

Validation of Educational Comic Integrated Material of Hidrometeorological Disaster to Improve and Knowledge Environmental Care Attitude

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Abstract. One way to optimize disaster mitigation efforts in the field of education is to provide reading materials related to disasters that usually occur in areas where students live. Comics are fun reading materials for students. To be used as reading material for elementary school students, comic needs to be validated. The purpose of this research is to inform the validation results and what are the validator's suggestions regarding the development of disaster comics for elementary school-aged children. The research instrument used was a validation questionnaire. Validation is carried out on aspects of content, language, graphics, and functionality. The results show that the comics developed are valid. The main suggestions regarding the development of comics for elementary school-aged children are to try to make the characters' faces clear and good-looking, bright colors, and use simple language, create a separate dialogues or monologues to explain the special term.

Keywords: Validation, Comic, Hidrometeorology, Mitigation

1 Introduction

Natural disasters can happen anywhere and anytime. Humans need to have knowledge of the causes, when they occur, the impacts, and signs of an imminent natural disaster. Regarding natural disasters whose causes are mostly caused by human activities, this knowledge is the first form of good disaster mitigation. This knowledge will raise human awareness of the environment. This knowledge needs to be given to children as early as possible. Provision of disaster knowledge can be done through reading materials.

Reading material for children needs attention to several aspects. The way children learn and understand things and their interests is something that needs attention. Therefore, to be able to become a disaster reading material that contains disaster information as a form of mitigation for children, especially elementary school children, these reading materials need to be validated.

Disaster Mitigation Through Education

Natural disaster mitigation is an effort to reduce disaster risk both before, during, and after a disaster occurs. According to [1], disaster mitigation can be done through physical development as well as awareness and capacity building to deal with disasters. In addition, one of the actions in the national disaster management plan for 2020-2024 is to increase the awareness and capacity of the government, private sector and society towards the environment. One of the indicators in this action is the formation of formal education units and institutions or communities that care and are environmentally cultured [2].

According to [3], education is a form of non-physical disaster mitigation. Education as a form of mitigation aims to prepare people to get used to living together with natural disasters. [1] states that formal education such as school is considered an effective forum for developing patterns of thought and behavior. Therefore, schools are very suitable as a place for students to gain understanding related to disasters and develop an attitude of caring for the environment and an attitude of being responsive and resilient to disasters. Integration of natural disaster mitigation materials into learning is a step that can be taken to provide disaster knowledge from an early age so that it gives birth to a young generation who is aware and responsive to disasters [4]. Disasters that are integrated should be disasters that often occur in the area where students live, such as in the Riau area, disasters that often occur are hydrometeorological disasters.

Comics As Reading Material For Disaster Education

Natural disaster mitigation comics are comics that contain disaster information with the aim of providing knowledge and fostering an attitude of caring for the environment to readers. Educational comics containing natural disaster material can help students prepare for disasters [5]. The material in comics is packaged in an attractive and educational form so that it is easy for readers to understand. Reading materials in learning can be supplements (additional), complement (complementary), and substitution (substitute). Reading materials are supplemental if students have the freedom to use them or not, are complementary if the reading materials aim to complement the subject matter that has been taught in class and are substitutes for choosing the desired learning and increasing learning flexibility [6], [7]. Disaster education comics as reading material for learning can function as supplements, complements, or substitutions.

[8] suggests that comics are pictures that tell stories and convey messages verbally and non-verbally, verbally through text and non-verbally through pictures. The ability to harmonize messages and images is needed to create a good comic. The steps for making a comic consist of determining the topic, determining the storyline, developing the character, preparing the background story, making a comic storyline if needed, preparing a visual storyboard script, and starting to finish the comic. There are several types of comics, namely comic strips that only involve one focus of discussion, comic books where one book presents a complete story, and website comics. Because hydrometeorological disasters that usually occur in Riau province consist of several disasters, the most suitable type of comic is comic strip.

Educational comics can be used as good reading material if they meet several criteria, one of which is valid for use. The objectives of this study are 1) to describe the validation results of hydrometeorological disaster mitigation comics in the Riau province, and 2) to convey validator's suggestions in improving educational comics.

2 Research Methods

The type of this research is R&D. The procedures used are 1) preliminary studies needed to obtain useful data for developing comics; 2) Drafting comics and instruments; 3) Validation; 4) Implementation; and 5) final revision. In particular, this research describes the results of validation by experts. This research was conducted in July - September 2021. This research describes the results of expert validation and suggestions in improving comics as disaster mitigation reading material for elementary school students, and shows the results of revisions before and after repairs according to expert advice.

The instrument used is a validation questionnaire filled out by 4 validators. The comic validators are the lecturers as experts in the fields of geography, earth physics, environmental science, and elementary education. Aspects assessed in this validation are content, language, graphics, and disaster mitigation functions validation. The analysis technique used is qualitative and quantitative analysis. Qualitative analysis is for validator's suggestions, while quantitative analysis is for data analysis of validation test results by experts. The level of validation is determined by the criteria for determining the validation that shown in Table 1.

3 Result and Discussion

The validated aspects include content validation, language, graphics, and disaster mitigation functions in comics. The validator of disaster material education comics consists of four experts, namely 1 expert in geography, 1 expert in earth physics, and 2 experts in basic education. The content or material validation aspect consists of six indicators. The average content validation score was 94.64 (very valid without revision). The graph of the content validation results can be seen in Figure 2.

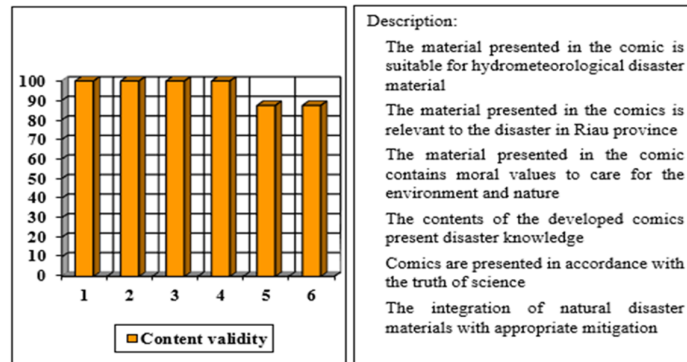


Fig.1. Content Validity

The material aspects presented and their relation to the disaster were stated to be very valid. The most frequent disasters that occur in Riau province are floods and forest fires, but there are two other disasters that are also common in this province, namely hurricanes and landslides. The contents of the comic's present disaster knowledge and moral messages related to environmental care. All disasters are given knowledge regarding the causes and mitigation of these disasters. Comics are presented in various storylines but still prioritize the truth of science for the reader.

Disaster mitigation using comics is a simulation effort with the aim of forming the concept of disaster in the minds of students so that they can live side by side with disasters, especially people in disaster-prone areas [3]. The contents of disaster materials summarized in the disaster mitigation pocketbook compiled by [2] generally consist of information on the causes of disasters, when disasters occur, the impact of disasters, and efforts to reduce the impact of disasters before, during, and after the disaster occurs. the hydrometeorological disaster material developed at least has this information in it, either delivered directly or in the actions of figures. An example of the integration of important information in the developed hydrometeorological disaster material is shown in Figure 2.



(a)



(b)



(c)

Fig.2. Disaster Information on Comics with (a) flood, (b) hurricanes, and (c) landslides themes

Each comic storyline is inserted with information about disasters such as the causes, when the disaster occurs, the impact of the disaster and disaster mitigation efforts. The information conveyed can be in the form of dialogues or monologues. To clarify the delivery of disaster messages, disaster stories in comics are also assisted with disaster illustrations.

The language aspect carried out is related to the assessment of whether the language used is suitable for reading for elementary school students or not, whether the language is communicative, the consistency of the use of terms, the information is easy to digest and the storyline is easy to understand. The results of the validation of the language aspect are shown in Figure 3.

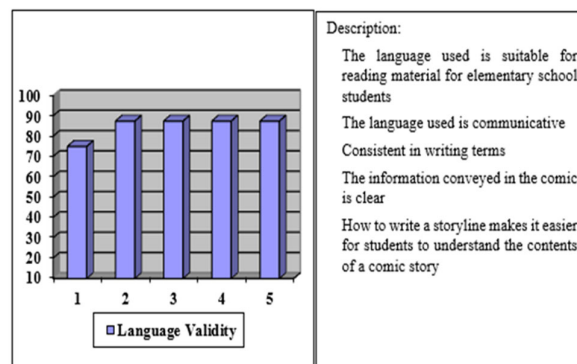


Fig.3. Language Validity of Disaster Comic Developed

Linguistically, the comics developed are suitable for reading for elementary school students, the language used is communicative, the information conveyed is clear, the storyline is easy to understand and consistent in using terms so that students do not feel confused in understanding some terms that are not familiar to them. Based on the validation results, it was found that the hydrometeorological disaster education comics were linguistically valid with an average validation value of 85, which means they are valid with several revisions. The suggestion put forward by the validator is to explain that unfamiliar terms can be explained through dialogue or monologue in the comic.

Comics are basically a medium for conveying information using a combination of words and colors. Comics can break down complex information into simple and easily digestible information. In addition, comics can also rearrange the information to be more meaningful [10]. The language aspect affects the absorption of information by the reader because this aspect relates to the way the writer conveys it to the reader. A simple storyline but able to explain disaster well will make it easier for students to read and absorb information [11]. In essence, an interesting storyline is arranged in simple, clear, and straightforward language [12] but not too standard [13].

The next aspect that is assessed in the validation is the graphic aspect. This aspect assesses the aesthetics of the comic. The results of the graphic validation test of the developed hydrometeorological disaster education comic are shown in Figure 4.

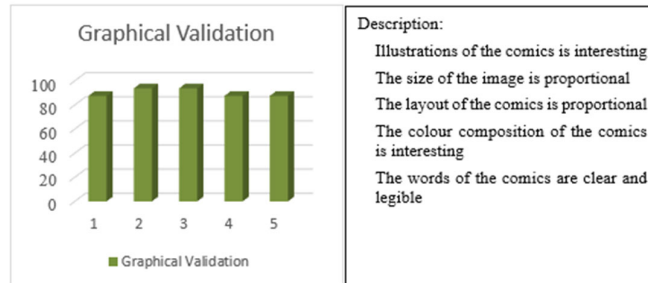


Fig.4. Graphical Validation of Developed Comis

Aesthetically, education comics of hydrometeorological disaster are declared valid. The illustrations, layout and color composition are attractive. In addition, the image size is also proportional. The average graphical validation of the hydrometeorological disaster education comics developed is 90, which means it is very valid without revision. The validator's suggestion regarding graphics is that the colors in comics are generally made bright because elementary school students tend to like bright colors.

Bright colors will give a warm and pleasant impression [13]. One of the layouts commonly used in comics is a geometric layout, which is a layout with line drawings or geometric shapes [14] and the disaster comics developed using a geometric layout. According to [14], layout serves to place panels and text balloons. Text balloons are well placed so they don't get in the way of important visual objects. Regarding the revision of the comic that was developed according to the validator's suggestions, transformation the education comic of hydrometeorological disaster in the Riau province before and after the revision are shown in Figure 5.



Fig.5. The Brightness of The Display (a) Before Revision and (b) After Revision

The next aspect that is assessed in the validation is the aspect of the comic's mitigation function. The results of the validation of the comic's functionality are shown in Figure 6.

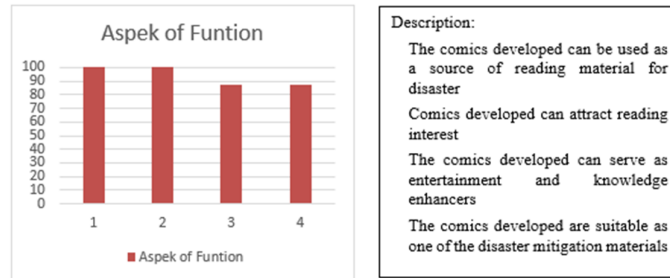


Fig.6. Functionality of Comic Developed

The validation of the developed hydrometeorological disaster educational comics can be used as a source of reading disaster material, attracts reading interest, entertains and increases knowledge, and is suitable for disaster mitigation. The results of the functional validation of the developed comics show that the comics are very valid with an average score of 93.75. The results of research by [3] show that cartoon comics integrated into science learning can improve recognizing and dealing with disasters. The results of [15] show that comics as additional reading material can increase student's knowledge regarding natural and non-natural disasters and disaster management procedures.

The validation carried out gave the result that educational comics for hydrometeorological disaster material were suitable for disaster reading material and could function as one of the media for disaster mitigation. The contents of the comics developed are very in line with the contents of the disaster material and aspects of disasters in the Riau area. In terms of language and graphics, the comics developed have good graphics and clear language with easy-to-understand storylines. Related to local disasters that are raised in disaster comics, the results of research conducted by [16] show that local disaster integrated mitigation comics are appropriate to be used as supporting media in studying disaster.

4 Conclusion

The validation aims to ensure that the aspects contained in the hydrometeorological disaster comics are in accordance with what they should be. In general, hydrometeorological disaster education comics in Riau province are in very valid criteria for very valid aspects without revision for aspects of content/material, linguistic, graphic, and mitigation functions. The language aspect that needs to be added is that if there is a specific term, it should be explained through a separate dialogue or monologue.

The content or material contained in educational comics should at least contain the causes of disasters, when disasters occur, their impacts, and their mitigation. The language used in comics is recommended to use simple, clear and straightforward language but not rigid so that the storyline in the comics becomes fun and information can be absorbed properly. Coloring in comics should be chosen bright colors

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