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The Development of Multiple Intelligence-Oriented Thematic Multimedia in Elementary Schools

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ABSTRACT
The developmental study conducted aims to develop learning multimedia on the empowerment of multiple intelligences in elementary schools. The aim is achieved by gradually developing learning multimedia by implementing a product development model. The development of the learning multimedia is implementing Luther development model that consists of creating concept, designing, collecting materials, creating product, testing, and distributing. After all stages are done, evaluation is conducted. The type of evaluation conducted is formative evaluation which aims to determine the things that need to be improved or revised to produce more systematic, effective and efficient multimedia. The formative evaluation on the multimedia adopts the formative evaluation stages according to Dick, Carey and Carey (2005) which covers three stages, namely individual trial, small group trial, and field trial. The trials are proceeded by expert validation or review. It is done by two experts; one in media and one in learning design. The trials involve 3 students for the individual trial, and 12 students for the small group trial. During the product development, the data on multimedia validity are collected using questionnaire. As the product of the development, a multimedia has been developed following Luther‘s model. According to the experts, the learning design and media aspects get very good category. Both aspects also get very good category in the individual and small group trials.

Keywords: *Learning Multimedia, Multiple Intelligences*

1. INTRODUCTION

One of the factors that determine the quality of education is the quality of the learning process. A quality learning is the learning that is able to inspire students and provide chances for students to interact with teachers, with each other and with other learning resources. The learning atmosphere should be fun, challenging, motivating and providing opportunities for students to develop their whole potentials. A learning component that has a strategic role on the success of learning at schools is teacher. Teachers’ personality, social, pedagogical, and profesional competencies are basic capital in facilitating students’ learning process. [1] states that interest, talent, ability and other potentials of students will not optimally developed withour teachers’ assistance. In addition to teachers, in this era of information and communication technology, the existence of media also has a quite strategic role. The invention of smartphones enables simulations of anything by using applications, such as assembling things, learning to count, learning a language, learning to draw and others. Thus, besides teacher, technology is one thing that has to be given attention to in identifying and developing students’ interests and talents.

One of the uniqueness of students that needs attention is multitalented intelligence (multiple intelligences). Intelligence as the ability to solve problems and produce products in a variety of settings and real situations. Until now, there are nine intelligences known, namely: 1) linguistic intelligence, 2) mathematical-logical, 3) spatial/spatial intelligence, 4) kinesthetic-physical intelligence, 5) musical intelligence, 6) interpersonal intelligence,7) intrapersonal intelligence, 8) naturalist/environmental intelligence, and 9) existential intelligence [2].

Multiple intelligences, such as interpersonal and intrapersonal intelligences are kinds of intelligences which are really needed in the 21st century. Intrapersonal intelligence is related to the ability to manage themselves well, take responsibilities, have work ethic, and being punctual. Those characters are the manifestations of softskills which are needed in the work place in the

present and the future. So is interpersonal intelligence. It is really needed in communication, diplomacy and building cooperation with others. It is a mandatory competency and is very crucial for this nation's competitiveness. However, there are not many teachers develop and empower those intelligences in their instructions yet. Instructions at schools generally emphasizes academic intelligence empowerment (linguistics and logic-mathematics). There has not been any development on learning media that especially foster students' multiple intelligences. The results of the need analysis indicate that availability of the learning media that can improve students' multiple intelligances have to be improved.

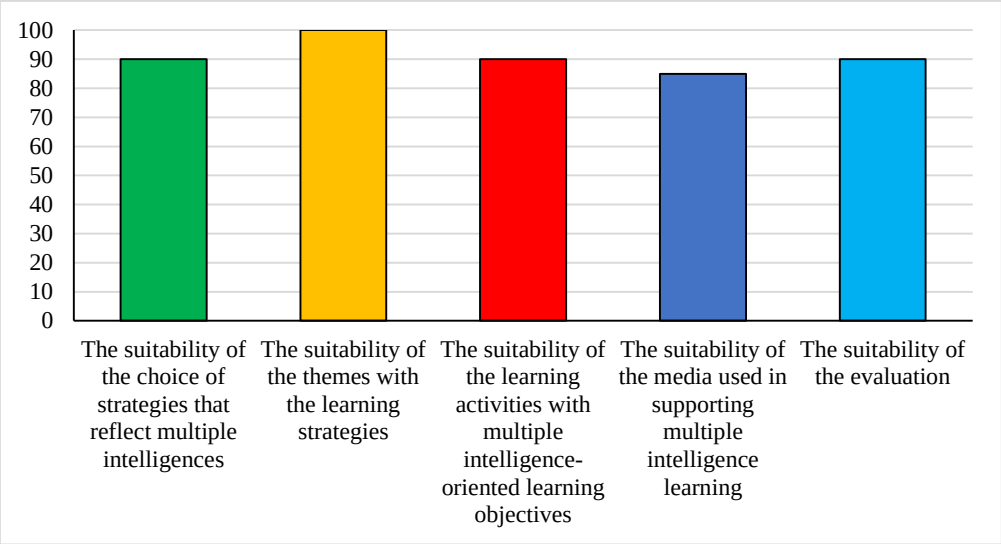

Figure 1 The Results of the Evaluation of the Lesson Plans of Teachers in Buleleng Sub-district

It can be seen in figure 1 that the aspect of media appropriateness in supporting multiple intelligence learning has the lowest score with average score 85. It indicates that the use of learning media, particulary multimedia, does not yet get serious attention from teachers. There are some probable causes, namely the limited number of learning media in elementary schools, the existing media does not suit the newest materials, and the limitation of teachers' skills in creating media, including multimedia. As also indicated by the results of the need analysis, it can be said there is no media, especially multiple intelligence-oriented learning multimedia is available at schools. Thus, its availability is really needed.

The existence of multimedia in elementary schools in general is still very rare, especially multimedia that is deliberately designed to develop multiple intelligences. In the digital era, elementary school students are generation Z who are already fluent in the existence of information and communication technology. Multimedia is indispensable both as a classical learning medium and independent learning media. Multimedia is a concept that has been around for a long time. The term multimedia according to [3] presents two elements, namely text (spoken or printed) and images (illustrations, photos, animation, or video). The type of multimedia learning according to its use can be divided into two, namely multimedia learning presentations and multimedia independent learning [4]. The results show that multimedia can improve learning completeness, and increase understanding so that it contributes to improving learning outcomes [5], [6],[7],[8].

Currently the existence of multimedia has been manifested in various forms of applications. The existence of interesting computer applications should be used to develop multiple intelligences for elementary students, such as educational game applications, simulations, electronic puzzles, digital puzzles and so on. The use of this technology is thought to be able to develop students' cognitive abilities, including identifying the dominant type of intelligence in each individual student. The development of multimedia-oriented learning with multiple intelligences can have an impact on the learning and learning process, namely: 1) multimedia is able to facilitate students in working independently, 2) multimedia is able to develop multiple intelligences, such as mathematical intelligence, linguistics intelligence, spatial intelligence, musical intelligence and naturalistic intelligence, 3) multimedia is able to present simulation, games, experiments, tutorials as methods of developing multiple intelligences, 4) multimedia is able to present learning messages using pictures, videos, and animations to make them more interesting and easy to understand, and 5) the learning will be more student-centred and varied so that can trigger optimal learning process.

Multiple intelligence-oriented learning multimedia will provide learning patterns in the forms of games, experiments, quizzes and cases. From those patterns, students are directed towards the development of

logic/mathematical intelligence, spatial intelligence and linguistic intelligence. From the use of those patterns, the dominant intelligence of one student will be identified so that teachers can guide the students on that intelligence.

Through the development of the learning multimedia, it is expected that teachers, especially in elementary schools, will find it easier to develop students' multiple intelligences. Students will also be able to interact with the learning multimedia so that they can be independently active in recognizing their own intelligences through the learning patterns that they get in the multimedia. The product of the study is expected to be disseminated to teachers in the efforts of improving the empowerment of students' multiple intelligences, particulary in elementary schools. The aims of every stage are as follows: 1) describing the steps of developing multiple intelligence-oriented learning multimedia, 2) analyzing and presenting the quality of the media based on the experts' judgement, and student trial.

2. METHOD

This research is a developmental research. A developmental research is a research that is oriented towards developing and validating the products used in education [9]. The development model applied is Luther's model (in [10] as in Figure 2.

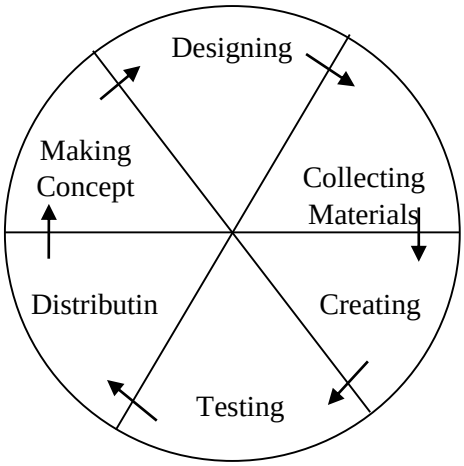

Figure 2 Development Model

The multimedia developed has gone through a series of validation and trial. For the validation and trial to using a formative evaluation model [11], the trial design is presented in Figure 3. below.

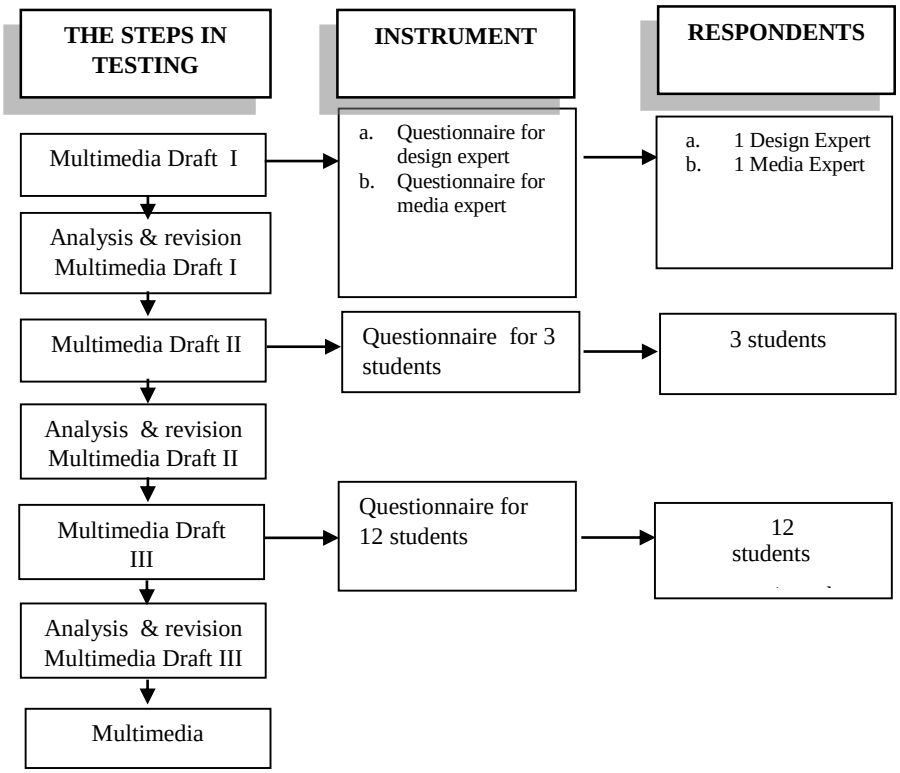

Figure 3 Trial Design of the Product Development Draft (Adapted from [12])

As seen in Figure 3, the multimedia trial has gone through four stages, namely expert validation, which involves two experts; one in media and one in design, individual trial which involves 3 students; one student with high learning achievement, one student with average learning achievement and one student with low learning achievement. In the stage of small group trial, 12 students with the same characteristics as the individual trial are involved. The data are collected by using questionnaires and tests. Questionnaire is used to collect data from the design, media experts, individual trial and small group trial. The data collected are then analyzed descriptively.

The guideline used in making decisions on the revision of the learning multimedia is presented in table 3.

Table 1. Scale Achievement Level Conversion Table

Achievement Level (%)	Qualification	Remarks
90-100	Very good	No revision is needed
75-89	Good	Minor revision is needed
65-74	Adequate	Revision as Needed
55-64	Insufficient	Major revision is needed
0-54	Very insufficient	Remake the product

Source: [13]

3. RESULTS

Thematic multimedia has been successfully developed by implementing Luther's Model. Multimedia is used to develop mathematics, language, and spatial intelligence. The following picture showcases the thematic multimedia.

Figure 4 The Display of the Home Page

The homepage has 3 Learning Activities. Learning Activities 4,5,6 are hidden and have pre-requisites. If the students complete learning activities 1,2,3 well, they can proceed to learning activities 4,5,6. The image below showcases one of the games used to develop spatial intelligence.

Figure 5 Game to Develop Spatial Intelligence

The game displayed above is specially designed to develop students' spatial intelligence. Students are given cases that require them to locate school fast and accurately. In locating the school, students will be given a few distracting paths so that the careful students will be able to determine the right path.

The testing stage was done by an expert in learning design and expert in media. The results of the validation are as follows.

Table 2. Results of the Validation of Expert in Learning Design

No	Indicators	Scores (1-4)
1	The clarity of the titles of the learning multimedia	4
2	The clarity of the objectives in the learning multimedia	4
3	The suitability of the games used for each intelligence	4
4	The contents of the multimedia are easy to understand	3
5	The suitability of feedback or responses used in the learning multimedia	4
6	The interactivity (stimulus and response)	4
	Total	23
	Score	95,83

The results of the validation of the expert in learning design shows that the thematic multimedia gets score 95,83, which is in **Very Good** category. The suggestions given by the expert are as follows: 1) write the name of

the developing team on the CD cover and on the multimedia, 2) make a cover for the CD. The table below displays the results of the validation of the expert in learning media.

Table 3. The Results of the Validation of the Expert in Learning Media

No	Indicators	Scores (1-4)
1	The attracttiveness of the packaging of the learning media	4
2	The readability of the texts in the media	4
3	The suitability of the pictures used with students' characteristics	4
4	The suitability of the colors of the texts with the background	4
5	The suitability of the texts chosen to be used	4
6	The suitability of the position of the texts on every page	4
7	The atttractiveness of the media presentation	4
8	The suitability of the picture presented with the material	4
9	The level of the interactivity between students and the media	4
10	The feedback given towards students' responses	4
	Total	40
	Score	100

Based on the results of the validation of expert in learning media, the thematic multimedia gets score 100, which is in **Very Good** category.

The individual trial involves 3 students. The results are presented in the table below.

Table 4. The Results of the Individual Trial

No	Questions	R1	R2	R3
1	Is the presentation of the multimedia interesting?	3	3	3
2	Is the multimedia easy to use?	2	2	3
3	Are you pleased/motivated learning with the multimedia?	3	3	3
4	Are the materials presented in the multimedia easy to understand?	3	2	3
5	Are the games presented interesting?	3	3	3
	Total	14	13	15
	Score			93,33

Remarks R: Respondent

The responses of the three students in the individual trial indicate that the media gets score 93,33, which is in the category of Very Good . The students' responses in the small group trial are presented in the table below.

Table 5. The Results of Small Group Trial

No	Questions	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12
1	Is the presentation of the multimedia interesting?	3	3	3	3	3	3	3	3	3	3	3	3
2	Is the multimedia easy to use?	3	3	2	3	3	3	3	3	3	3	3	3
3	Are you pleased/motivated learning with the multimedia?	3	3	3	3	3	3	3	3	3	3	3	3
4	Are the materials presented in the multimedia easy to understand?	3	3	3	3	3	3	3	3	3	3	3	3

No	Questions	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12
5	Are the games presented interesting?	3	3	3	3	3	3	3	3	3	3	3	3
	Total	15	15	14	15	15	15	15	15	15	15	15	15
	Scores	99,44											

The responses on the 12 students involved in the small group trial show that the media gets score 99,44, which is in the category of Very Good.

4. DISCUSSION

The thematic multimedia developed gets score **very good** in the aspects of learning design and learning media. There are a few factors that contribute to the achievement of the score. In the aspect of learning design, the theory on learning design on multimedia has been applied. The learning activities in the multimedia are in accordance with the development of the elementary school students, especially the first students. More games are developed in the multimedia so the students are more attracted to learning. The games presented are not merely games, but they also have intelligence aspect to be developed. For example, the map game where students' spatial intelligence is trained by locating their houses or school. Another example is the number guessing game where students' logic and mathematical intelligence are developed. Other things that have been applied in the multimedia are the sequence of learning activities. The sequence goes from the easier to the more difficult games. If the students have finished a game, they can proceed to the following games so that the mastery learning concept is also implemented in the multimedia developed. The results showed that game education was able to increase understanding, motivation and learning achievement [14], [15].

The multimedia developed gets **very good** category in the aspect of learning media. This is related to a few things. **First**, the materials in the multimedia are presented based on the message design theory, starting from the the choice of the types and sizes of the fonts, colors and pictures are in accordance with the characteristics of the targets. The message design theory also has roles in the blending of the visual and audio elements. The harmony between the audio and visual elements enables the students to understand the message to be delivered. The researchers find out that students who are taught using audio and visual elements or multimedia have high retention level compared to the students who are taught using conventional methods (Beerman in [16]). **Second**, the materials in the multimedia are mostly interactive. It means that the students have to play games that are available in the multimedia. These types of games will make the students more interested in the materials and understand them.

In the invidual and small group trials, the score gained is very good. This is presumed to be caused by a few factors. **First,** the thematic multimedia is interestingly designed so that it can attract students' attention. The attractiveness of multimedia is an important initial element because the first thing that the students see before using media is its look. When students see the media and it is attractive in their eyes, their curiousity of the media will be triggered. A few media elements that attract students are (1) the media has unique shape and has not been seen by students especially in their learning in class, (2) the media uses interesting characters with harmoniuos colors, (3) students can interact with the media so that they are triggered to try it, and (4) use of attractive visual images, colors, fonts, and sound or audio elements. The results showed that visuals were able to attract attention and increase students' understanding of concepts [17]. **Second,** learning media stimulates students to be actively involved with it. The media developed is based on the cognitive and constructivism theories. The cognitive learning theory is used as a reference so that the media is able to make the learning materials concrete based on the students' developmental stage. Meanwhile the constructivism theory is applied in designing the media so that it can make students active. In its implementation, the media is used thoroughly by the students while the role of the teachers is as supervisors and facilitators. Students are given questions through a game and they will complete the questions or the cases in the media. One example of students' activities is to easily calculate through the counting game. Students have control in the learning process. Multimedia that is interactive will be more useful and help student learning activities [18].

5. CONCLUSION

Thematic multimedia has been succesfully developed following Luther's Model that consists of 6 stages. However, this research is conducted only until the fifth stage. The stages that have been completed are: 1) making concept, 2) designing, 3) collecting materials, 4) creating the media, 5) testing. Based on the validation of the experts in learning design and learning media, the thematic multimedia developed is in very good category. The results of the individual and small group trials also indicate that the multimedia developed is in very good category.

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