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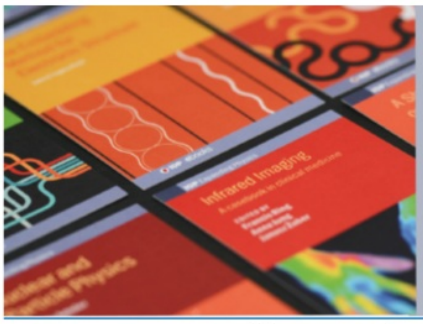

Characteristics and validity of SETS-based disaster learning models

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Abstract. This study aims to: (1) describe the characteristics of the SETS-based disaster learning model, (2) test the validity of the SETS-based disaster learning model. This type of research is research and development following the ten steps of developing Borg & Gall. In this study five steps from the ten steps were carried out to produce a valid product according to expert judgment. The research findings are: (1) producing a product in the form of a SETS-based disaster learning model with characteristics having the main elements consisting of: syntax, social system, reaction principle, support system, instructional impact, and companion impact. The learning model produced has met the specifications of the learning model which is complementary to existing products by focusing on the integration of thematic disasters, having a wider level of integration, having a high applicative level, and having in-depth studies and providing detailed and complete information. The SETS-based disaster learning model consists of six stages of activity. The first stage is organization and orientation, the second stage is concept formation, the third stage is Application and conceptualization, the fourth stage is adapting the concept, the fifth stage is Planning and making decisions, the sixth stage is SETS-based Evaluation. (2) SETS-based disaster learning model is feasible to use based on expert judgment. The average value of the model validation score is 102.5 or 85% (very valid).

1. Introduction

Disaster is a natural phenomenon and / or event that has a broad impact on society [1]. The earthquake that occurred in 2018 was an earthquake measuring 7.7 on the Richter scale that rocked Palu and Donggala, Central Sulawesi, on September 28, 2018 at 18.02 WITA. The Meteorology, Climatology and Geophysics Agency (BMKG) said the earthquake was at 0.18 South Latitude and 119.85 East Longitude or 27 kilometers northeast of Donggala. The National Disaster Management Agency recorded 2,113 people killed in the Palu, Central Sulawesi and surrounding areas. This number increased from the record of the previous death toll of 2,010. National Board for Disaster Management (BNPB) data shows that from the death toll from the Palu earthquake and tsunami, there was one South Korean national citizen who was victimized. The South Koreans were found in the ruins of the Roa-Roa Hotel. As the number of disasters that occur in Indonesia, the ability of survival or survival is needed by all people, including people outside the disaster-prone areas. Although this ability is a basic human ability to adapt to its environment, it still requires special techniques, especially when dealing with difficult

conditions and in a very sudden time. For example, when traveling suddenly a massive earthquake or massive flash flood occurs, this can result in the condition of the area suddenly turning into a "hard" area, no food source and drinking and here and there many victims (both killed and injured). If the community is not ready, it is difficult to survive in facing these conditions.

Based on the regulation of the Head of the National Disaster Management Agency Number: 4 of 2008 concerning Guidelines for Preparing Disaster Management Plans, education is one vehicle that can be used to instill knowledge and awareness about disasters. The process of internalising disaster management in the local content of education is a form of passive mitigation that can be done. In addition to passive mitigation, mitigation through education can also be classified as active mitigation that is non-structural [2-4]. The internalization of disaster management is admittedly difficult to do because of the unavailability of supporting learning resources. Learning resources used in schools only discuss subject matter in general, not in accordance with the threat of disaster which becomes a problem in the student area.

In a study conducted by Rusilowati et al [5] and Proulx & Aboud [6] found that one of the products produced was textbooks and supplements in the form of comics for IPA material grades IV, V, VI SD and VII, VIII, and IX SMP. The existence of disaster learning in the themes and syllabus in the 2013 curriculum is relatively lacking. This is indicated by the rare / rare appearance of categories of words / phrases related to disaster, namely: the core of disaster discourse (danger, vulnerability, disaster risk, protection, safety, ability); forms of disasters (landslides, earthquakes, volcanic eruptions, tornadoes, tsunamis); disaster management (mitigation, evacuation, early warning and others). Even though the themes related to nature and the environment are quite prominent in the 2013 curriculum, especially for grade 5 elementary schools [7]. Therefore, disaster learning activities need to be optimized in every theme related to nature and the environment. In order to optimize disaster learning in elementary schools to improve mitigation capabilities, adaptation and speed of responding to disasters requires a contextual learning model that involves the environment as the main source of learning. One learning model that links the environment as a learning resource is the visionary learning model of Science, Environment, Technology and Society (SETS). The SETS vision learning model has characteristics that connect science with other elements, namely technology, environment, and society [8-10]. Through this model elementary school students will be able to understand disaster material and disaster mitigation efforts prior to a disaster, when a disaster strikes, and after the disaster ends in their neighborhood.

2. Methods

This type of research is research and development which follows the ten steps of developing [11] In this study five of the ten steps were carried out to produce a valid product according to expert judgment.

3. Results and Discussion

Learning approach means learning references that seek to improve students' cognitive, affective, and psychomotor abilities in message / material processing so that learning objectives are achieved. This SETS approach combines the thoughts of STS (Science, Technology and Society) and E (Environment) by providing a new philosophy) [12]. In line with these statements [9]; reveal that the sequence of abbreviations for SETS carries the message that to use science (S) to form technology (T) in meeting community needs (S) it takes thinking about its various implications for the environment (E) physically and mentally.

The term Environmental Technology and Society (SETS) is an approach developed from a Science, Technology and Society (STS) approach or in Indonesian, often referred to as the Science, Technology and Community (STM) approach. The essence of the STS and SETS approaches is actually the same, what distinguishes only the SETS is the environmental aspect. In the discussion of the STM approach, the emphasis is on the impact of the development of science and technology for the community. The environment is actually related to the term, but the one who feels the impact of technology on the environment is human or community [13]. The word SETS (Science Environment Technology and Society) is interpreted as science, environment, technology, and society, a unity which in the concept of

education has an implementation so that students have high-order thinking skills. SETS education can begin with simple concepts found in the environment around students or complex concepts of science and non-science.

A number of characteristics of the SETS approach aim to provide contextual science learning, students are brought into situations to utilize science concepts in the form of technology for the benefit of society, and are asked to think about the various possibilities that occur due to the transfer of science in the form of technology. science is discussed with other elements in SETS. Students can be invited to discuss SETS from various directions based on the basic knowledge possessed by students [14]. In general, the SETS approach according to [14]; [15] has the following characteristics. 1) Identify local problems that have interests and impacts. 2) Use of local resources (human, objects, and environment) to find information used in problem solving. 3) Active involvement of students in gathering information used to solve problems in daily life. 4) Emphasize process skills as an effort to solve problems. 5) Opportunities for students to play a role as people who try to participate in solving problems that have been identified. Whereas Handayani [16] mentioned the characteristics of the SETS approach as follows. 1) Students are still given the elements of science learning. 2) Students are directed to situations to utilize science concepts in the form of technology that can be utilized for people's lives. 3) Students are asked to think about various possibilities resulting from the use of technology. 4) Students are asked to explain the relationship / link between elements of science with other elements in SETS that influence each other. 5) Students are directed to consider advantages or disadvantages using the application of science concepts in the form of technology in the context of constructivism. 6) Students are invited to discuss SETS from various directions based on the basic knowledge that students have.

SETS-based learning is divided into six domains. The six domains involved in SETS-based learning are: 1) Concepts, including mastery of basic concepts, facts, and generalizations taken from certain fields of science and are characteristic of each field of science. 2) Process, means how to obtain concepts or use of scientific processes in finding concepts / conducting investigations. 3) Creativity, including five individual behaviors, namely: fluency, flexibility, originality, elaboration, and sensitivity. 4) Application of concepts in everyday life. 5) Attitudes, such as realizing the greatness of God, respecting the work of others, caring about society and the environment. 6) Tend to take concrete actions in solving problems in their environment [15]; [5]. The SETS approach emphasizes concepts and processes because they will be used to identify and solve problems. In addition, the SETS approach is closely related to process skills. The SETS approach provides provisions for students to be prepared to face problems in their environment. The ability of students to care and be active in solving problems is one of the focuses in learning activities. The formulates the stages in SETS-based learning activities into five stages, namely: (1) the preliminary stage which includes initiation / invitations; (2) concept formation / development; (3) application of concepts in life; (4) consolidation of concepts; (5) assessment.

The learning step is based on the SETS approach according to Handayani [16]: 1) The initiation / invitation stage is an invitation for students to focus on learning. 2) Concept formation, can be done through various approaches and methods. 3) The problem solving stage is carried out when students have obtained concepts of problems or issues obtained from various ways. 4) The stage of stabilizing the concept, namely the straightening of concepts found during the learning process takes place. 5) Assessment stage, to determine the level of success of the learning activities that have been carried out.

Table 1. Comparison of the stages of SETS-based learning

Nugraha, D. A., & Binadja, A. (2013)	**Andry, (2014)**	**Research Synthesis**
Invitations / Initiations	Initiation / invitation	Organization and Orientation
Concept Formation	Concept formation	Concept Formation
Application Concept	Problem solving	Application and Consolidation of Concepts
Concept Consolidation	Concept consolidation	Adapt the Concept
Evaluation / Assessment	Assessment	Plan and Decide Evaluation

Based on Table 1 it can be seen that according to Nugraha&Binadja [9] and Handayani [15] SETS-based learning stages have five stages of learning. The five stages expressed by each researcher are only different in the third step, where according to [9] the third step in SETS-based learning is the application of concepts while according to Handayani [16] the third step is solving problems. The problem solving step is considered more complete because in solving this problem someone will also apply the concepts that have been obtained previously. The concept application to solve the problem is considered more meaningful than if someone just applies the concept in daily life. Based on some experts' opinions, it can be concluded that the SETS approach is an approach that combines elements of science, technology, society, and a contextual environment by presenting issues that are developing in the community so as to be able to guide students in solving problems in their environment by applying the concepts of science and technology, through scientific processes. The SETS-based disaster learning model developed has six stages of activity. The first stage is organization and orientation, the second stage is concept formation, the third stage is Application and conceptualization, the fourth stage is adapting the concept, the fifth stage is Planning and making decisions, the sixth stage is SETS-based Evaluation. The six stages of the activity are the development of the five stages of SETS-based learning that have been previously revealed.

This step of SETS-based disaster learning developed in the first and second steps is almost the same as the previous experts. The development of SETS-based disaster learning began to look different in the third step, namely the application and implementation of concepts. Where at this stage there was an activity of applying the concept of SETS in disaster learning so as to strengthen the mastery of students' concepts of natural disasters. The next difference is in the fourth step which is adapting the concept, in this step students will choose and use one or several concepts that have been obtained to take action in accordance with the events of the disaster that occurred. The next difference is in the fifth step, namely planning and making decisions. In this step students plan and decide what actions will be taken based on the concepts and knowledge that has been obtained in accordance with the characteristics of the event that occurred. Furthermore, in the sixth step, SETS-based evaluation is conducted. This step is used by teachers in assessing the extent to which mastery of disaster material concepts after conducting SETS-based disaster learning activities. Based on the description, it can be concluded that the SETS-based disaster learning model developed has differences with the previous SETS-based learning steps [17]. This learning model has steps that are more complete and more applicable. This model has an advantage over the previous SETS model, which is more specific and specific for learning natural disaster metrics in elementary schools.

Furthermore, after developing this learning model, feasibility tests were carried out by experts. This test aims to assess feasibility by matching the suitability of SETS-based disaster learning model indicators with the development learning model draft. The experts involved in assessing the feasibility of the SETS-based disaster learning model were two experts, Prof. Dr. Zuhdan Kun Prasetyo, M.Ed and Prof. Dr. C Asri Budiningsih, M.Pd. The results of the two experts' assessment of the SETS-based disaster learning model can be seen in Table 2.

Table 2. Model Feasibility Test Results According to Expert Valuation

No	Component	Assessment			Average percentage
		V 1	V 2	Average	
1	Completeness of Model Structure	14	12	13	86.67
2	Conformity of Supporting Theory of Model Development	24	20	22	88
3	Syntagmatic Model of Disaster Education Based on SETS	10	8	9	90
4	Clarity of the Social System of Disaster Learning Model Based on SETS	10	8	9	90
5	Clarity of the Reaction Principles of SETS-Based Disaster Learning Models	10	6	8	80

6	Clarity of Instructional Impact and Accompaniment Impact of SETS-Based Disaster Learning Models	8	8	8	80
7	Completeness of Model Support Components	35	32	33,5	82.5
	Total V1 dan V2	111	94		
	Total Average			102,5	85
	Validity Criteria			Very Valid	

Based on Table 2 it can be seen that the average rating of the feasibility of the model by each validator is 102.5 or 85%. Based on the scores obtained, it can be concluded that the learning model that has been developed is included in the Very Valid validity category, but the final recommendation given by the two validators is (can be used further but needs a little revision). Based on these results, then further improvements are made according to the suggestions and input of each validator. In the SETS-based disaster learning model it is also equipped with other model component features. The components in this disaster learning model consist of seven features of the supporting model components, namely the model book, the model manual, the teaching material, the Student Activity Sheet, the Learning Media, the Evaluation Tool, and the Learning Tools Prototype.

4. Conclusion

The characteristics of the SETS-based disaster learning model are the main elements which consist of: syntax, social system, reaction principle, support system, instructional impact, and companion impact. The learning model produced has met the specifications of the learning model which is complementary to existing products by focusing on the integration of thematic disasters, having a wider level of integration, having a high applicative level, and having in-depth studies and providing detailed and complete information. The SETS-based disaster learning model consists of six stages of activity. The first stage is organization and orientation, the second stage is concept formation, the third stage is Application and conceptualization, the fourth stage is adapting the concept, the fifth stage is Planning and making decisions, the sixth stage is SETS-based Evaluation. The SETS-based disaster learning model is feasible to use based on expert judgment. The average value of the model validation score is 102.5 or 85% (very valid).

Acknowledgments

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Reference

[1] Knez I, Butler A, Sang Å O, Ångman E, Sarlöv-Herlin I, Åkerskog A 2018 *J. Environ. Psychol.* **55** 11
[2] Norton J, Gibson T D 2019 *Disaster Prev. Manag.: Int. J.* **28** 2
[3] Imperiale A J, Vanclay F 2016 *J. Rural Stud.* **47** 204
[4] Mutch C 2015 *Int. J. Educ. Dev.* **41** 283
[5] Rusilowati A, Binadja A, Mulyani SE 2012 *J. Pendidik. Fisika Indones.* **8** 51
[6] Proulx K, Aboud F 2019 *Int. J. Educ. Dev.* **66** 1
[7] Atmojo S E, Rusilowati A, Dwiningrum SI, Skotnicka M 2018 *J. Pendidik. IPA Indones.* **7** 204
[8] Pearson L, Pelling M 2015 *J. Extreme Events* **2** 1571001
[9] Nugraha D A, Binadja A 2013 *J. Innov. Sci. Educ.* **2** 27
[10] LeCun Y, Bengio Y, Hinton G 2015 *Nature* **521** 436
[11] Atmojo S E, Anggraini D, Muhtarom T 2017 *Asian Soc. Sci.* **13** 161
[12] Farda U J, Binadja A, Purwanti E 2016 *J. Prim. Educ.* **5** 36
[13] Nurkaenah N, Isnaeni W, Subali B 2019 *J. Prim. Educ.* **8** 59
[14] Yager R R, Reformat M Z, To N D 2019 *Information Sciences* **479** 277
[15] Yager S O 2012 *Natl. Forum Appl. Educ. Res. J.* **25** 1
[16] Saadah D N, Sukaesih S, Wusqo I U 2017 *Unnes Sci. Educ. J.* **6** 1745

[17] Atmojo SE, Kurniawati W, Muhtarom T 2019 *J. Phys.: Conf. Ser.* **1254** 012033

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