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Developing an animation video for earthquake mitigation education for elementary school students

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ABSTRACT

Earthquakes cause damage and often cause casualties, where 30% of the victims are children and adolescents. Earthquake mitigation education should be conducted to improve earthquake literacy in children. The National Search and Rescue Agency organizes an education program to provide knowledge on natural disaster mitigation facilitated by instructors who give PowerPoint-assisted lectures. This delivery strategy is ineffective because earthquake mitigation content must visualize earthquake events and emergency responses. Experts determined the most effective video-based media for earthquake mitigation, so animated videos needed to be developed for this program. This study aims to develop an animated video of earthquake mitigation when it occurs in elementary schools. Products are developed with the ADDIE model. The instrument consists of a questionnaire containing criteria on the Likert scale. The analysis technique uses percentages. Animated videos developed are considered feasible as instructional media by experts. Field trials of elementary school students showed that almost all students could give the correct disaster mitigation.

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ABSTRAK

Peristiwa gempa bumi mengakibatkan kerusakan dan sering mendatangkan korban jiwa, dimana 30% diantara korban adalah anak-anak dan remaja. Pendidikan mitigasi gempa bumi harus dilakukan untuk meningkatkan literasi gempa bumi pada anak-anak. Badan Nasional Pencarian dan Pertolongan menyelenggarakan program Pendidikan untuk memberikan pengetahuan mitigasi bencana alam yang difasilitasi oleh para instruktur dengan memberikan ceramah berbantuan power point. Strategi penyampaian ini tidak efektif karena konten mitigasi gempa bumi harus memvisualisasikan kejadian gempa dan tanggap darurat. Para pakar menetapkan media berbasis video yang paling efektif untuk mitigasi gempa bumi sehingga video animasi perlu dikembangkan untuk program ini. Penelitian ini bertujuan untuk mengembangkan video animasi mitigasi gempa bumi bila terjadi di sekolah dasar. Produk dikembangkan dengan model ADDIE. Instrumen terdiri atas kuesioner yang berisikan kriteria-kriteria dalam skala Likert. Teknik analisis menggunakan persentase. Video animasi yang telah dikembangkan dinilai layak sebagai media pembelajaran oleh sejumlah pakar. Uji coba lapangan kepada para siswa sekolah dasar menunjukkan bahwa hampir semua siswa dapat memberikan jawaban yang benar dan siswa dapat memberikan contoh-contoh tanggap darurat. Video animasi ini layak dan efektif dipakai sebagai media pendidikan mitigasi bencana gempa bumi untuk siswa sekolah dasar.

Kata Kunci: *Media pembelajaran; mitigasi gempa bumi; siswa sekolah dasar; video animasi*

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INTRODUCTION

Data reported by the Center for Research on the Epidemiology of Disasters in 2022 (see: https://cred.be/sites/default/files/2022_EMDAT_report.pdf) noted that Indonesia and Afghanistan are included in the Top 10 Mortality 2022 caused by earthquakes. Natural disasters cause a significant impact, resulting in many damage and casualties. The United Nations International Strategy for Disaster Risk (UNISDR) reported that 2011 young people were the largest group affected by natural disasters (Pfefferbaum et al., 2018). BNPB states that 60 to 70 percent of disaster victims are women, children, and the elderly. The magnitude of the impact of natural disasters, both material losses and casualties, is caused by a lack of awareness or literacy about natural disasters. Mitigation or self-rescue during natural disasters is still poorly understood by the community, affecting disaster preparedness behavior (Pribudianto et al., 2023; Suryadi et al., 2021). Disaster education is necessary for disaster-prone countries like Indonesia, including children. Children need to know emergency and evacuation procedures needed in emergencies during earthquakes to mitigate more significant impacts (Stough et al., 2018). Children are considered weak because they are not ready to face natural disasters that can occur anywhere. Hence, they need to be given the knowledge to deal with natural disasters. The impact and handling of natural disasters on children differs from adults (Pfefferbaum et al., 2018).

Earthquakes are one of the natural disasters that can occur anywhere, including when children are studying at school. Earthquake mitigation education in primary schools is essential for students and everyone in the school because it cannot be solely the responsibility of teachers. The condition of earthquake-prone countries requires schools to instill awareness of natural disaster mitigation. The National Search and Relief Agency or *Badan SAR Nasional* (BASARNAS) is a very competent institution as a resource person for natural disaster mitigation. BASARNAS is a government agency with the main task of providing search and rescue services initiative to provide a comprehensive understanding of techniques in searching, providing assistance, and first handling victims and actions in dealing with emergency conditions. This is done to minimize casualties during accidents, disasters, and conditions that endanger human lives. BASARNAS made it happen with the SAR Goes to School program.

Based on an explanation from Gugus Widoyoko, BASARNAS's staff (Interview, December 12, 2019), the SAR Goes to School activity aims to provide knowledge about SAR from an early age that can be used if they need these abilities sometimes in real life. Information obtained from the Search and Rescue Office staff as a Technical Implementation Unit that schools that want to learn natural disaster mitigation in the SAR Goes to School activity can visit the SAR (Search and Rescue) office. SAR provides instructors to facilitate the students. Instructors lectured with power points slides to elementary school and kindergarten students, asked questions and answers with prizes, and went around to see the SAR facilities. As for high school students, there are simulation activities, for example, how to move victims in an earthquake." (Iriani, January 5, 2020 interviews). The lecture activity situation can be seen in **Figures 1** and **Figure 2**.

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Figure 1. Instructors at the BASARNAS office, KPP Surabaya, are explaining earthquake mitigation by expository (*ceramah*) using PowerPoint
Source: Researcher Documentation 2023

Figure 2. Instructors at the BASARNAS office, KPP Surabaya, are explaining earthquake mitigation by expository (*ceramah*) using PowerPoint
Source: Researcher Documentation 2023

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Mitigation instruction carried out by instructors still uses conventional methods that do not follow the characteristics of elementary school students and procedural mitigation content. In this case, the most important characteristic of natural disaster content is that natural disaster events are unpredictable, so it is not easy to document them. In this regard, the most important characteristic of natural disaster content is that natural disaster events are unpredictable, so it is challenging to document them. Video is very suitable as an instructional media for earthquake mitigation literacy because of its ability to "air" an event (Firdaus & Hamdu, 2020) so that viewers get illustrations of earthquake events close to the original. The Importance of earthquake mitigation information is disseminated to elementary school students, so it is necessary to provide (Efendi et al., 2020) more appropriate and exciting instructional media. Video is an instructional media that can explain abstract objects into reality (Adianto et al., 2023).

Animated videos in learning can increase students' vocabulary (Hamsari & Hanif, 2019) and effectively improve learning outcomes. Animated videos and the latest findings from researchers state that animated videos or videos, in general, are most appropriate as a media of education for natural disaster mitigation. Some findings stated that the knowledge and concern for disaster mitigation increased significantly after watching a video called Volcanic Eruption Disaster Mitigation (Nasution et al., 2023). Video games can facilitate deeper engagement and understanding of disasters; video could improve self-awareness in early childhood to mitigate volcanic eruptions, and video games are effective in disaster risk management (Solinska-Nowak et al., 2018).

Based on research, Febliza (2021) showed that all students expressed their need for learning media 99% stated that lecturers needed to design their learning media, 84% stated that contextual videos were suitable for teaching lecture material, and 97% stated that contextual concepts needed to be integrated in the form of video, and 98% need contextual video. Other research by Norma (2021) showed the implementation of the learning process based on the student's attendance rate of 94% and the results of the pre-learning video media data, especially on the interest in social studies lessons by 42% after using the learning video media increased to 77%. The results of pre-learning video media data showing that learning video media can help teachers deliver material is 42% and increases to 94% after using it. The data from the pre-learning video media shows that students can answer questions through online learning 19% after using the learning video media, increasing to 94%. The results of pre-learning video media data showing the subject matter given to students online are obvious: 42% after learning video media increased to 94%.

This needs to follow the implementation of natural disaster mitigation education in the SAR Goes to School program, where instructors lecture with PowerPoints, so developing suitable media, namely animated videos, is needed. Various studies have found that animated videos are effective for learning about natural disasters while instructors still use the lecture method with power points. This condition encourages BASARNAS to provide suitable instructional media, such as animated videos. Using animated videos is expected to increase elementary school students' knowledge about earthquakes and the self-rescue actions that can be taken in the school environment. This background prompted research to develop educational animated videos on earthquake mitigation for elementary school students. The availability of this animated video ultimately aims to improve BASARNAS' services to the community, especially children.

LITERATURE REVIEW

Earthquake Mitigation in Elementary School

Earthquakes inevitably cause damage and can result in loss of property and life. Earthquakes are difficult to predict, and society, including children, is unprepared to deal with them (Thoyibah et al., 2019). People's first response to an earthquake is panic, which usually leaves them with no action. However, emergency

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response must be carried out immediately to reduce the number of victims. Emergency response is an effort made immediately during a disaster to overcome the impact caused, especially in rescuing victims and property, evacuation, and evacuation (Indriasari, 2018). What things to do in the event of an earthquake are distinguished by two main conditions: indoors and outdoors (see: https://www.quakekare.com/earthquake-preparedness/what-to-do-during-an-earthquake).

The six conditions of self-rescue measures described above are quite detailed, with various situations that are broad enough in scope but are general so that places and contexts of events that have not been explained need development following the actual context, one of which is in the school environment. Of course, the literacy of students who have experienced earthquakes differs from those who have never experienced them (Nuraziz et al., 2023; Maharani & Andika, 2020). However, mitigation lessons must be carried out because Indonesia is prone to earthquakes. Various surveys have provided information that students' knowledge about earthquake mitigation is still lacking (Widdyusuf et al., 2022).

The actions that need to be taken by students in the school environment when an earthquake occurs need to be described according to the actual context that students work on every day. When an earthquake occurs, students can respond to emergency conditions in the school environment with actions following school facilities, rooms, room arrangements, and so on. All students must fully understand the actions to be taken in situations that often cause panic. Schools have a high level of risk in earthquake events, so every person in the school environment needs earthquake mitigation knowledge (Widdyusuf et al., 2022). Knowledge of earthquake mitigation includes emergency procedures and evacuation procedures so that emergencies can carry out self-rescue to minimize the impact.

Animated Video of Earthquake Mitigation Instruction for Elementary School Students

Delivery strategies are selected and established according to instructional objectives, content characteristics, and learners. According to intellectual development, Elementary school students are in the concrete stage of intellectual development, so the instructional delivery strategies and contents should be designed according to these stages (Purnama et al., 2023). In addition, earthquake mitigation content is procedural and concrete actions taken by students at school during emergency responses in the context of the school environment. Media is also needed to deliver content in ways that attract the attention of elementary school students with short attention spans, approximately 16-27 minutes. Appropriate and interesting delivery strategies become the basis for life safety knowledge to get attention from elementary school students. Videos are selected for the ability of this media to present and visualize earthquake events so that students get information on the state and situation of earthquake events and suggested emergency response instructions (Sweeney & Baker, 2018).

A video or animated video is multimedia because it contains information in various forms of text, audio, graphics, animation, or video (Pavithra et al., 2018). Designers can design content so that animation can visualize earthquakes and mitigate that students can do so that the resulting animated video products become instructional media for students. Research shows that animated video creates an enjoyable learning experience without causing anxiety (Lin & Li, 2018). Some animated video Research findings show that video in learning can elicit a sense of empathy (Sweeney & Baker, 2018), build motivational involvement in learning (Zheng et al., 2020), improve problem-solving skills (Adriyani & Suniasih, 2021), improve reading skill (Utami & Kowiyah, 2022), improving the understanding of science (Hanif, 2020).

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METHODS

Development Model

The research method used in developing this animated video is the Research and Development (R&D) method. Product development follows the procedures of the ADDIE (Analysis-Design-Develop-Implementation-Evaluation) model, which has been widely used to develop instructional media (Putri et al., 2023). The expected result is an animated video of earthquake mitigation when it occurs in schools that is effective as an instructional medium for elementary school students. This R&D research is completed until the implementation stage. The developer does the ADDIE model procedure as described in **Figure 3**.

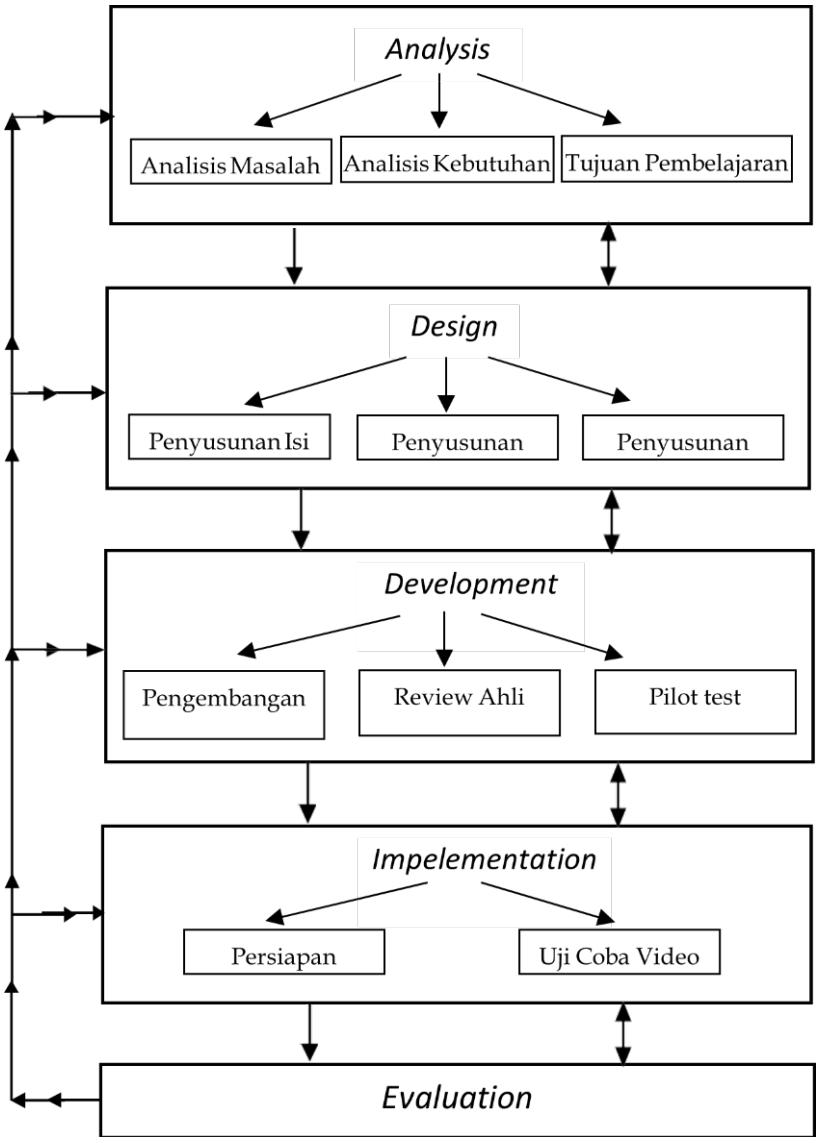

Figure 3. ADDIE Model modified by developers
Source: (Putri et al., 2023)

Analyzing Stage: This stage carried out a problem analysis in the SAR Goes to School activity at KPP Surabaya, including an analysis of needs and learning objectives for earthquake mitigation. The instructors in this program use the lecture method with PowerPoint media. The use of this media needs to follow the characteristics of the content, which contains concepts and various practical actions in the event of an earthquake in schools. Students' attention span is about 10-15 minutes (Placeholder 1), so the ability to

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pay attention to the instructor's explanation will be according to that period. Attention can distract students, boredom arises, or other activities that are counterproductive to the purpose of the activity. Animated videos can gain attention and lead someone to give more profound attention. Animated video development can extend student attention span, and animation increases student attention to increase student interaction with content. Content on earthquake mitigation in schools consists of 1) While in a vehicle, 2) While in the classroom and school environment, 3) When in an open space, and 4) When carried out in the school environment when the earthquake has stopped.

Design stage: The design stage is an effort to answer problems that have been identified. This stage has been carried out as follows: 1) preparation of material, 2) preparation of manuscripts, and 3) instrument breastfeeding assessing the feasibility of the product developed (Permatasari et al., 2019). The preparation of earthquake mitigation animation video content refers to earthquake natural disaster management guidelines consisting of 1) handling earthquakes when indoors, 2) outdoors, 3) in vehicles, and 4) when earthquake tremors have stopped. Script preparation is developing content into a unified animation video flow. The storyline is then arranged into each scene (*treatment*). *Treatment* is the arrangement of scenes so that the story fits the video's plot. After the treatment is designed, it is continued by compiling a script or screenplay. At this stage, instruments consisting of expert and user assessment instruments (elementary school students) are also prepared. Experts include material/content experts, instructional design experts, and instructional media/graphics experts. The instrument is prepared based on the instructional media evaluation instrument that has been used previously (Sabrinatami & Rinawati, 2018) with the procedure described in **Figure 4**.

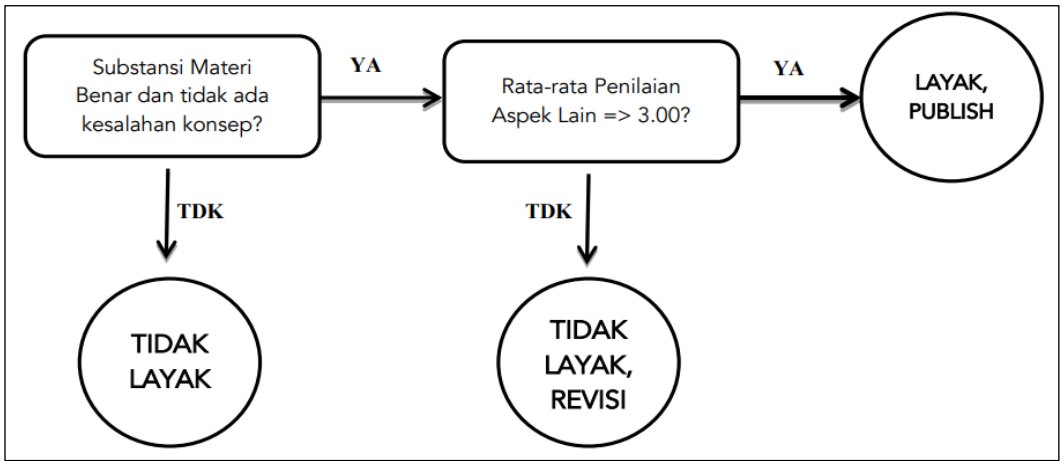

Figure 4. Determination of Media Eligibility
Source: (Sabrinatami and Rinawati, 2018)

Develop stage: This stage consists of 2 main activities: developing the video until it can be run and feasibility assessment. Animation Video Development is done until the animated video can be played on the player. The development of this video starts with defining and designing characters. The characters in this video include Ani, Nasar, the bus driver, students, teachers, parents, principals, and school security guards. Then, the writer began determining *the dubber* of all characters and the narrator in the animated video. In addition to the characters, the background and all the details began to be assembled. After all components are ready, animation is created using *Adobe After Effect software*. After that, the video editing process combines all scenes into a plot according to the earlier script. After completion, the next step is to render the entire editing into a video file. The finished animated video file can be played on various devices when the rendering process is complete. **Figures 5** and **Figure 6** document some product development activities.

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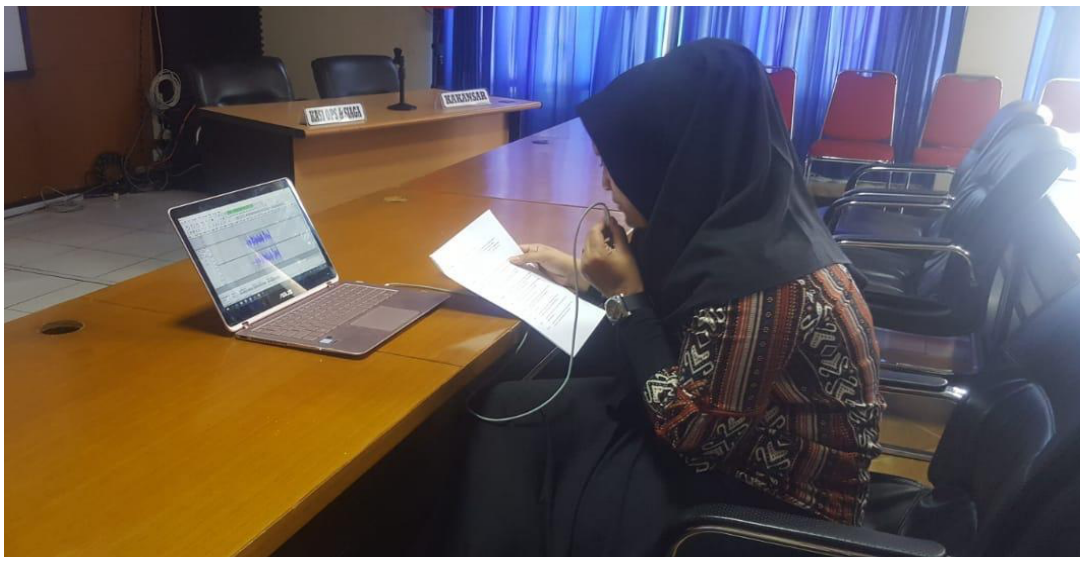

Figure 5. Voice-over recording process of teacher characters
Source: Researcher Documentation 2023

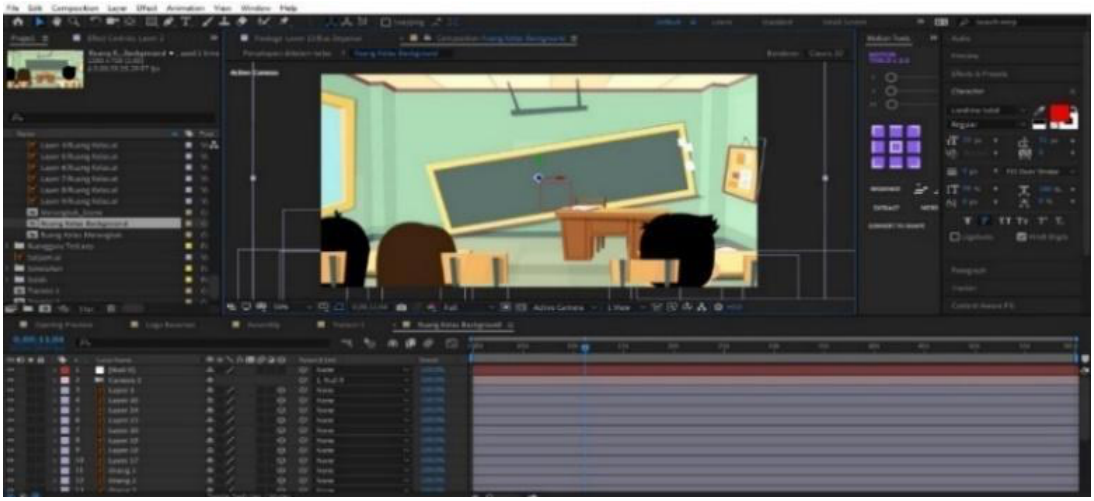

Figure 6. Animation creation
Source: Researcher Documentation 2023

Animated videos that have been developed need to get justification from experts, namely: 1) Content experts (Hari Adi Purnomo, S.H. as Head of KPP Surabaya who has worked at BASARNAS for 30 years), 2) Instructional media and Instructional design experts (Tantra Sakre, S.Sn., M.Pd., Bachelor of Visual Communication Design Education and Master of Educational Technology with project experience in various companies. The developer made improvements based on reviews from experts.

Implementation stage

Products that have been reviewed by experts and improved by developers according to experts' suggestions and continued with field trials by students. Before the field trials, a pilot test was carried out, where 3 students reviewed the animated videos after studying them individually. These students filled out a questionnaire to give their assessment. Then, the developer made revisions according to the result of the assessment. During post-COVID-19, the SAR Goes to School had very limited school visits, so the field trial was attended by ten students who were asked to participate to assess animated videos. The

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students studied the earthquake mitigation animation video to completion independently so that the answers and suggestions of the students contained in the questionnaire were authentic assessments from the students as users of the animated video. The children filled out a questionnaire consisting of items to assess the appropriateness of the animated video and several open-ended questions to assess student understanding.

Evaluation stage

This R&D research was conducted until the product was feasible by the experts and effectively used by the students in earthquake mitigation education. All these were completed at the implementation stage. The summative evaluation stage aims to test products on a broad scale with diverse participants. This stage involves significant work that must be done separately from developing prototype products.

Participants

Children as subjects of this study were elementary school students participating in SAR *Goes to School*, consisting of 3 students for a pilot test and ten students for field trials. These students come from several elementary schools that have attended the SAR Goes to School Program. At the time of the product trial, post-pandemic conditions 19 did not allow the invitation of many students, so the developer asked permission from the school so that some students could participate as subjects of the research being worked on.

Data Collection Technique, Instruments, and Data Analysis Technique

Experts' Review

Data was collected using questionnaires to obtain product feasibility from 3 experts: content experts, instructional media experts, and instructional design experts. If the average value exceeds or exceeds 3.00 from the scale range of values 1-5, then the media is declared feasible. The range of scale values used is arranged based on the Likert scale as **Table 1** follows:

Table 1. Likert Scale Assessment Criteria Expert Questionnaire (content expert, instructional media, instructional design expert)

Criteria	Score
Excellent	5
Good	4
Fair	3
Poor	2
Very Poor	1

Source: Researcher documentation

The data from the analysis obtained conclusions about the feasibility of animated videos, namely when there are no content errors, and the average is greater than or equal to 3.00 (≥ 3.00) or Good. The questionnaire also provides a blank column where experts can write suggestions for improving the animated video.

Student Response Analysis

Student responses were taken from a questionnaire consisting of an assessment of animated videos and several questions to determine students' understanding of earthquake mitigation content. This

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questionnaire was given to elementary school students participating in SAR *Goes to School* on pilot tests and field trials and was filled out by watching animated videos. The scale used in this questionnaire is Guttman's scale. The Guttman scale was chosen because the user is an elementary school student, so a more effective assessment scale is needed according to the student. In addition, with this scale, clear, firm, and consistent answers are obtained, such as yes-no, right - wrong, or agree to disagree. While in the study, the criteria for assessing the student response questionnaire used were as follows:

Table 2. Guttman Scale Assessment Criteria for student questioner

Criteria	Score
Agree	1
Disagree	0

Source: Researcher Documentation 2023

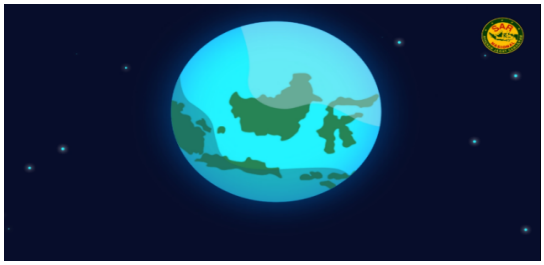
The average result data is then to get a result with an interpretation of a score of $0.5 < \bar{x} \leq 1$ to fall into the "feasible" category. Meanwhile, if an average value of $0 < \bar{x} \leq 0.5$ is obtained, the animated video is categorized as "unfeasible" with the intention that revision is needed. The questionnaire also contains four open-ended questions to determine students' understanding of earthquake mitigation content in animated videos.

RESULTS AND DISCUSSION

Product Development

At the design stage, animated video content has been determined based on the earthquake natural disaster management guidelines set by BASARNAS. This content is then created, a storyline consisting of scenes, and continued by compiling a script or screenplay. Animated videos are developed, as shown in **Table 3**.

Table 3. Results of Animation Video Development

No	Scene	Content of mitigation	Video
1	*Opening*	Explanation of the setting of the place and time	
			

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No	Scene	Content of mitigation	Video
2	Self-rescue during an earthquake while in a vehicle	1. Don't panic.; 2. Protect the head (school bag can be used).; 3. Stop the vehicle.; 4. Close your body to the chair in front.	 
3	Self-rescue during an earthquake while in the classroom	1. No running.; 2. Take refuge next to the table.; 3. Protect the head (can use a bag or book) so that the head is safe from objects falling from above.; 4. Stay away from glass.; 5. Stay calm and wait for instructions from adults (teachers) while praying for the earthquake to end soon.	 
4	Self-rescue during the earthquake while in the hallway of the school building	1. Towards the exit by not pushing each other.; 2. Follow the direction of the evacuation route to the assembly point.; 3. Can take shelter next to a table or closet if it is still far from the exit.	

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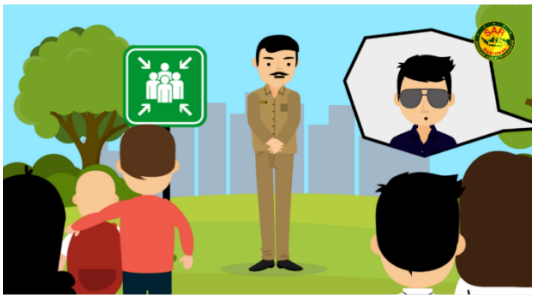
No	Scene	Content of mitigation	Video
5	Self-rescue during an earthquake while in open space	1. Do not enter the building.; 2. Look for open pages.; 3. Do not stand under big trees, electricity poles, and tall buildings.	
6	What to do when the vibration stops	1. Gather at assembling point (gathering point).; 2. Check school personnel among others, students, teachers, and others.	
7	*Closing*	Key conclusions/points: 1. Don't panic and always protect your head.; 2. Every building needs evacuation route signs and assembling points.; 3. When an earthquake occurs, adults must turn off the electrical switch.	

Source: Researcher Documentation 2023

Experts Assessment Results

Three experts were asked to review the product that had been developed to get an assessment of the feasibility of animated videos being used as instructional media. The aspects were assessed according to the respective areas of expert expertise. The overall assessment of experts is shown in Tables 4, 5, and 6. **Table 4** shows that the average score of content experts is 4.05 or feasible, which means that the material's content is correct and free from concept errors.

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Table 4. Results of Content Expert Reviews

Assessment Aspects	Score Maximum	Score
Content	40	35
Usefulness	30	28
Media Suitability	20	18
Number of scores	90	81
Total Mean		**4.05 (feasible)**

Source: Researcher Documentation 2023

Table 5 shows that the average score of an instructional media expert is 4.56 or feasible, which means that animated videos can be seen and heard clearly.

Table 5. Results of Instructional Media Expert Reviews

Assessment Aspects	Score Maximum	Score
Purpose	30	29
Visual	30	27
Audio	20	17
Number of scores	80	73
Total Mean		**4.56 (feasible)**

Source: Researcher Documentation 2023

Table 6 shows that the average score of the Instructional Design Expert is 4.60 or feasible in terms of use where animated characters and character interactions are appropriate for elementary school students.

Table 6. Results of Instructional Design Expert Reviews

Assessment Aspects	Score Maximum	Score
Usage	30	28
Instructional Strategies	30	27
Number of scores	60	55
Total mean		**4.60 (feasible)**

Source: Researcher Documentation 2023

The assessment results of the three experts show a feasible score, meaning that the development product can be used as an instructional media. The developers made several revisions according to experts' advice.

Pilot test results

According to experts, product development that has met the feasibility is followed by an assessment by small group students, called pilot tests, which three students do. Developers use input from pilot tests to make minor improvements that are still necessary. The questionnaire answers in **Table 7** recapitulate students' assessment of the product.

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Table 7. Students' questionnaire answers on the pilot test (n = 3)

No	Criteria	Score		x̄	Information
		X	Xi		
1.	Content	21	24	0.88	Feasible
2.	Usefulness	10	12	0.83	Feasible
3.	Visual aspect	7	9	0.78	Feasible
4.	Audio aspect	8	9	0.89	Feasible
	TOTAL	46	54	0.85	Feasible

Source: Researcher Documentation 2023

Results of Product Development Tryout

The animated video has been improved according to student input on the pilot test, then tested on ten elementary school students. Figure 5 documents an 8-year-old student watching an animated video to learn earthquake mitigation if it occurs in his school.

Figure 7. Students studying earthquake mitigation in a pilot
Source: Researcher Documentation 2023

After watching the animated video, students were asked to fill out a questionnaire of open-ended and four closed-ended questions. Answers to closed questions can be seen in **Table 8.**

Table 8. Questionnaire answers on product trials (n=10)

No.	Criteria's indicators	Score		x̄	Information
		X	Xi		
Content Criteria					
1	Clarity of self-rescue contents during an earthquake while in a vehicle	9	10	0.9	Feasible

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No.	Criteria's indicators	Score		x̄	Information
		X	Xi		
2	Clarity of self-rescue contents during an earthquake while in the classroom	10	10	1.0	Feasible
3	Clarity of self-rescue contents during an earthquake while inside the building	6	10	0.6	Feasible
4	Clarity of self-rescue contents during an earthquake when outside the building	10	10	1.0	Feasible
5	Clarity of contents on what to do when earthquake tremors stop	9	10	0.9	Feasible
6	Clarity of contents on what the school must prepare for disaster preparedness	6	10	0.6	Feasible
7	Accuracy of self-rescue contents during an earthquake in the school environment	10	10	1.0	Feasible
8	The presentation of the contents is coherent	10	10	1.0	Feasible
	Number of contents Criteria Scores	70	80	0.88	Feasible
Usefulness Criteria					
10	Instructional videos are easy to understand	10	10	1.0	Feasible
11	Instructional videos increase learning motivation	8	10	0.8	Feasible
12	Instructional videos can provide new learning experiences	9	10	0.9	Feasible
13	Instructional videos can improve learning concentration	9	10	0.9	Feasible
	Number of Usefulness Criteria Scores	36	40	0.9	Feasible
Visual Criteria					
15	Image quality in instructional videos is excellent and clear	10	10	1.0	Feasible
16	Text in easy-to-read instructional videos	10	10	1.0	Feasible
17	The animation used in the video is appropriate and interesting	9	10	0.9	Feasible
	Number of Visual Criteria Score	29	30	0.97	Feasible
Audio Criteria					
19	The use of *sound effects* instructional videos is appropriate	6	10	0.6	Feasible
20	The use of language is easy to understand	8	10	0.8	Feasible
21	The clarity of voice filler pronunciation is good	7	10	0.7	Feasible
	Number of Audio Criteria Scores	21	30	0.7	Feasible
	TOTAL	156	180	0.87	Feasible

Source: Researcher Documentation 2023

The students' answers regarding material, benefit, visual, and audio criteria have met the feasibility of the product as an earthquake mitigation instructional medium. The students were given four open-ended questions to determine their understanding of the contents of the animated video. The students' answers are presented in Tables 9, 10, 11 and 12.

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Table 9 Students answer the question**: "**Name 3 important things to do when an earthquake occurs."(N =10)

Students	Student Answers
1	Protect the Head, calm down, and stay away from the glass.
2	Stay away from Glass, run to the field, Hide under the table.
3	Protect Head, Don't Panic, Go to Collect Point.
4	Don't Panic and Always Protect Your Head, Follow Evacuation Routes and Gathering Points, Turn Off Electric Switches (For Adults).
5	Don't Panic, Protect Yourself, Ask for Help.
6	Cover Your Head, Try to Get Out of the Building, Don't Run.
7	Covering Your Head with a Bag, Taking Shelter Under a Table, Saving Yourself.
8	Take Shelter Near a Table, Don't Run, Gather at a Gathering Point.
9	Don't Panic and Always Protect Your Head, Evacuation Routes, Turn Off Electric Switches.
10	Don't Panic and Always Protect Your Head, Evacuation Routes, Turn Off Electric Switches.

Source: Researcher Documentation 2023

Table 9 shows that all students gave correct answers, but there were incomplete ones; student no. 7 answered with two correct things: covering the Head with a Bag and taking Cover under the Table. In addition, student No. 5's answer to "ask for help" is not entirely correct because the video content is not about the suggestion. Students' answer to the question: "What Knowledge Is Gained from This Animated Video?" is explained in **Table 10**.

Table 10 Student answer to the question: "What knowledge do I gain from this animated video?" (N= 10)

Student	Student Answers
1	Protect Your Head in case of an Earthquake.
2	First Confectionery during an Earthquake at the First Handling School.
3	What to Do in the Event of an Earthquake.
4	When an earthquake occurs, don't panic; always protect your head. If There Is An Earthquake, Do Not Be In The Building; always Follow The Evacuation Route. When the earthquake was over, the parties counted their members.
5	How to Handle in the Event of an Earthquake.
6	Do not run.
7	Knowledge of Saving Yourself from an Earthquake.
8	Do not Panic in the event of an earthquake.
9	The occurrence of earthquakes How to protect yourself Earthquake.
10	The occurrence of earthquakes How to protect yourself Earthquake.

Source: Researcher Documentation 2023

Table 10 shows that student No. 4 gave the most complete answer by explaining the essential steps when an earthquake occurs in schools. In addition, other students, namely numbers 3, 5, 7, 9, and 10, know the purpose of developing this animated video. The question: "Which Part of Animated Video is Most Interesting?" can be seen in **Table 11**.

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Table 11. Students answer the question: "Which Part of the Animated Video Is the Most Interesting?" (N = 10)

Student	Student Answers
1	Earthquake Makes Things Fall.
2	When an Earthquake Occurs in the Classroom.
3	Earthquakes in the Classroom.
4	The Most Interesting Animated Video Part during an Earthquake, but I am in a Classroom/Building.
5	Inside the Vehicle.
6	While in the Classroom.
7	When the earthquake began
8	Earthquakes in the Classroom.
9	Animated Videos on the Bus
10	Animated Videos on the Bus

Source: Researcher Documentation 2023

The student's answers in **Table 11** show that five students chose the scene of self-rescue when an earthquake occurred in the classroom. This aligns with the student's answers to closed question no. 3: "Clarity of self-rescue material during an earthquake in the classroom." All students agree that the material presented is explicit. This can happen because the video classroom scene contains much essential material, and many characters are involved in the scene. The second most common answer is the scene of self-rescue while in the vehicle in this video on the school bus. Students' answers to the question, "Who is the most liked character in the animated video?" can be seen in **Table 12**.

Table 12. Students answer the question: "Who is the most liked character in the animated video?" (N= 10)

Students	Students' Answers
1	Nasar.
2	Mr. Driver and Mrs. Teacher (Ibu guru).
3	Ani.
4	All figures.
5	School students.
6	Ani.
7	Mrs. Teacher (Ibu Guru).
8	Ani and Nasar on the Bus.
9	School students.
10	School students.

Source: Researcher Documentation 2023

Students' answers in **Table 12** showed that Ani and Nasar were the most liked figures. Ani and Nasar are elementary school students. The developer designed these two characters to be liked by students because it can be interpreted that students identify themselves as existing characters so that students feel as if they are experiencing an earthquake event experienced by two characters and imitate disaster response actions carried out by two characters. Students are asked to provide suggestions or input for animated videos, as shown in **Table 13**.

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Table 13. Student suggestions

No	General Students' Comments
1.	The videos are funny and exciting to watch.
2.	Students suggest making other videos related to natural disasters.
3.	The animated video is already good; there is nothing to subtract or add.
4.	The sound effects of the animated video are already good, but they are out of sync between the sound and the movement of the mouth. Intonation also needs to be considered.
5.	Less *back sound* to accompany animated videos.

Source: Researcher documentation

Discussion

The development of animated videos aims to provide appropriate instructional media in earthquake mitigation education for elementary school students. The delivery of content of natural disaster events is less or inappropriate if expository methods are used because earthquake events are very contextual, so to understand them, appropriate instructional media is needed. The animated video can depict the actual situation of an earthquake so that the students can feel it and develop empathy with students who witnessed it (Maymunah, 2021). This was revealed from the students' answers after testing the product, where all students answered that the most liked characters were two elementary school student figures. This answer shows that the students position themselves like two elementary school student figures. Video is an instructional media that can arouse student motivation, encouraging students to learn earthquake mitigation and name emergency actions in the event of an earthquake (Ramadhan et al., 2021).

All students can be said to provide three earthquake mitigation measures, although one student gives answers that are not specific to the context at school. The ability of students to provide emergency action can be interpreted as animated videos being precise and clear in the delivery of mitigation content. In addition, all students can also provide appropriate answers to statements that ask about the context of the mitigation video they witnessed. This means that the animated video successfully conveys the learning objectives or content of the animated video. This finding is in addition to empirical data from previous studies where animated videos can improve elementary school student's understanding of subject matter, such as science comprehension (Adriyani & Suniasih, 2021).

CONCLUSION

Earthquake mitigation animation videos have met the feasibility of instructional media from sharing experts. The students can understand the learning objectives and information in the animated video. Thus, it can be concluded that this developer's product meets the qualifications to be used as an earthquake mitigation instructional media. The development product of earthquake mitigation animation videos is feasible and effective as an instructional media. The developers were advised to develop animated videos for various natural disasters in different places.

AUTHOR'S NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirm that the data and content of the paper are free from plagiarism.

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