Jurnal Geografi Gea

Journal homepage: https://ejournal.upi.edu/index.php/gea

Effectiveness of Video Media in Teaching Coastal Area Management for Abrasion Disaster Mitigation

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ABSTRACT

Using video media in learning can potentially enhance student understanding, especially in mitigating coastal abrasion disasters. This study aims to determine the effect of video learning media on Class XI IPS students at SMA Negeri 1 Wolo in understanding coastal area management based on abrasion mitigation. This study uses a pre-experiment one-group pretest-posttest design, collecting data through observation and multiple-choice tests, which were then analyzed using parametric inferential statistics. The t-test results showed a significance of 0.000, indicating a significant increase in student understanding, with average scores rising from 33.50 (pretest) to 71.85 (posttest). Video media can foster curiosity and skills, and present geography material on the coastal area management cycle based on abrasion disaster mitigation, making it easier for students to understand. This study implies that video learning media can enhance students' understanding of coastal area management based on abrasion mitigation and should be implemented as an effective teaching strategy in schools.

ARTICLE INFO

Article History:
Submitted/Received 31 December 2024
First Revised 10 May 2025
Accepted 9 October 2025
First Available online 31 October 2025
Publication Date 31 October 2025

Keyword:
Abrasion Mitigation,
Understanding,
Coastal Management,
Video.

1. INTRODUCTION

Learning is a dynamic and interconnected system composed of various elements, each vital in achieving educational objectives (Somantri et al., 2018). Humans, such as teachers and students, form the core of this system, engaging in reciprocal interactions that shape the learning experience. Materials, including textbooks and digital resources, provide the content foundation, while facilities like classrooms and laboratories create the physical environment conducive to learning. Equipment, ranging from basic tools to advanced technological devices, enhances the delivery and comprehension of material (Al Fauzi et al., 2022). Procedures, such as instructional strategies and classroom management techniques, guide the flow of the learning process, ensuring it remains structured and purposeful. These components do not function in isolation but instead influence one another in complex ways, forming an ecosystem where the interaction of learning objectives, teaching methods, media, materials, and evaluative practices creates a holistic and enriched educational experience. This interconnectedness highlights the importance of balance and integration within the system, as the success of the teaching and learning process hinges on the seamless interplay of its components within a conducive and well-designed learning environment. Each component is interconnected and influences the others in every learning process (Supiani et al., 2018). Learning should follow the development of science and technology to be able to present a classroom atmosphere that is in line with the needs of the times, and by the character of students (Raini and Wiranata, 2020; Sejati et al., 2017).

The level of student understanding can be seen from their learning outcomes. Video media is one way to improve learning outcomes. Considerations in determining learning outcomes in the use of video media in this study are that video media can enhance the quality of student learning outcomes (Ardhianti, 2022; Yarso et al., 2019). Video media content containing the environment around students adds context to learning and is meaningful (Surahmi et al., 2021).

Video-based learning can complement students' essential experiences when reading, discussing, and practicing. However, students must experience their own experiences to understand and use the material daily. A learning process that can provide students with direct experience is needed (Kasmiati et al., 2020).Video media can substitute for the surrounding environment and even show objects that cannot be seen normally. Students can use their senses of hearing and sight to obtain information about learning materials that can normally be seen and cannot be seen, so that the learning process is not tedious because the audio-visual media can be used in learning in the form of films or videos. Videos can encourage and increase motivation and instill attitudes and behaviors in the learning process. The ability to engage video media to help increase low student learning motivation because using video media can make it easier to convey messages and understanding to students (Sejati et al., 2019).

Coastal area management in the waters of Bone Bay occurs in stages. The first change occurred in 1990-2003, and there was a reduction in the amount of Mangrove Forest by 78.9 hectares. From 2003 to 2017, there was a reduction in the Mangrove Forest by 37.8 hectares. The total period of 27 years saw a reduction in the Mangrove Forest area by 116.71 hectares. The Mangrove Forest in the waters of Bone Bay was initially 220.03 hectares, becoming only 103.32 hectares in 2017. The Meteorology, Climatology, and Geophysics Agency (BMKG), 2021, recorded an increase in the height of sea waves in Bone Bay, reaching 1.25-2.5 m.

DOI: https://doi.org/10.17509/gea.v25i2.78777
p-ISSN 1412-0313 e- ISSN 2549-7529

The high waves triggered coastal abrasion in Donggala Village and Muara Lapa-Pao Village, so efforts are needed to increase the knowledge of every community from an early age, especially for school-age students. Knowledge of coastal area management for school-age students is essential to know the efforts needed to minimize abrasion in coastal areas (Sejati et al., 2022; Sumarmi and Amiruddin, 2014).

Students' knowledge related to coastal area management based on abrasion disaster mitigation at SMA Negeri 1 Wolo is still low, as seen from the lack of class XI IPS students who participated in the abrasion disaster in Donggala Village and Muara Lapa-Pao Village. Students take advantage of the disaster by playing at the disaster location, so it is necessary to conduct socialization using video media to increase knowledge of abrasion disaster mitigation in the coastal areas of Donggala Village and Muara Lapa-Pao Village. Knowledge is provided so that students can play independently or in groups and be a driving force in their environment to overcome the threat of abrasion (Sumarmi and Amiruddin, 2014).

Coastal abrasion is also often referred to as coastal erosion; erosion can cause a reduction in coastal areas, especially areas closest to seawater. Slowly but surely, if left unchecked, abrasion will erode all coastal areas, and seawater will inundate all coastal and residential areas. The threat of coastal abrasion is increasingly worrying, especially for residents living on the coast of Donggala Village and Muara Lapa-Pao, Wolo District. Climate change events with increasing temperatures and rising sea levels can cause coastal abrasion, as well as several things that need to be considered, namely, policies from a legislative perspective (HL, et al., 2022). If left unchecked, coastal abrasion can develop further, and boundaries can continue to shift.

The beach is also important for the community's economy, especially for fishermen in Donggala Village and Muara Lapa-Pao, Wolo District. Coastal area management is based on abrasion disaster mitigation in Donggala Village and Muara Lapa-Pao, which involves planting mangroves and making breakwaters. The cause of coastline abrasion occurs due to natural and human activities, such as the size and height of waves hitting the coastline, which can gradually erode the coastline. Human activities include supplying groundwater, which causes the land to subside and the sea level to rise, opening up land and ponds that do not maintain Mangroves, and reforestation (Sejati et al., 2022).

The use of video as a learning medium in geography education in this study is based on Mayer's Cognitive Theory of Multimedia Learning and Paivio's Dual Coding Theory. Mayer explains that learning will be more effective when information is delivered through a combination of text and images because students have two cognitive channels to process visual and verbal information (Mayer, 2009). Learning videos provide both types of information simultaneously, thus helping students build better mental representations of complex geographic concepts (Cavanagh and Kiersch, 2022). This theory is very relevant in disaster mitigation-based learning, where visualization of events such as coastal abrasion can provide real context and increase students' understanding of the importance of coastal area management (Muryani et al., 2018).

Paivio's Dual Coding Theory also supports the use of video in the learning process. This theory states that information presented visually and verbally will be stored in two codes in memory, making it easier to access and recall (Aldag and Sezgin, 2022). In geography, videos can combine oral narratives with visualizations of real objects or events that are difficult for students to observe directly, such as changes in coastlines due to abrasion (Jong et al., 2020).

DOI: https://doi.org/10.17509/gea.v25i2.78777
p-ISSN 1412-0313 e- ISSN 2549-7529

This combination not only increases students' interest and motivation to learn but also strengthens the storage and understanding of information in the long term.

Integrating videos into geography learning, especially related to abrasion disaster mitigation, is an approach that can potentially improve students' learning outcomes and awareness of environmental issues around them (Roemmele and Pantazes, 2023).

Based on the results of previous research conducted by Walangadi and Pratama (2020) Using 2D animation video media with classroom action research can improve students' learning and understanding. The results of the second cycle of PTK have achieved set performance indicators, so using 2D animation video media can improve students' understanding of social studies in class V SDN 2 Kabila, Kabila District, Bone Bolango Regency (Walangadi and Pratama, 2020).

Meanwhile, Citra et al. (2020) Studied students' understanding of high-zone earthquake-prone areas using quantitative descriptive research. In high-zone earthquake areas, the level of understanding of mitigation seen in students from three schools in the high zone was very poor, with a total of 58 students, or 42%. Understanding mitigation with geography learning that occurs in high zones has an influence factor of 55.4% (Citra et al., 2020).

Third, Maharani (2020) Conducted a comprehensive study to evaluate the knowledge level of students regarding earthquake disaster preparedness at SMPN 3 South Kuta, located in Badung, Bali Province. Employing a quantitative methodology and random sampling for data collection, the research revealed that students' preparedness knowledge fell into the "good" category. This finding underscores the critical role of experiential learning, as students with prior exposure to earthquake events demonstrated a heightened awareness of both the causes of seismic activities and appropriate preventive and responsive actions. These experiences, whether direct or vicarious, appeared to serve as practical learning opportunities, enabling students to internalize effective strategies for safety and mitigation (Pamungkas et al., 2023). For instance, students who had participated in earthquake drills or witnessed the aftermath of such disasters were more likely to understand the importance of measures like identifying safe zones, securing heavy objects, and knowing emergency response procedures. The study highlights the importance of integrating real-life scenarios and simulations into educational curricula to bolster disaster preparedness at a young age (Maharani, 2020; Pamungkas et al, 2025).

Fourth, Fauzi et al. (2020) Conducted a detailed investigation into the level of understanding of grade X students regarding online learning in Physical Education at SMAN 2 Cikarang Pusat, employing a quantitative descriptive approach. Using survey instruments, the study meticulously evaluated the comprehension levels of students, yielding an average score of 23.38 across 29 questions. This suggests that students displayed a moderately adequate grasp of the material presented in the online format. Interestingly, the study revealed that 42% of the participants, or 51 students, fell into the "Quite Good" category, highlighting a diverse range of understanding among the cohort. The findings underline the mixed outcomes of transitioning physical education, a traditionally hands-on subject, into a virtual learning environment, pointing to its feasibility and the challenges in maintaining robust student engagement and comprehension (Fauzi et al., 2020).

Fifth, Trinanda (2017) studied coastal area management in Indonesia, focusing on the context of conservation and sustainable development. Employing a normative legal analysis, the study highlights the lack of integration in coastal management across different sectors, often leading to inefficiencies and policy implementation conflicts.

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p-ISSN 1412-0313 e- ISSN 2549-7529

The findings underscore the urgent need for a comprehensive and cohesive policy framework that addresses various aspects of coastal area management, including environmental conservation, resource utilization, and community development.

Such a policy would aim to enhance the welfare of communities in coastal and island regions by promoting sustainable practices, ensuring equitable access to resources, and mitigating the negative impacts of uncoordinated sectoral activities (Trinanda, 2017).

The difference between previous research and this research is the type of research. Previous research used classroom action, normative legal analysis, and descriptive methods, while this research uses pre-experiments. Second, the disaster studied in previous research was an earthquake, while this research uses an abrasion disaster. This study aimed to determine the effect of video learning media on the level of understanding of class XI IPS students of SMA Negeri 1 Wolo on mitigation-based coastal area management to overcome abrasion.

2. METHODS

This study uses a pre-experimental research design. The experiment used a group pretest and posttest design, conducted on one group without a control group (HL et al., 2022; Sugiarto et al., 2023). The study was conducted from May 2021 to October 2021 on class XI IPS students of SMA Negeri 1 Wolo. Pre-experiments are used because class XI IPS is only divided into one study group. Pre-experimental research does not involve a control class, but can still describe the results scientifically (Marsden and Torgerson, 2012).

The population in this study was all 34 class XI IPS students. Class XI IPS was used as the population because it studied disaster mitigation material. The researcher used a saturated sampling technique to select 34 students as the experimental class. According to Sugiyono (2019), the research design is shown in **Table 1**.

Table 1. Research Implementation Design

Class	Pretest	Treatment	Posttest
Experiment	O1	X1	O2

Description

X1 : Learning Using Video Media
O1 : Pre Test
O2 : Post Test

Data collection techniques include observation and multiple-choice tests of 18 questions. Validity using Pearson correlation with sig <0.05; out of 29 questions, 18 questions are valid. As seen from Cronbach's Alpha, eighteen questions obtained a data reliability value of 0.769, or high reliability. Respondents were asked to choose one answer based on their knowledge by crossing (x) on the test question. Test indicators are shown in **Table 2**.

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p-ISSN 1412-0313 e- ISSN 2549-7529

Table 2. Research Instrument Grid

Research Variables	Indicators	Questions
Level of Understanding of Grade XI IPS SMAN 1 Wolo	Students Disaster Mitigation Abrasions Coastal Area Management: To overcome abrasion	1, 2, 4, and 9 10, 11, and 12 15, 17, 20, 21, 22, 24, 26, 27, 28, and 29

Source: (Ekosafitri et al., 2017; Kusumawati, 2016; Maulida, 2019).

Parametric inferential statistics are employed in this analysis to evaluate the data, with prerequisite tests ensuring the validity of assumptions.

A normality test using the Kolmogorov-Smirnov test determines whether the data follows a normal distribution. This is achieved by interpreting the significance value (sig), where a value greater than 0.05 indicates normality. Similarly, a homogeneity test, utilizing the homogeneity of variance test, assesses whether the data exhibits uniform variance across groups, confirming homogeneity if the significance value exceeds 0.05. Once these prerequisites are satisfied, the hypothesis is tested using the t-test, enabling comparisons between groups to draw meaningful conclusions.

3. RESULTS AND DISCUSSION

The level of student understanding is critical to the learning process, as it directly influences their ability to grasp and master various learning materials. This study evaluated the level of understanding among class XI IPS students at SMA Negeri 1 Wolo through their responses to multiple-choice questions. The research data was categorized into two segments: pretest and posttest results. The pretest, conducted before introducing video media in the experimental group, revealed a wide range of learning outcomes. The highest score in the pretest was 58, while the lowest was 10, with an overall average score of 33.50. These results highlight the students' initial understanding before any intervention. The detailed distribution of the pretest data is presented in **Table 3**, providing a comprehensive overview of the students' baseline performance.

Table 3. Experimental Group Pretest

Nu	Experimental Group	Pretest
1	Mean	33.50
2	Standard Deviation	11.563
3	Maximum	58
4	Minimum	10

After using video media, the posttest obtained the highest learning outcome score of 95 and the lowest of 45, while the average calculation was 71.85. The distribution of posttest data can be seen in **Table 4** below.

Table 4. Posttest Experimental Group

Nu	Experimental Group	Pretest
1	Mean	71,85
2	Standard Deviation	10.460
3	Maximum	95
4	Minimum	45

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p-ISSN 1412-0313 e- ISSN 2549-7529

Normality testing was conducted on two data sets: pretest and posttest data. The results of the normality test are shown in **Table 5**.

Table 5. Normality Test

Class	Variable	Statistics of Kolmogorov-Smirnov	P Volume of KS	Conclusion	Interpretation
Experiment	*Pretest*	0.102	0,200	P-Valume > 0,05 Valume>0,05	Normal
	Posttest	0,118	0,200	P-Valume > 0,05	Normal

Based on the table above for the experimental group, the data shows a normal distribution from the pretest results of 0.200 and posttest 0.200. This means that the data meets the requirements to proceed to the next stage using parametric statistics of the homogeneity test. The study's homogeneity test can be seen in **Table 6**.

Table 6. Homogeneity

Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
1,140	1	68	0.290

Based on the table above, the sig value is 0.290 > 0.05, if seen from the F-table value with α = 5%. Thus, it can be concluded that the variance of the posttest class data is homogeneous; thus, one of the prerequisite analysis tests is met.

Hypothesis testing is used in research to test temporary assumptions. The data from this study were tested using the SPSS 25.0 program. **Table 7** shows the statistical test results for the learning outcome values taken from the posttest values of the experimental class.

Table 7. Paired Sample Test

		T	Df	Sig
Pair 1	*Posttest*	3.116	34	0,004

Based on the calculations in the table above using SPSS 25.0, the Tcount value = 3.116 and Ttable 1.69389 were obtained with sig = 0.004 <α = 0.05, so H0 is rejected, and H1 is accepted. This result shows that video media socialization influences the level of student understanding.

The study compared the effectiveness of using video media as a teaching tool against traditional methods, focusing on its impact on students' comprehension levels. To achieve this, the researchers implemented an experimental design involving students from class XI IPS, who were designated as the experimental group. This group utilized video learning media to study the material on coastal area management. The learning outcomes were assessed through tests, providing data to determine whether significant differences existed between the teaching approaches. The study explored innovative educational methods for enhancing students' grasp of crucial environmental management concepts by focusing on video-based learning.

Video media was effectively utilized to present material on coastal area management, focusing on abrasion disaster mitigation. This material was disseminated via WhatsApp, leveraging its accessibility and familiarity among users.

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p-ISSN 1412-0313 e- ISSN 2549-7529

One of the key advantages of using video media is its ability to simplify complex topics, making it easier for students to understand the presented concepts. Additionally, video content tends to be more engaging, capturing students' attention more effectively compared to traditional methods (Adlika et al., 2021). This engagement enhances understanding and provides students with valuable references related to the subject matter. The effectiveness of this approach was demonstrated through a descriptive analysis of pretest and posttest scores. Before the intervention, the average pretest score was 33.50, with a maximum score of 58 and a minimum of 10. After the intervention, the average posttest scores significantly improved to 71.85, with the highest score reaching 95 and the lowest 45. This marked increase in scores highlights the positive impact of video media in enhancing students' knowledge and comprehension of coastal area management and disaster mitigation strategies.

Learning videos are a tool that combines audio and visuals to convey educational messages, including concepts, principles, procedures, and theories, aiming to enhance understanding and facilitate the application of knowledge. Video media present during the learning process can help convey the content and objectives of learning faster than controlled classes that use conventional learning models, so that videos affect students' understanding of concepts (Istiqomah et al., 2017; Nisa et al., 2024). Videos are highly engaging because they combine visuals and sound, stimulating both sight and hearing to create a more immersive experience (Febrianti, 2021).

The advantages of video media are that it can meet the needs of all students who have different learning characteristics (audio, visual, or audio-visual) and can present events that students cannot possibly experience outside of school, such as seeing floods, earthquakes, tsunamis, and abrasion (Triana et al., 2017). These advantages will indirectly have an impact on increasing student understanding. Several advantages that have been described prove that video is a media with many positive and effective values for use by students (Gadeng et al., 2020; Sejati et al., 2023). The selection of videos must still be adjusted to learning objectives, learning materials, learning methods, and facilities and infrastructure (Pinilih et al., 2016).

Video media in teaching can enhance students' curiosity and skill development by presenting geography topics, such as coastal area management cycles related to abrasion disaster mitigation, in a more tangible and comprehensible manner. Learning using video media makes students understand an object; there is no need to present real objects, but they can be replaced with objects that can represent the role of the object. Video media can effectively capture students' interest and attention, fostering greater enthusiasm and active participation in the learning process (Kurniawati et al., 2013).

Video media used in online learning can provide better learning stimuli for students because it helps them remember learning materials longer (Febrianti, 2021). The many senses involved make the material more likely to be stored longer in students' cognitive structures. Video media enables teachers to present learning materials more effectively and efficiently (Ramadinata et al., 2020).

Building on the effectiveness of video media in learning, it is evident that such tools play a significant role in creating an engaging and dynamic educational environment. Video media provides a multisensory experience that caters to diverse learning styles, including auditory, visual, and audio-visual learners, thereby enhancing comprehension and retention of knowledge. For instance, in geography lessons, videos can visually illustrate abstract or complex concepts, such as tectonic movements or climate systems, making them more

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p-ISSN 1412-0313 e- ISSN 2549-7529

accessible and relatable to students (Surahmi et al., 2021; Yarso et al., 2019). Additionally, integrating audio and visual elements fosters active engagement, encouraging students to participate more fully in learning. As Gay and Sofyan (2017) highlight, the flexibility of video media in addressing varied learning preferences ensures that students remain attentive and interested, ultimately leading to improved learning outcomes (Gay and Sofyan, 2017).

Another study that supports this study was conducted by Sari et al. (2020), which shows that video media has been shown to have effective capabilities (more than 70% to convey information, entertainment, and education) (Sari et al., 2020). Students' interest in participating in the learning process will help them receive the material presented. It will help them be more diligent in studying to improve their understanding of concepts. Differences in treatment in learning steps and materials delivery can affect students' conceptual understanding. Good learning involves all learning components, including media, such as video (Kurniawati et al., 2013; Ramadinata et al., 2020).

This study aligns with Mayer's Cognitive Theory of Multimedia Learning, which states that combining visual and verbal stimuli can strengthen students' cognitive processes, so information is more easily processed and stored in long-term memory (Mayer, 2024).

The study is also in line with Paivio's Dual Coding Theory; the integration of audio and visuals in videos helps students form two mental representation paths, verbal and images that support each other in understanding information (Layer, 2024). Videos can increase learning motivation and deepen students' conceptual understanding, especially for topics that require real visualization, such as coastline dynamics and the impact of abrasion (Speed et al., 2018). The use of videos also provides a virtual, hands-on learning experience, making it an effective medium for improving learning outcomes and environmental awareness from an early age (Hajj-Hassan et al., 2024; Tani et al., 2022).

The findings of the study are in line with several previous studies, which state that video media is effective in improving student learning outcomes because it can present information audiovisuals and strengthen memory through multisensory stimulation (Febrianti, 2021; Surahmi et al., 2021). This study has a unique context in applying disaster mitigation-based geography learning, especially abrasion in the Donggala Village and Muara Lapa-Pao areas. This study emphasizes the importance of a visual approach in conveying complex environmental concepts, such as coastline dynamics and changes in mangrove ecosystems. The results of this study support Trinanda (2017), the argument is that the delivery of coastal area management material must be packaged innovatively so students can more easily understand environmental issues and become agents of change in society.

4. CONCLUSION

There is an effect of video learning media on students' understanding of the material on coastal area management based on abrasion disaster mitigation in class XI IPS students. Video media can foster students' curiosity and skills. They can present more concretely and easily understood geography material on coastal area management based on abrasion disaster mitigation. This study has limitations in improving understanding by using videos, and it is necessary to examine other factors or the same research involving control classes. The use of video media in geography learning, especially related to abrasion disaster mitigation, can be an effective strategy for teachers and curriculum developers to improve student understanding through visualization of complex concepts and strengthen memory through multisensory stimulation.

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p-ISSN 1412-0313 e- ISSN 2549-7529

5. RECOMMENDATIONS

Geography teachers can use video as the main media to teach abrasion disaster mitigation material. Concrete strategies can include documentary videos or educational animations showing the abrasion process, its impact on the mangrove ecosystem, and solutions such as making breakwaters and reforestation. Videos are equipped with narration and visual text according to the principles of Mayer's Cognitive Theory to strengthen understanding. Teachers can collaborate through video media by holding discussions or project assignments, encouraging students to find local solutions according to their environmental conditions.

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