



Content analysis of the revised K-13 science textbook grade VII SMP/MTs on disaster risk reduction instruction

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ABSTRACT

Keywords:

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Textbooks are one of the learning resources that are widely used by students and teachers. Analyzing the contents of a textbooks is a way that can be done to assess the quality of the book. This research aims to determine the content of the revised K-13 science textbook grade VII SMP/MTs which is appropriate for integrated disaster risk reduction learning in schools. The emphasized disaster is a disaster that often occur in Indonesia. This research used document analysis method. Data were collected based on a systematic review of documents and supporting evidence in the form of research on disaster risk reduction in science learning in SMP/MTs. Data were analyzed by using descriptive analysis based on research focus. This research was conducted by analyzing two books from the government and non-government. The result of research shows that there are 19.05% sub material in the science books from the government and 17.2% of non-government that integrated disaster risk reduction. From the result, it can be seen that the content in grade VII SMP/MTs science textbooks on disaster risk reduction is still lack, so it is necessary to add content related to disaster mitigation to the science book grade VII SMP / MTs.

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INTRODUCTION

Indonesia is a country that is in the area where three tectonic plates meet, namely the Indo-Australia, Eurasian and Pacific Plates. Indonesia is also on the path of a series of active volcanoes in the world or the Pacific Ring of Fire. This area contributes around 90% of earthquake events in the world (literasipublik.com). That is why Indonesia is known as a disaster-prone country. According to Nugroho (2011), Indonesia ranks highest for tsunami, landslides and volcanic hazards (Yusuf, 2011). According to the National Disaster Management Authority (BNPB), there were 2,829 disasters in Indonesia from January to September 2019. Head of the Center for Information and Public Relations Data of the National Agency for Disaster Management, Wibowo (2018), said that more than 98% of this amount was dominated by hydro-meteorological disasters such as strong winds, tornadoes, landslides and floods (Puspasari, 2019).

Natural disasters are natural phenomena that threaten people's lives because they can cause casualties, environmental damage, and other adverse impacts. Efforts to overcome the risk of natural disasters can be given to the community since basic education through the provision of information and

socialization in school books. This disaster management education is important to be given to reduce the impact of disasters that occur. One of the lessons in schools that can support the insertion of disaster preparedness material is the Natural Sciences (IPA). Science is one of the subjects that studies about natural events such as natural disasters and their causes related to daily life so that science materials can be integrated with natural disaster materials.

The curriculum is a tool to achieve goals and as a guide in the implementation of education. The 2013 curriculum revision is an effort the government can do to improve the learning system. The success of the 2013 curriculum implementation depends on the implementation of National Education Standards such as Content Standards and Facilities and Infrastructure Standards that occur in the learning process in schools. One of the Facilities and Infrastructure Standards used is textbooks. Textbooks are learning media that are widely used by students and educators. Textbooks are important in teaching and learning activities because the existence of this book can facilitate teachers, parents, and school elements to support the achievement of student learning outcomes (Mumpuni, 2018, p. 45)

Science subjects have been given to students from elementary/MI, junior high/MTs, and high

school/MA to tertiary level. The focus of this research is aimed at the SMP/MTs levels. To make it easier for educators and students to carry out the learning process in accordance with the 2013 curriculum at the SMP/MTs level, especially in natural science subjects, the Government of Indonesia has referred several books which are materially in accordance with the revised 2013 curriculum. There are a lot of books published by the government that can be accessed free of charge by educators and students on educational sites in Indonesia, for example the easiest and most common are BSE books published by the Ministry of Education and Culture which can be accessed on the <https://bse.page.kemdikbud.go.id>. In addition to government reference books, there are also a number of books published by general publishers that publish natural science textbooks for SMP/MTs with adjusted material for the 2013 revised curriculum. In this study the researchers used 2 sources of books namely government reference books and books published by the general publisher.

In accordance with Indonesia's disaster-prone regions, it is worthwhile to introduce disaster mitigation as early as possible and be implemented in the education process of Indonesia's young generation. The time that is considered suitable for starting to provide knowledge about disaster management is at the level of SMP/MTs. Junior/MTs students have started to receive science subjects which generally discuss about events that occur in nature, with this science subjects very supportive when integrated about disaster management materials.

To find out the extent of the integration of disaster management materials in science subject books that are used as learning media in schools. Content analysis is needed in science textbooks for SMP/MTs (government and public publisher references). The purpose of the analysis of the content of science textbooks for SMP/MTs is to find out the percentage of government and public publisher reference books whose content has been integrated with disaster management material.

The analysis of the contents of this book is expected to be able to provide an overview for educators, that there are several content books for the 2013 curriculum of SMP/MTs revised curriculum which have integrated disaster management material, and it is hoped that educators can deliver the material by integrating the response to disasters that often occur around us.

METHOD

This research was conducted with quantitative descriptive through a book analysis approach. Steps

taken: (1) looking for literature that forms the basis of research theory, (2) analyzing books that are research subjects, (3) coding of material on books that have the potential to integrate with disaster risk reduction, (4) describing material indicated containing disaster integration, (5) weighting each material by the sum of all chapters in the Natural Sciences book, (6) analyzing and deciding the content of the book material whether it meets the criteria as material for disaster mitigation.

The subjects of this study were the revised science book grade VII SMP/MTs 2013 curriculum published by the government and non-government published books in class. Data collection techniques were carried out by analyzing the material in terms of delivery, drawings, worksheets and questions integrated with disaster risk education in the science material in the textbook. From this data, two government reference books and a general publisher were compared.

RESULT AND DISCUSSION

This research describes two revised SMP/MTs science books which were analyzed descriptively focused on the integration of material with disaster mitigation education. The phenomena related to nature focus on grade VII books in semester 1 & 2. The books analyzed are student books which are often used as media as well as teaching materials for students.

Government reference books are divided into two categories based on time of use, namely books semester 1 and semester 2 in one study year. However, in books published by general publishers they have semester 1 and 2 compositions in one book for one study year.

There are 243 pages in government books in semester 1 books and 185 pages in semester 2 books, while in general publisher books there are 388 pages for one year of study. A book analysis has been conducted in terms of the integration of the revised VII grade SMP disaster risk education in 2013 curriculum. The results are shown in the Table 1.

There are 7 public grade publications for SMP/MTs grade VII publications that are integrated with disaster mitigation education. In semi-electronic science books for Class VII semesters 1 and 2 published by the public publisher, in chapter 7 on living things and the environment, in the submersion of the influence of plants on the soil there has been an integration of disaster management, that is, the material explains a little about the relationship of plants to the soil that will become a solution to prevent flooding.

Table 1. Semi-Electronic Science Book Analysis for class VII semesters 1 & 2 published by the public publisher

Chapter	Material	Integration Analysis		Description
		Yes	No	
1. Science Subjects and Observations	a. Science and Scientific Work		√	-
	b. Measurement		√	-
	c. Size and Unit		√	-
2. Classification	a. Living creatures and inanimate objects		√	-
	b. Characteristics of Living Things and Non-Living Things		√	-
	c. Classification of Living Things		√	-
3. Substance and Character	a. Solid, Liquid and Gas		√	-
	b. Elements, Compounds and Mixtures		√	-
	c. Physical Properties and Chemical Properties		√	-
	d. Changes in Physics and Changes in Chemistry		√	-
4. Temperature and Heat	a. Temperature and Measurement		√	-
	b. Expansion		√	-
	c. Application of Expansion in Daily Life		√	-
	d. Heat		√	-
	e. Heat Transfer		√	-
	f. Body Temperature Stability of Living Things in Everyday Life		√	-
5. Energy	a. Understanding Energy		√	-
	b. Forms of Energy		√	-
	c. Energy Sources		√	-
	d. Changing the Form of Energy		√	-
	e. Energy Transformation in Cells		√	-
	f. Metabolism of Cells		√	-
6. Life Organizational System	a. Cell		√	-
	b. Tissue		√	-
	c. Organic Body		√	-
	d. System Organ		√	-
	e. Organism		√	-
7. Living creatures and the environment	a. Ecosystem		√	-
	b. Interaction of Ecosystem Components	√		● □ Page 238 Flood prevention
	c. Ecosystem Balance		√	-
	d. Population Dynamics		√	-
8. Environmental Pollution	a. Natural Environment and Polluted Environment		√	-
	b. Types of Pollution		√	-
	c. Pollution Prevention		√	-
9. Climate Change	a. Causes of Climate Change	√		● Page 287 Due to volcanic eruptions
	b. Climate Change Impacts	√		● Page 294-295 Causes of natural disasters (hurricanes and typhoons, fires, drought, floods)
	c. Mitigation of the Impact of Climate Change	√		● Page 296-297 Disaster management caused by climate change
10. Earth Layers and Disasters	a. Earth Structure	√		● Page 307 Earthquake process
	b. Natural Disasters	√		● Page 308-310 The process of the volcano erupting ● Page 311-313

Chapter	Material	Integration Analysis		Description
		Yes	No	
	c. Disaster Response Measures	√		The process of an earthquake ● Page 313-314 Tsunami process ● Pages 315-316 & 318 Disaster risk reduction ● Pages 317 & 316 Reducing the risk of tsunami disaster ● Pages 317 & 319 Risk reduction for volcanoes
11. Solar System	a. Components of the Solar System		√	-
	b. The Earth and Moon's Movement against the Sun.i		√	-

For the chapter on climate change presented in chapter 9, submersion of the causes of climate change is one explanation that climate change can affect and be the cause of volcanic eruptions. For other submitters, namely climate change impact submersions, there is also integration of disasters, namely the impacts of climate change that can cause several disasters including storms and typhoons, fires, droughts, and floods. In addition to the impacts that can cause several disasters, in this chapter the climate change mitigation submersion has also integrated disaster management related to the way disaster management is caused by climate change. Based on these results it can be seen that in chapter 9 on climate change as a whole there has been integration of disasters and their mitigation.

Chapter 10 discusses the earth's layers and disasters. Substrate structure of the earth, there is material that integrates with disaster, namely earthquake, in this sub-article there is an explanation of the process of earth formation caused by earthquakes and explains the movement of the earth's layers related to the earthquake process. For disaster submissions in chapter 10 about the layers of the earth and disasters, there is a whole material

in this submitter explaining and integrating the material discussed in disaster, in accordance with the title of the submateries in this chapter about disasters. In this submitter there is an explanation of the understanding of volcanoes, earthquakes, and tsunamis. This submission also presents material explanation on disaster management procedures for the risk reduction of volcanic eruptions, earthquakes and tsunamis. However, the procedures for disaster risk reduction presented for earthquakes and tsunamis only contain procedures for reducing risk before a disaster occurs and when a disaster occurs, it does not contain procedures for reducing risk after a disaster occurs. Meanwhile, volcanoes / volcanoes contain procedures for risk reduction before a disaster occurs, when a disaster occurs and after a disaster. Based on these results it can be seen that in chapter 10 about the earth's layers and disasters, overall there has been a lot of material integrated about disasters and their mitigation, and it can also be seen in this chapter that the chapters have indeed been prepared and prepared to provide material on mitigation and reduction disaster risk for Grade VII students of SMP/MTs in accordance with the revised 2013 curriculum.

Table 2. Semi-Natural Science Class VII Book Analysis semester 1 government referral

Chapter	Material	Integration Analysis		Description
		Yes	No	
1. Natural Science Objects and Observations	a. Natural Sciences Investigation		√	-
	b. Measurement as Part of Observation		√	-
2. Classification of Living Things	a. Characteristics of Objects in the Surrounding Environment		√	-
	b. How to classify living things		√	-
	c. Classification of Living Things		√	-
3. Classification of Material and Changes	a. How to Classify Materials		√	-
	b. How to separate the mixture		√	-
	c. Objects that can undergo change		√	-
4. Temperature and Changes	a. How to Know the Temperature of Objects?		√	-
	b. Changes Due to Temperature		√	-
5. Calories and Displacement	a. Definition of Heat		√	-
	b. Heat Transfer		√	-
6. Energy in the Living System	a. Understanding Energy		√	-

Chapter	Material	Integration Analysis		Description
		Yes	No	
	b. Various Energy Sources		√	-
	c. Food as an Energy Source		√	-
	d. Energy Transformation in Cells		√	-
	e. Cell Metabolism		√	-
	f. Digestive system		√	-

Table 3. Semi-Natural Science Book Analysis Class VII semester 2 reference government

Chapter	Material	Integration Analysis		Description
		Yes	No	
1. Life Organizational System of Living Things	a. Cell as the Structural and Functional Unit of Life		√	-
	b. Networks in Animals and Plants		√	-
	c. Organs in Animals and Plants		√	-
	d. System Organs and Organisms		√	-
2. Interaction of Living Things with the Environment	a. Understanding of the Environment		√	-
	b. Things Found in an Environment		√	-
	c. Interaction in Ecosystems Forms a Pattern		√	-
	d. Patterns of Human Interaction Influencing Ecosystems		√	-
3. Environmental Pollution	a. Pollution Definition	√		● Page 50 Impact of Mount Eruption
	b. Water Pollution		√	
	c. Air Pollution	√		● Page 61 Impact of Mount Eruption
4. Global Warming	d. Land Pollution		√	-
	a. Greenhouse Effect		√	-
	b. Definition of Global Warming		√	-
	c. Causes of Global Warming		√	-
	d. Impact of Global Warming		√	-
5. Earth's Layers	e. Efforts to Tackle Global Warming		√	-
	a. AtmosferAtmospheric		√	-
	b. Litosfer			● Page Causes of fracture formation
		√		● Page 108-114 Process, causes, effects of earthquakes
				● Page 115 Tsunami process
				● Page 118-121 Disaster risk reduction
		√		● Page 121-126 The process and causes of volcano fire
				● Pages 127-130 Volcanic disaster risk reduction
				● Pages 133-135 The process and causes of flooding
				● Pages 135-136 Impact of flooding
				● Page 136-139 Reduction of flood risk
	c. Hydrosphere		√	● Page Causes of fracture formation

Chapter	Material	Integration Analysis		Description
		Yes	No	
				<ul style="list-style-type: none"> ● Page 108-114 Process, causes, effects of earthquakes ● Page 115 Tsunami process ● Page 118-121 Disaster risk reduction ● Page 121-126 The process and causes of volcano fire ● Pages 127-130 Volcanic disaster risk reduction ● Pages 133-135 The process and causes of flooding ● Pages 135-136 Impact of flooding ● Page 136-139 Reduction of flood risk
6. Solar System	a. Solar System		√	-
	b. Earth condition		√	-
	c. Moon Conditions		√	-
	d. Eclipse		√	-

The science books for SMP/MTs grade VII government references are divided into two books, namely the first and second semester books. After being analyzed, there were no integrated disaster mitigation submersions in the first semester book and there were 4 integrated disaster mitigation education submissions in the second semester. First, in the chapter on environmental pollution page 50. On that page there is a picture of a volcano erupting. On that page also found writing stating the impact of the volcano erupted causing ash volcanic causes environmental pollution. This is clarified on page 61 of the air pollution submersion, which contains a statement of the impact of volcanic eruptions, one of which is air pollution. Although there is only one sentence and picture that states the impact of the volcano erupting, it can stimulate educators and students to become familiar with disaster mitigation education.

In the lithosphere submitter there is much discussion about mitigating various types of disasters such as earthquakes, tsunamis and volcanic eruptions. Essential disaster mitigation learning materials about earthquakes in this submateria are the understanding of earthquakes, the causes of earthquakes, the process of forming faults until earthquakes, the workings of earthquake force measuring devices (seismographs), body waves and surface waves, impacts earthquake, and disaster risk reduction regarding actions that must be taken before, during and after an earthquake. In the discussion of earthquakes, this submission is associated with a tsunami disaster study. Learning

material covered about tsunamis is limited to the understanding and process of tsunami waves. In addition to the earthquake and tsunami, this submitter also discussed volcanic disasters. Essential disaster mitigation learning materials about volcanoes are the process of volcanoes to erupt, the cause of volcanoes to erupt, the relationship of Indonesia's geographical location to the existence of volcanoes, and risk reduction of volcanoes. In the hydrosphere submater there are materials related to flood disaster mitigation. Essential disaster mitigation learning materials about floods that exist in this submateria are the processes and causes of floods, the effects of floods, and risk reduction before, during and after floods. In addition to material in the form of writing, both in lithosphere submersion and hydrosphere there are many images that can stimulate educators to better understand some of the disasters that have been mentioned.

In the general publisher's book, there are 7 submitters integrated with disaster mitigation education out of 42 existing submitters. The results show that 16.6% of all material was integrated with disaster risk reduction. In the government reference book there are 4 sub materials integrated with disaster mitigation education out of 42 sub materials in the book. The results show 9% of all material integrated with disaster risk reduction. Based on the analysis of the two books which have identified the content of disaster mitigation integration, there are several materials that are likely to be integrated with natural disasters. Among them are in the Table 4.

Table 4. Identification of Essential Learning Materials about Natural Disaster Risk Reduction

Material that can be integrated with natural disasters	Essential Material about Natural Disasters
Substance and character	<ul style="list-style-type: none"> - Sulfur can show the activeness of volcanoes - Oxygen can cause a fire in a forest fire - The nature of flammable objects causes forest fires
The pattern of interaction of living things with their environment	<ul style="list-style-type: none"> - Changes in animal interactions in the volcanic region that will erupt
Temperature and changes	<ul style="list-style-type: none"> - Rising temperatures on earth cause forest fires and drought
Heat and displacement	<ul style="list-style-type: none"> - The process of heat transfer in the spread of forest fire propagation - The process of magma heat transfer in the cause of the volcano erupted
Energy sources and forms of energy	<ul style="list-style-type: none"> - Changing kinetic energy into heat energy as a cause of fire
Water pollution	<ul style="list-style-type: none"> - The impact of a volcanic eruption resulting in cold lava floods,
Climate change	<ul style="list-style-type: none"> - Impacts of climate change caused by volcanic eruptions (Example: the eruption of Mount Krakatoa)

CONCLUSION

Government reference books and public publisher publications used by students of grade VII SMP / MTs in the revised 2013 curriculum have not yet fully integrated the education of disaster mitigation education. There are 16.6% in books published by general publishers and 9.5% in government reference books that have integrated disaster mitigation learning. In terms of quantity of material delivery, non-government books are more often integrated with natural disasters. In the book, the government emphasizes more on disaster management in terms of material essence and material delivery which further stimulates educators to better understand. From the two books, it is still necessary to add material essence related to the integration of natural disaster mitigation.

This research is expected to provide input to teachers to provide learning in science class VII subjects of SMP/MTs integrated with disaster risk reduction education. The government and the private sector can review in making textbooks so that it can be used as a disaster mitigation education in Indonesia. Further research is needed on integrated content analysis of natural disasters for grade VIII and IX books.

REFERENCES

- Anoname. (2018). Mengapa wilayah indonesia rawan terhadap bencana. Diakses pada <https://www.literasipublik.com/wilayah-indonesia-rawan-bencana> pada Rabu, 30 Oktober 2019 pukul 03.25 WIB.
- Hamisesa, R. S. A., Nataliya, F. H., Nurdiyanto, R., & Pujianto, P. (2018). Analyses of junior high school science competencies in KTSP and integrated-revision of 2013 curriculum: reviewed from the potential of disaster mitigation education for the shaping of a disaster response character. *Journal of Science Education Research*, 2(2), 85-96.
- Mumpuni, A. (2018). *Integrasi nilai karakter dalam buku pelajaran: Analisis konten buku teks kurikulum 2013*. Deepublish.
- Nugroho, S. P. (2011). Penerapan SIG untuk penyusunan dan analisis lahan kritis pada satuan wilayah pengelolaan DAS Agam Kuantan, Provinsi Sumatera Barat. *Jurnal Teknologi Lingkungan*, 9(2).
- Nurdiyanto, R. dkk. (2018). Studi analisis pemetaan kompetensi dasar IPA SMP/MTs pada K-13 terevisi dan potensinya sebagai pengurangan resiko bencana bagi pendidikan mitigasi bencana. *Seminar Pendidikan IPA X. Yogyakarta.123-130*
- Pujianto. (2011). *Analisis proporsi materi IPBA dalam kurikulum tingkat satuan pendidikan (KTSP) sebagai dasar pengembangan dan pemahaman materi siaga bencana di sekolah*. Yogyakarta: Universitas Negeri Yogyakarta.
- Puspasari, H. (2019). *Sejak Januari-September 2019, 2.829 bencana terjadi di Indonesia*. Diakses pada <https://nasional.kompas.com/read/2019/10/03/10171591/sejak-januari-september-2019-2829-bencana-terjadi-di-indonesia> pada Rabu, 30 Oktober 2019 pukul 03.56 WIB.
- Verawati, D., Fauzi, A., & Ramli, R. (2018). Analisis kesesuaian materi IPA dengan tujuan kurikulum pada buku teks pelajaran IPA SMP/MTs Kelas VII Semester 1 untuk Diintegrasikan dengan Materi Kebakaran. *PILLAR OF PHYSICS EDUCATION*, 11(3), 01-08.
- Wibowo, W. S. (2018). Intergrasi pendidikan pengurangan risiko bencana (PPRB) gempa bumi kedalaman pembelajaran IPA SMP.

Seminar Pendidikan IPA:Yogyakarta: 151-160

Yusuf, A. (2011). *Indonesia negara rawan bencana*. Diakses pada

https://www.bbc.com/indonesia/berita_indonesia/2011/08/110810_indonesia_tsunami pada Rabu, 30 Oktober 2019 pukul 03.43 WIB.