

Sustainable environment in the classroom: Exploring environmental socioscientific issues (ESSI) using Mongabay online news site

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Abstract: Environmental issues in online newspapers allow environmental course instructors to examine social scientific topics in a sustainable. However, it remains a problem for instructors to fully examine the dimensions of knowledge connected to the environment in online newspapers. The purpose of this research is to develop a fundamental framework for studying scientific information in online newspapers that can be integrated into the curriculum and utilized successfully to foster environmentally conscious young people. The exploratory process utilizes Robert N. Entman's framing analysis model combined with Bloom's taxonomy. According to Bloom's taxonomy, framing has two dimensions: environmental issue selection and issue emphasis, which is centered on the knowledge dimension. The findings indicate that the Mongabay media, in generating news about environmental concerns such as mangrove degradation can highlight the full aspects of environmental knowledge, allowing it to be utilized as a medium for environmental learning in the classroom. However, the information presented on Mongabay media reveals more of the dimension of knowledge at a factual level only. Therefore, it is still to enrich material especially that which is not presented in the news to explore conceptual and procedural dimensions.

Keywords: Environmental socioscientific issues; newspaper; sustainable environment

Introduction

The advancement of science and technology requires science education to direct students to acquire various abilities in responding to various environmental concerns, ensuring students are actively and critically involved in making decisions and resolving these problems (Herman, 2018). According to Kopnina (2012), education about the environment is closely related to the concept of a sustainable environment which aims to educate people to be aware, concerned, and actively involved in solving environmental problems and preventing new environmental problems.

The implementation of science learning needs to integrate and explore environmental issues because it has the potential to promote environmental awareness, but still considers the purpose of environmental education, namely to achieve a sustainable society and life (Ignell et al., 2019; Kang & Hong, 2021; Wi & Chang, 2019). Thus, an effort to provide an understanding of the concepts and skills about the environment should begin in learning environments such as schools and universities.

Socioscientific issues (SSI) is a learning trend that has the potential to improve the mastery of sustainable environmental education concepts for students and is widely applied in science learning. According to [Sadler and Donnelly \(2006\)](#), SSI is a term that describes controversial social issues related to science concepts, procedures, or technology. The issues raised are often related to biotechnology and the environment, genetic engineering, cloning, pollution, and global climate change. Learning SSI with *environmental issues* or environmental socioscientific issues (ESSI) contributes to increasing students' awareness and self-efficacy towards the environment, responsibility for sustainable development, and environment-related activities ([Herman, 2018](#); [Herman et al., 2018](#); [Wang et al., 2018](#)). In addition, SSI learning raises environmental issues, it also provides opportunities for students to master a number of skills such as argumentation skills ([Dawson & Venville, 2013](#); [Venville & Dawson, 2010](#); [Wang et al., 2018](#)), reasoning ([Kinslow et al., 2018](#); [Owens et al., 2019](#)), decision making ([Genisa et al., 2020, 2021](#); [Khishfe, 2012](#); [Rizal et al., 2016](#); [Tal & Kedmi, 2006](#); [Zhang & Hsu, 2021](#)) and environmental issues or problems that are developing in society because it allows students to integrate their understanding of science and other factors that ultimately also improve scientific literacy ([Yacoubian, 2018](#); [Zeidler et al., 2005, 2019](#)).

ESSI that is actual in society can be obtained through various media both online and offline. One of the popular media to obtain ESSI information quickly and easily is through newspapers or online news ([Huang & Yore, 2005](#); [Ramnarain & Moleki, 2017](#)). Through newspapers as a source of ESSI, students can identify and analyze issues, evaluate decisions that have been made, determine their choices, and acquire concepts or knowledge related to the environment. In addition, it is also an appropriate method to help students to have environmental literacy. However, information obtained from newspapers has the potential to cause misunderstandings, misconceptions, and inaccuracies about science and environmental information, therefore students need to be supported to develop their critical thinking skills in interpreting the information contained in newspapers and the role of teachers is needed to be able to analyze the potential of mass media in exploring the dimensions of knowledge contained therein.

Analysis of the potential development of the knowledge dimension in ESSI newspapers as a source of information is still very rare, even though newspapers are a rich source of information and knowledge. Some studies also show the positive potential of using mass media as a learning resource in the classroom ([DeBoer, 2000](#); [Elliott, 2006](#); [McClune & Jarman, 2010](#)). The lack of a basic framework and appropriate methods for exploring the potential of newspapers as a source of ESSI, especially for teachers, causes a gap in this field. As a solution to this gap, the study aims to develop a framework for studying scientific information in online newspapers that can be integrated into the curriculum to foster environmental consciousness. The author conducted a Framing analysis of Robert Entman's model of ESSI contained in online newspapers by combining it with Bloom's taxonomy. Framing is an approach used to determine the point of view or perspective used by the author in selecting issues and writing news in the newspaper. Robert N. Entman's framing analysis model emphasizes four stages of concept analysis, namely problem definition, estimating the cause of the problem, making moral decisions, and emphasizing solutions ([Entman, 1993](#)). The analysis of the model, will help in identifying facts, concepts, and procedures contained in the mangrove forest issues in the Mongabay online news site as a source of ESSI associated with Bloom's taxonomy. This research is expected to be a basic framework for the implementation of learning and assessment to support the concept of a sustainable environment for students through ESSI contained in mass media.

Method

The method used is exploratory according to [Creswell \(2012\)](#) which digs deeply into a particular topic. The process of extracting information in an effort to analyze how the media framed the news about the environmental issue of mangrove forest destruction in Aceh Taming using the framing approach of [Entman's model \(1993\)](#) combined with Bloom's taxonomy by [Anderson and Krathwohl \(2001\)](#). Two stages were conducted (Figure 1). Stage I: issue selection, researchers used the online environmental news site Mongabay.co.id, because the information focuses on environmental issues that often occur in society. This stage is related to the selection of facts. Generally, newspapers present complex and varied information, but not all aspects or news sections of an issue are presented by journalists. A deep understanding of the issue is crucial in the process of exploring the dimensions of knowledge, especially the presentation of data that shows the factual dimension of knowledge. Stage II: issue emphasis, related to the exploration process through placing the contents of the newspaper into knowledge dimension indicators using Bloom's taxonomy. This stage is closely related to the use of words or sentences placed in the factual, conceptual and procedural knowledge categories of the selected newspaper. The use of primary data in this research examines news texts from online media, while secondary data comes from literature or literature studies using literature that can support in conducting analysis related to environmental concepts. The two stages of the ESSI exploration process are shown in [Figure 1](#).

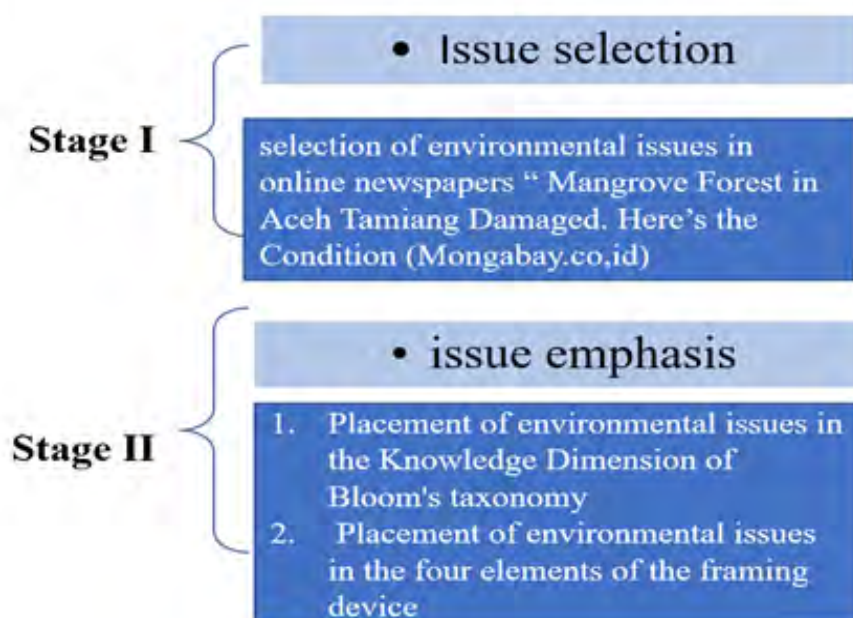


Figure 1. The two stages of the ESSI exploration process

Results and Discussion

Environmental Socioscientific Issues (ESSI) continue to grow from time to time, not only on a local scale, but also globally. These issues are presented by various mass media that provide a lot of information to the public online and offline. Along with the potential of mass media as a source of information that is growing and easily accessible, it also needs to be accompanied by efforts to present this information in the classroom to provide opportunities for students to learn through real situations that occur in society and are directly involved in the process of providing solutions to existing issues. Involving online news in classroom learning shows positive results in facilitating communication skills and cognitive development related to the subject being studied (Huang et al, 2014). Table 1 showed the use of one issue taken from Mongabay.co.id aims to be a first step in finding patterns of exploration of knowledge dimensions contained in online newspapers. Existing patterns can later be used on several issues from different newspaper sources.

Table 1. Mongabay news data studied

Rising time	Title
March 14, 2018	Mangrove Forest in Aceh Tamiang Damaged, Here's the Condition (Mongabay.co.id)

The emphasis of ESSI knowledge dimension aspects through placement on Bloom's taxonomy was shown in Table 2. A basic framework is needed to present ESSI in mass media into the implementation of learning by exploring the dimensions of knowledge through a framing analysis, which is an analysis used to define, explain, evaluate, and recommend solutions to events that are discussed. A framing analysis of issues contained in online newspapers with Robert N Entman's Framing model is divided into four conception processes, namely define problems, diagnose *causes*, make moral judgments, and treatment recommendations. At the problem definition stage emphasizes how environmental issues are viewed or understood, an environmental issue in the mass media can be understood differently by each person. The problem estimation stage is carried out to frame the causes of events and who is involved in the issue. The stage of making moral choices is carried out to provide arguments or views to support or justify ideas in the previous stage. The resolution stage is to assess the solution or problem-solving to the issue in the online newspaper (Entman, 1993).

Table 2. Emphasis of ESSI knowledge dimension aspects through Placement on Bloom's taxonomy

ESSI	Knowledge Dimension		Question frame (Checking and critiquing)
	Type	Sub Type	
Mangrove Damage	Factual	Knowledge of terminology	<p>Checking: The reading mentions facts about the adverse effects of the destruction of mangrove forests due to overexploitation, which facts have a direct impact on the lives of local people.</p> <p>Critiquing: According to the discourse, if mangrove forests are damaged, one of the impacts is river and beach abrasion/erosion. Justify whether there is a relationship between mangrove destruction and river and beach abrasion/erosion.</p>
		Knowledge of specific element details	<p>Checking: Within mangrove forest areas there are zones that have different characteristics, including mangrove forest areas in Aceh Tamiang. Of the three zones, the back zone and front zone are the most exploited zones. Explain why these zones are often exploited so that they are mangrove zones that are often damaged.</p> <p>Critiquing: Mangrove forests in Aceh Tamiang Regency are only found in coastal areas spread across four sub-districts. Just like other areas, mangrove forests are also only found in coastal areas. Tell us whether it is true that mangrove forests are only found and can grow in coastal areas and are not found in other areas.</p>
	Conceptual Knowledge of classifications and categories		<p>Checking: Based on the classification of mangrove forest condition levels can be divided into three classes: good condition, moderately damaged and severely damaged. If it is related to the discourse presented, give reasons including what category of mangrove conditions that occur in the Aceh Tamiang area.</p> <p>Critiquing: From the discourse, it is written that the remaining mangrove forests in Aceh Tamiang are around 40%, the rest have been cut down illegally and converted into other uses. Give reasons whether it can be said that the remaining mangrove forests in Aceh Tamiang are categorized in good condition.</p>
		Knowledge of principles and generalization	<p>Checking: In the discourse, it is mentioned that the damaged mangrove forests in Aceh Tamiang are only mentioned in the encroached areas because the mangrove forests have been cut down. From this, what indicators can be used to evaluate the condition of the remaining mangrove forests.</p> <p>Critiquing: One of the government's efforts to save mangrove forests is to make them a protected forest area. This is expected to prevent activities that can damage the forest. Give reasons whether this step has been effective enough to protect mangrove forests from damage like what happened in Aceh Tamiang District.</p> <p>Checking: One of the consequences of the destruction of mangrove forests as stated in the discourse is a decrease in the catch of traditional fishermen. This shows that there is a relationship between the existence of mangrove forests and aquatic biota as fisheries resources. Give reasons for considering the relationship between the two things.</p> <p>Critiquing: Mangrove forests are forests that have their own characteristics. From an economic point of view, mangrove forest areas have enormous potential to be utilized in improving the economy. However, on the other hand, if it is damaged, it will have an impact on environmental damage, loss of physical function and biological function of the mangrove forest itself. In your opinion, which is more profitable whether the mangrove forest is still exploited for other uses or the mangrove forest is still maintained and preserved.</p>
	Procedural	Knowledge of skills in a specific field	<p>Checking: The existence of mangrove forests, including those in Aceh Tamiang District, will continue to be damaged especially since there has been no handling by the authorities, coupled with illegal logging practices that are backed up by the authorities. What should be done so that mangrove forest encroachment can be overcome.</p> <p>Critiquing: Usually, to know the condition of mangrove forests in an area, data on the extent, type and density of mangroves are needed. According to the reading, the condition of mangrove forests in Aceh Tamiang Regency only displays data on mangrove area and does not yet display data on mangrove community structure. Is mangrove community structure also important to know as a basis for mangrove management.</p>
		Knowledge of scientific techniques and methods	<p>Checking: Aceh Tamiang has a large mangrove forest. To find out how the pattern of mangrove distribution, extent and condition of course in the field survey is not possible to do as a whole in a large area and difficult terrain to reach. With what techniques should be done so that the distribution, extent and condition of mangroves can be monitored (monitoring) on an ongoing basis and clearly known.</p> <p>Critiquing: Mangrove forests in Aceh Tamiang District consist of production areas and protected areas with each area determined. However, it is not presented how much mangrove forest density (ind/ha) and what types of mangroves are in the area. If sensing methods are effective in determining the distribution and extent of mangrove forests, provide a reason whether remote sensing methods are also effective in determining the density of trees and types of mangrove forests that exist.</p>
		Knowledge of criteria for when to use a procedure	<p>Checking: In order to utilize mangrove forests to increase economic income including regional income without destroying its existence, the Aceh Tamiang District government plans to turn the mangrove forest area into a mangrove ecotourism area. In your opinion, what needs to be done by the government as a basis for deciding whether or not the mangrove forest area in Aceh Tamiang Regency is suitable for mangrove ecotourism so that if it is implemented later it can be successful as expected.</p> <p>Critiquing: Most of the mangrove forests in Aceh Tamiang Regency have been damaged. As a result of this damage, various adverse impacts arise both on the lives of the surrounding community and on aquatic biota. One of the local government's efforts to overcome this is to carry out rehabilitation activities. Give your argument whether the actions taken by the government are appropriate in restoring damaged mangrove forest areas.</p>

The research results show that Mongabay online news can be a source for ESSI on the issue of mangrove forest destruction. The information presented shows the existence of factual, conceptual and procedural dimensions of knowledge as well as subtypes of knowledge from each of these dimensions. This shows the rich and complex knowledge of online news. Complex information contained in the mass media can be a source of knowledge in discussing environmental issues which in turn can realize students' awareness of the environment and support the concept of a sustainable environment for

students. This is in line with what was stated by [Kang and Hong, \(2021\)](#) that the information provided can affect a person's awareness and varies based on how the information is presented and can change attitudes and the way a person [\(Spence et al., 2014; Van De Velde et al., 2010\)](#). In addition, students who use online media as a source of socio-scientific information can also improve their ability to evaluate information based on the richness and explanatory power of arguments, the existence of evidence, and the authority of information sources [\(Yang et al., 2013\)](#).

Patterns were found in exploring the dimensions of knowledge in newspapers can be used as a source of material in sustainable environmental education in the classroom. Research conducted [Nuryani et al \(2021\)](#) that analyze the concept of biodiversity news as learning sources indicated the presence of biodiversity concept, threat, conservation and benefit. In this research, the factual knowledge dimension revealed there is knowledge related to terminology, knowledge of specific elemental details in the information presented which is quite complete, namely facts regarding the effects of over-exploitation on mangrove forests and the character of mangrove forest areas. Furthermore, related to conceptual dimension knowledge there is knowledge of classifications and categories from mangrove condition levels, but there is no detailed explanation regarding the classifications mentioned. Knowledge of principles and generalization is explained in information related to indicators that can be used in evaluating the condition of mangrove forests. In the procedural dimension knowledge consists of knowledge of skills in a specific field, Knowledge of scientific techniques and methods, Knowledge of criteria for when to use a procedure. However, the reading only shows data on mangrove areas, it does not show data on mangrove community structure as important information for mangrove management. This investigation firmly proves the potential of online media in highlighting aspects of environmental knowledge, as well as as a media for implementing environmental learning in the classroom by using Robert N. Entman's framing model combined with Bloom's taxonomy. However, the limitation in using Mongabay online media as an ESSI source is that the information presented reveals more of the knowledge dimension at a factual level only, while the conceptual and procedural knowledge dimensions are not revealed much, for example conceptual knowledge regarding when mangrove forests are categorized as heavily damaged, moderately damaged, or lightly damaged, and why is so much mangrove forest land being converted into ponds. In terms of procedural knowledge, how to evaluate the amount of damaged mangroves, how to manage damaged mangroves to recover their physical and biological functions. This requires a deeper understanding for educators in handling mangrove forest damage. As solution to overcome this limitation, educators might investigate conceptual and procedural knowledge derived from literature in the form of books and journals connected to information offered in online newspapers, in this case mangrove forests. This conversation can subsequently generate information for policymakers to evaluate and input for comprehensively conserving mangrove forest resources and their significance as a source of nutrients for fish resources in the waterways.

Conclusion

Robert N. Entman's framing model combined with Bloom's taxonomy has the potential to explore environmental issues found in online news. The results obtained can serve as a foundation for instructors to integrate environmentally based curricula using online news in the classroom, further it play roles in promoting students' environmental consciousness. The results of this exploration can also be used as an assessment source in assessing students' abilities regarding sustainable environmental knowledge. The information in the Mongabay online news site can be used for ESSI source because it is rich in factual dimension knowledge, however the limited information on the conceptual and procedural dimensions means that teachers need an in-depth understanding of the issues raised to investigate conceptual and procedural knowledge, therefore a combination of using other sources such as books and related journals is highly recommended.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

M. U. Genisa: Methodology; Data analysis; Writing — original draft preparation; review and editing. **E. Angraini:** Writing — review and editing.

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