

SPATIAL INFORMATION LEARNING TO IMPROVE CONSCIOUSNESS AND ATTITUDE TOWARDS DISASTERS

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ABSTRACT: The approach towards disasters in Indonesia was initially responsive, sectoral and centralized, but this has changed to one that is preventive, multi-sectoral, decentralized and centered on disaster risk reduction, including through disaster education. Such education should be given to everyone in Indonesia. In addition, disaster management is conducted with a territorial approach, not one based on administrative areas. Disaster-prone areas in Indonesia have been mapped, including those susceptible to geological disasters, such as earthquakes, tsunamis, liquefaction, volcanic eruptions and landslides. However, not everyone understands spatial information related to disaster. The spatial information learning for disaster will be able to increase knowledge, capacity and skills, in order to be able to build awareness of disaster hazards to reduce disaster risk. Disaster mitigation efforts through the spatial information for disaster learning include activities such as 1) preparing and describing the spatial information for disaster; 2) socializing the spatial information for disaster understanding to increase disaster awareness; 3) knowing the benefits of the spatial information for disaster for self-rescue; and 4) conducting spatial analysis to organize disaster-prone areas and reduce disaster threats. The strategy for disaster learning is conducted through learning by doing, including conceptual and practical approaches, and having a strong conscious attitude. The spatial information for disaster will provide basic knowledge of disasters to determine their forms, processes, potential threats, vulnerabilities, capacities and disaster risks. The practice of using spatial information for disaster to have disaster skills, through preparedness, and emergency, recovery and disaster management.

Keywords: *Education related to disaster, Consciousness and attitude towards disaster, Disaster information learning, Spatial information to disaster.*

1. INTRODUCTION

In the present era, the shift of social paradigm has replaced the fatalistic-reactive and emergency response with a proactive approach to disaster risk reduction management in Indonesia. The shift urges every individual to recognize potential disaster threats and to enhance their capacity to minimize disaster risk potentials [1]. It has also had an impact on the new strategies of disaster management systems, such as: 1) the focus of disaster prevention management, which no longer relies on the emergency response, but rather on the overall risk management techniques; 2) the communal protection from disaster threats which is organized by the government is considered to reflect the fulfillment of human rights values that should not merely be perceived as the government's duty; and 3) disaster prevention management is no longer perceived as a single matter that relies solely on the government, but instead as a collective concern among the communities and business institutions of which the government is in charge [2].

The shift of social paradigm will potentially result in changes in disaster management from a responsive,

sectoral and centralized system, to a preventive, multi-sectoral, decentralized, and educational-based disaster risk reduction approach [1]. The disaster risk reduction initiative should ideally take place in an integrated manner that covers cross-sectoral and cross-regional strategies through social, economic, and environmental orientation. Its implementation can involve communities, due to their position as the subject, object and the target of disaster risk reduction management, thus the available local wisdom and traditional knowledge should also be considered as part of the strategies to reduce the potential risks of regional disasters [2].

The concept of disaster education emphasizes the integration of disaster-related subjects in formal and non-formal education, whose purpose is to provide students with sufficient knowledge, skills and awareness, in an attempt to improve their capacity to handle disaster management and to help them to recover after the disaster occurs, in case they face the danger of disaster in their regions [3].

Disaster education is essential, and should be available for everyone in Indonesia because of the country's territory, which faces relatively high threats of various potential disasters, especially geological

ones, such as earthquakes, tsunamis, liquefaction, volcanic eruptions and landslides. Through the provision of the disaster-based education concept, the population will have high awareness in handling disaster management in order to create a safe situation.

The National Disaster Management Agency (BNPB) has mapped disaster-prone areas in Indonesia in detail; however, such spatial disaster information has yet to reach all elements of Indonesian society, due to the lack of socialization and limited public access to the spatial data. This implies an urgent demand for the availability of the spatial information for disaster to further enhance people's disaster-related knowledge, including matters at the level of risk and spatial distribution. The spatial information for disaster contains the descriptive data of disaster-potential areas, which includes the location of disasters, the level of threat, vulnerability, and disaster capacity. Accommodation of the spatial information for disaster learning process will potentially elevate students' knowledge, capacity, skills and awareness regarding disaster risk reduction [4,5].

This study aims to measure the level of knowledge and awareness of the spatial information for disaster utilization.

2. METHODS

The study was conducted at the Disaster Mitigation Education Laboratory, Department of Geography, Universitas Negeri Semarang (UNNES). In the laboratory, there are various media related to the spatial information for disaster, including maps of disaster-prone areas, disaster modules and posters, disaster videos and replicas, and disaster rescue simulations.

The respondents consisted of UNNES Geography Department students, whose selection was based on a purposive sampling technique, namely students who had received disaster education materials.

The data were collected using instruments that were designed based on the relevant to the spatial information for disaster indicators, consisting of 20 multiple-choice questions and five descriptive questions with regard to the cognitive aspect measurement (knowledge), in addition to 25 questions related to the behavioral aspect measurement (attitude). The instrument was curricularly validated by a team of disaster management experts and then delivered to the research subjects, comprising 30 students who had not yet received disaster education-related lectures.

Disaster mitigation efforts through the spatial information for disaster learning include activities such as: 1) preparing and describing the spatial information for disaster; 2) disseminating the spatial information for disaster understanding to increase

disaster awareness; 3) knowing the benefits of the spatial information for disaster for self-rescue; and 4) conducting spatial analysis to organize disaster-prone areas and reduce the threat of disaster. Disaster learning strategies are conducted through learning by doing, including conceptual knowledge (knowing) and practice (doing), and having a strong conscious attitude in dealing with disasters (being).

The results of the study were processed using descriptive quantitative techniques.

3. RESULTS AND DISCUSSION

Development of the level of disaster awareness can be achieved through a number strategy, such as the spatial information for disaster learning media in the form of disaster-prone area mapping, guiding modules and disaster posters, disaster videos and replicas, as well as disaster rescue simulation; the provision of media of the spatial information for disaster can thus accommodate a learning-by-doing strategy [6].

The media of spatial information for disaster are effective in providing students with basic understanding of disaster management, types of disaster, how it occurs, potential threats, vulnerability, capacity, and disaster risks [7]. The implementation of the spatial information for disaster learning is targeted at developing students' skills in handling disaster management, through preparation, emergency state response, recovery and risk prevention management.

With regards to the above explanation, the media construction process for spatial information for disaster must guarantee to have positive impacts on disaster risk management. Therefore, an initial measurement is considered important to explore aspects of the participants' knowledge and attitude based on the predetermined indicators. There were six points of indicators covering cognitive aspect (knowledge) measurement and four points of indicators related to behavioral aspect (attitude) measurement. The indicators were designed based on the objectives of the study. The cognitive aspects were measured through tests (multiple-choice questions and essays), while the behavioral aspects were measured by the questionnaire.

3.1. Preparing and Describing the Spatial Information for Disaster

Three indicators measured the participants level of knowledge in preparing and describing the media of the spatial information for disaster, namely: (a) the relevance of media selection and utilization of the spatial information for disaster for the learning process through adjustment to the curriculum; (b) the benefits of digital and non-digital forms of media of

the spatial information for disaster for specific or general utilization, based on the purpose of particular learning activities; and (c) media selection, utilization and strategic development of the spatial information for disaster based on class management factors.

Based on the tests delivered to the respondents, the first indicator showed the relevance of media selection and utilization of the spatial information for disaster for the learning process through adjustment to the curriculum. The indicator demonstrated that 53.3% of the respondents possessed a good level of cognitive aspects, 26.6% a moderate level, and 20.0% a poor level.

These implied that not all the students understood the relevance of media selection and utilization for the spatial information for disaster for their learning process through the adjustment to the curriculum, as 46.60% of the respondents were unfamiliar with the first indicator. The competencies of the cognitive aspects based on the first indicator were considered essential due to the inseparable relationship between the curriculum and learning activities during class lectures, especially through the use of learning media and their implementation.

The second indicator covered the benefits of digital and non-digital forms of media related the spatial information for disaster for specific or general utilization, based on the purpose of particular learning activities. It showed that 46.6% of the respondents possessed a good level of knowledge to the spatial information for disaster, 46.6% a moderate level, and 6.6% a poor level. Therefore, not all the students were familiar with the benefits of media utilization for the spatial information for disaster. The second indicator emphasized more the knowledge of the digital and non-digital media benefits that referred to the actual condition surrounding the respondents, in an attempt to elevate their understanding of disaster management.

The third indicator of cognitive aspect measurement covered the media selection of the spatial information for disaster, utilization and strategic development based on class management factors. It showed that 46.6% of the respondents possessed a good level of knowledge to the spatial information for disaster, 33.3% a moderate level, and 20.0% a poor level.

These figures imply that not all the students possessed the media selection and utilization abilities of the spatial information for disaster. The measurement of the third indicator aimed to encourage academic practitioners to first consider appropriate media of the spatial information for disaster for class learning (Fig. 1).

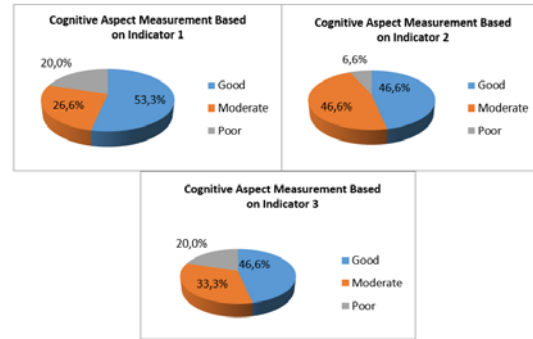


Fig. 1 Percentages of Cognitive Aspect Measurement Based on Three Indicators

The next measurement related to the area of behavioral aspects in preparing and describing the media of the spatial information for disaster. It consisted of two indicators, namely (a) recognition of the importance of media selection and utilization of the spatial information for disaster to boost effective learning, and (b) recognition of the importance of the spatial information for disaster-based education development regarding the requirements of the 21st century paradigm and the 4.0 and 5.0 industrial eras. The measurement of the first indicator showed that 80.0% of the respondents possessed a good level of attitude and the remainder, 20.0%, a moderate level.

These implies that the majority of the students demonstrated a good attitude and awareness of the media selection of spatial information for disaster and utilization in supporting effective learning. The measurement of the behavioral aspects based on the second indicator aimed to determine the respondents' awareness in selecting the media of spatial information for disaster based on their fields of experiences (such as the results of discussions and research). This indicator emphasized awareness of the importance of the spatial information for disaster education development based on 21st century education standards and the requirements of the 4.0 and 5.0 industrial eras. It showed that 86.6% of the respondents possessed a good attitude and 13.3% a moderate one (Fig. 2). The behavioral aspects were considered important due to the demand for the future challenges.



Fig. 2 Percentages of Behavioral Aspect Measurement Based on Two Indicators

3.2. Socializing Spatial Information for Disaster by Utilizing Media to Foster Disaster Awareness

The measurement of understanding related to the media utilization of the spatial information for disaster forms the strategy to foster the level of disaster awareness. It covers the aspects of knowledge in developing the concepts and techniques for media implementation of the spatial information for disaster through the learning process based on students' needs analysis (age, learning styles, education level, 21st century education paradigm, and the 4.0 and 5.0 industrial eras). The aspects of knowledge in developing the learning media are considered very important in the design phase, in order to provide alternative solutions to reducing the risks based on the current and future need analysis, especially the matters that relate to the competency requirement in the 21st century education paradigm and the 4.0 and 5.0 industrial eras; therefore, media innovation will be appropriate for proceeding to the socialization phase. [7] shows that the use of media is very helpful in learning about a phenomenon.

Based on the questionnaire, 40% of the respondents possessed a good level of knowledge of the spatial information for disaster, 53.3% a moderate level, while 6.7% possessed a poor level. To summarize, more than 50% of the respondents did not understand the benefits of spatial information for disaster by utilizing media to increase their disaster awareness. Based on the results, the researchers suggest that education practitioners socialize the media of the spatial information for disaster by providing the concept in forms of instructional models, such as guiding modules, disaster posters, videos, disaster replicas, games and applications, which could be adjusted to current needs (Fig. 3).

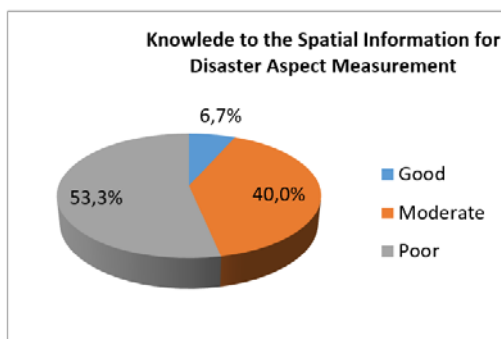


Fig. 3 Percentages of Cognitive Aspect Measurement in Understanding the Media Utilization of the Spatial Information for Disaster to Foster Disaster Awareness

3.3. Exploring the Benefits of Media Utilization of the Spatial Information for Disaster for Self-Rescue Simulation

The cognitive aspect measurement related to the benefits of media of the spatial information for disaster for self-rescue simulation is inseparable from the adoption of types of learning media. Referring to the indicator, both digital and non-digital learning instruments should be developed that potentially foster the improvement in students' knowledge of self-rescue, especially in supporting the simulation of risk management during their learning. To meet these competencies, media of spatial information for disaster should provide basic understanding of self-rescue procedures through a number of learning media, such as modules, disaster posters and digital simulation (tutorial videos and games). The survey and questionnaire revealed that 33.3% of the respondents possessed a good level of knowledge to the spatial information for disaster, 46.6% possessed a moderate level and 20% possessed a poor level. Only a small proportion of the students had understood well the benefits of media utilization of the spatial information for disaster for self-rescue simulation, so improvement should be made regarding this indicator. Next, the measurement of behavioral aspects based on the indicators aimed to establish the benefits of the spatial information for disaster learning for self-rescue simulation. The indicators could facilitate academic practitioners with an overview of media of the spatial information for disaster, potential for self-rescue. To conclude, the majority of the students already possessed good awareness of the spatial information for disaster utilization for self-rescue learning (Fig. 4).

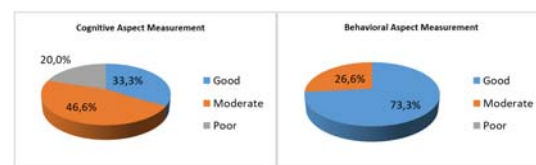


Fig. 4 Percentages of Cognitive and Behavioral Aspect Measurements Regarding the Benefits of the Spatial Information for Disaster for Self-Rescue

3.4. Organizing Spatial Analysis to Arrange Disaster-Prone Areas and Reduce Disaster Risks

The measurement of the cognitive aspects emphasized the utilization of instructional media in conducting spatial analysis, in order to arrange the disaster-prone areas and reduce disaster threats. The utilization of cognitive indicators was expected to enforce the students' knowledge and ability in planning management concepts and dealing with the potential disasters that might occur in their respective areas, thus competency in using maps was prioritized. The survey and questionnaire revealed that only 7.0% of the respondents who had a good level of knowledge to disaster, 73.3% a moderate level, and

20.0% a poor level. An implication of this is that the cognitive aspects in spatial analysis should be improved.

In addition, the measurement of behavioral aspects aimed to perceive and criticize the spatial analysis in managing disaster-prone areas and reducing disaster threats through the spatial information for disaster learning. The students were expected to realize the importance of in-depth spatial disaster analysis, in an attempt to provide better and more effective solutions regarding disaster management (Fig. 5).

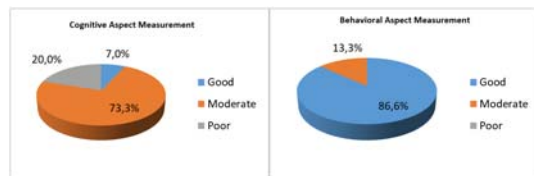


Fig.5 Measurement of Cognitive and Behavioral Aspects to Arrange Disaster Prone Areas and Reduce Disaster Risks

Based on the data analysis, a number of differences were found in the percentages of indicators of the spatial information for disaster among the participants according to the three specified criteria. The participants who possessed a good level of knowledge and attitude were affected by several internal and external factors. Education, perception and motivation, experience were the internal factors that affected the aspects of knowledge [10]. For instance, a higher educational quality coupled with linear studies on disaster management will result in a more qualified individual competency [11]. The perceptual factors that rely on the observational experiences of particular objects through the senses of sight, hearing and smell will also result in different levels of knowledge. Furthermore, the motivational factors that derive from the inner conscience are believed to affect the cognitive aspects in understanding the media utilization of the spatial information for disaster. The motivational factors can be distinguished by the personal willingness to undertake regular studies and discover relevant references for disaster management.

The experiential factors mark the state of acquiring knowledge through the activities that consciously rely on the human senses, for example in obtaining better knowledge related to disaster management through discussions and problem-solving activities with experts [12]. The participants who had previously been involved in simulation or research definitely displayed relatively extensive experience. The difference in experience during the learning process is inseparable from the learning styles which specify the individual process in obtaining and processing information, as well as

producing new conclusions through the senses. Therefore, each learning style promotes a different approach to the individual's learning process [13,14]. The common learning styles are classified into three types based on the differences in learning features and implementation; these styles are visual, auditory and kinesthetic [15,16].

External factors can also lead to differences in knowledge level in understanding the media utilization of the spatial information for disaster. These external factors include the environment, socioeconomics, culture and information [10]. The surrounding environment can be perceived as a learning medium by first considering the potential learning resources related to disaster management. The environment physically provides knowledge in terms of disaster occurrence processes and natural impacts. At the same time, the environment also encourages analysis of factors causing disasters socially, based on anthropological insights and other relevant studies, thus producing differences in cognitive levels. Cultural factors also contribute to the level of relevant knowledge in disaster management, especially through regional local wisdom, which offers a potential breakthrough due to its reliability since ancient times and ability to complement modern disaster knowledge. In addition, the informational factors that thrive strongly and become more accessible and timeless can offer a potential means to improve disaster management competencies.

The different percentages in the participants' attitude also indicate several causal factors. These factors include personal experiences and surrounding influences which are considered to matter [16]. Personal experiential factors can create a gap in understanding of the disaster context. The experiences can derive from various references, such as the use of learning media, knowledge from social interaction, or even private experiences from the phenomena that occur in the surrounding environment. Another factor is the meaningful surrounding influence that affects individual thinking patterns and actions in perceiving the disaster context. Local people's wisdom in managing post-disaster situations will shape social implications [17,18,19]. Social values will shape the intent of the community to coordinate with each other, to assist in various activities, and to provide capital. Social values and attitudes are capital for business entities and can be managed by the community for their own welfare, or from community to community.

4. CONCLUSION

Based on the findings, the respondents' cognitive aspects related to media utilization of the spatial information for disaster were mostly in the moderate range in terms of preparing and describing the spatial

information for disaster; socializing the media utilization of the spatial information for disaster to foster disaster awareness; and understanding the benefits of media utilization of the spatial information for disaster for self-rescue simulation. Meanwhile, in organizing the spatial analysis for the disaster-prone area arrangement and disaster threat reduction, the majority of the respondents possessed a good level of knowledge. They tended to perform better in behavioral aspects than cognitive ones.

The differences in knowledge and attitude among the respondents were affected by both internal and external factors. The internal factors included the level of education, perception, motivation, and experiences, while the external factors consisted of the environment, social economy, culture and information.

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