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DISASTER PREPAREDNESS IN THE FORM OF MODEL EMERGENCY SCHOOL LEARNING WITH *FUN LEARNING* APPROACH USING RECYCLING HOUSEHOLD WASTE LEARNING MEDIA

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ABSTRACT

Almost all regions in Indonesia, according to the geographical conditions, are including areas prone to natural disasters, so that it's hardly required a disaster-preparedness. One of the consequences is palpable in the field of education where students have difficulty both mentally psychologically and physically with the destruction of learning facilities. For this reason it is deemed absolutely necessary to prepare a model of disaster preparedness in the form of emergency school learning that emphasizes to the approach of fun learning in an effort to rehabilitate the psychological condition of students. Remembering the emergency conditions in which many learning tools are damaged hence the media made of plastic and metal waste are specially implemented for handling education in post-disaster areas. Research method used is Research and Development (R & D) by using the four-D Models (Define, Design, Development, and Disseminate). The results of the research are: (1) a learning tool have been developed through a test in SDN test Wojo (tsunami disaster, Bantul) and SDN Pangukrejo (Mount Merapi disaster, Sleman), (2) study module base on fun learning is yielded by using the media of plastic and metal waste, (3) the increase of mental stamina and motivation of the students to study, and (4) learning about early detection and integrated disaster risk in science subjects in primary schools affected areas can be developed.

Keywords: *disaster preparedness, fun learning, emergency school.*

INTRODUCTION

Almost all regions in Indonesia, according to the geographical conditions, are including areas prone to natural disasters, so that it's hardly required disaster preparedness. One of the consequences is palpable in the field of education where students have difficulty both mentally and physically psychologically destroyed and damaged by learning facilities. Disasters are also often causing a prolonged effect for children. Education infrastructure destruction caused by the disaster make the children lose the opportunity to participate in educational activities. Educational activities then held in emergency schools. In many disaster incidents, this condition lasted for a long time. This situation is clearly less favorable for them who have to learn with limited facilities, and ultimately teaching and learning process cannot take place optimally.

Legal framework to address this case has been mandated in the 1945 Constitution article 31 paragraph one which states that every citizen has equal opportunity to obtain education. Similarly the Law on National Education System Law No. 20 of 2003of the eleventh section of article 32 that states about the government's obligation to conduct special education for those who have difficulty in learning.

For this reason it is deemed absolutely necessary to prepare a model of disaster preparedness in the form of emergency school learning that emphasizes to the approach of *fun learning* in an effort to rehabilitate the psychological condition of students. Remembering the emergency conditions in which many learning tools are damaged hence the media made of plastic and metal waste are specially implemented for handling education in post-disaster areas. Besides that, this research is also introducing to the students about the existing knowledge about disaster, as emphasized by the United Nations International Strategy for Disaster Reduction (UN ISDR) in

the form of *Institutionalizing Integrated Disaster Risk Management at School.*

The study involved several experts and practitioners who have been involved in the development of disaster-prone school education either in college involving science experts (Suyoso, M.Sc. and July Astono, M. Si) as well as educational evaluation experts (Dadan Rosana, M.Sc.), or experienced enough teachers in learning science in elementary schools from SDN Wojo Banguntapan Bantul and SDN Pangukrejo Cangkringan Sleman. In relation with that, hence this research activity located in the Science Laboratory of FMIPA UNY, SDN Wojo Banguntapan Bantul and SDN Pangukrejo Cangkringan Sleman Jogjakarta.

Later in the second year it will be held a limited dissemination involving teachers and students around the disaster-prone eight schools in Jogjakarta. Thus it is clear that the subject of this research are the students and teachers from several schools located in areas where the tectonic earthquake in Bantul District, and Mount Merapi volcanic disasters in the district Cangkringan of Sleman regency in the province of Jogjakarta Special Region.

In the first year the number of students involved as a part of limited restricted dissemination stage only about 32 people since the number of students in two most vulnerable schools selected is limited in number. The study also refers to empirical validity by some good teachers who are in one group with the selected schools as a place of trial; those are the district Cangkringan and district Banguntapan. Therefore, beside the students who attend school in disaster-prone area also involved four teachers who taught science at those two schools.

The first year of research results has been able to develop a learning tool as follows: (1) Practicum device special for recycling, (2) Learning Plan, (3) Student Activity Sheet (LKS) and (4) Instrument Evaluation.

The Learning device has been tested on students at SDN Wojo and SDN Pangukrejo. This is in accordance with the specific purpose of the research relating to the objectives of the *third* and *fifth* that is; developing learning media by using waste materials or waste plastics and metals that be easily obtained in the post-disaster areas, and producing *fun learning* based module using the media learning from plastic and metal waste. Thus, this design can be applied in accordance with the *second* goal that is, developing teaching and learning strategies with *fun learning* approach, in an effort to improve mental resilience and motivation to study further after the disaster that comes with the realization of the *first* research objective that is; to develop learning about early detection and disaster risk integrated in science subjects in elementary schools disaster areas. In accordance with the original study design has been obtained, the results of this study are divided into three main sections:

1. The result in the form of real product
   a. Media learning utilizing waste materials or waste plastics and metals that can be easily obtained in the post-disaster areas
   b. *Fun learning* based learning module using the media of plastic and metal waste
   c. Observation sheet of limited activity dissemination
   d. Observation sheet of teacher training activities
   e. Student Activity Sheet associated with the media developed
   f. Profile of students' skills in using the media
   g. Assessment of the learning process
   h. Product Assessment, student learning outcomes (cognitive tests and portfolio)
   i. Articles and Proceeding/Journal of Sciences in the submission stage of the manuscript to the editor of Education Journal Research Institute of Yogyakarta State University
2. The results in the form of recording process of the activities
   a. Instruments Analysis
   b. *Need assessment* (analysis of the needs of disaster-prone school students)
   c. *Performance assessment* (performance of disaster-prone-school-students of science teachers)
   d. Observation sheet and questionnaire of attitude
   e. Cognitive test
   f. Portfolio
   g. Learning assessment tool
   h. Recording Photos
   i. Videotape
3. The results in the form of Partnership

This first year of activities carried out cooperation with SDN Wojo Bantul and SDN Pangukrejo Sleman in teacher training activities for a group of work and one trial learning tool and the evaluation instruments at those two

schools. This cooperation is conducted within the framework of limited testing, consulting of learning implementation and media development. Besides that, it has explored the possibility of cooperation with several schools that are also located in disaster-prone areas of tectonic earthquake and Mount Merapi in Jogjakarta Special Region.

RESEARCH FINDINGS

This research uses several methods in the framework of research and development (R & D) those are; descriptive, evaluative, and experimental. Descriptive research methods used in early studies were to collect data on existing conditions. Evaluative research method is used to evaluate the testing process of product development. And experimental research method uses to test the efficacy of the product produced. While the model testing phase was conducted *collaboration action research* strategies involving teachers directly in primary schools and disaster-prone students in the bottom of school concerned.

Moved from the consideration of approaching systems that the development of practical tools for students at the school vulnerable to disasters will not be quit of management and organizational context of learning, hence the spiral model is selected as referenced by Cennamo and Kalk (2005). In this spiral model there are 5 (five) development phases, those are: (1) definition (define), (2) design (design), (3) show (demonstrate), (4) development (develop), and (5) presentation (deliver).

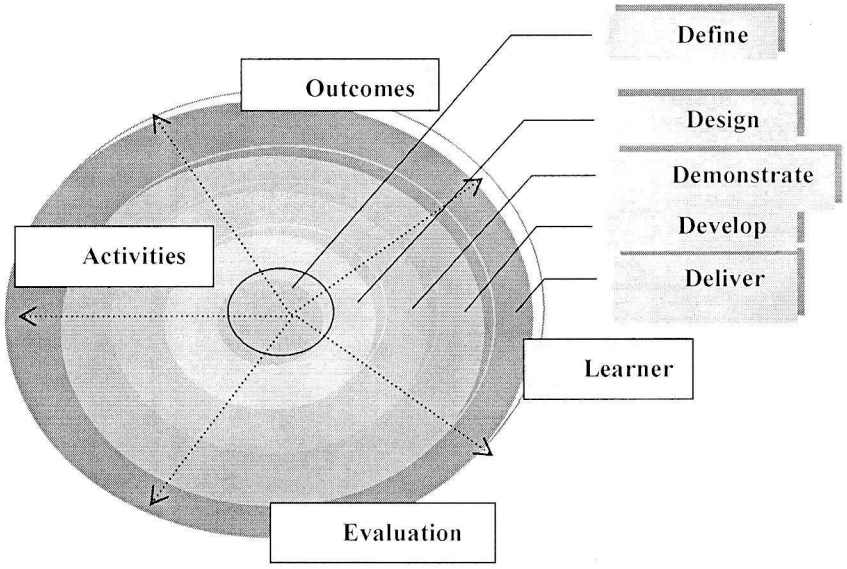

Figure 1 Five phase spiral model of teaching design
Source: Cennamo and Kalk (2005)

A research in the first year begins with a need analysis in the schools potentially affected both by the volcanic Mount Merapi disaster and tectonic earthquake. Analysis is done to determine the basic needs related to the continuity of teaching and learning process after disasters. Simply research stage that has been successfully conducted in the first year of this study can be viewed on the diagram below. Learning tool development activities which adopt the development model of Kemp et al. (1994) has successfully developed the necessary learning tool in science teaching and learning process for students of disaster victims in the secondary school level. The learning device that successfully developed are: (1) Practicum device special for recycling, (2) Learning Plan, (3) Student Activity Sheet (LKS) and (4) Instrument Evaluation. Learning device has been tested on students at SDN Wojo and SDN Pangukrejo.

Conducting research of the application of learning tools in science courses held on the two partner schools SDN Wojo and SDN Pangukrejo, which the teachers followed the training. These implementation activities have been held from 18th July 2006 to 20th September 2008 with duration of 2 sessions per week. Each time meeting or forwarding of RP, it observed: (1) the ability of teachers to manage teaching and learning activities with teachers' competency evaluation instruments, (2) teacher

and student activity in learning, (3) Profile of student abilities, and (4) performance and attitudes of the students during the teaching and learning activities with the corresponding instrument. Observations of each activity are presented in Figure 2 below.

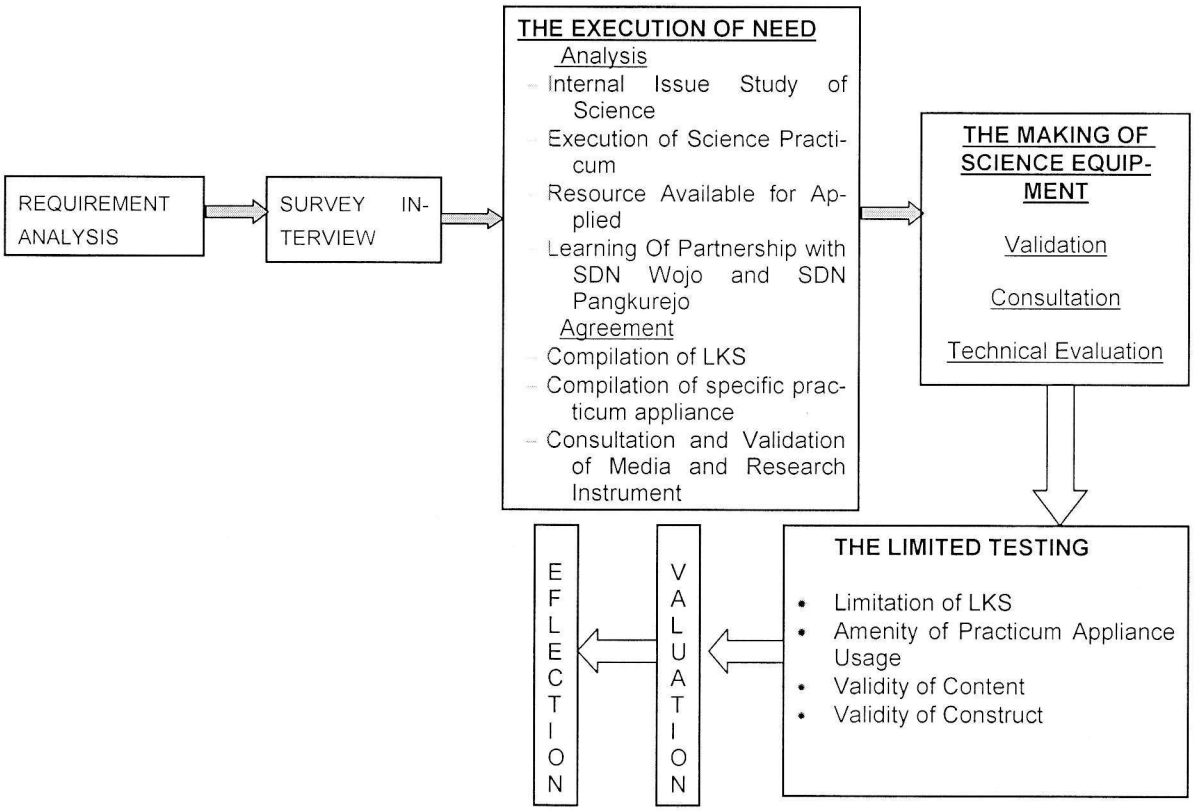

Figure 2 The step diagram execution of research

1. Teachers Ability in Managing Learning

Partner teacher's ability in managing cooperative learning focuses on the ability of activities: Learning Preparation, Introduction, core activities, Closing, Time Management, and the ability of teachers to control classroom atmosphere.

2. Teacher and Student Activities in Education

Teacher and student activities during teaching and learning activities are expressed in percentage of teacher and student activities occurred during the learning process. Percentage of teachers' activities ranged from 7.5% to 35.8%. Activity of the most dominant teachers are explaining teaching materials, that is 35.5% and seek additional examples 21.5 % whereas the least activity a teacher is providing feedback 8% and stimulating to considering the concept 8.5%. While the students' activities are dominated by listening / paying attention to the teacher's explanation or other students 32.1% and the least was asking questions 11.4% and writing down important things that 12.4%.

3. Evaluation Response Against Students Learning

Based on data from the response of students' attitudes towards learning using the learning tool created specifically for disaster emergency handling, it is clear that there is a positive improvement of student attitudes. This is of course a very significant capital to develop further learning, because the attitude that one of them associated with the motivation to be critical success factors of the program.

4. Implementation Evaluation Discussion of Student

The students' discussion activity getting better, this leads to higher activity. This can be seen from the increasing percentage of the activity on next meeting which 1, 2 and 3 values decreased, and the value of 4 and 5 increased.

5. Cognitive Test

This test is used to see students' cognitively level after learning activities were carried out, besides that this test is important to see the correlation between performance and cogni-

tive. This cognitive test consists of 4 formative testing devices and 3 structured tasks based on empirical testing it fit to be used. The average difficulty levels of tasks are medium, which is only about 6 tasks with high difficulty levels and three tasks with low difficulty levels. The complete results of tests of cognitive instruments can be found in the appendix.

The test results of the product are used to determine the student mastery level of subject matter which is measured by assessing the cognitive abilities in learning. Then the cognitive ability will be reviewed individually that called as the individual's exhaustiveness, and viewed as a whole class of students attending class from beginning to end that called as classical exhaustiveness.

The average proportion of correct answers to the first students' formative test 1 is 0.26, and the average proportion of correct answers after they learned using the devices made with the next three formative tests (formative test 2, 3, and 4) is 0.72. Thus, the average proportion of students' correct answers increased amount 0:46. The results of students' exhaustiveness analysis prove that, 23 students or 88.64% of the students have completed their study, of 26 students who follow the field practice of teaching and learning activities and discussions. Thus, classically the students have completed their study, because the percentages of students who have completed their studies exceed the standards set forth in exhaustiveness syllabi. According to the science syllabi, the class is complete if 85% of the students have completed their study, or 85% of the students had p ³ 0.65

There is increasing in cognitively levels between before and after treatment that can be viewed with different test, t test. This indicates that the treatment provided significant enough to increase the level of student cognitively.

6. Correlation between Performance and Cognitively

It can be shown an interesting thing about the correlation between performance and cognitively in this research. By using the Bivariat Kuder-Richardson correlation using the SPSS program, it showed that there is a strong correlation between performance and cognitively.

One important thing that needs to be analyzed for this study is the correlation coefficient between the variables of cognitive tests, and performance assessment in the form of teacher observation sheet. Testing with the bivariate correlation showed that with a significance level of 0.01 obtained:

a. Descriptive Statistic Correlation
   Pearson Correlation between performance and cognitive value 0.791
b. Nonparametric Statistical Correlation
   Kendal's Correlation between performance and cognitive value 0.668
c. Spearman's Correlation between performance and cognitive value 0.807

From the data above, it is clear that the correlation coefficient between performance and cognitive value was above 0.500. Thus there is a strong correlation between the three variables; it means that the students who have high performance values tend to better cognitive value.

CONCLUSIONS

The first year of research results has been able to develop a learning tool as follows: (1) Practicum device special for recycling, (2) Learning Plan, (3) Student Activity Sheet (LKS) and (4) Instrument Evaluation. Those learning device has been tested on students at SDN Wojo and SDN Pangukrejo. This is in accordance with the specific aim of the research relating to the *third* and *fifth* objectives, developing learning media by using waste materials or waste plastics and metals that be easily obtained in the post-disaster areas, and producing *fun learning* based module using the media learning from plastic and metal waste. Thus, this design can be applied in accordance with the *second* goal that is, developing teaching and learning strategies with *fun learning* approach, in an effort to improve mental resilience and motivation to study further after the disaster that comes with the realization of the *first* research objective that is; to develop learning about early detection and disaster risk integrated in science subjects in elementary schools disaster areas. Then, to be realized in second year of the research are:
(1). Developing process evaluation models and science learning products for elementary school students after the disaster, (2). Integrated analysis involving many variables that affect the success of learning both in the form of the manifest variables and latent variables using Structural Equation Modeling (SEM). Therefore, this research is explanatory so that it's carried out an analysis line for several study variables. And in order to develop models of research methods, it used *Research and*

Development (R & D) using *the four-D Models (Define, Design, Development, and Disseminate*). While the statistical analysis to see whether the relationship between variables that is *measurable* and that *latent* in this study used structural equation models with line analysis and confirmatory analysis, using structural equation modeling.

Some of the results achieved in the first year of this study are:

1. The learning device has been successfully developed and supported the quality processes and the quality of science teaching and learning process
2. Teachers are able to do all aspects of learning syntax as it has been designed together with the research team
3. Teacher activity is dominated by KBM manage activities in accordance with the study design, encourage or train the students to active independence
4. Students Activities are dominated by using the learning activities, practice field, and relevant discussion, and practice activities to do active independence. Active independent practice activity increases with the high percentage of teachers' activities in these skills to train students
5. The dominant active independence done by students is a skill to observe and share tasks in groups to complete group assignments.
6. In general, students expressed pleasure and new to learning tools and learning models that have been developed by researchers, so students interested to attend the next science learning as they have followed
7. Science teachers think that teaching media researchers that has been developed quite helpful and very useful in teaching and learning science
8. Teaching and learning processes that apply learning tool made specifically for post disaster situation can increase the proportion of students' correct answers. For formative tests is amount 0:46 and the processes increased by 0.78. However, it still took quite a long time to gain the mature achievement of that goal because the main concept that is *fun learning* can be achieved through continuous development and improved next year.

SUGGESTIONS

Based on the above conclusions, there are still several weaknesses found in this research. Therefore it needs a reflection as the feedback of research action plan next year. Variations of learning media that have successfully created are still not able to fulfill schools need yet, because there are so many science concepts that require tools or instruments for demonstration experiments. However, the limited funds and time led researchers in the first year to be more focused on the tools that easier to make.

It needs the involvement of the Education Department at the district / city in coaching and the Ministry of National Education, who really desperately need development in such this research. Publication of the tools available and socialization planned by researchers' team in subsequent years are expected could be more intensive.

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