Comic Strip Design as an Alternative Learning Media in Disaster Themes for Elementary Students

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Abstract. Most children are interested in comics so the media has the potential to be used in the learning and teaching process at school. We have developed and implemented comic strips for learning related to disasters in the fifth-grade science subject at SD Negeri Buengcala, Aceh Besar District. The designed materials were validated by experts and the attractiveness of the comic media was measured based on class observation during teaching and learning processes related to students’ involvement and responses through the questionnaires. Quantitatively the questionnaires were scored (1 to 4) from too bad to very interested. The experts concluded that the media are valid with unrevised criteria including the attractiveness of media and language used. Based on the questionnaires, the students also agreed that the class was very interesting. Therefore, comic strip media can be developed potentially for disaster education at elementary schools.

Keywords: Disaster education, comic strip, instructional media, multimedia.

Introduction

In disaster-prone countries and regions, disaster education plays an important role in community disaster risk reduction efforts. At schools, disaster education can be taught as a separate subject or can also be inserted into other fields. Therefore, disaster education can be considered a multidisciplinary course, especially related to disaster risk management and environmental studies. However, disaster education is a new challenge...
in the field of education (Amri, et al., 2022). In particular, the literature conceptualizing disaster education in teaching learning activities is still lacking (Kitagawa, 2021). At schools, whereas, disaster education can provide knowledge and information to students so that students will have the ability to involve in disaster risk reduction (Annisa, et al., 2022). Knowledge about disaster risk reduction is the process and activity of individual thinking through the interaction of sight and hearing in seeing disasters, both before, during, and after disasters that have occurred (Noviana, 2019). On the other hand, disaster education programs in schools help teachers and students to develop a culture of safety in their surroundings, and play a direct role in acquiring the necessary disaster knowledge and skills. Among them, increasing awareness, building a more realistic perception of risk, providing more information about risk reduction, and preventing possible hazards in the environment of everyday life (Gokmenoglu, 2021).

In the last 10 years, some countries have established and promoted disaster schools’ program and disaster education as part of disaster risk reduction (DRR) efforts. Schools are an effective place to instill disaster mitigation education (UNISDR, 2007). Based on the 2018/2019 center for cultural data and statistics (PDPS) of Aceh Province, only 441.024 units of schools are involved in disaster mitigation and preparedness education programs. In addition, schools are places that are at high risk of disaster, prone to loss of life and damage to infrastructure. Over the past 10 years (2009-2018), more than 62,687 educational units and 12 million students have been affected by disasters. On the other hand, school buildings are often places of evacuation and protection after disasters occur. Thus, it is needed for schools or educational units to be involved in disaster mitigation education programs (Sakurai, et al., 2018). In addition, the united nations (UN) and the united nations international strategies for disaster risk reduction (UNISDR) revealed that children have become the main target of disaster education, this is because children are one of the groups that are most affected when a disaster occurs. Lack of ability to save oneself is one of the contributing factors. Children need to be introduced to disaster education from an early age (Marissa & Allahji, 2022). The existence of several early childhood education institutions in Indonesia, such as in the Riau Province, often faces the risk of floods overflowing the Kampar River which results in fatalities. Children still lack knowledge about flood disaster mitigation, and schools do not have appropriate mitigation programs or media (Artha, et al., 2020).

The way to attract children’s attention to learning about disasters is through the media they enjoy (Halmunia, et al., 2022). One of the suitable media for teaching disaster to children is comic media. Comics can provide encouragement and stimulation for learning and create different learning experiences. Therefore, every comic frame is meant to set the scene, create emotion, or imagine the story. Using comic media can increase knowledge about disaster mitigation in elementary schools (Noviana, et al., 2019). One type of comic that can be used as a medium for learning disasters for children at school is a comic strip. A comic strip is a type of comic that is a narrative element consisting of short images and text. Simply, comic strips can be defined as sequential art that is interrelated between text and images that form a short story. Comic strips can stimulate a deep connection between the reader, the story, space, time, and place that is illustrated. Comic strips can form a separate point of view by the reader (Moore, et al., 2018). Strip comics have fewer panels than regular comics (Rutta, et al., 2019). Comic strips can be presented in classroom learning to make students more focused and interested (Özdemir, et al., 2019).

Based on previous studies, Indonesian students have limited visual learning abilities. The low literacy of these students is a concern for being able to develop literacy through comic worksheets (Pratwi & Nugraheni, 2022). Comics are also a type of learning media that students like, compared to other types of learning media such as textbooks (Wallner, 2020). In addition, comics can be used as an effective medium for teaching material about disaster mitigation because there is little text in comics, and there are
images to support the text so that students can easily understand the material being taught (Noviana, et al., 2019).

Incorporating comic strips into the classroom must be adjusted to the learning curriculum that applies in the school. The science curriculum in elementary schools at the district level in Aceh Province follows the 2020 curriculum standard. The curriculum consists of 9 themes or subject topics. Each topic can be inserted into disaster comics that lead to disaster risk mitigation and reduction including aspects of preparedness and early warning. In this study, comic strip products have been developed and implemented then carried out several evaluations related to the use of disaster comics in the science curriculum at the elementary school level in Sekolah Dasar Negeri (SDN) Buengcala, District of Aceh Besar, Aceh Province, Indonesia. Science subjects are subjects that have a close relationship with disaster, so the application of disaster comics in science teaching materials is quite appropriate (Yuliariatiningsih, 2016). This study can be considered new in education since inserting comic strips in science learning materials has never been done before, especially at SDN Buengcala, District of Aceh Besar. Furthermore, testing the validation and effectiveness of comic strips in this study can be used for the development of disaster learning methods in the future. Previously, there had never been a similar media that had been developed in the disaster learning process at the SDN, and even a special curriculum for disaster education had never existed at the elementary school level. Delivery of disaster information to children requires the right media. Using the right media is useful for conveying information clearly so that information can be received properly (Ariandhini, 2022). Based on the background that has been described, this study aims to create comic strip learning media for disaster material which will then be tested for feasibility and quality for development.

**Methods**

The method used in this study was based on the research and development method. The method is intended to develop new products or improve existing products and can be accounted for. Here we have produced a particular product and tested the effectiveness of the product. Product development model research is based on trials and then revised to produce usable products. In this study, the product developed was in the form of a comic strip which was then tested in the science subject for fifth-grade elementary school students at SDN Buengcala, District of Aceh Besar. The procedure in this study refers to the development research proposed by Borg and Gall then simplified by Sugiyono (2012: 409) as shown in Figure 1. This research procedure was then adjusted again to the needs of researchers.

Data collection was carried out using study experts, questionnaires, and in-depth interviews to identify potentials and problems using qualitative methods with in-depth interviews with several informants (i.e., teachers) from the Elementary School of Buengcala, District of Aceh Besar. For the product design processes, drafting and producing the product have been tested following the steps of comic strip proposed by Maharsi (2011), The steps were initiated with writing a story synopsis, drafting storyboards, choosing characters, sketching layout panels, providing illustrations and text balloons, inking and coloring stage for text balloons and their contents, covers, and layout. The final step is finishing the products. Product validation was conducted using questionnaires filled by 20 media expert validators who are employees of a reputed local newspaper namely Serambi Indonesia, 13 material expert validators who are science teachers, and 5 linguist validators who are lecturers and teachers in linguistics. The product attractiveness was also measured through questionnaires filled by fifth-grade students of Buengcala Elementary School. Results of the questionnaires were scored and classified based as shown in Table 1. The total self-assessment score was obtained by dividing the total score obtained divided
by the maximum total score and dividing by four. The media eligibility score for expert validator assessment was referred to the method proposed by Sudijono (2008).

![Figure 1. Product development research flow (Sugiyono, 2012).](image)

**Table 1.** Expert Validation Rating Score

<table>
<thead>
<tr>
<th>Response</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Interested (VI)</td>
<td>4</td>
</tr>
<tr>
<td>Interested (I)</td>
<td>3</td>
</tr>
<tr>
<td>Less Interested (LI)</td>
<td>2</td>
</tr>
<tr>
<td>Not Interested (NI)</td>
<td>1</td>
</tr>
</tbody>
</table>

(Source: Sudijono, 2008)

**Table 2.** Criteria for the Validity of Average Value Analysis.

<table>
<thead>
<tr>
<th>Average</th>
<th>Validation Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.26 - 4.00</td>
<td>Valid/without revision</td>
</tr>
<tr>
<td>2.51 – 3.25</td>
<td>Almost Valid/with revision</td>
</tr>
<tr>
<td>1.76 – 2.50</td>
<td>Less Valid/minor revision</td>
</tr>
<tr>
<td>1.00 – 1.75</td>
<td>Not Valid/major revision</td>
</tr>
</tbody>
</table>

(Source: Sudijono, 2008)
Furthermore, an analysis of students’ attractiveness to the comic media was obtained from a student attractiveness questionnaire. The attractiveness scores were categorized according to the attractiveness criteria used by Riduwan (2009).

Table 3. Questionnaire Scoring Table

<table>
<thead>
<tr>
<th>Response</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree (SA)</td>
<td>4</td>
</tr>
<tr>
<td>Agree (A)</td>
<td>3</td>
</tr>
<tr>
<td>Less agree (LA)</td>
<td>2</td>
</tr>
<tr>
<td>Disagree (TD)</td>
<td>1</td>
</tr>
</tbody>
</table>

(Source: Riduwan, 2008)

Table 4. Attractiveness Interpretation Criteria

<table>
<thead>
<tr>
<th>Average</th>
<th>Attractiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.26-4.00</td>
<td>Very attractive</td>
</tr>
<tr>
<td>2.51-3.25</td>
<td>Attractive</td>
</tr>
<tr>
<td>1.76-2.50</td>
<td>Less attractive</td>
</tr>
<tr>
<td>1.00-1.75</td>
<td>Not attractive</td>
</tr>
</tbody>
</table>

(Source: Riduwan, 2008)

Based on the validity and attractiveness scores, the comic strip was revised with minor revisions. The revised results were tested again to see whether the comic was getting more suitable for use or not.

Results and Discussion

The development of comic strip learning media in this study consists of two main steps. The first step is producing comic strips. The concept of the design was referred to by Maharsi (2011). The second step is validating and measuring the attractiveness of the design. In general, this study refers to the research and development method proposed by Sugiyono (2012). The results and discussion of the research that has been carried out are presented as follows.

Needs Analysis and Preliminary Data Collection

The initial step of this research was to carry out a needs analysis or identification of the potential problems of the main idea. This is important to be conducted to find out what problems and needs are required in the development of learning media. At this stage, the analysis was carried out using a qualitative approach with in-depth interviews. Respondents who were interviewed at this stage were 5 teachers from Buengcala Elementary School, Aceh Besar District. Based on the interview finding, responses given by the informants were quite uniform. It can be concluded that there is a need for interesting learning media for the disaster learning process in natural sciences subjects. The teachers admitted that the science classes were taught conventionally using textbooks and student worksheets. This method is considered monotonous and boring for students. In addition, the teachers
agreed that they do not prepare special teaching learning material for disaster themes inserted in the science subject. Therefore, introducing comic strips for teaching learning material in science class for disaster themes is one option that can answer the problems. This need is reinforced by the statement that the use of comic media can increase knowledge about disaster mitigation in elementary schools (Noviana, et al., 2019).

Using comic media for teaching science harnesses the power of visual storytelling, engages students, simplifies complex concepts, and promotes active learning, making it an effective and enjoyable educational tool. Comics are visually appealing and can capture the attention of students, particularly those who may struggle to engage with traditional text-based resources (Lai, et al., 2022). The combination of colorful illustrations and dialogue bubbles can make complex scientific concepts more accessible and interesting, thereby increasing student engagement and motivation to learn. Science can often involve intricate details and abstract concepts that are challenging to comprehend. Comics provide a simplified representation of scientific ideas through visual storytelling, allowing students to visualize and grasp complex concepts more easily. The combination of visuals and concise text can break down complicated information into digestible chunks, making it more accessible to a wider range of learners.

Comics typically follow a narrative structure with characters, plots, and story arcs (Avraamidou & Osborne, 2009). This storytelling element can help students connect with scientific content on an emotional level. By incorporating real-world scenarios, relatable characters, and plotlines, comics can contextualize scientific concepts and showcase their applications in everyday life, making the subject matter more relatable and memorable. Reading comics requires interpreting visual cues, following dialogue, and synthesizing information from both text and images (Bach, et al., 2016). By engaging with comics, students develop critical thinking skills, visual literacy, and the ability to extract information from multiple sources. These skills are transferable and valuable for effective science communication, where complex ideas often need to be presented concisely and engagingly.

Comics can be particularly beneficial for students with learning disabilities, language barriers, or limited reading abilities (Caldwell, 2012). The visual nature of comics reduces the cognitive load of processing information, allowing students to focus on comprehension rather than deciphering complex texts. This inclusivity ensures that a wider range of students can participate and succeed in science education. Comics provide a creative outlet for students to express their understanding of scientific concepts. By creating their comics or modifying existing ones, students can demonstrate their comprehension, apply their knowledge, and engage in imaginative storytelling. This creative aspect fosters a deeper connection to the subject matter and encourages active learning and participation.

**Preliminary Product Design, Data Collection, and Final Product Design.**

Before comic strip design, various sources including books, laws, and the internet were referred to enrich the idea. Based on the references, the ideas were written on notebooks and sketched in the form of raw pictures for creating the comics. In the second step, comic conversations were compiled following the material to be discussed. Here, for example, the discussion focused on the relationship between disasters and a natural science subject for the fifth grade of elementary school. Subsequently, the comic strip drafts were sketched with the images, shading, and panels manually using a pencil (Figure 1).
Figure 2. Examples of products for writing narration in a notebook sheet (left) and sketching the comic on the panel (right).

The third step is the mixing process as shown in Figure 3 (top left). At this stage, each component was compiled in the form of combining conversational dialogs with sketches of images that have been drawn. Here, speech bubbles and dialog boxes are created for each character's conversation in the comic. While at the fourth step is finishing the final stage of creating a comic strip. At this stage, the previously illustrated shades on the pictures are then thickened and the pictures are colored as seen in Figure 3 (down left), for example.

Product Validation and Revisions

The final product of comic media designed with disaster knowledge content inserted in science teaching materials for the fifth grade of elementary school has been validated by media, language, and teaching material experts. The media expert's validation was carried out by 20 journalists of Harian Serambi Indonesia, the biggest newspaper in Aceh Province. The media experts evaluated the images, appearance, content, order, and language style of the products. The components assessed were adopted from Sudaryono (2016). Based on the media expert evaluations and advice, the materials were revised for a better product. The media experts' validation score is 3.87 which means the products are valid without revision as shown in Table 5.

The comic strip was also validated by 10 teachers of Buengcala Elementary School, District of Aceh Besar. The validation includes completeness, contents, and systematics of the material in the comics presented. Language validation was carried out by 5 Indonesian language teachers of senior high school from Sekolah Menengah Atas Negeri (SMAN) 3 Banda Aceh. Aspects assessed based on standards from the National Education Standards Agency namely Badan Standar Nasional Pendidikan (BSNP) regarding language appropriateness for student teaching materials that includes directness, communicative, dialogic and interactive, conformity with student development, conformity with language rules, use of terms, symbols, and icons. The validation items were referred to Sugiyono (2008) and the scoring referred to the concepts proposed by Riduwan (2008). The results of the validation process are described in Table 5, which shows that the material and
language are minor revisions. Both teaching material and language experts advised the comic strip needs to be revised. The teaching material and language experts' scores are 3.13 and 2.39, respectively as shown in Table 5.

![Figure 3. Examples of results after mixing (top left), finishing (bottom left), and the final product (right)](image)

**Table 5.** Result of validation test of comic strip products before and after revision

<table>
<thead>
<tr>
<th>Validator</th>
<th>Score before revision</th>
<th>Action</th>
<th>Score after revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>3.87</td>
<td>No revision needed</td>
<td>-</td>
</tr>
<tr>
<td>Teaching material</td>
<td>3.13</td>
<td>Need revision</td>
<td>3.94</td>
</tr>
<tr>
<td>Language</td>
<td>2.39</td>
<td>Need revision</td>
<td>3.79</td>
</tr>
</tbody>
</table>
Based on the results of the validation test, product revisions were made to the material and language used in the comics. The material revision was carried out to obtain compatibility between science teaching materials and the comics being developed. The material in the comic was revised based on the suggestions and input given by the teaching material validator during the research. Language revision was done to get the appropriate language use in the comic. In addition, based on the results of the language validation test, indicated that a revision was needed in the language section of the comic. The language used in comics for teaching and learning at school plays a crucial role in enhancing comprehension, expanding vocabulary, promoting language acquisition, developing reading skills, fostering visual literacy, understanding storytelling elements, and creating an engaging learning environment. Comics offer a unique medium to combine language and visuals, making learning more accessible, enjoyable, and effective for students.

Comics utilize a combination of text and visuals, allowing students to reinforce their understanding of the language used (Bach, et al., 2016). The dialogue and text in comics often use concise and engaging language, which can enhance students' comprehension skills. Additionally, comics expose students to a wide range of vocabulary, including specialized scientific terms, helping to expand their linguistic repertoire. Comics can serve as a powerful tool for language acquisition, especially for students who are learning a new language (Cohn, 2013). The visual context provided by the illustrations helps students grasp the meaning of unfamiliar words or phrases, enabling them to connect the language with its visual representation. This visual support aids in the development of reading, speaking, and listening skills.

Comics encourage students to engage in active reading and develop their reading comprehension skills. The combination of text and visuals allows students to make connections, infer meaning, and visualize the story. The use of dialogue and speech bubbles also helps students understand the interactions between characters, facilitating a deeper understanding of the narrative. Comics require students to interpret and analyze visual cues, such as facial expressions, body language, and panel sequencing. This promotes visual literacy skills, allowing students to understand and interpret visual information effectively. Visual literacy is a crucial skill in today's media-rich world, enabling students to decode and critically evaluate various forms of visual communication.

The second revision was also carried out on the same validator as at the first validation. This was performed to obtain a comparison of the results of the first validation and the results of the product revision. An example of the final product after the revision is shown in Figure 5. The revision has been able to improve the quality and content of the comic strip. A comparison between the initial and final product regarding appearance, content, and language is shown in Figure 6. The scores given by validators have increased significantly. This is important because the feasibility of language and material in a learning text greatly influences students' ability to receive material (Willy, et al., 2015). Comics have a narrative structure that includes characters, plotlines, and sequential events. This narrative aspect helps students understand story elements, such as setting, conflict, and resolution. By following the story arc, students learn about character development, plot progression, and how events connect.

This understanding of storytelling elements enhances their comprehension and analytical skills. The use of comics in the classroom can foster a positive and engaging learning environment. The combination of visuals and text stimulates students'
imagination, captures their attention, and makes learning more enjoyable. The engaging nature of comics can motivate students to actively participate in the learning process and develop a genuine interest in the subject matter. Comics often reflect cultural and historical contexts, offering insights into different perspectives and experiences. By incorporating diverse comics into the curriculum, students can explore various cultures, traditions, and historical events. This exposure to different linguistic and cultural contexts promotes cultural awareness, empathy, and a broader understanding of the world (Dahlstrom, 2014).

![Comic strip before and after revision](image)

**Figure 5.** Comic strip before and after revision

**Student Interest Test**

Student attractiveness testing was carried out to measure students' responses to the comic strip media that was developed. This test can be used for benchmarking the feasibility of comic media for students in the fifth grade of elementary school at the Sekolah Dasar Negeri Buengcala, District of Aceh Besar. The attractiveness test was carried out in a limited group that involved 40 students of the first grade V of the elementary school. Students as respondents were randomly selected because it was considered all respondents to be homogeneous. The student attractiveness test obtained a final average score of 3.69. The value falls in the interval of 3.26 - 4.00 according to the attractiveness interpretation criterion score range used by Ridwan (2008). The score implied that the comic strip introduced to the students are interesting. This proves that comic strips can be presented in classroom learning to make students more focused and interested (Özdemir, et al., 2019). However, to complete the perfection and achieve the learning objectives, it still needs to be followed up with the creation of disaster-related learning modules specifically (Atmaja, et al., 2021). Comics can engage students through visual appeal, storytelling, relatability, humor, and creative expression. By incorporating comics into the learning
process, educators can leverage these factors to enhance student interest, motivation, and overall enjoyment of the subject being taught.

Comics are visually appealing with colorful illustrations, dynamic artwork, and visually engaging layouts. The combination of visuals and text captures students' attention and makes the learning experience more enjoyable. Comics usually follow a narrative structure, featuring characters, plotlines, and story arcs. The storytelling aspect of comics helps students connect with the content on an emotional level and creates a sense of immersion (Dahlstrom, 2014). They become invested in the characters and their journey, which enhances their engagement and motivation to learn. Comics can make complex concepts more accessible to students. The visual nature of comics helps to break down information into smaller, more manageable parts. This makes it easier for students to understand and remember the content, particularly for visual learners who benefit from visual representations. Many comics feature relatable characters and situations, which students can connect with on a personal level. This relatability helps students see themselves in the story and makes the content more relevant to their own lives. It can also create opportunities for discussions and reflections on real-world issues.

Comics often incorporate humor and entertainment value, which can make learning more enjoyable. The inclusion of jokes, witty dialogue, and comedic situations can lighten the learning atmosphere and create a positive association with the subject matter. Comics are often associated with popular culture, superheroes, and well-known characters (Cohn, 2013). This familiarity and connection to popular media can pique students' interest and draw them into the learning experience. Students may be more willing to engage with educational content if it is presented in a format they already enjoy and recognize. Comics provide students with an opportunity for creative expression. They can create their comics, adapt existing ones, or modify storylines to showcase their understanding of the subject matter. This creative aspect allows students to take ownership of their learning and encourages active participation.
Conclusion

The comic strip designed in this study has fulfilled all criteria based on responses of media, teaching material, and language experts with a score range that falls in very good. The experts concluded that the materials are valid with unrevised criteria including the attractiveness of media, conformity with the theme being taught, and language used. Based on the questionnaires, the students also agreed that the class was very interesting. The comic strips designed in this study can be implemented as an alternative solution to meet the needs of interesting disaster learning media for fifth-grade of elementary school students. Inserting disaster material with comic strips will improve student ability to learn about the disaster in a fun but able to increase students' knowledge of disaster. When using comic strip design as an alternative learning media for disaster themes, educators can leverage its visual appeal, storytelling elements, simplified information, and creative expression to engage elementary students actively. By presenting the information in an accessible and engaging format, students can develop a deeper understanding of disaster-related concepts while enjoying the learning process.

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