library management team, who were appropriate and expert, especially in the field of library or information systems/ informatics engineering. The support of personnel to manage the digital library was needed for organizing digital library effectively, however

in personnel recruitment needed to be qualified with the appropriate academic qualifications as needed; (7) Support from entire academic community in the college. This aspect was needed to find out how optimal the support from the academic community in the implementation of digital library. In the organization of digital libraries was needed full support from entire academic community for organizing digital library optimally.

In the program planning component there were several evaluation aspects to measure the optimization of digital library service (Divayana, 2016, p. 148), including: (1) Organization structure of digital library management. This aspect was needed to find out how the organizational structure had been conducted optimal and full of responsibilities for its duties and authorities. This aspect was very important to organizing digital library, because the organization structure could show the job authority and job description for digital library management. With the clarity of job description, it could optimize the performance of the digital library management personnel; (2) Readiness of lecturers' ability in using digital library services. This aspect was needed to find out how optimal the lecturer's ability in using digital library service. With their good ability and knowledge in using digital library services, it could ease and facilitate the management personnel in disseminating the digital library services to the lecturers. It was related with the results of research conducted by Divayana in 2016 which stated that with lecturers' good knowledge in operating digital library services, it would help the management personnel in disseminating the use of digital libraries (Divayana, 2016, p. 149).

In addition, the management personnel would focus on other activities in providing the things required in digital library services more optimally, (3) Readiness of students' ability in using digital library service. This aspect was needed to find out how optimal the readiness of students' ability in operating the digital library service. Similar to the readiness of lecturers' ability, the students' good ability and knowledge in operating digital library services, so it facilitated the management personnel in teaching the students how to use digital library services; (4) Readiness of the management personnel's

ability to organize digital library services. This aspect was needed to find out how optimal the readiness of the management personnel's ability to organize digital library services. With the readiness of the good capabilities in managing the digital library, then if later there were obstacles found in the implementation of digital libraries, they could be easily overcome and sought the way out, so that the implementation of digital libraries still running smoothly; (5) The readiness of university funding in organizing digital library. This aspect was needed to find out how optimal the readiness of university funding to organize digital library. This aspect was the most important thing in the implementation of digital library, because without any budget/funding, the digital library could not be implemented; (6) Readiness of supporting facilities and infrastructure in organizing digital library. This aspect was needed to find out how optimal the readiness of supporting facilities and infrastructure for organizing digital library. This aspect also greatly determined the success of the digital library implementation, because without the supporting facilities and infrastructure, such as: computer, internet access, computer network then the implementation of digital library impossible to be implemented optimally.

In the program implementation components there were several evaluation aspects to measure the optimization of digital library services (Divayana, 2016, p. 154), including: (1) Socialization for users about features used in digital library. This aspect was needed to find out how optimal the socialization of the features used in digital libraries had been implemented. This aspect was important and was implemented in organizing digital libraries because all users needed to know how to operate and use digital library services; (2) Socialization for management personnel about required hardware in digital library. This aspect was needed to find out how optimal socialization of the hardware required in organizing digital libraries had been implemented. This aspect was important because if there was a change or there was a new management team to join, they should be given the introduction of socialization about required hardware in digital library, so the management team could work to manage digital library optimally; (3) Socialization for

management personnel about the required software in the digital library. This aspect was needed to find out how optimal socialization of software required in organizing digital library had been implemented. Similarly with hardware socialization to the management team, the aspect of software socialization was also important to know which software had been used or updated which was required for organizing digital libraries.

In the program improvement components there were several evaluation aspects to measure the optimization of digital library service (Divayana, 2016, p. 159), including: (1) Digital library operation for the users. This aspect was needed to find out how optimal the digital library operation could be implemented for users. This aspect was necessary to provide ways and steps to operate the digital library for the users (both lecturers and students); (2) Process of hardware installation and setting required for digital library. This aspect was needed to find out how optimal the process of hardware installation and settings had been implemented by the management personnel. This aspect was necessary to provide knowledge and skills to the management personnel in performing the installation and setting for the hardware implemented in digital library; (3) Process of software installation and setting required for digital library. This aspect was needed to find out how optimal the process of software installation and software settings had been implemented by the management team. Similar to the process of hardware installation and setting required in digital libraries, this aspect was also required to provide knowledge and skills to the management team in performing the installation and settings for the software used in digital library; (4) Management of data collection, documents and files by digital library management personnel. This aspect was needed to find out how optimal the management of data collection, documents, and files had been conducted by the management team. This aspect was needed to find out how optimal the personnel's ability in managing the data collection, documents, and files needed in the organizing digital libraries; (5) Funding and budgeting by digital library management personnel. This aspect was needed to find out how optimally the management team managed the budget that had been used in the organizing digital library, so that budget

usage could be used properly and could be reported completely and transparently.

In the program certification component there were several evaluation aspects to measure the optimization of digital library service (Divayana, 2016, p. 164), including: (1) Quality of digital library service from *tangibles* dimension. This aspect was needed to find out how optimal the physical appearance of digital library services, such as: the availability of physical devices, collection and operational standards of program usage; (2) Quality of digital library services from *reliability* dimension. This aspect was needed to find out how optimal the reliability and accuracy of digital libraries, such as: reliability of access and accuracy of optimal services provided by the program; (3) Quality of digital library service from *responsiveness* dimension. This aspect was needed to find out how optimal the speed of digital library response, such as: the speed of response in the process

of manipulation and digital collection search; (4) Quality of digital library service from *assurance* dimension. This aspect was needed to find out how optimal the guarantee of data stored in digital libraries, such as: the guarantee of access rights and the security of digital collection storage; (5) Quality of digital library service from *empathy* dimension. This aspect was needed to find out how optimal the ease of providing feedback on criticism and suggestions through digital libraries, such as ease of providing information, giving advice and complaints if there were complaints from users.

In addition to obtaining data related to evaluation aspects used as parameters in measuring the optimization of digital library services, in the stage of field research and data collection also obtained data related to the determination of weighted values for each aspect of evaluation, which could be seen in Table 2.

Table 2. Weighting Value for Each Aspect of Evaluation in Measuring the Optimization of Digital Library Services Based on CSE-UCLA Model Evaluation Components

No	Evaluation Component	Aspect Code	Evaluation Aspect	Preference Weight	Weight Improvement	Criteria
1.	<i>System Assessment</i>	A ₁	Law regulation of digital library	5	0.047	Profit
		A ₂	Vission of digital library	4	0.037	Profit
		A ₃	Mission of digital library	4	0.037	Profit
		A ₄	Objectives of digital library	4	0.037	Profit
		A ₅	Benefits of digital library	4	0.037	Profit
		A ₆	Support of digital library management personnel	4	0.037	Profit
		A ₇	Support from entire academic community in the college	4	0.037	Profit
2.	<i>Program Planning</i>	A ₈	Organization structureof digital library management	5	0.047	Profit
		A ₉	Readiness of lectures' ability in using digital library services	4	0.037	Profit
		A ₁₀	Readiness of students' ability in using digital library services	4	0.037	Profit
		A ₁₁	Readiness of management personnel ability in organizing digital library services	4	0.037	Profit
		A ₁₂	Readiness of university's funding in organizing digital library services	4	0.037	Cost
3.	<i>Program Implementation</i>	A ₁₃	Readiness of supporting facilities and infrastructures in organizing digital library services	4	0.037	Profit
		A ₁₄	Socialization for users about features used in digital library	4	0.037	Profit
		A ₁₅	Socialization for management personnel about required hardware in digital library	4	0.037	Profit
4.	<i>Program Improvement</i>	A ₁₆	Socialization for management personnel about required software in digital library	4	0.037	Profit
		A ₁₇	Digital library operation for users	4	0.037	Profit
		A ₁₈	Process of hardware instalation and setting required for digital library	4	0.037	Profit
		A ₁₉	Process of software instalation and setting required for digital library	4	0.037	Profit
		A ₂₀	Management of document and file data collection by digital library management personnel	4	0.037	Profit
5.	<i>Program Certification</i>	A ₂₁	Funding and budgeting by digital library management personnel	5	0.047	Cost
		A ₂₂	Quality of digital library services from <i>tangibles</i> dimension	4	0.037	Profit
		A ₂₃	Quality of digital library services from <i>reliability</i> dimension	4	0.037	Profit
		A ₂₄	Quality of digital library services from <i>responsiveness</i> dimension	4	0.037	Profit
		A ₂₅	Quality of digital library services from <i>assurance</i> dimension	4	0.037	Profit
		A ₂₆	Quality of digital library services from <i>empathy</i> dimension	4	0.037	Profit
Σ Weight Improvement					1	

Based on Table 2 above, the preference weighted value of each aspect was obtained based on the rating of interest on each aspect. For the “excellent” interest rating then given the preference weight = 5, for the “good” interest rating then given the preference weight = 4, for the interest rating “adequate” then given preference weight = 3, for the “less” importance rating then given preference weight = 2, and for the rating of interest was “poor” then given preference weight = 1. The value of the weight improvement was obtained from the weight preference of an aspect divided by the total preference weight of all aspects. Σ Weight Improvement was the sum of the overall value of weight improvement and should obtain value of 1. For the criteria of each aspect there were “Profit” category and “Cost” category.

Profit criterion is a criterion whose value will be maximized, while cost criterion is a criterion whose value will be minimized (Divayana & Sugiharni, 2016, p.71-72). At the planning stage, we got the data related to the personnel requirement needed to design CSE-UCLA evaluation model modified with the *weighted product* concept. The detail explanation of personnel requirement plan could be seen in Table 3.

Based on Table 3, the total number of personnel required is 16 persons, with details of 3 people (three researchers in this study) involved in determining evaluation aspects, determining of weight for each evaluation

aspect, and creating a model design. In the preliminary field test involves 4 people (i.e: 2 education experts and 2 informatics experts).

In addition to the planning of personnel required, at the planning stage also obtained the data related to the time requirements plan to creating a design of *CSE-UCLA* model modified with *weighted product* could be seen in Table 4.

Based on Table 4, the overall time plan required was 91 days (3 months), with 28 days for determining evaluation aspects, 2 days for weighting each evaluation aspect, 30 days (1 month) for designing CSE-UCLA evaluation model modified with wighted product, and 31 days (1 month) to conduct preliminary test on model design that had been drafted to the education and informatics experts.

At the development phase on the design of CSE-UCLA evaluation model modified with weighted product, two science concepts were combined. They were science of education and informatics engineering. The field of education science is the use of education evaluation concept, especially the model of CSE-UCLA, while in the field of informatics engineering is the use of the weighted product concept, one method that was used in decision support systems. The design of CSE-UCLA evaluation models modified with weighted products to measure the optimization of digital library services at computer colleges in Bali, could be seen in Figure 2.

Table 3. Personnel Requirements Plan in Creating Design of *CSE-UCLA* Model Modified with *Weighted Product* Concept

No	Activity	Personnel Number
1.	Determining evaluation aspects used to measure service optimalization	3
2.	Determining weighting for each evaluation aspect	3
3.	Designing <i>CSE-UCLA</i> evaluation model modified with <i>weighted product</i>	3
4.	Preliminary Test	4
5.	Preliminary test Revision	3
Total		16

Table 4. Time Requirements Plan in Creating Design of *CSE-UCLA* Model Modified with *Weighted Product* Concept

No	Activity	Time (Day)
1.	Determining evaluation aspects used to measure service optimalization	29
2.	Determining weighting for each evaluation aspect	2
3.	Designing <i>CSE-UCLA</i> evaluation model modified with <i>weighted product</i>	31
4.	Preliminary Test	31
5.	Preliminary test Revision	7
Total		100

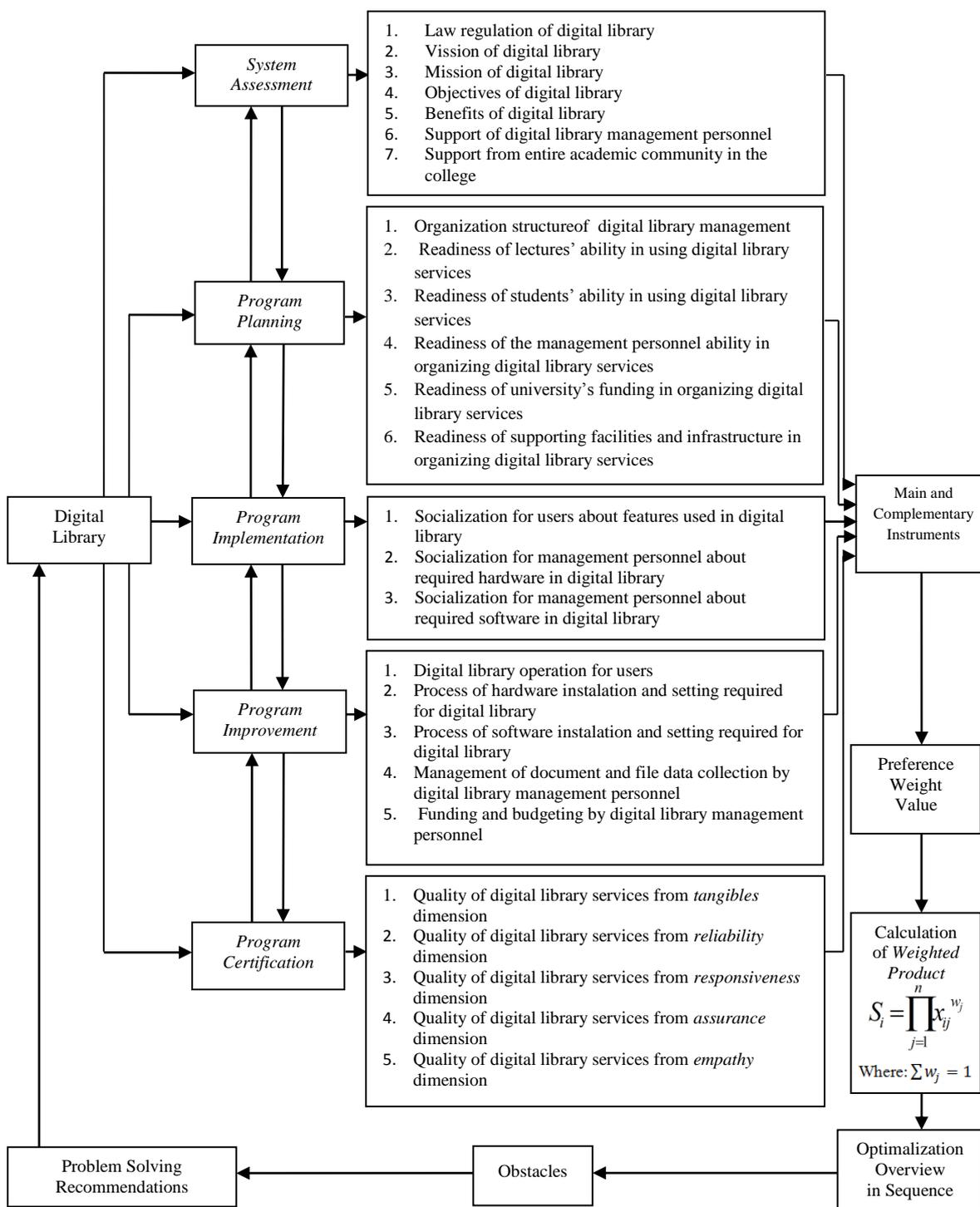


Figure 2. Design of CSE-UCLA Evaluation Model Modified with Weighted Product to Measure the Optimization of Digital Library Service

Based on Figure 2, it could be explained that in this design illustrated the digital library services evaluated using the CSE-UCLA model. The components of the CSE-UCLA model included: *system assessment*, *program planning*, *program implementation*, *program improvement*, and *program certification*

components. There are seven aspects used to measure the optimization of library services when viewed from the *system assessment* components, among others: (1) Law regulation of digital library, (2) Vision of digital library, (3) Mission of digital library (4) Objectives of digital library, (5) Benefits

of digital library, (6) Support of digital library management personnel, and (7) Support from entire academic community in the college.

There were six aspects used to measure the optimization of library services when viewed from the *program planning* components included: (1) Organization structure of digital library management, (2) Readiness of lectures' ability in using digital library services, (3) Readiness of students' ability in using digital library services, (4) Readiness of management personnel ability in organizing digital library services, (5) Readiness of university's funding in organizing digital library services, (6) Readiness of supporting facilities and infrastructures in organizing digital library services.

There were three aspects used to measure the optimization of library services if viewed from the *program implementation* components, such as: (1) Socialization for users about features used in digital library, (2) Socialization for management personnel about required hardware in digital library, (3) Socialization for management personnel about required software in digital library.

There were five aspects used to measure the optimization of library services when viewed from *program improvement* components, they were: (1) Digital library operation for users, (2) Process of hardware instalation and setting required for digital library, (3) Process of software instalation and setting required for digital library, (4) Management of document and file data collection by digital library management personnel, (5) Funding and budgeting by digital library management personnel.

There were five aspects used to measure the optimization of library services when viewed from the *program certification* components, they were: (1) Quality of digital library services from *tangibles* dimension, (2) Quality of digital library services from *reliability* dimension, (3) Quality of digital library services from *responsiveness* dimension, (4) Quality of digital library services from *assurance* dimension, (5) Quality of digital library services from *empathy* dimension.

The whole aspects were represented into the main and complementary instruments,

so it could be used to measure the optimization of digital library services.

The result which had been collected through the data collection process using the main and the complement instruments was then processed by incorporating the concept of *weighted product* that was preceded by entering the weighted value of preference into each evaluation aspect, then proceed by calculating using *weighted product* formula.

From the calculation results, an idea obtained about the level of optimization of digital library services in sequence from the smallest to the largest in category evaluated from each *CSE-UCLA* evaluation model component.

From the description of optimization level on each evaluation component, then it could be found some obstacles in each component evaluation. After the obstacles found, then the recommendation of the solution were determined based on the sequence of the value obtained previously on the calculation of the weighted product, starting from the component that obtained the smallest value up to the largest, so that the digital library service could be more improved again.

In the preliminary field test which involved 2 education experts and 2 informatics experts, test results were obtained on the calculation of the *weighted product* concept used to modify the *CSE-UCLA* evaluation model. The test results could be seen in the following Table 5 and 6.

The values in each aspect (A_1 - A_{26}) shown in Table 5 were derived from the average value given by the four experts. Whereas, the values seen in each aspect (A_1 - A_{26}) shown in Table 6 were obtained from the result of the power between the aspect value and the preference weights that had been fixed (could be seen in Table 2). As an example in obtaining value of 0.995 (on aspect A_1 *system assessment* components, shown in Table 6) was by conducting power between 0.900 (on aspect A_1 *system assessment* components, show in Table 5) to the weighted preference value 0.047 (on aspect A_1 *system assessment* components, with *benefit* criteria, shown in Table 2). The explanation of the calculation to obtain 0.995 could be explained more concisely to $0.900^{0.047}=0.995$.

Table 5. Result Data on Value Given by Experts towards Each Measurement Aspect for Digital Library Service Optimalizaion based on CSE-UCLA Evaluation Component

Evaluation Component	Aspect (A ₁ -A ₁₃)												
	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	A ₁₁	A ₁₂	A ₁₃
System Assesment	0.900	0.880	0.920	0.880	0.920	0.880	0.950	0.047	0.037	0.037	0.037	0.037	0.037
Program Planning	0.047	0.037	0.037	0.037	0.037	0.037	0.037	0.930	0.780	0.730	0.880	0.750	0.770
Program Implementation	0.047	0.037	0.037	0.037	0.037	0.037	0.037	0.047	0.037	0.037	0.037	0.037	0.037
Program Improvement	0.047	0.037	0.037	0.037	0.037	0.037	0.037	0.047	0.037	0.037	0.037	0.037	0.037
Program Certification	0.047	0.037	0.037	0.037	0.037	0.037	0.037	0.047	0.037	0.037	0.037	0.037	0.037

Evaluation Component	Aspect (A ₁₄ -A ₂₆)												
	A ₁₄	A ₁₅	A ₁₆	A ₁₇	A ₁₈	A ₁₉	A ₂₀	A ₂₁	A ₂₂	A ₂₃	A ₂₄	A ₂₅	A ₂₆
System Assesment	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.047	0.037	0.037	0.037	0.037	0.037
Program Planning	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.047	0.037	0.037	0.037	0.037	0.037
Program Implementation	0.850	0.880	0.930	0.037	0.037	0.037	0.037	0.047	0.037	0.037	0.037	0.037	0.037
Program Improvement	0.037	0.037	0.037	0.780	0.850	0.900	0.890	0.930	0.037	0.037	0.037	0.037	0.037
Program Certification	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.047	0.880	0.900	0.830	0.850	0.900

Table 6. Result Data on Value by Experts after Preference Weight Given for Each Measurement Aspect for Digital Library Service Optimalizaion based on CSE-UCLA Evaluation Component

Evaluation Component	Aspect (A ₁ -A ₁₃)												
	A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈	A ₉	A ₁₀	A ₁₁	A ₁₂	A ₁₃
System Assesment	0.995	0.995	0.997	0.995	0.997	0.995	0.998	0.867	0.884	0.884	0.884	1.131	0.884
Program Planning	0.867	0.884	0.884	0.884	0.884	0.884	0.884	0.997	0.991	0.988	0.995	1.011	0.990
Program Implementation	0.867	0.884	0.884	0.884	0.884	0.884	0.884	0.867	0.884	0.884	0.884	1.131	0.884
Program Improvement	0.867	0.884	0.884	0.884	0.884	0.884	0.884	0.867	0.884	0.884	0.884	1.131	0.884
Program Certification	0.867	0.884	0.884	0.884	0.884	0.884	0.884	0.867	0.884	0.884	0.884	1.131	0.884

Evaluation Component	Aspect (A ₁₄ -A ₂₆)													S	
	A ₁₄	A ₁₅	A ₁₆	A ₁₇	A ₁₈	A ₁₉	A ₂₀	A ₂₁	A ₂₂	A ₂₃	A ₂₄	A ₂₅	A ₂₆		
System Assesment	0.884	0.884	0.884	0.884	0.884	0.884	0.884	1.154	0.884	0.884	0.884	0.884	0.884	0.154	
Program Planning	0.884	0.884	0.884	0.884	0.884	0.884	0.884	1.154	0.884	0.884	0.884	0.884	0.884	0.106	
Program Implementation	0.994	0.995	0.997	0.884	0.884	0.884	0.884	1.154	0.884	0.884	0.884	0.884	0.884	0.094	
Program Improvement	0.884	0.884	0.884	0.991	0.994	0.996	0.996	1.003	0.884	0.884	0.884	0.884	0.884	0.091	
Program Certification	0.884	0.884	0.884	0.884	0.884	0.884	0.884	1.154	0.995	0.996	0.993	0.994	0.996	0.118	
														Σ S	0.563

Another example was getting value of 1.011 (in aspect A₁₂ of *program planning component*, shown Table 6) by conducting the power between 0.750 (on aspect A₁₂ *program planning component*, shown in Table 5) to the weighted preference value 0.037 (on aspect A₁₂ *program planning component*, with *cost*

criteria, shown in Table 2). The explanation of the calculation to obtain 1.011 could be explained more concisely to $0.750^{-0.037}=1.011$.

In order to obtain an overview of the optimum level of digital library service in sequence from the highest to the smallest (ranking) could be calculated by determining

the value of vector V of each evaluation component by dividing the S value of an evaluation component divided by the total S value of the entire components. For more details could be calculated as follows.

If:

$$\begin{aligned} S_1 &= 0.154 \\ S_2 &= 0.106 \\ S_3 &= 0.094 \\ S_4 &= 0.091 \\ S_5 &= 0.118 \end{aligned}$$

Where:

S_1 : S value for *system assessment* components
 S_2 : S value for *program planning* components
 S_3 : S value for *rogram implementation* components
 S_4 : S value for *program improvement* components
 S_5 : S value for *program certification* components

Then, value of V_1 - V_5 , were:

$$\begin{aligned} V_1 &= S_1/(S_1+S_2+S_3+S_4+S_5) \\ V_1 &= 0.154/(0.154+0.106+0.094+0.091+0.118) \\ V_1 &= 0.273 \end{aligned}$$

$$\begin{aligned} V_2 &= S_2/(S_1+S_2+S_3+S_4+S_5) \\ V_2 &= 0.106/(0.154+0.106+0.094+0.091+0.118) \\ V_2 &= 0.189 \end{aligned}$$

$$\begin{aligned} V_3 &= S_3/(S_1+S_2+S_3+S_4+S_5) \\ V_3 &= 0.094/(0.154+0.106+0.094+0.091+0.118) \\ V_3 &= 0.166 \end{aligned}$$

$$\begin{aligned} V_4 &= S_4/(S_1+S_2+S_3+S_4+S_5) \\ V_4 &= 0.091/(0.154+0.106+0.094+0.091+0.118) \\ V_4 &= 0.162 \end{aligned}$$

$$\begin{aligned} V_5 &= S_5/(S_1+S_2+S_3+S_4+S_5) \\ V_5 &= 0.118/(0.154+0.106+0.094+0.091+0.118) \\ V_5 &= 0.210 \end{aligned}$$

Where:

V_1 : Vector V value for *system assessment* components
 V_2 : Vector V value for *program planning* components
 V_3 : Vector V value for *program implementation* components
 V_4 : Vector V value for *program improvement* components
 V_5 : Vector V value for *program certification* components

After obtaining the vector V value for each evaluation component, then it was ranked from the largest to the smallest value. The ranking results could be seen in Table 7. Based on the results shown in Table 7, the evaluation component that obtained the highest value was the *system assessment*, while the lowest was the *program improvement*.

CONCLUSION

The conclusion that could be generated from this research was that there were 26 aspects of digital library that must be evaluated based on *CSE-UCLA* evaluation model components which had been shown in Table 1.

In this research, it had been obtained a design of *CSE-UCLA* evaluation model modified with using weighted product with good form so that it could measure the optimum level of digital library service optimization.

It was proved by the results of preliminary test that had been conducted by experts that indicated the accuracy of weighted product method calculation in generating vector V value that could be used to determine ranking towards *CSE-UCLA* evaluation components ranging from the highest to the smallest values, so the optimization level of digital library services at one computer colleges in Bali, that was STIKOM Bali could be measured well.

Table 7. Ranking Results Based on Vector V Value

Ranking	V Values	Evaluation Component
1	0,273	<i>System Assesment</i>
2	0,210	<i>Program Certification</i>
3	0,189	<i>Program Planning</i>
4	0,166	<i>Program Implementation</i>
5	0,162	<i>Program Improvement</i>

REFERENCES

- Ardana, I. M., Ariawan, I. P. W., & Divayana, D. G. H. (2017). Measuring the effectiveness of BLCS model (Bruner, local culture, scaffolding) in mathematics teaching by using expert system-based CSE-UCLA. *International Journal of Education and Management Engineering*, 7(4), 1-12. Retrieved from <http://www.mecspress.org/ijeme/ijeme-v7-n4/IJEME-V7-N4-1.pdf>
- Ariawan, I. P. W., Sanjaya, D. B., & Divayana, D. G. H. (2016). An evaluation of the implementation of practice teaching program for prospective teachers at Ganesha University of Education based on CIPP-Forward Chaining. *International Journal of Advanced Research in Artificial Intelligence*, 5(2), 1-5. Retrieved from <http://thesai.org/Publications/ViewPaper?Volume=5&Issue=2&Code=IJARAI&SerialNo=1>
- Borg, W.R., & Gall, M.D.G. (2008). *Educational research: An Introduction* (5th ed). New York : Longman.
- Divayana, D. G. H. (2014). Development of duck diseases expert system with applying alliance method at Bali provincial livestock office. *International Journal of Advanced Computer Science and Applications*, 5(8), 48-54. Retrieved from <http://thesai.org/Publications/ViewPaper?Volume=5&Issue=8&Code=IJACSA&SerialNo=7>
- Divayana, D. G. H. (2015). Penggunaan model CSE-UCLA dalam mengevaluasi kualitas program aplikasi sistem pakar. In *SNATIA*, 165-168. Ilmu Komputer Universitas Udayana.
- Divayana, D. G. H. (2016). *Evaluasi program perpustakaan digital berbasis sistem pakar pada Universitas Teknologi Indonesia*. Jakarta: Program Pascasarjana Universitas Negeri Jakarta.
- Divayana, D. G. H. (2017). Evaluasi pelaksanaan blended learning di SMK TI Udayana menggunakan model CSE-UCLA. *Jurnal Pendidikan Vokasi*, 7(1), 64-77. Retrieved from <http://journal.uny.ac.id/index.php/jpv/article/view/12687>
- Ardana, I. M., Ariawan, I. P. W., & Divayana, D. G. H. (2016). Development of decision support system to selection of the blended learning platforms for mathematics and ICT learning at SMK TI Udayana. *International Journal of Advanced Research in Artificial Intelligence*, 5(12), 15-18. Retrieved from <http://thesai.org/Publications/ViewPaper?Volume=5&Issue=12&Code=IJARAI&SerialNo=3>
- Divayana, D. G. H., Ardana, I. M., & Ariawan, I. P. W. (2017). Measurement of effectiveness of a lecturer in transferring algebra knowledge through of multimedia facilities by using certainty factor-formative-summative model. *Journal of Theoretical and Applied Information Technology*, 95(9), 1963-1973. Retrieved from <http://www.jatit.org/volumes/Vol95No9/8Vol95No9.pdf>
- Divayana, D. G. H., Ariawan, I. P. W., Sugiarta, I. M., & Artanayasa, I. W. (2015). Digital Library of expert system based at Indonesia Technology University. *International Journal of Advanced Research in Artificial Intelligence*, 4(3), 1-8. Retrieved from <http://thesai.org/Publications/ViewPaper?Volume=4&Issue=3&Code=IJARAI&SerialNo=1>
- Divayana, D. G. H, Marhaeni, A. A.I . N, Dantes, N., Arnyana, I. B. P., & Rahayu, W. (2017). Evaluation of blended learning process of expert system course program by using CSE-UCLA model based on mobile technology. *Journal of Theoretical and Applied Information Technology*, 95(13), 3075-3086. Retrieved from <http://www.jatit.org/volumes/Vol95No13/19Vol95No13.pdf>
- Divayana, D. G. H., & Sanjaya, D. B. (2017). mobile phone-based cipp evaluation model in evaluating the use of blended learning at school in Bali. *International Journal of Interactive Mobile Technologies*, 11(4), 149-159. Retrieved

- from <http://online-journals.org/index.php/i-jim/article/view/6796>
- Divayana, D. G. H., Sanjaya, D. B., Marhaeni, A. A. I. N., & Sudirtha, I. G. (2017). CIPP evaluation model based on mobile phone in evaluating the use of blended learning platforms at vocational schools in Bali. *Journal of Theoretical and Applied Information Technology*, 95(9), 1983-1995. Retrieved from <http://www.jatit.org/volumes/Vol95No9/10Vol95No9.pdf>
- Divayana, D. G. H., & Sugiharni, G. A. D. (2016). Evaluasi program sertifikasi komputer pada Universitas Teknologi Indonesia menggunakan model CSE-UCLA. *Jurnal Pendidikan Indonesia*, 5(2), 865-872. Retrieved from <http://ejournal.undiksha.ac.id/index.php/JPI/article/view/8586>
- Divayana, D. G. H., & Sugiharni, G. A. D. (2016). Sistem pakar dan sistem pendukung keputusan (buku ajar pendidikan teknik informatika). Singaraja: Undiksha Press.
- Divayana, D. G. H., Suyasa, P. W. A., Sugihartini, N. (2016). Pengembangan media pembelajaran berbasis web untuk matakuliah kurikulum dan pengajaran di jurusan pendidikan teknik informatika Universitas Pendidikan Ganesha. *Jurnal Nasional Pendidikan Teknik Informatika (JANAPATI)*, 5(3). Retrieved from <http://ejournal.undiksha.ac.id/index.php/janapati/article/view/9922>
- Fadli, A. S., Kusumandari, R. B., & Nurussaadah. (2014). Evaluasi perpustakaan Online di SMA Negeri 8 Semarang. *Indonesian Journal of Curriculum and Educational Technology Studies*, 2(1), 1-6. Retrieved from <http://journal.unnes.ac.id/sju/index.php/jktp/article/view/3292>
- Jampel, I. N, Widiyana, I. W., & Divayana, D.G.H. (2016). The effect of implementation authentic assessment development result based on ICT toward student's learning outcome in learning process by 2013 Curriculum. *International Journal Modern Education and Computer Science*, 8(5), 32-38. Retrieved from <http://www.mecs-press.org/ijmecs/ijmecs-v8-n5/IJMECS-V8-N5-4.pdf>
- Narbuko, C., & Achmadi, A. (2009). *Metodelogi penelitian : memberi bekal teoritis pada mahasiswa tentang metodelogi penelitian serta diharapkan dapat melaksanakan penelitian dengan langkah-langkah yang benar*. Jakarta: Bumi Aksara.
- Sanjaya, D. B., & Divayana, D. G. H. (2015). An expert system-based evaluation of civics education as a means of character education based on local culture in the Universities in Buleleng. *International Journal of Advanced Research in Artificial Intelligence*, 4(12), 17-21. Retrieved from <http://thesai.org/Publications/ViewPaper?Volume=4&Issue=12&Code=IJARAI&SerialNo=3>
- Sholikhah, R., & Soenarto. (2014). Evaluasi program talent scouting guru SMK Tahun 2013 Direktorat P2TK Dikmen Kemdikbud. *Jurnal Pendidikan Vokasi*. 4(3), 363-378. Retrieved from <http://journal.uny.ac.id/index.php/jpv/article/view/2560/2114>
- Sugiharni, G. A. D, & Divayana, D. G. H. (2017). Pemanfaatan metode forward chaining dalam pengembangan sistem pakar pendiagnosa kerusakan televisi berwarna. *Jurnal Nasional Pendidikan Teknik Informatika (JANAPATI)*, 6(1). Retrieved from <http://ejournal.undiksha.ac.id/index.php/janapati/article/view/9926>
- Syamsudin, R. (2013). *Evaluasi efektivitas temu kembali informasi pada system digital library di Perpustakaan UIN Sunan Kalijaga Yogyakarta*. Yogyakarta: UIN Sunan Kalijaga Yogyakarta.