



## KOASE: Disaster Mitigation Learning Media in Elementary School

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**Abstract:** Disaster mitigation learning in elementary schools is the knowledge that must be taught considering that Indonesia is a disaster-prone region. This research was aimed to design and develop KOASE comics that are appropriate to be used to understand disaster mitigation. The research method used was the 4D (Define, Design, Develop, dan Disseminate) model. The feasibility of the product assessed by expert validators was 51.13 with a fairly feasible category. The teacher's response at the development stage obtained the score of 92.08 with a very good category and the students' responses obtained a score of 85.87 with a very good category. Then it can be concluded that the development of KOASE comics is appropriate to be used as a medium for disaster mitigation learning. It is suggested for the next researcher is to develop comics that are more specific to one type of natural disaster so that they can explore the depth of essential material. For the teacher, this comic can be used as a source of additional reading and learning media in teaching disaster mitigation.

## INTRODUCTION

Indonesia is a region that is prone to natural disasters, namely natural disasters caused by geological and hydro-meteorological disasters (Murtianto, 2016; PNPB, 2017). Geological natural disasters are natural disasters that are affected by shifts in the earth's plates (Kodoatie & Syarief, 2010; Tondobala, 2011). The earth plate in the territory of Indonesia consists of the Eurasian plate, the Pacific Plate, and the Indian-Australian plate. The existence of these three plates is a factor that causes natural geological disasters. Geological natural disasters that are possible to occur from the presence of these plates in the territory of Indonesia are earthquakes, tsunami, and volcanic eruptions (PNPB, 2017; Tondobala, 2011). In addition to natural disasters caused by the influence of the earth's plates, Indonesian territory is also

affected by meteorological phenomena, this makes the Indonesian region will have an impact on natural disasters. The intended natural disaster is a hydrometeorological natural disaster. Hydro-meteorological natural disasters that are possible to occur are floods, landslides, tornadoes, drought and forest, and land fires. Natural disasters that occur in Indonesia are natural disasters caused by two factors, namely factors that are affected by the movement and magnification of the earth's plates (fire of rings) and factors that are influenced by climate and weather phenomena (PNPB, 2017).

Due to the region of Indonesia which is vulnerable to natural disasters, knowledge content about the disaster is needed. The disaster knowledge content must be able to provide in-depth information to be given to anyone in the

face of natural disasters that will occur at any time. The disaster knowledge content is called disaster mitigation. Disaster mitigation is conceptual that was developed to provide knowledge in early prevention in dealing with natural disasters, both before, during, and after natural disasters with the main objective being to reduce and minimize the risks and impacts of a disaster that is happening. Therefore, conceptual disaster mitigation is a necessity that needs to be disseminated to the general public to provide knowledge content about the disaster. Research conducted by Brown et al. (2014), Daramola et al. (2017), and Sung-Chin Chung & Cherng-Jyh Yen (2016), states that disaster knowledge needs to be designed and managed by educational institutions to provide disaster training activities to develop literacy skills about disaster mitigation for school residents and community so that with the ability of disaster literacy can reduce the impact of disasters.

Schools are one of the institutions that have legality in providing and stimulating knowledge about the disaster. Disaster mitigation education should be an important and major issue that must be done by schools considering that Indonesia is a region that is vulnerable to disasters. Elementary school is an education level that provides an initial foundation in shaping knowledge, attitudes, and skills. The formation of this initial foundation required planning and action tailored to aspects of ability at the level of elementary school students (UNESCO-IIEP, 2011). Students in elementary schools are individuals at the operational stage of the concrete (Cerry, 2019), who make it possible to have a logical understanding and have awareness in taking action. Therefore, we need activities that stimulate this ability. One thing that can be done by schools is to provide a broad space for teachers to innovate in the learning process (Selby & Kagawa, 2012; Winarto et al., 2018).

Innovations made in learning are by developing learning media (Farah et al., 2014). Learning media is a component of learning resources that contain instructional material that can stimulate students to learn. The main function of learning media is as a teaching aid that also influences the conditions and learning environment that are arranged and created by the teacher. The use of instructional media in the orientation stage of learning achievement is very helpful in the effectiveness of the learning process and delivery of the contents of the learning message. The contents of the learning message as outlined in the learning media are the ability of students to understand disaster mitigation.

Comics are a medium for learning to read and understand stories by visualizing or illustrating images presented in the form of a series of stories in the form of cartoons with certain characters. Comics can be used as a learning medium that functions as a messenger of learning with visual media that is packaged as attractive as possible so that students are more interested in learning. Comics are one of the learning media that can stimulate students to want to learn and learn things. Comics are learning media in the form of cartoons that have characters and characters. Comics are a cartoon that expresses characters in the form of illustrated stories and is designed to provide entertainment and stimulation to students. Comic media in the form of cartoon characters are assumed to influence the ability of students in elementary schools to understand disaster content so that students are expected to be able to maintain and protect the environment in the face of disasters (Toledo et al., 2014).

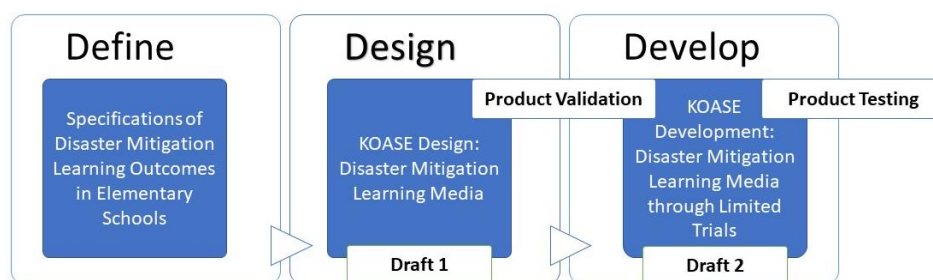
The comic that was developed was the KOASE which stands for Komik Anak Sekolah (Comics for Students). The comics developed are comics that contain the knowledge of activities that must be carried out before, during, and after

disasters. There have been no comics made related to disaster mitigation for students in elementary schools. The comics developed in this research were comics that describe and explain disaster mitigation knowledge, specifically for elementary school students. The figures used in this comic consisted of three people, namely a teacher and two elementary school students while the setting and place in the storyline were the elementary school environment. The grammar used had been adjusted to the level of understanding and ability of elementary school students. The material contained in the comics had been adjusted to the learning achievements of the elementary school curriculum. Thus, the comics developed in this study were comics specifically designed to be used as additional references and learning media for elementary school students. It is expected that with this KOASE, the students know and understand the activities carried out as a disaster mitigation information literacy. This paper describes the design process and development of the KOASE disaster mitigation comic so that it can be used as a learning media by teachers, both in the learning process in the classroom or outside of the classroom. The students are expected to be able to obtain information early on about disaster mitigation (Noviana et al., 2019).

**METHOD**

The 4D model was employed to develop the product (Thiagarajan et al., 1974). This model consists of four stages, namely Define, Design, Develop and Disseminate. The define stage is to analyze the basic problems faced in learning. The results of this analysis were used to determine the comic design on disaster mitigation. The design stage is the stage to compile and prepare a prototype for the development of the product. The activities contained in this stage namely making storyboards, determining characters, determining the use of designs and choosing colors, and making characters illustrations. The develop stage was to produce the KOASE product (final draft) that had been validated and revised based on the inputs from experts and practitioners as well as the responses of teachers and students in using the KOASE during the learning process in a limited trial.

Disseminate stage is the stage of using the developed product on a broader scale aimed at testing the effectiveness. The revised comics had been implemented on the actual target to measure the achievement of the goal so that the effectiveness of the product could be known. Disseminate stage was not carried out due to limited time and research funds. Therefore, this research did not carry out all stages, only limited to three stages. The stages can be seen in Figure 1.



**Figure 1.** Stages of Research Implementation

The type of data collected was qualitative and quantitative data.

Qualitative data was in the form of comments and suggestions for

improvement from expert validators obtained through the validation process and product trials while the quantitative data was in the form of assessment scores provided by the validator, student, and teacher. The expert validator who validated the product consisted of five validators, they were two lecturers who validated the content, one language expert who validated word selection and use, and two elementary school teachers who validated the suitability and usefulness. The research subjects in the implementation of the product consisted of 12 teachers and 20 students. The aspects assessed by the validator at the develop stage can be seen in Table 1. Teacher and student responses after using the KOASE can be seen in Table 2.

**Table 1.** Validator Research Instruments

Material/Content Component	Learning Media Component
Content aspect	Design and color aspect
Presentation aspect	Linguistic aspect
	Content suitability aspect

**Table 2.** Teacher and Students' Response Instruments

Teacher's Response	Student's Response
1. Content aspect	1. Content aspect
2. Instructional media aspect	2. Instructional media aspect
3. Display aspect	3. Display aspect
4. Linguistic Aspect	4. Interest Aspect

The criteria used to determine the feasibility of the KOASE can be seen in Table 3.

**Table 3.** Feasibility Categories

No	Interval	Categories
1	81 – 100	Very Feasible
2	61 – 80	Feasible
3	41 – 60	Fairly Feasible
4	21 – 40	Inadequate
5	0 – 20	Not Feasible

The criteria to determine teachers' and students' responses can be seen in Table 4.

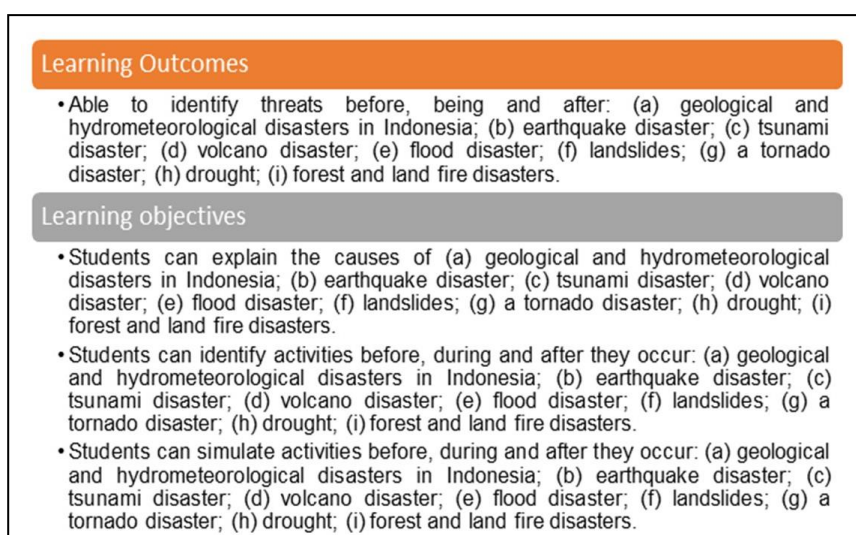
**Table 4.** Teacher and Student Response Categories

No	Criteria	Interval
1	Very Good	81 – 100
2	Good	61 – 80
3	Enough	41 – 60
4	Less	21 – 40
5	Very Less	0 – 20

## RESULT AND DISCUSSION

### Define Stage

The activity carried out at the define stage was to analyze the basic problems encountered in learning. The results of this analysis were used to determine the comic design. Based on the analysis, the specifications for the achievement of disaster mitigation learning can be seen in Figure 2.



**Figure 2.** Specifications of Learning Outcomes and Learning Objectives of Disaster Mitigation

Based on Figure 2, the specifications of learning outcomes and learning objectives of disaster mitigation was the main basis of analysis for designing KOASE. The product was arranged into one theme and nine series. The theme used was Disaster Alert with: (a) a series of geological and hydro-meteorological disasters in Indonesia; (b) earthquake disaster series; (c) tsunami disaster series; (d) volcanic eruption disasters series; (e) flood disaster series; (f) landslide disasters series; (g) cyclones series; (h) drought series; and (i) forest and land fire disaster series (Akbar & Hartono, 2017; Noviana, 2019; Sampurno et al., 2015). KOASE is a comic that illustrates the knowledge and activities of disaster mitigation, starting from before,

during, and after a disaster. The figures used in this comic consisted of three people, namely a teacher and two elementary school students. The setting and place in the storyline were the elementary school environment. The grammar used had been adjusted to the level of understanding and ability of elementary school students. Disaster mitigation material developed as the content of the comic had been adjusted to the learning outcomes in the elementary school curriculum.

### Design Stage

Based on the needs analysis conducted at the define stage, a comic design had been produced as shown in Figure 3.



Figure 3. KOASE Design

Based on Figure 3, the cover was designed with a dominant orange color and a little mix of green and yellow because orange looks bright and refreshing, especially if it is combined with a little green and yellow and to make elementary school students more interested in reading (Anafiah, 2014; Budiarti & Haryanto, 2016). The KOASE had been designed with interesting color selection under the theme of natural disasters, the uses of language in

conveying material were designed and adapted to the language used by students every day, the material on disaster had been presented interactively, clearly, and systematically.

The main part of the KOASE consists of an overview of the concepts and materials of disaster mitigation starting from (1) understanding, causes, and impacts of disasters and (2) activities before the disaster, activities during the disaster, and activities after the disaster,

as well as disaster management (Amri et al., 2017; Hardi et al., 2018; Kastolani & Mainaki, 2018; Nandi & Marlyono, 2019; Nur, 2010). The contents cover the geological and hydrometeorological disasters in Indonesia which include the earthquake, tsunami, volcanic eruption, flood, landslides, tornadoes, drought, and forest, and land fires. In the end, there is a list of terms compiled so that the reader (elementary school students) understand their meanings and purposes (Kristiyaningrum, 2017).

**Develop Stage**

This stage produced a product that had been validated and revised based on the inputs from the expert validators and practitioners (elementary school teachers

and elementary school students). The develop stage was divided into two stages, namely:

a. Expert Validation

The experts who validated the products were expert validators and practitioners. There were five expert validators, consisted of two lecturers who validate the content one language expert who validated the selection and use of words, and two elementary school teachers who validated the suitability and usefulness of the product.

The suggestions given by the validators were used to improve the aspects of content, presentation, design, color, language, and suitability of the contents. The results of the validation are presented in Table 5.

**Table 5.** Feasibility Data of Draft 1 and Draft 2

Assessment Aspects	Average			
	Draft 1		Draft 2	
	Score	Categories	Score	Categories
Content	55.00	Fairly feasible	89.50	Highly feasible
Presentation	50.00	Fairly feasible	96.00	Highly feasible
Design and Color	52.00	Fairly feasible	92.00	Highly feasible
Language	45.33	Fairly feasible	86.97	Highly feasible
Appropriate Content	53.33	Fairly feasible	92.28	Highly feasible
<b>Average</b>	<b>51.13</b>	<b>Fairly feasible</b>	<b>90.97</b>	<b>Highly feasible</b>

The aspect of the content of the draft 1 obtained a score of 55.00 with a fairly feasible category while in draft 2, the score became 89.50 in the highly feasible category. Based on this data, the product is very appropriate because the KOASE product met the requirements to be used as a learning media. This is because the developed KOASE product contained learning objectives, learning materials, and learning topics about disaster mitigation designed for elementary school students. The clarity and accuracy of the storyline contained in comics were in line with cognitive, affective, and psychomotor aspects. It is also suitable for the level of students' development in elementary school.

This content aspect provided information that the design of the product

developed was in line with the essential material on disaster mitigation. Sung-Chin Chung & Cherng-Jyh Yen (2016) state that knowledge about disaster needs to be designed and managed by educational institutions to provide disaster training activities programs to develop literacy skills on disaster mitigation for school residents and the community so that it can reduce the impact of disasters. Also, the essential material needs to be adjusted to the abilities and cognitive stages of the elementary school students and one of the other supporting elements is to connect with local wisdom and the environmental conditions in which product design will be developed (Noviana et al., 2019).

In the presentation aspects, there were two indicators used to see the

presentation of the comics. The score of the presentation aspect was 50.00 with a fairly feasible category in draft 1 and a score of 96.00 with a very feasible category in draft 2. The presentation aspect is a very important element in developing learning media products in the form of comics. The comics developed need to have an elementary identity and specificity (Tatalovic, 2009) and interesting and easy to read (Liu, 2004) so that readers can get messages and information about disaster mitigation (Hardi et al., 2018), disaster participation (Adiyoso & Kanegae, 2012; Mane, 2019) and preparedness in facing disasters (Kastolani & Mainaki, 2018; Tuswadi & Hayashi, 2014).

There were eight indicators in the aspects of design and color. The scores obtained on the aspect was 52.00 with a quite feasible category and 92.00 with a highly feasible category. The aspects of color selection and usage are very important because they greatly influence the interest of the reader (teacher and elementary school students) and also give meaning in the design of the product. The orange-dominated color is bright, fresh, and pleasing. Therefore, good planning and design are needed in the use and selection of colors to develop two-dimensional printed media products (Farinella, 2018). It is expected to be able to create interest and motivation to see and read (Budiarti & Haryanto, 2016) and can also affect the interest in learning of students who have low abilities (Arini et al., 2017).

There were three indicators used to see the suitability of the language used in the comics. The scores obtained in the language aspect were 45.33 (draft 1) with a fairly feasible category and 86.97 in the very feasible category (draft 2). The linguistic aspect is very important because the choice and use of words and sentences greatly influence the reader in understanding the contents of the reading

material. The selection and use of words must be adjusted to the ability of the readers. Therefore, in the process of designing the product, the researcher validated the product to a linguist (Indonesian) so that the selection and use of words are suitable for the level of reading ability and skills of elementary school students (Maharani et al., 2019). Also, the selection and use of words can improve students' ability to read so that they can understand and interpret the material (Kissau & Hiller, 2013; Pourhosein Gilakjani & Sabouri, 2016).

There were three indicators in the aspects of content suitability to see whether the contents of comics can provide readers understanding of the contents of the comics. The scores obtained were 53.33 with a fairly feasible category and 92.8 in the very feasible category. The content suitability aspect provided information on whether the design of the product was able to provide readers with an understanding of the content of essential material. Looking at the data that has been obtained from this aspect, the product can be used in learning (Damopolii & Rahman, 2019; Heisler, 1947). This aspect impacts the ability of elementary school students to know and understand the various forms of natural disasters that exist in Indonesia (Noviana, 2019).

The average feasibility of KOASE in draft 1 was 51.13 with a fairly feasible category and 90.97 with a highly feasible category in draft 2. It can be concluded that the developed product is highly feasible to be used in learning by elementary school students, so that it can have an impact and influence the disaster mitigation ability (Hosler & Boomer, 2011), reading abilities (Liu, 2004), student communication skills, providing curiosity, and student motivation to learn (Budiarti & Haryanto, 2016), and disaster mitigation knowledge is very important

for elementary school students (Hardi et al., 2018; Nandi & Marlyono, 2019).

The teachers need supporting facilities in disaster mitigation learning to make it easier for teachers to carry out learning activities in class. Therefore, learning media are needed that can be used to provide disaster mitigation knowledge. Based on this, the KOASE product is an alternative that can be used in disaster mitigation learning for

elementary school students so that the disaster mitigation literacy skills, reading abilities, students' communication skills, and disaster preparedness can be improved.

The developed product had been revised based on input and assessment from the five validators. The following are examples of changes or improvements.

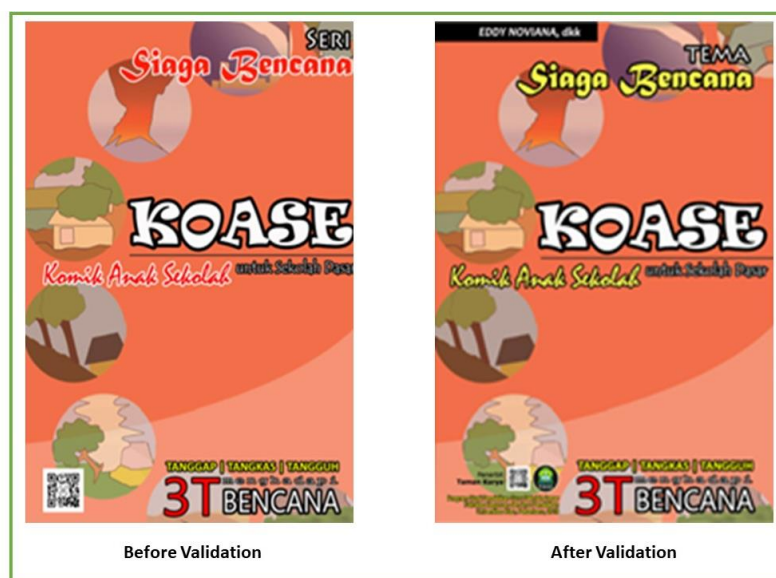


Figure 4. Changes and Improvements to the Cover of Draft 1

The improvements were done on the icon to be more specific to the disaster

that will be discussed as can be seen in Figure 5.



Figure 5. Changes and Improvements to the Cover of Draft 2



The content section was improved by adding the name of the disaster at the top of the page, adding the page number at the top right, adding the number to the

dialog section, correcting the colors, and adjusting the original object. The improvements can be seen in Figure 6.

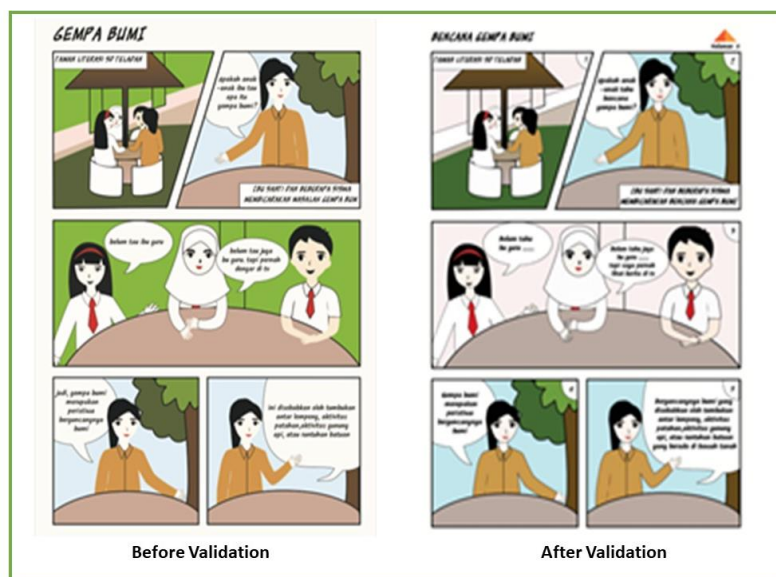


Figure 6. Changes and Improvements in the Contents of Draft 2

b. Field Trial

The next stage was to test the product to the actual target subject. The trial’s results were used to improve the product to obtain feasible results so that it can be used and utilized by teachers and students in learning (Heisler, 1947; Liu, 2004). At this stage, a limited trial was conducted to obtain the responses from the teacher and students after using the product. The teacher’s responses can be seen in Table 6.

Table 6. Teacher’s Response

Assessment Aspects	Score	Categories
Content	92.78	Very good
Learning Media	95.00	Very good
Display	88.33	Very good
Language	92.92	Very good
Average Teacher Response	<b>92.08</b>	Very good

Table 6 shows that the teacher gave positive responses with a score of 92.08. The teacher’s responses score was based on four aspects, namely the aspect of content, aspects of learning media, aspects of appearance, and the aspects of language. The content aspect consisted of

three indicators, namely comic material obtained a score of 91.67.

The product developed obtained a score of 93.33 for reading interest and a score of 93.33 for the ability to convey information. The content aspect obtained an average score of 92.78 in the excellent category. The data obtained in this aspect proves that the product can be used and utilized in learning (Rezkita & Ardhian, 2019) and can help elementary school students to increase their interest and motivation to read (Buchori & Setyawati, 2015). The essential materials about disaster mitigation increase the knowledge and understanding of elementary school students in dealing with disasters (Contreras, 2014; Noviana et al., 2019; Tuswadi & Hayashi, 2014).

The aspect of instructional media obtained a score of 95.00 with an excellent category. The score was obtained based on three indicators, namely the ability to increase students' motivation with a score of 93.33, the ability to broaden students' insights with a

score of 96.67, and the ability to add knowledge with a score of 95.00. The data provided information that the product was easy for students to understand, motivate the students to read (Anafiah, 2014) and review the material (Kastolani & Mainaki, 2018; Kristiyaningrum, 2017).

The display aspect, based on the teacher's response, obtained a score of 88.33. The score was obtained based on three indicators, namely the attractiveness of the writing and type of fonts used with a score of 86.67, the design attractiveness with a score of 86.67, the attractiveness of color, display, and cover with a score of 88.33, and the attractiveness of the text with a score of 91.67.

The language aspect obtained a score of 92.92 in the excellent category. The score was obtained based on four indicators, namely the level of cognitive development with a score of 95.00, choice of words with a score of 91.67, the storyline with a score of 93.33, and the accuracy of the terminology with a score of 91.67. Based on the teacher's response the product can be used by teachers as learning media (Indra Daulay, 2018), both inside and outside of the classroom (Inang Prambudi, 2018). The developed product is expected to be able to influence the knowledge, understanding, abilities, and skills of teachers and elementary school students in dealing with natural disasters (Hidayat & Rostikawati, 2018; Nurjannah et al., 2018; Rosyida et al., 2018).

The students' responses data after using the developed product can be seen in Table 7.

**Table 7.** Students' Response

Assessment Aspects	Score	Categories
Content	88.33	Very good
Learning Media	90.83	Very good
Display	80.14	Very good
Linguistic	84.17	Very good
Average Student Response	<b>85.87</b>	Very good

Table 7 provides information that the students' responses on the KOASE media are in the very good category with

a score of 85.87. the score was obtained based on four aspects, namely aspects of content, aspects of learning media, aspects of the display, and aspects of interest. Students' responses after using KOASE this proves that the students were pleased during the learning (Farah et al., 2014) and motivated to read the comics (Winarto et al., 2018). The contents of the material presented are clear, and systematic so that it makes it easy for students to understand the concepts and materials regarding disaster mitigation (Arini et al., 2017). The choice of colors and the use of images are interesting to give students a sense of interest in learning (Toledo et al., 2014). The use of grammar that is adapted to the development of students in elementary schools can facilitate the students in understanding the content or material. Therefore, it can increase students' knowledge in elementary schools (Clark, 2017).

The content aspect consisted of two indicators, namely the material indicator that obtained a score of 90.00 and the delivery indicator that obtained a score of 86.67 so that the content aspect obtained an average score of 88.33. The clarity of the material presented is important (Clark, 2017), therefore, the presentation of the material needs to be designed systematically using language that is easily understood by students in elementary schools (Ntobuo et al., 2018). It will have an impact on students' interest in reading which in turn will increase literacy skills about disaster mitigation (Muktaf, 2017).

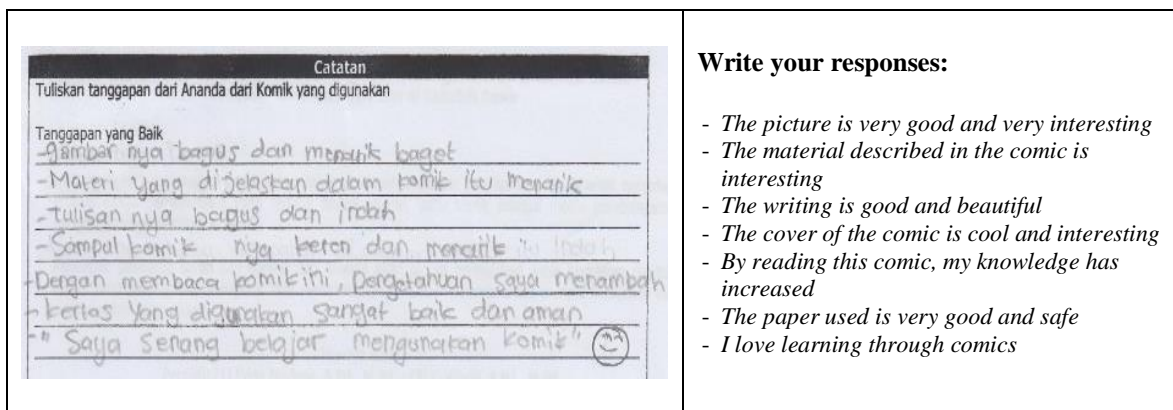
The learning media aspect obtained a score of 90.83 with an excellent category. The score was obtained based on three indicators, namely the easy to understand indicator with a score of 86.67, the knowledge improvement indicator with a score of 93.33, and the ability to be used individually and in groups indicator with a score of 95.00. The KOASE product met the standard to

be used as a learning media. This is because it can facilitate students to understand the material and activities of disaster mitigation (Clark, 2017). The material is easy to understand and can give students experience to acquire and add disaster mitigation knowledge (Winarto et al., 2018).

The display aspect obtained a score of 80.14. The score was obtained based on six indicators, namely the cover indicator with a score of 74.17, the images indicator with a score of 80.83, the color indicator with a score of 85.83, the paper indicator with a score of 80.00, the font indicator with a score of 84.17, and the size of the product indicator with a score of 75.83. The use of attractive images is a necessity in developing comics. Attractive images can stimulate elementary school students to want to read and learn (Winarto et al., 2018). This is due to the students' stage of development which is at the concrete operational stage (Cerry, 2019). The use of images that are interesting and relevant is an alternative in delivering abstract material to be more concrete. Comics that are designed to provide security can be used by students in elementary schools. Safety in the use of instructional media is very necessary in order not to endanger

and harm the students (Clark, 2017). The choice and use of color are crucial in developing comics. Color has a certain meaning and impression, therefore the colors used in KOASE are adjusted to the material content. The color selection used is more striking and bright because it can stimulate the curiosity of the students. The use of fonts must be proportional and interesting to influence and stimulate students to want to read and learn. The size of learning media in the form of comics should be concise and easy to carry so students can always take it to the class or take it to the outside of the class (Clark, 2017).

The aspect of students' interest scored 84.87 which is in the excellent category. The development of a product needs to pay attention to aspects of users' interest. Likewise, the development of comics needs to be designed so that users can be interested in reading and using products (Liu, 2004). This attraction is one indicator in the process of forming individual motivation (Hosler & Boomer, 2011). This is necessary because comics that are designed with attention to aspects of interest can stimulate students to want to read and learn. More details can be seen in Figure 7.



**Figure 7.** Elementary School Students Responses after Using the KOASE

Based on the students' responses, the developed product can be used by

students, both in the classroom or outside of the classroom. This serves as evidence

that the product can provide clear information to students about disaster mitigation, increase their reading interest, and make it easy for them to understand the content and material about disaster mitigation.

## CONCLUSION

KOASE: disaster mitigation learning media in elementary schools are feasible and can be used by teachers and students in learning disaster mitigation and can be used. The feasibility of the product assessed by expert validators was 51.13 with a fairly feasible category. The teacher's response at the development stage obtained the score of 92.08 with a very good category and the students' responses obtained a score of 85.87 with a very good category.

It is suggested for the next researcher is to develop comics that are more specific to one type of natural disaster so that they can explore the depth of essential material. For the teacher, this comic can be used as a source of additional reading and learning media in teaching disaster mitigation.

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