

Development of instruments for *DIVAYANA* evaluation model

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Abstract: The purpose of this research showed a valid *DIVAYANA* evaluation model instruments were used to evaluate the implementation of *e-learning*. This research approach was the development of evaluation instruments. The evaluation instruments developed were in the form of interview guides and questionnaires. The interview guidelines that resulted were related to several *DIVAYANA* evaluation components, included: the *Description* component, *Input* component, *Verification* component, and *Yack* component. Questionnaires were generated on several *DIVAYANA* evaluation components, included: the *Verification* component, *Action* component, and *Yack* component. The subjects involved in the content validity test of the interview guidelines were two experts, including an informatics education expert and an educational evaluation expert. The content validity tests of questionnaires were conducted by six experts, including three education evaluation experts and three informatics education experts. The content validity calculation process of the interview guidelines used the *Gregory* formula, while the content validity of the questionnaires used *Lawshe's CVR* formula. The content validity average of interview guidelines on the *Description*, *Input*, *Verification*, and *Yack* components was 0.882 so it was included in the very good category. The content validity average of questionnaires on the *Verification*, *Action*, and *Yack* components was 0.774 so it was in a good category. The implication of this research is the realization of valid measuring instruments that can be used in evaluating the implementation of *e-learning*.

Keywords: Instruments; Interview Guidelines; Questionnaires; Content Validity; *DIVAYANA* Evaluation Model.

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INTRODUCTION

The instruments are important data collection tools used in evaluation activities. The data collected through instruments later processed to obtain appropriate recommendations for decision-makers in making decisions. The several forms of instruments used in evaluation activities are questionnaires and interview guidelines. Generally, all types of evaluation models in education need instruments as evaluation tools. The instruments used must be valid (Vakili & Jahangiri, 2018).

Likewise, several evaluation models are used to evaluate the implementation of information technology-based learning (for example is *e-learning*) also require instruments. This is reinforced by the research results that showed the importance of instruments in evaluating the *e-learning* implementation using the *Kirkpatrick* evaluation model (Quintas et al., 2017), the *CIPP (Context-Input-Process-Product)* evaluation model (Aldapit & Suharyana, 2019; Ardi et al., 2020; Nuruhidin et al., 2018), and the *Countenance* evaluation model (Widiharti et al., 2019).

However, the reality in the field showed that there were invalid instruments used in evaluating the implementation of conventional learning (Ramadani et al., 2017) and specifically in the implementation of learning based on *e-learning* (Guspatni & Kurniawati, 2018; Hung & Yang, 2015). Therefore, it is necessary to be careful in selecting instruments and developing new instruments to support the evaluation model's effectiveness.

The development of new instruments for a new evaluation model requires precision and care, especially in determining the content validity of the instruments (Taherdoost, 2016). One of the innovations in the evaluation model that also requires valid instruments in terms of content is the *DIVAYANA* evaluation model. *DIVAYANA* evaluation model consists of eight evaluation components,

including (1) *Description* component; (2) *Input* component; (3) *Verification* component; (4) *Action* component; (5) *Yack* component; (6) *Analysis* component; (7) *Nominate* component; and (8) *Actualization* component. This evaluation model is used to evaluate information technology-based learning services and programs (Divayana, 2020). In each evaluation component of the *DIVAYANA* model, valid instruments are needed to obtain optimal evaluation results. Based on that statement, the research question is how to develop valid *DIVAYANA* model evaluation instruments?

Several studies strengthen this research position. The research was conducted by Arifin et al. (2018) showed instruments development for authentic assessment of performance in the linear mathematics learning process. The results of Arifin et al. (2018) research only showed the validity of instruments, but the research constraints had not shown yet manual calculations of instruments' validity. Santoso et al. (2017) research showed the determination of the validity and reliability of professionalism assessment instruments in the field of psychiatry. The results of Santoso et al. (2017) research only showed the results recapitulation of the validity and reliability of the instruments, but the research constraints had not shown yet the calculations process in detail to obtain the recapitulation results. The research was conducted by Kadir et al. (2019) showed the development of valid, practical, and effective instruments used for authentic assessment of speaking skills of junior high school students. Results of Kadir et al. (2019) research only showed instrument items that were valid, practical, and effective descriptively, but the research constraints had not shown yet the validity value of the instrument quantitatively. N. H. M. Ghazali (2016) showed the validity and reliability of the *CIPP* model evaluation instruments used to evaluate teacher perceptions of the School-Based Assessment System application. Ghazali's research results had shown recapitulation of the validity and reliability of the instruments without displaying the calculation process.

Research of Erfan et al. (2020) has similarities with this research about the validity of instruments. However, the difference lies in the calculation process to obtain the validity scores for the instruments. The research results of Rachman and Napitupulu (2017) showed the validity of instruments used to evaluate *e-learning*. The weakness of Rachman and Napitupulu (2017) research was that had not shown yet in detail the stages of the calculation process to obtain the validity scores of instruments. The research results of Barteit et al. (2020) showed the scores for the validity of the instruments used to evaluate *e-learning*. The weakness of Barteit et al. (2020) research was that had not shown yet in detail the process to obtain the validity scores of the evaluation instruments.

METHOD

The approach in this research was instrument development. The focus of instrument development was evaluation instruments for the *DIVAYANA* model. The instruments developed were only for the initial data collection on several *DIVAYANA* evaluation components, included: the *Description* component, the *Input* component, the *Verification* component, the *Action* component, and the *Yack* component. Other components of the *DIVAYANA* model no require instruments because just focused on the calculation process to determine recommendations.

Specifically for research in 2020, researchers developed instruments for *DIVAYANA* evaluation model to evaluate the *e-learning* implementation during the *social distancing* period. Therefore, the *Description* component requires instruments of interview guidelines. The *Input* component requires instruments of interview guidelines. The *Verification* component requires instruments of interview guidelines and questionnaire instruments. The *Action* component requires questionnaire instruments. The *Yack* component requires instruments in the form of interview guidelines and questionnaires.

The experts involved in testing the content validity of the questionnaire instruments were six experts, including three experts in the field of informatics education and three experts in the field of educational evaluation. The experts involved in testing the content validity of the interview guidelines instruments were two experts, including an expert in the field of educational evaluation and an expert in the field of informatics education.

The formula used to test the content validity of the questionnaires was *Lawshe's CVR* formula, while testing the content validity of the interview guidelines instrument was the *Gregory* formula. *Lawshe's CVR* formula (Fitriyanto et al., 2019; N. H. M. Ghazali, 2016; Mahmoudian et al., 2018; Ngadiarti et al., 2020; Shrotryia & Dhanda, 2019; Torkian et al., 2020) can be seen in equation (1), while *Gregory's* formula (Ismanto, 2016; Mahendra et al., 2020) can be seen in equation (2).

$$CVR = \frac{N_e - (N/2)}{N/2} \quad 1)$$

Notes:

CVR = Content Validity Ratio

N_e = the number of experts stated an item of important value

N = the total number of experts

$$\text{Content Validity} = \frac{D}{A + B + C + D} \quad 2)$$

Notes:

A = cell that show disagreement between the two judges

B and C = cells that show the difference in views between the judges

D = cell that show valid agreement between the two judges

Analysis of the results of the content validity test of the questionnaire instruments and the interview guidelines were conducted by comparing calculation results and the categorization standards of the instruments' content validity. The standards intended can be seen in Table 1 (Hapsari et al., 2018; Sugiharni et al., 2018).

Table 1. The Standards for Categorizing the Content Validity of the Questionnaire Instruments and the Interview Guidelines for the *DIVAYANA* Evaluation Model

Range of Scores	Category of Validity
$r_{xy} \leq 0.00$	Invalid
$0.00 < r_{xy} \leq 0.20$	Very low
$0.20 < r_{xy} \leq 0.40$	Low
$0.40 < r_{xy} \leq 0.60$	Medium
$0.60 < r_{xy} \leq 0.80$	High
$0.80 < r_{xy} \leq 1.00$	Very high

RESULTS AND DISCUSSION

Referring to the need for valid *DIVAYANA* model instruments to be used in evaluating the *e-learning* implementation during the *social distancing* period, there were several interview guidelines and questionnaires that need to be validated. The instruments referred were related to the *e-learning* implementation, especially in the Informatics Engineering Education Department, Universitas Pendidikan Ganesha.

Instruments in the Component *Description* and its Content Validity Process

In this component, interview guidelines instruments are needed to be related to the causes of *e-learning* and the obstacles in its implementation. The interview guidelines items related to the causes of *e-learning* can be seen in Table 2. Interview guidelines items related to the constraints of *e-learning* implementation can be seen in Table 3.

Table 2. Items of Interview Guidelines in the *Description* Component to Find Out the Causes of the *E-Learning* Implementation

Items	Questions
C1	Is there an idea from the lecturer to organize <i>e-learning</i> ?
C2	How is the support and enthusiasm from students in organizing <i>e-learning</i> ?
C3	Is there approval from the faculty leadership to hold <i>e-learning</i> ?
C4	Is there a clear legal basis for implementing <i>e-learning</i> ?
C5	How is the readiness of funds in implementing <i>e-learning</i> ?
C6	How is the readiness of the facilities and infrastructure to realize <i>e-learning</i> ?
C7	What is the academic qualification for <i>e-learning</i> managers?
C8	What is the readiness of human resource competencies as <i>e-learning</i> managers?

Table 3. Items of Interview Guidelines in the *Description* Component to Determining the Obstacles in Implementing *E-Learning*

Items	Questions
O1	Are the software and hardware used in the organizing of <i>e-learning</i> inadequate?
O2	Is internet access unstable?
O3	Is the ability of the management team not optimal?
O4	Is the commitment of the study program members who use <i>e-learning</i> inconsistent?
O5	Is the ability of <i>e-learning</i> users not optimal?
O6	Is data security in <i>e-learning</i> not optimal?
O7	Is the funding capacity relatively minimal?
O8	Is the ability of the financial management team relatively minimal?
O9	Is the education curriculum always changing, making it difficult to organize <i>e-learning</i> ?
O10	Is the socialization of <i>e-learning</i> operations not being implemented?

Results of the content validity of interview guidelines instruments in the *Description* component to determine the causes of *e-learning* implementation were obtained from the calculation of the *Gregory* formula. The complete calculation process can be explained starting from Table 4 to Table 6.

Table 4. Experts Assessment Results Toward Interview Guidelines Items in the *Description* Component to Determine the Causes of *E-Learning* Implementation

Items	Experts							
	Expert-1				Expert-2			
	Irrelevant		Relevant		Irrelevant		Relevant	
1	2	3	4	1	2	3	4	
C1	-	-	-	√	-	-	√	-
C2	-	-	-	√	-	-	-	√
C3	-	-	-	√	-	-	-	√
C4	-	-	-	√	-	-	-	√
C5	-	-	-	√	-	-	-	√
C6	-	-	-	√	-	-	√	-
C7	-	√	-	-	√	-	-	-
C8	-	-	√	-	-	-	-	√

Based on the assessment results shown in Table 4, the expert's assessment results were compiled. The details related to the compilation data from the expert's assessment results toward the interview guidelines items in the *Description* component to find out the causes of *e-learning* implementation can be seen in Table 5. After obtaining the compilation data, the cross-tabulation process of the expert's assessment results was carried out. Results of the cross-tabulation process can be seen in Table 6.

Table 5. Data Compilation of Expert's Assessment Results toward Interview Guidelines Items in the *Description* Component to Determine the Causes of *E-Learning* Implementation

Expert-1		Expert-2	
Irrelevant (Scores: 1 - 2)	Relevant (Scores: 3 - 4)	Irrelevant (Scores: 1 - 2)	Relevant (Scores: 3 - 4)
C7	C1, C2, C3, C4, C5, C6, C8	C7	C1, C2, C3, C4, C5, C6, C8

Table 6. Cross-Tabulation of Expert's Assessment Validation Results toward Interview Guidelines Items in the *Description* Component to Determine the Causes of *E-learning* Implementation

		Expert-1	
		Irrelevant (Scores: 1 - 2)	Relevant (Scores: 3 - 4)
Expert-2	Irrelevant (Scores: 1 - 2)	A C7 (1)	B - (0)
	Relevant (Scores: 3 - 4)	C - (0)	D C1, C2, C3, C4, C5, C6, C8 (7)

Referring to Table 6, so the content validity of interview guidelines was able to be calculated using the *Gregory* Formula. The calculation results can be shown as follows.

$$\text{Content Validity} = \frac{7}{1 + 0 + 0 + 7} = \frac{7}{8} = 0.875$$

Based on the data shown in Table 7 and using the same method as in the content validity calculation process of the interview guidelines shown earlier, so the content validity results were 0.900. The data of Table 7 intended can be seen as follows.

Table 7. Results of Expert’s Assessment toward Interview Guidelines Items in the *Description* Component to Determine the Obstacles in Implementing *E-Learning*

Items	Experts							
	Expert-1				Expert-2			
	Irrelevant		Relevant		Irrelevant		Relevant	
	1	2	3	4	1	2	3	4
O1	-	-	-	√	-	-	-	√
O2	-	-	-	√	-	-	-	√
O3	-	-	√	-	-	-	-	√
O4	-	-	√	-	-	-	-	√
O5	-	-	√	-	-	-	-	√
O6	-	-	-	√	-	-	√	-
O7	-	-	-	√	-	-	-	√
O8	-	-	√	-	-	-	√	-
O9	-	-	√	-	-	-	-	√
O10	√	-	-	-	√	-	-	-

Instruments in *Input* Component and its Content Validity Process

This component requires interview guidelines instruments related to alternative solutions that are used to solve constraints in the implementation of *e-learning*. The several items of the interview guidelines related to alternative solutions to solving the obstacles to the implementation of *e-learning* can be seen in Table 8.

Table 8. Items of Interview Guidelines in the *Input* Component to Find Out Alternative Solutions to Solving Problems in the Implementation of *E-Learning*

Items	Questions
A1	How are you respond if the preparation of software and hardware for <i>e-learning</i> purposes is assisted by the institution?
A2	How are you respond if the internet bandwidth is increased so that internet access is more stable?
A3	How are you respond if training is conducted for <i>e-learning</i> managers so that their abilities will improve?
A4	How are you respond if there is socialization to the academic community at the study program regarding the benefits and importance of using <i>e-learning</i> in supporting the learning process?
A5	How are you respond if training is conducted for <i>e-learning</i> users so that their abilities are more optimal?
A6	How are you respond if set up a higher data security system for <i>e-learning</i> so that its performance is more optimal?
A7	How are you respond if the funding for <i>e-learning</i> is not only sourced from the faculty but also from the institution?
A8	How are you respond if financial management training is conducted for the financial management team so that their abilities will improve?
A9	How are you respond if a complete and reliable platform is prepared so that the system remains stable when there is a change in the educational curriculum?
A10	How are you respond if there is routine socialization about the operation of <i>e-learning</i> to the academic community at the study program level?

Based on the data shown in Table 9 and using the same method as in the calculating process of the content validity of previous interview guidelines in the *Description* component, so the content

validity results of the interview guidelines in the *Input* component were 0.900. The data of Table 9 intended can be seen as follows.

Table 9. Results of Expert’s Assessment toward Interview Guidelines Items in the *Input* Component to Find Out Alternative Solutions for Solving Obstacles to the Implementation of *E-Learning*

Items	Expert							
	Expert-1				Expert-2			
	Irrelevant		Relevant		Irrelevant		Relevant	
	1	2	3	4	1	2	3	4
A1	-	-	-	√	-	-	√	-
A2	-	-	-	√	-	-	√	-
A3	-	-	√	-	-	-	√	-
A4	-	-	√	-	-	-	-	√
A5	-	-	√	-	-	-	-	√
A6	-	-	√	-	-	-	-	√
A7	-	-	√	-	-	-	-	√
A8	-	-	√	-	-	-	√	-
A9	-	-	√	-	-	-	√	-
A10	-	√	-	-	-	√	-	-

Instruments in the *Verification* component and Its Content Validity Process

This component requires interview guidelines instruments related to the success standards of the *e-learning* implementation. The complete interview guidelines items can be seen in Table 10. In addition, this component also requires questionnaire instruments related to checking the suitability of success standards and alternative solutions for solving problems in the *e-learning* implementation. The complete questionnaire items can be seen in Table 11.

Table 10. Items of Interview Guidelines in the *Verification* Component to Determine the Success Standards of the *E-Learning* Implementation

Items	Questions
S1	Is the percentage of software and hardware preparation for <i>e-learning</i> needs assisted by institutions $\geq 85\%$?
S2	Is the percentage of added internet bandwidth $\geq 90\%$?
S3	Is the percentage of training implementation for <i>e-learning</i> managers $\geq 90\%$?
S4	Is the percentage of socialization to the study program community related to the benefits and importance of using <i>e-learning</i> $\geq 90\%$?
S5	Is the percentage of training implementation for <i>e-learning</i> users $\geq 85\%$?
S6	Is the percentage of data security system preparation on <i>e-learning</i> $\geq 90\%$?
S7	Is the percentage of funding for <i>e-learning</i> $\geq 90\%$?
S8	Is the percentage of financial management training for the financial management team $\geq 90\%$?
S9	Is the percentage of complete and reliable platform readiness $\geq 90\%$?
S10	Is the percentage of routine socialization about the operation of <i>e-learning</i> to the academic community at the study program level $\geq 90\%$?

Table 11. Items of Questionnaires in the *Verification* Component to Check the Suitability between Alternative Solutions to Solving Problems and the Success Standards in the *E-Learning* Implementation

<i>Verification</i> Items	Alternative Solution Items	Success Standard Items	Suitability	
			Unsuitable	Suitable
V1	A1	S1	...	...
V2	A2	S2	...	...
V3	A3	S3	...	...
V4	A4	S4	...	...
V5	A5	S5	...	...
V6	A6	S6	...	...
V7	A7	S7	...	...
V8	A8	S8	...	...
V9	A9	S9	...	...
V10	A10	S10	...	...

Based on the data shown in Table 12 and using the same method as in the calculating process of the content validity of previous interview guidelines in the *Description* component, so the content validity results of the interview guidelines in the *Verification* component were 0.900. The data of Table 12 intended can be seen as follows.

Table 12. Results of Expert’s Assessment toward Interview Guidelines Items in the *Verification* Component to Determine the Standard for the Success of *E-Learning* Implementation

Items	Expert							
	Expert-1				Expert-2			
	Irrelevant		Relevant		Irrelevant		Relevant	
	1	2	3	4	1	2	3	4
S1	-	-	-	√	-	-	√	-
S2	-	-	-	√	-	-	-	√
S3	-	-	√	-	-	-	-	√
S4	-	-	√	-	-	-	-	√
S5	-	-	√	-	-	-	-	√
S6	-	-	-	√	-	-	-	√
S7	-	-	-	√	-	-	-	√
S8	-	-	-	√	-	-	√	-
S9	-	-	√	-	-	-	√	-
S10	√	-	-	-	-	√	-	-

The content validity results of the questionnaire instruments in the *Verification* component to check the suitability of alternative solutions to problem-solving and the success standards in the *e-learning* implementation were obtained from the calculation of *Lawshe’s CVR* formula. The complete calculation process can be explained starting from Table 13 to Table 15.

Table 13. Results of Expert’s Assessment toward Questionnaire Items in the *Verification* Component to Check the Suitability between Alternative Solutions to Solving Constraints and Standards of Success in the *E-Learning* Implementation

Items	Experts					
	1	2	3	4	5	6
V1	Important	Important	Important	Important	Important	Important
V2	Important	Important	Important	Important	Important	Important
V3	Important	Important	Important	Important	Important	Important
V4	Important	Important	Important	Important	Important	Important
V5	Important	Important	Important	Important	Important	Important
V6	Important	Important	Important	Important	Important	Important
V7	Important	Important	Important	Important	Important	Important
V8	Important	Important	Important	Important	Important	Important
V9	Important	Important	Important	Important	Important	Important
V10	Important	Not Important	Not Important	Not Important	Important	Not Important

Table 14. The Tabulation Data of Expert’s Assessment Results toward Questionnaire Items in the *Verification* Component to Check the Suitability between Alternative Solutions to Solving Obstacles and Standards of Success in the *E-Learning* Implementation

Items	Number of Expert’s Assessment	
	Important	Not Important
V1	6	0
V2	6	0
V3	6	0
V4	6	0
V5	6	0
V6	6	0
V7	6	0
V8	6	0
V9	6	0
V10	2	4

Based on Table 14, then the calculations of content validity of the instruments were carried out using *Lawshe's CVR* Formula. Results of the content validity of the instruments can be seen in Table 15.

Table 15. Calculation Results of the Content Validity of the Questionnaires in the *Verification* Component to Check the Suitability of Alternative Solutions to Solving Problems and the Standards of Success in the *E-Learning* Implementation

Items	N _e	N	N/2	N _e - (N/2)	CVR
V1	6	6	3	3	1
V2	6	6	3	3	1
V3	6	6	3	3	1
V4	6	6	3	3	1
V5	6	6	3	3	1
V6	6	6	3	3	1
V7	6	6	3	3	1
V8	6	6	3	3	1
V9	6	6	3	3	1
V10	2	6	3	-1	-0.333
				Average	0.867

Instruments in the Action Component and its Content validity Process

This component requires questionnaire instruments related to the field trial of the *e-learning* implementation. The complete questionnaire items can be seen in Table 16.

Table 16. Items of Questionnaires in the Action Component to Determine the Field Trial Results of the *E-Learning* Implementation

Items	Statements	Scores of Assessment				
		Poor	Less	Moderate	Good	Excellent
F1	The software and hardware used in providing <i>e-learning</i> are adequate	...	...	...	...	...
F2	Internet access used in <i>e-learning</i> is stable	...	...	...	...	...
F3	The ability of <i>e-learning</i> managers is optimal	...	...	...	...	...
F4	The commitment of the academic community in the study program in using <i>e-learning</i> has been consistent	...	...	...	...	...
F5	The ability of <i>e-learning</i> users is optimal	...	...	...	...	...
F6	Data security in <i>e-learning</i> has been maintained optimally	...	...	...	...	...
F7	The funding capacity is appropriate	...	...	...	...	...
F8	The ability of the financial management team is adequate	...	...	...	...	...
F9	The implementation of <i>e-learning</i> continues to run adequately despite changes in the educational curriculum	...	...	...	...	...
F10	The socialization of <i>e-learning</i> operations has been carried out regularly	...	...	...	...	...

Table 17. Results of Expert's Assessment toward Questionnaire Items in the Action Component to Determine the Field Trial Results in the *E-Learning* Implementation

Items	Experts					
	1	2	3	4	5	6
F1	Important	Important	Important	Not Important	Not Important	Important
F2	Important	Not Important	Important	Important	Important	Important
F3	Important	Important	Important	Important	Important	Important
F4	Important	Important	Important	Important	Important	Important
F5	Not Important	Important	Important	Not Important	Important	Important
F6	Important	Important	Important	Important	Important	Important
F7	Important	Important	Important	Important	Not Important	Important
F8	Important	Important	Important	Important	Important	Important
F9	Important	Important	Important	Important	Important	Important
F10	Not Important	Not Important	Not Important	Not Important	Not Important	Important

Based on the data shown in Table 17 and using the same method as in the calculating process of the content validity of previous questionnaires in the *Verification* component, so the results of the validation of the contents of the questionnaire in the Action component were 0.633. The data of Table 17 intended can be seen as follows.

Instruments in the *Yack* component and its Content Validity Process

This component requires interview guidelines instruments related to the arguments of experts in focus group discussion activities in assessing the *e-learning* implementation. The complete interview guidelines items can be seen in Table 18. Besides, this component also requires questionnaire instruments related to determining the weight of decision making for each successful standard of *e-learning* implementation by each expert. The complete questionnaire items can be seen in Table 19.

Table 18. Items of Interview Guidelines in the *Yack* Component to Find Out the Experts' Arguments in Assessing the *E-Learning* Implementation

Items	Questions
AR1	How do you think about the software and hardware used in the implementation of <i>e-learning</i> ?
AR2	How do you think about internet access that is used in the implementation of <i>e-learning</i> ?
AR3	How do you think about the ability of <i>e-learning</i> managers?
AR4	How do you think about the commitment of the academic community of study program in using <i>e-learning</i> ?
AR5	How do you think about the ability of <i>e-learning</i> users?
AR6	How do you think about data security in <i>e-learning</i> ?
AR7	How do you think about the funding capability for <i>e-learning</i> implementation?
AR8	How do you think about the capabilities of the financial management team?
AR9	How do you think about the smooth implementation of <i>e-learning</i> when the education curriculum changes?
AR10	How do you respond to the routine socialization of <i>e-learning</i> operations?
AR11	How do you think about the legal basis used in the implementation of <i>e-learning</i> ?
AR12	How do you think about the enthusiasm of <i>e-learning</i> users at the study program level?

Table 19. Items of Questionnaires in the *Yack* Component to Determine the Weight of Decision Making for Each Successful Standard of *E-Learning* Implementation

Items	Statements	Scores of Weights				
		Poor	Less	Moderate	Good	Excellent
W1	Percentage of software and hardware preparation for <i>e-learning</i> purposes assisted by institutions $\geq 85\%$	...	...	...	...	...
W2	Percentage of additional internet bandwidth $\geq 90\%$	...	...	...	...	...
W3	Percentage of training implementation for <i>e-learning</i> managers $\geq 90\%$	...	...	...	...	...
W4	Percentage of socialization to the academic community of study program related to the benefits and importance of using <i>e-learning</i> $\geq 90\%$	...	...	...	...	...
W5	Percentage of training implementation for <i>e-learning</i> users $\geq 85\%$	...	...	...	...	...
W6	Percentage of preparation for data security system on <i>e-learning</i> $\geq 90\%$	...	...	...	...	...
W7	Percentage of funding for <i>e-learning</i> $\geq 90\%$	...	...	...	...	...
W8	Percentage of financial management training for the financial management team $\geq 90\%$	...	...	...	...	...
W9	Percentage of complete and reliable platform readiness $\geq 90\%$	...	...	...	...	...
W10	Percentage of routine socialization about <i>e-learning</i> operations to the academic community at the study program level $\geq 90\%$	...	...	...	...	...

Based on the data shown in Table 20 and using the same method as in the calculating process of the content validity of previous interview guidelines in the *Description* component, so the content validity results of the interview guidelines in the *Yack* component were 0.833. The data of Table 20 intended can be seen as follows.

Table 20. Results of Expert’s Assessment toward Interview Guidelines Items in the *Yack* Component to Find Out the Evaluator’s Arguments in Assessing the Implementation of *E-Learning*

Items	Expert							
	Expert-1				Expert-2			
	Irrelevant		Relevant		Irrelevant		Relevant	
	1	2	3	4	1	2	3	4
AR1	-	-	√	-	-	-	√	-
AR2	-	-	√	-	-	-	-	√
AR3	-	-	√	-	-	-	-	√
AR4	-	-	√	-	-	-	√	-
AR5	-	-	√	-	-	-	√	-
AR6	-	-	-	√	-	-	√	-
AR7	-	-	√	-	-	-	-	√
AR8	-	-	-	√	-	-	√	-
AR9	-	-	√	-	-	-	√	-
AR10	√	-	-	-	-	√	-	-
AR11	-	-	-	√	-	-	√	-
AR12	-	√	-	-	-	√	-	-

Based on the data shown in Table 21 and using the same method as in the calculating process of the content validity of previous questionnaires in the *Verification* component, so the results of the validation of the contents of the questionnaire in the *Yack* component were 0.733. The data of Table 21 intended can be seen as follows.

Table 21. Results of Expert’s Assessment toward Questionnaire Items in the *Yack* Component to Determine the Weight of Decision Making for Each Successful Standard of *E-Learning* Implementation

Items	Experts					
	1	2	3	4	5	6
W1	Important	Important	Important	Important	Important	Important
W2	Important	Important	Important	Important	Important	Important
W3	Important	Important	Important	Important	Important	Important
W4	Important	Important	Important	Important	Important	Important
W5	Important	Important	Important	Important	Important	Important
W6	Important	Important	Important	Important	Important	Important
W7	Important	Important	Important	Important	Important	Important
W8	Important	Not Important	Important	Not Important	Important	Important
W9	Important	Important	Important	Important	Important	Important
W10	Not Important	Not Important	Important	Not Important	Not Important	Important

The recapitulation of content validity results of the instruments on each component of the *DIVAYANA* evaluation model is needed to facilitate checking of instruments that are not yet valid so that later it will be easier to improve the instruments. The recapitulation of instruments for each component of the *Description*, *Input*, *Verification*, action, and *Yack* can be seen in Figure 1. The average recapitulation of content validity results in all components of *Description*, *Input*, *Verification*, Action, and *Yack* can be seen in Figure 2.

Based on Figure 1 and Figure 2, it appears that generally, all the instruments were valid, so no need for thorough repair of the *DIVAYANA* model evaluation instruments. However, when viewed from the manual calculation process using the *Gregory* formula and *Lawshe’s CVR* formula, it appears that some instrument items must be discarded to optimize the validity of the *DIVAYANA* model evaluation instruments. Item of interview guidelines that need to be removed from the *Description* component which related to things to find out the cause of *e-learning* implementation was item-C7. Item of interview guidelines that need to be removed from the *Description* component which related to things to find out the constraints of *e-learning* implementation was item-O10. Item of interview guidelines that need to be removed from the *Input* component which related to things to find out alternative solutions for solving problems in *e-learning* implementation was item-A10. Item of interview guidelines that need to be removed from the *Verification* component which related to things to determine the success standards in *e-learning* implementation was item-S10. Item of questionnaires that need to

be removed from the *Verification* component which related to things to check the suitability of alternative solutions to problem-solving and the success standards in *e-learning* implementation was item-V10. Item of questionnaires that need to be removed from the *Action* component which related to things to determine the field trial results in the *e-learning* implementation was item-F10. Items of interview guidelines that need to be removed from the *Yack* component which related to things to find out the experts' arguments in assessing the *e-learning* implementation were item-AR10 and item-AR12. Item of questionnaires that need to be removed from the *Yack* component which related to things to determine the weight of decision making for each successful standard of *e-learning* implementation was item-W10.

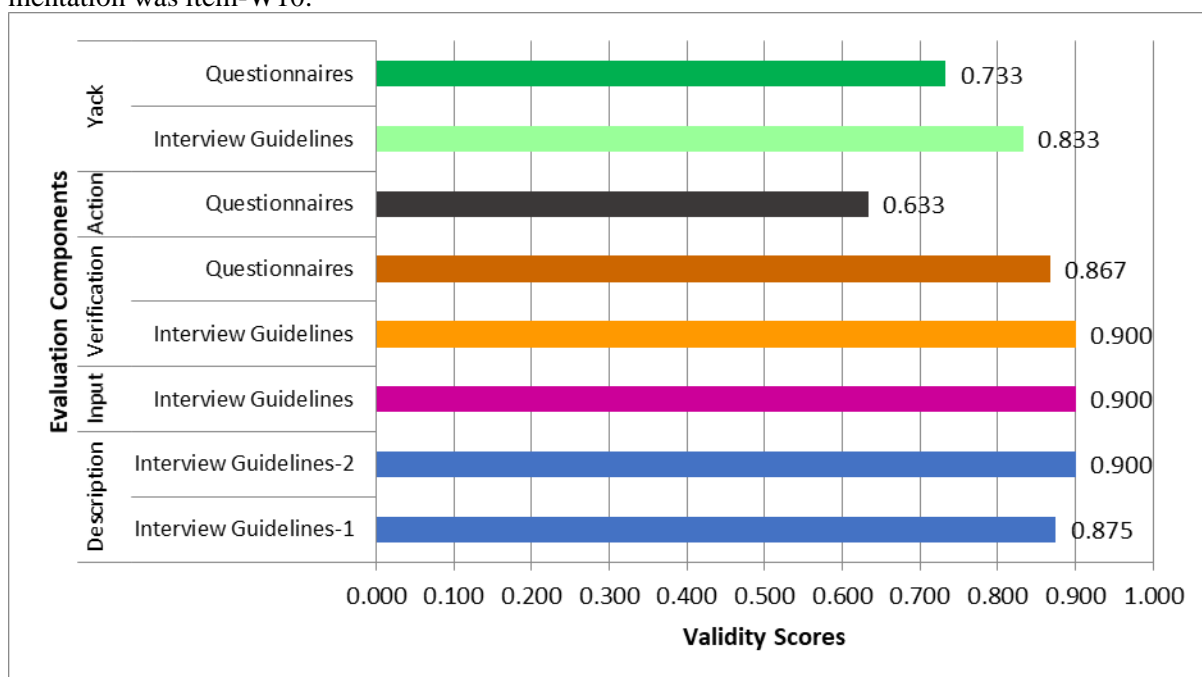


Figure 1. Recapitulation of the Validity Content Results of the Instruments for Each Component of the *Description, Input, Verification, Action, and Yack*

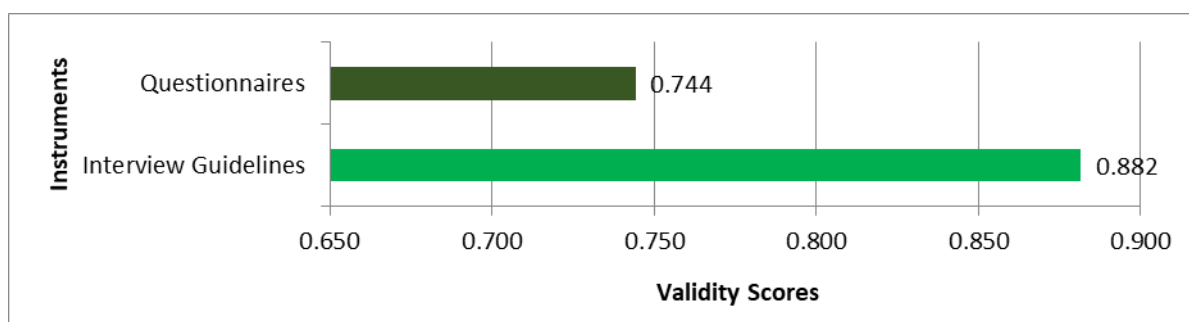


Figure 2. Average Recapitulation of Content Validity Results in All Components of *Description, Input, Verification, Action, and Yack*

Interpretation of the content validity results was able to be done by comparing the content validity results of each instrument with the standard categorization of validity content instruments shown earlier in Table 1. The content validity of interview guidelines in the *Description* component which related to things to determine the causes of *e-learning* implementation was able to be categorized as very good because the content validity results were 0.875 that located at the score range $0.80 < r_{xy} \leq 1.00$. The content validity of interview guidelines in the *Description* component which related to things to determine the obstacles in the *e-learning* implementation was also categorized as very good because the content validity results were 0.900 that located at the score range $0.80 < r_{xy} \leq 1.00$. The content validity of the interview guidelines in the *Input* component which related to things to find out alternative solutions for solving problems in the *e-learning* implementation was able to be categorized as very good because the content validity results were 0.900 that located at the score range $0.80 < r_{xy} \leq$

1.00. The content validity of the interview guidelines in the *Verification* component which related to things to determining the standards of success in the *e-learning* implementation was able to be categorized as very good because the content validity results were 0.900 that located at the score range $0.80 < r_{xy} \leq 1.00$. The content validity of the questionnaires in the *Verification* component which related to things to check the suitability of alternative solutions to problem-solving and the standards of success in the implementation of *e-learning* was able to be categorized as very good because the content validity results were 0.867 that located at the score range $0.80 < r_{xy} \leq 1.00$. The content validity of the questionnaires in the *Action* component which related to things to determining the field trial results of the implementation of *e-learning* was able to be categorized as good because the content validity results were 0.633 that located at the score range $0.60 < r_{xy} \leq 0.80$. The content validity of the interview guidelines in the *Yack* component which related to things to find out the arguments of the experts in assessing the *e-learning* implementation was able to be categorized as very good because the content validity results were 0.833 that located at the score range $0.80 < r_{xy} \leq 1.00$. The content validity of the questionnaires in the *Yack* component which related to things to determine the weight of decision making for each successful standard of *e-learning* implementation was able to be categorized as good because the content validity results were 0.733 that located at the score range $0.60 < r_{xy} \leq 0.80$.

The results of this research had been able to answer the limitations of Arifin et al. (2018) research and Santoso et al. (2017) research by explaining the existence of a manual calculation process for the content validity of instruments. The results of this research had also answered the limitations of Santoso et al. (2017) research and N. Ghazali et al. (2018) by showing the calculating results of instruments content validity quantitatively.

This research results had shown the calculation process of instruments content validity accurately using the *Gregory* formula. This is reinforced by the research results of Retnawati (2016) and the research results of Sutrisna et al. (2018) that also showed the process of content validity of the instruments using the *Gregory* formula. This research results had also succeeded in showing the content validity of the instruments quantitatively by using *Lawshe's CVR* formula. This is confirmed by the research results of Zamanzadeh et al. (2015) and the research results of Yudiana et al. (2017) that also showed the calculation process to obtain the content validity of the instruments using *Lawshe's CVR* formula.

The findings in this research were the existence of interview guidelines and questionnaires that good validity to support the *DIVAYANA* model used in the evaluation of *e-learning* implementation. The meaning of valid instruments as findings in this research is that the instruments used as measuring tools to support the *e-learning* evaluation process have been able to measure correctly and precisely according to what is being measured. This is also according to Panyajamorn et al. (2018); Setiawan & Munajah (2020); Singh & De Villiers (2017); and Suryaman et al. (2020). It is in principle the same as the findings of this research regarding valid instruments and urgently needed in the e-learning evaluation process to be able to provide measurement results precisely and according to the object being measured. The limitation in this research is the calculation process has not been shown yet in performing the instruments' reliability test.

CONCLUSION

The instruments developed to support the *DIVAYANA* model in evaluating the implementation of e-learning during the *social distancing* in the informatics engineering education study program, Universitas Pendidikan Ganesha was in the form of interview guidelines and questionnaires. The interview guidelines and questionnaires were declared valid based on the results of the content validation test using the *Gregory* formula and *Lawshe's CVR* formula. The impact that arises after the success of developing instruments for the *DIVAYANA* evaluation model is that it can be used as a valid measuring tool in evaluating the implementation of e-learning. Future work to overcome the limitation of this study is conducting the reliability test of the *DIVAYANA* evaluation model instruments.

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REFERENCES

- Aldapit, E., & Suharjana, S. (2019). CIPP evaluation model for the coaching program of running athletes. *Psychology, Evaluation, and Technology in Educational Research*, 1(2). <https://doi.org/10.33292/petier.v1i2.10>
- Ardi, Z., Syahril, S., & Anwar, M. (2020). Evaluation of digital simulation learning based e-learning in SMK Negeri 2 Padang. *International Journal of Educational Dynamics*, 2(1), 188–198. <https://doi.org/10.24036/ijeds.v2i1.245>
- Arifin, Z., Kartono, K., & Supriyadi, S. (2018). Development of authentic assessment instrument for performance in learning mathematics in linear program. *Journal of Research and Educational Research Evaluation*, 7(2), 154–162. <https://doi.org/10.15294/jere.v7i2.24884>
- Barteit, S., Guzek, D., Jahn, A., Bärnighausen, T., Jorge, M. M., & Neuhann, F. (2020). Evaluation of e-learning for medical education in low- and middle-income countries: A systematic review. *Computers & Education*, 145, 103726. <https://doi.org/10.1016/j.compedu.2019.103726>
- Divayana, D. G. H. (2020). Utilization of DIVAYANA formula in evaluating of suitable platforms for online learning in the social distancing. *International Journal of Interactive Mobile Technologies (IJIM)*, 14(20), 50. <https://doi.org/10.3991/ijim.v14i20.15787>
- Erfan, M., Maulyda, M. A., Ermiana, I., Hidayati, V. R., & Widodo, A. (2020). Validity and reliability of cognitive tests study and development of elementary curriculum using Rasch model. *Psychology, Evaluation, and Technology in Educational Research*, 3(1). <https://doi.org/10.33292/petier.v3i1.51>
- Fitriyanto, J. N., Widjanarko, D., & Khumaedi, M. K. (2019). Validity and reliability test of assessment instrument of the suitability of electric power steering media. *Journal of Vocational and Career Education*, 4(1). <https://doi.org/10.15294/jvce.v4i1.22186>
- Ghazali, N. H. M. (2016). A reliability and validity of an instrument to evaluate the school-based assessment system: A pilot study. *International Journal of Evaluation and Research in Education (IJERE)*, 5(2), 148–157. <https://doi.org/http://dx.doi.org/10.11591/ijere.v5i2.4533>
- Ghazali, N., Nordin, M. S., Hashim, S., & Hussein, S. (2018). Measuring content validity: Students self-efficacy and meaningful learning in massive open online course (MOOC) scale. *Proceedings of the International Conference on Education in Muslim Society (ICEMS 2017)*. <https://doi.org/10.2991/icems-17.2018.25>
- Guspatni, G., & Kurniawati, Y. (2018). Validity and reliability testing of an e-learning questionnaire for chemistry instruction. *IOP Conference Series: Materials Science and Engineering*, 335, 012102. <https://doi.org/10.1088/1757-899X/335/1/012102>
- Hapsari, S. I., Sugiyarto, K. H., & Kosaka, N. (2018). An evaluation of application of information technology and communication of learning science with the theme of solar system. *Psychology, Evaluation, and Technology in Educational Research*, 1(1), 41. <https://doi.org/10.33292/petier.v1i1.18>
- Hung, J.-L., & Yang, D. (2015). The validation of an instrument for evaluating the effectiveness of professional development program on teaching online. *Journal of Educational Technology Development and Exchange*, 8(1). <https://doi.org/10.18785/jetde.0801.02>
- Ismanto, I. (2016). Aspect of language on a qualitative analysis of student's evaluation instrument. *QIIS (Qudus International Journal of Islamic Studies)*, 4(2), 218. <https://doi.org/10.21043/qijis.v4i2.1788>
- Kadir, J. S., Zaim, M., & Refnaldi, R. (2019). Developing instruments for evaluating validity, practicality, and effectiveness of the authentic assessment for speaking skill at junior high school. *Proceedings of the Sixth of International Conference on English Language and Teaching (ICOELT 2018)*. <https://doi.org/10.2991/icoelt-18.2019.14>
- Mahendra, I. W. E., Jayantika, I. G. N. A. T., Sumandya, I. W., Suarni, N. M., Ariawati, N. W.,

- Sugiharni, G. A. D., & Divayana, D. G. H. (2020). Design of digital test using wondershare in supporting the blended learning with kelase platform. *Universal Journal of Educational Research*, 8(3), 953–959. <https://doi.org/10.13189/ujer.2020.080330>
- Mahmoudian, A., Torabi Chafjiri, R., Alipour, A., Shamsalinia, A., & Ghaffari, F. (2018). The design and evaluation of psychometric properties for a questionnaire on elderly abuse by family caregivers among older adults on hemodialysis. *Clinical Interventions in Aging, Volume 13*, 555–563. <https://doi.org/10.2147/CIA.S149338>
- Ngadiarti, I., Jauhari, A., El Jannah, S., Sulisty, J., & Dwirahmadi, F. (2020). Quality validation of learning outcomes test instrument of core courses in Polytechnics Health Jakarta II, Indonesia. *Annals of Tropical Medicine and Public Health*, 23(08). <https://doi.org/10.36295/ASRO.2020.23811>
- Nuruhidin, A., Putra, F., Pamungkas, O. I., Ardiyanto, H., & Saputro, D. P. (2018). An evaluation of powerlifting and weightlifting development program. *Psychology, Evaluation, and Technology in Educational Research*, 1(1), 1–8. <https://doi.org/10.33292/petier.v1i1.19>
- Panyajamorn, T., Suanmali, S., Kohda, Y., Chongphaisal, P., & Supnithi, T. (2018). Effectiveness of elearning design and affecting variables in Thai public schools. *Malaysian Journal of Learning and Instruction*, 15(1), 1–34.
- Quintas, C., Silva, I. F., & Teixeira, A. (2017). Assessing an e-learning and b-learning model — A study of perceived satisfaction. *International Journal of Information and Education Technology*, 7(4), 265–268. <https://doi.org/10.18178/ijiet.2017.7.4.878>
- Rachman, T., & Napitupulu, D. B. (2017). Rasch model for validation a user acceptance instrument for evaluating e-learning system. *CommIT (Communication and Information Technology) Journal*, 11(1), 9. <https://doi.org/10.21512/commit.v11i1.2042>
- Ramadani, M., Supahar, S., & Rosana, D. (2017). Validity of evaluation instrument on the implementation of performance assessment to measure science process skills. *Jurnal Inovasi Pendidikan IPA*, 3(2), 180. <https://doi.org/10.21831/jipi.v3i2.15534>
- Retnawati, H. (2016). *Proving content validity of self-regulated learning scale (The comparison of Aiken index and expanded Gregory index)*. 2(2). <https://doi.org/10.21831/reid.v2i2.11029>
- Santoso, B., Marchira, C. R., & Sumarni, P. (2017). Development and validity and reliability tests of professionalism assessment instrument in psychiatry residents. *Jurnal Pendidikan Kedokteran Indonesia: The Indonesian Journal of Medical Education*, 6(1), 60. <https://doi.org/10.22146/jpki.25369>
- Setiawan, R., & Munajah, R. (2020). Evaluation of the application of online learning in Indonesian Universities. *TEM Journal*, 9(3), 1194–1199. <https://doi.org/10.18421/TEM93-46>
- Shrotryia, V. K., & Dhanda, U. (2019). Content validity of assessment instrument for employee engagement. *SAGE Open*, 9(1), 215824401882175. <https://doi.org/10.1177/2158244018821751>
- Singh, U. G., & De Villiers, M. R. (2017). An evaluation framework and instrument for evaluating e-assessment tools. *The International Review of Research in Open and Distributed Learning*, 18(6). <https://doi.org/10.19173/irrodl.v18i6.2804>
- Sugiharni, G. A. D., Setiasih, N. W., Mahendra, I., Ardana, I., & Divayana, D. G. H. (2018). Development of alkin model instruments as evaluation tools of blended learning implementation in discrete mathematics course on STIKOM Bali. *Journal of Theoretical and Applied Information Technology*, 96(17), 5803–5818. <http://www.jatit.org/volumes/Vol96No17/15Vol96No17.pdf>
- Suryaman, H., Kusnan, K., & Mubarok, H. (2020). Profile of online learning in building engineering education study program during the Covid-19 pandemic. *IJORER : International Journal of Recent Educational Research*, 1(2), 63–77. <https://doi.org/10.46245/ijorer.v1i2.42>
- Sutrisna, I. P. E., Ratminingsih, N. M., & Artini, L. P. (2018). Mall-based English instruction. *JPI (Jurnal Pendidikan Indonesia)*, 7(1), 30–40. <https://doi.org/10.23887/jpi-undiksha.v7i1.13191>
- Taherdoost, H. (2016). Validity and reliability of the research instrument; how to test the validation of a questionnaire/survey in a research. *SSRN Electronic Journal*.

<https://doi.org/10.2139/ssrn.3205040>

Torkian, S., Shahesmaeili, A., Malekmohammadi, N., & Khosravi, V. (2020). Content validity and test-retest reliability of a questionnaire to measure virtual social network addiction among students. *International Journal of High Risk Behaviors and Addiction, 9*(1).

<https://doi.org/10.5812/ijhrba.92353>

Vakili, M. M., & Jahangiri, N. (2018). Content validity and reliability of the measurement tools in educational, behavioral, and health sciences research. *Journal of Medical Education Development, 10*(28), 106–118. <https://doi.org/10.29252/edcj.10.28.106>

Widiharti, W., Tola, B., & Supriyat, Y. (2019). Evaluation of principal partnership programs in the directorate of education management - The application of Kirkpartick and countenance stake evaluation model. *Universal Journal of Educational Research, 7*(9A), 71–77.

<https://doi.org/10.13189/ujer.2019.071609>

Yudiana, Y., Hidayat, Y., Hambali, B., & Slamati, S. (2017). Content validity estimation of assessment instrument based on volleyball information system of volleyball learning: field research. *IOP Conference Series: Materials Science and Engineering, 180*, 012230.

<https://doi.org/10.1088/1757-899X/180/1/012230>

Zamanzadeh, V., Ghahramanian, A., Rassouli, M., Abbaszadeh, A., Alavi-Majd, H., & Nikanfar, A.-R. (2015). Design and implementation content validity study: development of an instrument for measuring patient-centered communication. *Journal of Caring Sciences, 4*(2), 165–178.

<https://doi.org/10.15171/jcs.2015.017>