Development of Learning Materials Based on Local Culture in Basic School Using Waterfall Methods

Herlina Ragalutu, Nurdin Ibrahim and Diana Nomida

Abstract--- Development of Learning Materials is a process that will be carried out on devices that will be used in the learning process. Education is rooted in national culture and regional culture as a pillar of national culture. This study aims to produce local culture-based learning material in Class IV Elementary School (SD). Local culture is a habit that grows and develops and is owned and recognized by local tribal communities. This culture will later be used as the basis for developing learning materials. The steps for developing teaching materials follow the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation) with the Research and Development method. The product of development research is the Nosarara Nosabatutu Module with expert validity test results. The Waterfall method is a model that is often called the classic life cycle, which describes a systematic and sequential approach to software development that can be implemented in various developments. The results showed that the module-shaped learning material nosarara nosabatutu is suitable for use in elementary school learning in Palu City as evidenced by the results of language expert validation of 3.9 (good), design experts validation of 4,3 (very good), mater expert validation of 4.5 (very good), teacher validation of 4.5 (very good). This data is reinforced by the validation of the readability of one to one learners by 86.8%, the effectiveness of learning materials through completeness testing in small groups with 100% classical completion results and an increase in the learning outcomes of pretest and posttest by 81.08% (criteria sufficient 29.73% ; good criteria 32.43%; very good criteria 18, 92%). Nosarara nosabatutu module-shaped learning material has been integrated with a communication technology-based learning system by including barcodes from online learning sources that can be operated with QR Scanner Nosarara Nosabatutu (QR. NN Scanner).

Keywords--- Local Culture, Nosarara Nosabatutu, ADDIE, Waterfall.

I. INTRODUCTION

In the midst of current globalization, education is the most important requirement after fulfilling other basic needs. Educational outcomes are evidence of human existence in the midst of world civilization. Through human education it can develop and develop every potential to take a role in every dimension of life. In Indonesia this condition was accommodated through the statement that national education was held as an effort to equip Indonesian people to have the ability to develop all the potentials that exist in each of them. In the regulations on curriculum it was stated that education is rooted in national culture to build the life of the present and the future Upcoming Education is a civilization process as the opinion that Education as a cultural enterprise aims in the life of the personal growth of students as a whole in its nature with surrounding cultural influences Indeed culture is capital

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for the Indonesian nation to become a great country above differences, therefore the implementation of education in Indonesia must be based on culture. Culture is the whole human knowledge as social beings, which is used to understand and interpret the environment and its experience. Then, it becomes a guideline for his behavior. Culture is the whole result of human efforts to increase their dignity and dignity. Regional culture is part of national culture. One of the regional cultures in Palu City is the culture of Nosarara Nosabatutu.

In the concept of community life in Palu City and its surroundings, the government has determined that "Nosarara Nosabatutu is a policy, is a system that has been built and guided by To Kaili since centuries ago (Haliadi, 2007). Community life in diversity is united by a concept as the view that the Nosabatutu Nosasara Culture is a philosophy that means Together with Us One. That is a picture of togetherness to achieve the goal of success. Local wisdom of Nosarara Nosabatutu's must be socialized through the development of learning so that there is a process of inheritance to the younger generation. Development is carried out through scientific efforts, one of which uses research and development methods. Research and development is a creative work carried out systematically to increase knowledge, in this case including knowledge about humans, culture and society. This knowledge is used to compile new applications. Development is "the process of translating the design specifications into physical form". Seel and Richey. (Akahr, 2015) Development in learning is the process of translating concepts and theories about goals, processes and evaluation of education into physical form and can be heard, seen, felt and used for learning. As said that Instructional development is concerned with understanding, improving, and applying methods of creating instruction and the development process using the Waterfall model consists of four stages: analysis, design, implementation, and testing. The reason for using the Waterfall model is that this model in detail accommodates all that is needed in the display system starting from the analysis of customs, analysis, coding to maintenance.

This research is supported by the concept of local culture as stated by Ki Hajar Dewantara that culture and culture are the result of human civilization,(Nayono, 1994) that culture can be interpreted as all efforts and results of human and community efforts to fulfill all their needs and desires to improve their destiny. (Ayatrohaed, 1986) Culture, protection and promotion of cultural expression are important components of sustainable development,(Mancacaritadipura, 2018) while on the other hand it is recognized that culture, sustainability, development is a concept that seems difficult to understand, especially applied (Basmah Nurhidayah, 2017). There must be a commitment to develop cultural dimensions as an inseparable part of Everyone's commitment development to achieve greater cultural dimensions of development. Culture is the basic capital in development, especially the development of human resources from its humanistic side. (Sempere, 2012) Therefore the development of local culture-based learning materials has a strong basis for learning in elementary schools.

Development of a local culture-based learning material module Nosarara Nosabatutu refers to the ADDIE model (Branch, 2009). The ADDIE model is a development model that is good for traditional learning materials, electronic teaching materials and online learning. (Drljača, Latinović, Stanković, & Cvetković, 2017) The ADDIE model is easy to use Vejvodova stated the ADDIE design model was applied not only because it was easily applicable, flexible and systematic but also because it allowed turning back to previous phases (Durak & Ataizi, 2016). The ADDIE model is flexible in its use but more than that the ADDIE model demands more attention on content development because students will learn more independently and without the help of others. (Wiphasith, Narumol,

& Sumalee, 2016). Hess considers that ADDIE models can be used to develop learning materials with different objectives. (Amanda Nichols Hess, 2016). The use of ADDIE models in the development of local culture-based learning materials is based on the flexibility, clarity, and systematicity of each step of ADDIE development, besides that local culture-based learning material has the aim of minimizing the emergence of recurring conflicts in the City of Palu as hidden curriculum in this development module.

Nosarara nosabatutu is a concept of shared life carried by the people of Palu City and its surroundings, the values of shared life in diversity that have existed since hundreds of years ago, this concept is increasingly degraded due to globalization. Nosarara nosabatutu has been studied from various perspectives, but does not eliminate its existence as local wisdom that upholds the values of life in diversity in all dimensions of human life. Nosarara nosabatutu is a social approach in resolving conflicts between villages,(Ilyas, 2014) used in counseling services to improve the attitude of unity among students,(Moh. Halim, 2017) developed as a social skill that must be possessed by early childhood (Andi Agusniatih 2018). Nosarara nosabatutu has been revitalized in the form of social participation in the people of Palu City and its surroundings (Ariani, 2018), semiotic analysis of the values of nosarara nosabatutu has become the most important part in enriching the content of modules developed (Clara, 2018). From the perspective of nosarara nosabatutu learning has been raised as a process of learning history in high school (Misnah, 2018).

The waterfall is a development procedure for software components. The Nosabatutu nosarara module integrates network-based learning resources through barcodes that are connected to videos and learning resources other than videos from the internet network. This barcode is enabled by the QR scanner Nosarara Nosabatutu which can be downloaded by students from the Google Play Store application. The procedure for developing a barcode and QR scanner nosarara nosabatutu implements the waterfall model. The waterfall is a development model that is used to reduce manual approaches (Sasmito, 2017) while other studies state that the waterfall is more suitable for generic systems or software (Dr. H.S.Behera, 2010).
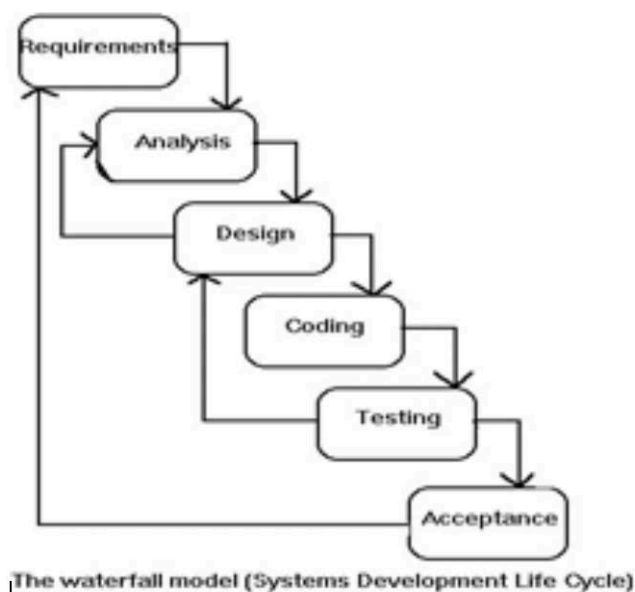

Fig. 1: Waterfall Method Model

II. RESEARCH AND DEVELOPMENT DETAILS

Learning material refers to the curriculum used in the elementary school of Palu City, but it is integrated with the local cultural values of Nosasara Nosabatutu. This study uses a Qualitative Approach with Research and Development Methods or Research and Development (R & D). The method used in this study follows the following stages; Needs analysis is intended as an effort to identify the problems that occur in the city of Palu, which is the basis for efforts to develop culture-based learning materials Nosarara Nosabatutu.

The analysis phase is also a procedure for formulating solutions to problems that exist, taking into account the character of students, teachers and the environment. Design is a procedure for formulating learning objectives and producing technical recommendations about media that can be used to achieve learning goals.

In this procedure include recommendations regarding instruments for measuring the success of learning objectives. Develop is a procedure for compiling content, delivery strategies, teacher guides, student guides, compiling test instruments, conducting trials as a process of validating learning materials through a formative test. Implementation is the actual testing procedure for classroom learning materials, implementation is an effort to measure the effectiveness of nosarara-based nosabatutu learning materials. Evaluation is a procedure to justify the effectiveness of learning materials through summative tests.

Waterfall Method Steps 1. Needs Analysis, This step is an analysis of system requirements. Data collection at this stage can do a study, interview or literature study. System analysts will dig up as much information as possible from the user so that it will create a computer system that can perform the tasks desired by the user. This stage will produce user requirement documents or can be said as data that relates to the user's desire in making the system. This document will be the system analyst's reference to translate into the programming language. 2. Stage System Design where the pouring of mind and system design to the solution of existing problems by using system modeling tools such as data flow diagrams (data flow diagrams), entity relationship diagrams (entity relationship diagrams) and structure and discussion of data. 3. Writing Program Code Writing program code or coding is a translation design in a language that can be recognized by a computer. Performed by programmers who will translate transactions requested by the user. This stage is the real step in working on a system. In that sense the use of computers will be maximized in this stage. After the coding is complete, testing of the system that was made earlier will be carried out. The purpose of testing.

III. RESULTS AND DISCUSSION

Learning material refers to the curriculum used in the elementary school of Palu City, but it is integrated with the local cultural values of Nosasara Nosabatutu. This study uses a Qualitative Approach with Research and Development Methods or Research and Development (R & D). The method used in this study follows the following stages; Needs analysis is intended as an effort to identify the problems that occur in the city of Palu, which is the basis for efforts to develop culture-based learning materials Nosarara Nosabatutu.

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The focus of research is to produce learning materials by integrating local cultural values that are implemented. The results of the design and research of this development are systematic studies of the process of design, development, and evaluation with the aim of producing products, instructional or non-intructional tools and new models or empirically refined models.

The research results are grouped based on research and development procedures which consist of five stages. It is sequentially displayed in table form. The results of the needs analysis describe the current performance and expectations that produce the percentage gap, as well as recommendations to cover the gap. In addition there are also results of analysis of student characteristics and teacher characteristics.

Table 1: Performance Analysis and Recommendations

| Performance Components | Performance | | % Gaps |
	Current	Expected	
Mastery of environmental conditions geographically	35% of students know the number of municipal districts, the names of the kabuaten capital cities and the tribes that inhabit each of these districts	All students know the number of city districts, names of capital cities and indigenous tribes that inhabit these districts	26,92
Mastery is subject to social environmental conditions	40% of students know about the social environment both in terms of ethnicity, religion, skin color, social status, status, economy and education. 40% of students know the social environment both in terms of ethnicity, religion, skin color, social status, status, economy and education	All students know the social environment conditions from all aspects of differences	30,77
Mastery of local culture and cultural products as regional wealth	25% of students know the culture and results of the local culture of the Kaili Tribe	All students know that regional culture is the wealth of the region	19,23
Implementation and implications of mastery of geographical, social and cultural conditions	30% of students have attitudes and behaviors that describe knowledge related to the geographical, social and cultural conditions of their environment	All students have attitudes and behaviors knowing, appreciating, maintaining and preserving every high value and good thing from the area where they live	23,08
Total			100
Recommendation	The purpose of development is to produce effective strategies to improve the ability of students to know, understand, implement their knowledge of local conditions into their daily lives both now and in the future.		

The results of the analysis of the characteristics of students reviewed student learning conditions are as follows:

Table 2: Analysis of the Characteristics of Student Learning Conditions

No	Questions	Answers Choices	Students Answers	
			Total	%
1	Learning Style	Listening to teachers	31	88
		Reading books	1	3
		Writing notes	-	0
		Listening while writing	3	9
2	Favourite reading materials	Books Course	17	48
		Fairy tales book	2	6
		Science books	9	26
		Comics	7	20
3	Interested on reading materials	There are pictures	4	11
		Colourful	2	6
		Interesting story	24	69
		New story	5	14
4	Favourite subjects	History	7	20
		Mathematics	18	52
		IPA/ Science	6	17
		Art	4	11

The results of the analysis of teacher characteristics are focused on the ability of teachers to develop the curriculum. Analysis relates to the ability of teachers to integrate local culture into curriculum and learning. The results of the analysis of the characteristics of learning by the teacher are as follows;

Table 3: Analysis of Teacher Characteristics in Curriculum Development and Learning

No	Questions	Answer Choices	Teacher answers	
			Total	%
1	Implemented curriculum	K 13 Revision 2016	6	100
		K 13 have not been revised		0
		KBK		0
		Others		0
2	The way to teach learning styles	Local Content	2	33
		Extracurricular		0
		Blends with other subjects	4	67
		Others		0
3	Integration of local wisdom in the curriculum	Local Content Curriculum	2	34
		Syllabus	2	33
		Lesson plan	2	33
		Learning Materials		0
4	Learning Development	Syllabus	4	67
		Lesson Plan	2	33
		Materials		0
		Others		0

The results of the research at the design stage are learning objectives related to the four components of capability in the curriculum, completely can be seen in the following table:

Table 4: Research Product Validation Tests

| No | Test | | Total item of test/ reading materials | Partisipan | | Description |
	Form	Specification		Status	Total	
1	Questionnaire	Media validation	76	Expert	1	one-to-one expert
		Material validation	50	Expert	2	
		Language validation	18	Expert	1	
		Validation of practitioners	76	Elementary Teachers	3	One-one- guru
2	Close test	Reading texts	6	Students	9	One-to one learner
3	Multiple choices	Formative (3 unit)	15/unit	Students	8	Small group
		Sumative	25	Students	37	Big group

The results of the develop phase are local culture-based learning materials Nosarara Nosabatutu arranged in the form of student module books and teacher modules. At the develop stage there are validation procedures by experts, teachers and students. Systematically the material in the teacher module adapts to the student module while the systematic material in the student module can be seen in the table below;

Table 5: Systematics of Material in Student Modules

No	Learning Units	Learning Activities	Materials	Pages
	1	1	I live in central Sulawesi	5 - 17
		2	We are brothers and sisters	18 -37
		3	Bear destiny together	38 -53
	2	1	The uniqueness of my region	54 -65
		2	The beautiful of unity	66 - 80
		3	Respecting culture	81 – 96
	3	1	My reach area	97 - 113
		2	I am proud living in Central Sulawesi	114 -131

The results of the validation test (one-to-one) for the feasibility of modules from experts and teachers are as follows:

Table 6: One-on-one and Teacher Expert Test Results (One-to-one Expert and Teacher Trials)

No	Assessment type	Number of raters	Average scores	Conclusion
1	Linguists	1	3.9	good
2	Design Expert	1	4,3	Very good
3	Materials experts	2	4,5	Very good
4	Teachers	3	4,5	Very good

Table 7: Result of One-to-one Student's Test

| Schools | Initial Name | Reading Title being Tested | Test results | |
			Correct Answers	%
SDN Model Madani	TAG	Honesty canteen	27	93,10
	SB	Givu	35	92,11
	MYM	Buya Sabe	20	100
SDN 15 Palu	KSS.	Honesty canteen	29	100
	AS	Learn from history	37	97,37
	VSB	Palu City	10	90,9
SDN 10 Palu	EG	Palu city	6	54,54
	YNM	Honesty canteen	18	62,07
	SN	Learn from History	35	92,11
	Average scores			86,8

The results of the implementation of learning products in small groups are in the table below:

Table 8: The Result of Small Group Trials Test

No	Initial name	Test result			Average	Description
		Unit 1	Unit 2	Unit 3		
1	AM	80	100	80	86,7	Complete
2	AR	100	100	80	93,3	Complete
3	DYS	80	80	80	80	Complete
4	GRA	60	80	80	73,3	Complete
5	JGR	80	100	80	86,7	Complete
6	KA	80	100	100	93,3	Complete
7	MRR	100	100	100	100	Complete
8	WD	80	80	100	86,7	Complete
	Average completeness scores				100	

Large group testing is the last activity of the implementation phase. The large group test was applied to 37 students. This data only shows the percentage of success classically by comparing the results of the pretest and posttest. The large group test is a summative test as the last step in the validation of Nosarara Nosabatutu based learning materials.

Table 9: Results of Big Groups (Field Group Trials)

Criteria	Pretest		Posttest	
	Students	%	Students	%
Fail	14	37,84	0	0,00
Less	17	45,95	1	2,70
Enough	6	16,22	17	45,95
Good	0	0,00	12	32,43
Very good	0	0,00	7	18,92

The Evaluation Phase was carried out throughout the study, in substance there were no changes to the learning material, revisions were only made to the layout or physical appearance of the learning material. Some revisions made to the nosarara nosabatutu module include

1. Pictures of teachers cannot turn their backs on students

2. The font size is changed to size 12

3. The layout is adjusted to the function and small size of the image

4. The book design is arranged as closely as possible with the books that students use.

Research and Development in general is an empirical study that produces certain products in all forms and purposes. Products produced from Research and Development (Research Development) through empirical verification process through long stages and processes.

The Nosarara Nosabatutu module needs to be validated to prove and justify that the module empirically is feasible to use. Module validation is done through three stages, namely one-to-one trails, small group trials, and field group trials. These three stages require relevant instruments. In this context for one-to-one teachers and experts the instrument is in the form of an answer choice questionnaire in the form of a differential semantic scale. One-to-one learners use an instrument in the form of a close test (Sitepu, 2014), students are given a reading with the instruments presented need to be compiled for validation. Table 5 describes the types, quantities and participants needed in the validation process.

Table 1 is a needs analysis that draws the percentage gap in elementary school students in Palu City. Needs analysis is important to know exactly what is needed by students in learning. Needs analysis is an important component of the analysis phase in the ADDIE model, needs analysis provides clear direction on why, what and how learning materials are developed.

Table 2 and table 3 are the results of the analysis of the characteristics of students and teachers. Analysis of student characteristics is needed as a basis for compiling material and module design. Modules must be adapted to the characteristics of students, so that the content of the module can be understood more easily by students and the purpose of developing the module is achieved. The first is to identify needs. It is an important factor in the total design process. Instructional designers use survey, observation and interview methods to determine students' need to learn (Isman, 2011), in this context the analysis of student perceptions becomes an integral part of student characteristics (Stess, Maeyer, Gijbels, & Petegem, 2012), students need to be determined to know the skills needed by students (Linh, 2015). While the analysis of teacher characteristics is related to the ability to develop the curriculum, it provides an overview of how development products can be implemented in schools. Teacher analysis support for curriculum development in schools was put forward by (Kanuka, 2010), (Soine & Lumpe, 2015), under certain conditions it is necessary to analyze teacher characteristics from the student's perspective (Calaguas, 2016).

Table 4 is a draft systematics module nosarara nosabatutu, systematics of the material in the module is adapted to the values of nosarara nosabatutu. The concept of shared life in diversity which is the main value in nosarara nosabatutu is grouped into 8 (Haliadi & et. al, 2007). The concept of nosarara is supported by the values of brotherhood, unity and unity, togetherness and family, while nosabatutu is supported by shared values, mutual respect, caring for shared property, maintaining confidentiality and prudence. The transformation of the 8 values is done by presenting various components of local culture that are relevant to these values. The presentation in the module is a written description of history, art, folklore, and the real-life reality of the people of Palu City, especially in groups of people who still uphold and apply the values of local culture in their daily lives.

Table 5 describes the types, quantities and participants needed in the validation process. The research instrument was validated by experts in the field of evaluation to determine the validity of the construct. Determination or selection of validators is adjusted to the type of instrument validation and expertise of the validator, especially the expert validator. Besides being validated by experts, the module was also validated by students through one to one trials readability test, meaningfulness and benefit test through small group testing and large group testing.

Table 6 is the result of research from the develop stage, language experts give a score of 3.9 (good), learning design experts give a value of 4.3 (very good), the average value of 2 material experts is 4.5 (very good) and average 3 teachers give a score of 4.5). The average score given by 3 expert groups and teachers is 4.3 or a very good category. Based on the values given by experts and teachers this module is worthy of use and continued in the next test.

Table 7 is the result of the study and is still part of the develop stage, in table 7 is the one-on-one test data. One-on-one tests involved 9 students from 3 different schools, one school involved 3 students. Readability data through one to one is collected through cloze test. Readings are taken in a random module and omitted a few words, in this

case the researcher removes every 5th word consistently. Students are asked to complete a text that has been omitted by a few words (overlapping text), so that it becomes a complete reading again. The involvement of students in the validation process is related to readability testing, both in terms of language and content. In this case the ability of students to understand and interpret module content is an important aspect, with a readability level above 86, 8% of nosarara nosabatutu modules are in the very easy category. This means that the module can be easily understood by students until it can be continued for the next test.

In small groups, tests are carried out relating to efforts to measure whether the module answers the learning needs of students. In other words, is the module developed in accordance with the competencies needed by students in learning. Table 8 presents data from the results of small group trials. At this stage the data collected is student learning outcomes and compared with the completeness criteria used in school. The results of the analysis showed that 8 students involved in the small group test completed all, so the percentage of completeness in the small group was 100%. This data is a clear indicator that the module is relevant to student learning needs, thus the module is feasible to be continued in the next test.

Large group trials are part of the implementation phase of the ADDIE model. This is based on the view that large group trials are applied to real classes or actual classes. The conditions and climate that occur in the classroom is a natural atmosphere without treatment. The teacher still manages learning with the same concept but by applying module learning materials nosarara nosabatutu. The data in this large group test classifies students according to their success in learning before using the module and after using the module. Based on the results of the analysis of the level of success of student learning, qualitatively there was an increase in the category of adequate, good and very good at 81.08%, while the categories were unsuccessful and there was a decrease of 21, 62%. Thus, the qualitative Nosarara Nosabatutu module can increase the percentage of student learning success and also can reduce the percentage of student learning failure.

IV. CONCLUSION

The conclusions drawn based on the findings\ are as follows:

1. The form and substance of learning materials in the fourth grade of Palu City Elementary School on the theme of the environment are: the form of textbooks for the Themes of Region 8 of My High School lessons, published by the Ministry of Education and Culture of the Republic of Indonesia in the form of e-books.

2. Local culture-based learning materials in Palu City are available in three components, namely conceptual, procedural and physical. Conceptually it contains concepts that build learning materials, procedurally contains stages and steps taken to use the module and physically in the form of student books in the form of nosarara nosabatutu modules and teacher books in the form of teacher modules. Both conceptual and procedural are the contents and substance of physical forms.

3. Local culture-based learning materials for SD Kota proved to have high validity with a one-to-one expert validation value of 4.3 or a very good category, one-to-one learner validation of 86.8, small group trials 100% complete classics.

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