

Digital Comics of Folktales as Learning Media to Strengthen Elementary School Students' Ecoliteracy

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Abstract—This study explored students' perceptions in understanding ecological values through digital comics of folktales. This study was important because early environmental education played a major role in shaping students' awareness of environmental conservation. Through digital comics, ecological messages could be accepted and understood easier by children. Folktale-based digital comics can be alternative media which is effective in instilling environmental awareness and introducing local wisdoms that were in line with ecological principles. This study utilized a questionnaire survey to collect data from elementary school students. This data aimed to present substantial evidence regarding the effectiveness of folktale-based digital comics in increasing environmental awareness. The results of this study indicated that the use of folktale-based digital comics as media to strengthen elementary school students' ecoliteracy was very effective in increasing their understandings on environmental issues. This media conveyed ecoliteracy messages and introduced local wisdoms that were relevant to ecology. Students' positive responses showed that folktale-based digital comic was able to strengthen environmental awareness and local wisdom easily and enjoyable. The global implication of this study was as an effort for the environmental sustainability movement and disaster mitigation efforts.

Index Terms—ecoliteracy, digital comics of folktales, elementary school students

I. INTRODUCTION

Human behaviour that disregards the environment has a negative impact on environmental sustainability, natural equilibrium, and ecosystems (Abbas et al., 2024; Suryanto et al., 2024). This issue must be addressed seriously since it threatens the equilibrium of the world's ecosystems. The relevance of environmental awareness is growing for the consideration of the sustainable human life on Earth (Suryanto et al., 2024). There must be intensive socialization to raise awareness and encourage ecologically sustainable behaviour. This is a vital step towards sustaining a healthy environment and life on Earth. These environmental difficulties are linked to moral concerns, perceptions, and human behaviour (Sultoni et al., 2023). In addition, human intervention in exploiting natural resources excessively threatens the natural balance (Arianto et al., 2021). This viewpoint depicts how people interact with their surroundings. Awareness of the necessity of environmental preservation and judicious use of natural resources is frequently based on moral knowledge and obligation to future generations. As a result, efforts to address these issues have to be focussed on changing individuals' and society's morality, perceptions, and behaviour.

Java Island is one of densely populated areas in Indonesia which is inhabited by approximately 1,100 people (Liu & Yamauchi, 2014). Population density of Java Island reduces the conflict between the agricultural system and the balance of natural ecosystem. The dilemma of overlapping agricultural land and biodiversity populations has led to several confrontations on the Java Island, and population density exacerbates the situation (Rahmah et al., 2024). As a result, these environmental issues require an intense and coordinated approach. Indonesia has a rich cultural legacy which includes tangible artefacts, intangible customs, and traditional ecological knowledge (TEK) (Sumarwati et al., 2021). One of them is folktale which becomes cultural treasure with moral lessons. Folktale conveys moral and cultural values that are relevant to the present (Mishra & Satpathy, 2020). Literary works that explore environmental issues are important educational instruments for achieving ecological literacy, which encompasses present environmental situations, causes of damage, and potential conservation remedies (Yulisatiani et al., 2020). As a result, there is a need to raise awareness about the need of using literary works to develop an understanding of environmental sustainability.

The relationship between popular fiction and ecological risks is important to discover and understand the significant environmental challenges (Pihkala, 2020). Popular fictions, such as novels, films, folktales, and comics, frequently reflect and interpret social, cultural, and environmental themes that are important for society. Folktale can be utilized to promote

ecological literacy and conservation (Sultoni et al., 2023). Folktale can deliver ecological messages in an easy and enjoyable way for all people by using rich narratives and exemplary characters. Central Java and Yogyakarta provinces have roughly 208 folktales (Rochmiyati et al., 2020). However, due to a lack of public understanding about the need of preserving these folktales, they are rapidly disappearing. The majority of Java's folktales convey the Javanese people's opinions and perspectives on life. The Javanese people believe that human life is inextricably linked to the environment where they live. They will constantly relay to their surroundings. Javanese people develop local wisdom values by observing and learning from their surroundings (Ali Ikhsan et al., 2018). These values are passed down from generation to generation. Therefore, most of the folktales in Central Java are related to its environment.

The next generation, particularly elementary school students, will act as change agents in exploitative behaviour towards natural resources. Students of this age are still in the process of developing values and behaviours. Therefore, conveying environmental awareness is very important. Efforts to improve elementary school students' comprehension and awareness of environmental conservation using folktale are conducted to enhance their knowledge (Cynthia Johan et al., 2021). Folktale-based comics can be useful media for teaching elementary school students about environmental conservation. They are more interested in graphics and colours than in texts. Students provide better responses to a combination of plain text and images. Comics can be represented as fun and informative communication tool for children (Pongoh et al., 2022). The texts in folktale-based comics facilitate students to understand easily because there are a lot of illustrations to stimulate their imagination.

The use of folktale-based digital comics as an alternative ecoliteracy media needs to be implemented to instil the environmental awareness of elementary school students. The story in the comics is related to the myth of supernatural things that are used by ancestors to preserve nature and teach ecology. Research conducted by Zhang and Li (2024) reveals that the animist system is utilized as an important spiritual principle for the Inuit tribe for the preservation of Arctic ecology (Zhang, 2024). In addition, research conducted by Jain and Satkunanathan (2021) shows that the presence of supernatural thing can increase people's fear and arouse respect for the sanctity of nature. These beliefs are attached into folktales by the ancestors as ethical principles of environmental sustainability that must be adhered to by future generations. The previous studies are significant for enriching environmental sustainability literacy. However, it is still rare to employ folktale-based digital comics to instil an understanding of environmental sustainability. Another research conducted by Vasileva and Golubev (2019) which is experimental study to produce something new that can improve community environmental awareness through ecological friendly comics (Vasileva & Golubev, 2019). Previous studies on science comics which are unique media created to educate science and nonfiction scientific subjects or themes. Comics, which combine visual and narrative aspects, can communicate ecological information in a fun and engaging way (Tatalovic, 2009). The contribution of study on the use of digital folktale comics to enhance environmental sustainability literacy is significant since it can present the way for more creative and successful educational methods. This study examines how folktale-based digital comics facilitate students to comprehend and accept local ecological values. It can be said that this study not only contributes to the preservation of cultural and environmental care values, but it also helps to comprehend students' understanding and execution of sustainable practices and environmental preservation.

II. LITERATURE REVIEW

A. Folktale

Folktale is a type of historical narrative that deals with the life problems. This is a long-standing social structure that serves many purposes in society (Hilmiyatun et al., 2022). Folktale serves as a teaching tool to instil moral and ethical values to children. They are taught about the differences between good and bad, the importance of discipline, perseverance, and good behaviour with tender and honest kisses. Additionally, folktale is used in religious exercises to preserve cultures, languages, and beliefs within a community.

Folktales are essential component of people's lives (Saddhono & Rakhmawati, 2018). Maintaining cultural identity helps to preserve ancestors' values and wisdom in the past times. These stories allow people to share common experiences, create social relationships, and gain a better understanding of their history and social context. Therefore, folktale is not only a great cultural resource, but it is also an important component that brings communities together and strengthens their identity.

Folktales offer valuable life lessons for children. Folktales can help them acquire and internalise environmental values (Adwiah et al., 2023). Folktales frequently convey themes about the value of maintaining nature and the peaceful relationship between humans and their surroundings. The characters and stories of folktales can transmit environmental themes such as sustainability, conservation, and human duty to nature in an understandable and relevant way for children and adolescents (Mackenthun, 2021).

B. Folktale-Based Digital Comics

Comics as an instructional learning media engage students' learning interest and foster their critical thinking (Vasileva & Golubev, 2019). The use of visuals and text has a significant impact on boosting learning results. Visualisation using graphics facilitates children to understand and recall information better than using text. Comics create children's imaginations and interests, so they are engaged in the learning process. Images can also assist them to have better

understanding about the learning concepts. Comics are popular among children because they are entertaining, hence learning using comics is considered to be more effective.

Folktale-based digital comics instil cultural and moral values to children in an engaging and entertaining way. The inclusion of folktale in comics makes the learning to be more enjoyable (Febriani et al., 2021). Comics combine texts and pictures to make stories easier to be understood. It can capture children's interest with colourful illustrations. The implementation of folktale-based digital comics is designed to encourage BIPA students to read Indonesian folktales and learn about Indonesian cultures and history (Mulyati et al., 2021). Folktale-based digital comics provide enjoyable and engaging learning. Children can enjoy the adventures in the novel while learning moral lessons indirectly.

The use of folktale-based comics can improve students' responses in the learning process (Pathoni et al., 2020). Local folktale comics make learning materials more relevant to children's daily lives (Tatalovic, 2009). They feel more engaged to the lesson. This increases their motivation and interest in learning, because they can see the connection between what they are learning and the cultural values that are already familiar to them. The use of folktale-based digital comics enriches students' understanding of cultural diversity and traditions that teaches them about the history and valuable cultural heritage. It can be said that folktale-based digital comics not only improves their academic knowledge but it also develops important social and emotional skills.

C. Ecoliteracy

In 1990, a physicist named Fritjof Capra and an American educator named David W. Orr coined the term "ecoliteracy". Promoting an eco-friendly way of life is the goal. According to Fadjarajani and As'ari (2021), ecoliteracy is a method of education that aims to develop students' knowledge, consciousness, and abilities in protecting the environment. According to Salimi et al. (2021), ecoliteracy is the process of making person to be aware of how important to protect and coexist with the nature. Everyone has to implement ecoliteracy in interacting with nature to make the ecosystem to be balanced. Moreover, Juhriati et al. (2021) argue that ecoliteracy activities refer to learning out of the class and utilizing the surrounding environments as learning sources. Integrating ecoliteracy into education is an effort to raise students' awareness to protect the environment (Adeani & Iskandarwassid, 2019). The goal of ecoliteracy is to raise people's understanding of the living value (Herawati, 2019). They tend to be more capable to organize their surrounding environments. As a result, they can live harmoniously with nature to create sustainable environment for human (Kim-Rich & Curwood, 2023). It can be concluded that teaching ecoliteracy needs appropriate media to make students obtain the value of preserving nature for future life.

III. RESEARCH METHODS

Research Design

This study utilized a questionnaire survey to collect data related to students' perceptions of digital comics of folktale as learning media of ecoliteracy. In the initial stage, the researchers conducted observation and preparation of research instruments related to environmental concerns using Buell's ecocriticism. In the next stage, the researchers provided reading materials for elementary school students in form of digital comics of folktale which were related to nature.

Population and Sample

The population of this study were elementary school students in Central Java, Indonesia. The samples were taken using purposive sampling technique. The samples were 199 elementary school students. They were students in public and private schools in Central Java, Indonesia.

Data Collection Techniques and Instruments

The digital comics of folktale included the myths about environmental issues, environmental awareness as local wisdom value, environmental ethics, and overcoming environmental damage. The digital comics utilized folktales originating from Central Java, Indonesia. The selected folktale comics were "The Disappearance of Tepeng Village" from Temanggung Regency, "The Origin of Tembalang Village" from Semarang Regency, and "Raden Ranusentika and Dewi Masinten" from Banyumas Regency. The researchers provided the folktale comics to be read by students. Furthermore, students had to answer several questionnaire questions related to the comics. The questionnaire was adapted from the concept of ecocriticism (Juanda et al., 2024), namely non-human natural components, legitimacy of nature, responsibility for nature, and dynamics of nature. The assessment used Likert scale that showed in Table 1.

TABLE 1
ENVIRONMENTAL CARE QUESTIONNAIRE (SOURCE: JUANDA ET AL., 2024)

Indicators	Code	Statements	Scales
Flora and fauna	ENV_Care1	Caring for animals and plants in surrounding environments.	1 = Never 2 = Rarely
Ecosystem and Physical Environments	ENV_Care2	Protecting ecosystems and the physical environments.	3 = Sometimes 4 = Often
Manifestation of nature as a central object	ENV_Care3	Implementing local policies that nature were created to be cared for.	5 = Always
	ENV_Care4	Implementing local policies that nature had guardians.	
Environmental Education and ethics	ENV_Care5	Implementing environmental education principles for environmental sustainability.	
	ENV_Care6	Implementing environmental ethics by preserving the environments.	
Concerns and Participation	ENV_Care7	Complying with environmental ethics by preserving the environments.	
Environmental Degradation	ENV_Care8	Showing caring attitude and active roles in disaster rescue.	
Flora and fauna	ENV_Care9	Preventing damage to the environments.	

Data Analysis

Data analysis was conducted using descriptive statistics based on the questionnaire results. The participants' answers were interpreted based on Likert scale, namely 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always. Quantitative analysis of data was conducted to obtain the frequency and percentage of each question in the questionnaire.

IV. RESULTS

Folktale-based digital comics with environmental themes can be an interesting and effective means to convey important messages about nature conservation, reforestation, and environmental awareness. The digital comics include folktales from Central Java, Indonesia that have been adjusted to the students' reading needs in elementary school level. The digital comics of folktale are entitled *The Disappearance of Tepeng Village* from Temanggung Regency, *The Origin of Tembalang Village* from Semarang Regency, and *Raden Ranusentika and Dewi Masinten* from Banyumas Regency. The students' responses can be viewed in Table 2.

TABLE 2
STUDENTS' RESPONSES TO ENVIRONMENTAL CARE VALUES THROUGH ECOLITERACY OF FOLKTALE-BASED DIGITAL COMICS

Items	Students' Responses										
	Never		Rarely		Sometimes		Often		Always		Average score
	N	%	n	%	N	%	n	%	N	%	
ENV_Care1	15	8	34	17	67	34	48	24	35	18	3,27
ENV_Care2	1	1	9	5	24	12	64	32	101	51	4,28
ENV_Care3	6	3	6	3	17	9	38	19	132	66	4,42
ENV_Care4	18	9	15	8	52	26	39	20	75	38	3,69
ENV_Care5	2	1	10	5	18	9	49	25	120	60	4,38
ENV_Care6	13	7	32	16	54	27	50	25	50	25	3,46
ENV_Care7	2	1	7	4	46	23	70	35	74	37	4,04
ENV_Care8	3	2	10	5	37	19	64	32	85	43	4,09
ENV_Care9	8	4	23	12	42	21	67	34	59	30	3,73

Table 2 shows that in the ENV_CARE1 item, the average score is 3.27. In this case, the elementary school students sometimes have a sense of caring for flora and fauna by caring for them. This is adapted from the folktale comics of *Raden Ranusentika and Dewi Masinten* in which Dewi Masinten has good attitude of taking care of the forest because she considers that forest is a place for living things. Her attitude in preserving the nature is emulated by students.

Table 2 shows that in the ENV_CARE2 item, the average score is 4.28. In this case, the elementary school students often protect the ecosystem and environment. This is adapted from the folktale comics of *Raden Ranusentika and Dewi Masinten* in which Dewi Masinten protects the forest to maintain the balance of ecosystem. She is as a symbol of the forest guard who maintains the forest integrity.

Table 2 shows that in the ENV_CARE3 item, the average score is 4.42. In this case, elementary school students often apply local policies that are created to care for animals and plants. This is adapted from the folktale comics of *Raden Ranusentika and Dewi Masinten* in which Dewi Masinten is as a symbol of a figure who teaches environmental sustainability by protecting the forest from being cut down by Raden Ranusentika's troops. Dewi Masinten uses her power to regrow trees that have been cut down.

Table 2 shows that in the ENV_CARE4 item, the average score is 3.69. In this case, elementary school students often apply local policies in which nature has guardians to protect it. This is adapted from the folktale comics of *The*

Disappearance of Tepeng Village which tells a giant fish that is considered as the village guardian. He has informed that there would be a disaster in the village because of deforestation.

Table 2 shows that in the ENV_CARE5 item, it shows an average value of 4.38. In this case, elementary school students often carry out the principles of environmental sustainability by maintaining environmental sustainability. This is adapted from the folktale comics of *The Disappearance of Tepeng Village* in which the people of Tepeng village follow the advice from a giant fish. They are asked to leave the village and build a new one. Their behaviour in land clearing without paying attention to environmental sustainability results in landslides.

Table 2 shows that in the ENV_CARE6 item, it shows an average score of 3.46. In this case, elementary school students sometimes carry out environmental ethics by planting beneficial plants. This is adapted from the folktale comics of *Raden Ranusentika and Dewi Masinten*. Dewi Masinten replants the trees that have been cut down, so the environment is maintained until this time. In addition, the forest and waterfall in that village attract visitors.

Table 2 shows that in the ENV_CARE7 item, it shows an average score of 4.04. In this case, elementary school students often comply with environmental ethics by maintaining the environment, for example they do not littering or damaging plants. This is adapted from the folktale comics of *The origin of Tembalang* in which the people follow the advice of Prince Pandan Arang to maintain environmental sustainability, so that natural disasters do not happen again.

Table 2 shows that in the ENV_CARE8 item, it shows an average score of 4.09. In this case, elementary school students often act caringly and actively play a role in disaster relief by helping and comforting friends who are affected. This is adapted from the folktale comics of *The origin of Tembalang* in which Prince Pandan Arang helps villagers to stop disasters the floods. His attitude needs to be adapted by students to build sympathy for others and environments.

Table 2 shows that in the ENV_CARE9 item, it shows an average score of 3.73. In this case, elementary school students often prevent damage to the environment by advising friends who damage it. This is adapted from the folktale comics of *“Raden Ranusentika and Dewi Masinten*. Dewi Masinten advises Raden Ranusentika to stop deforestation. She also prevents Raden Ranusentika and his troops in their efforts to have illegal land clearing.

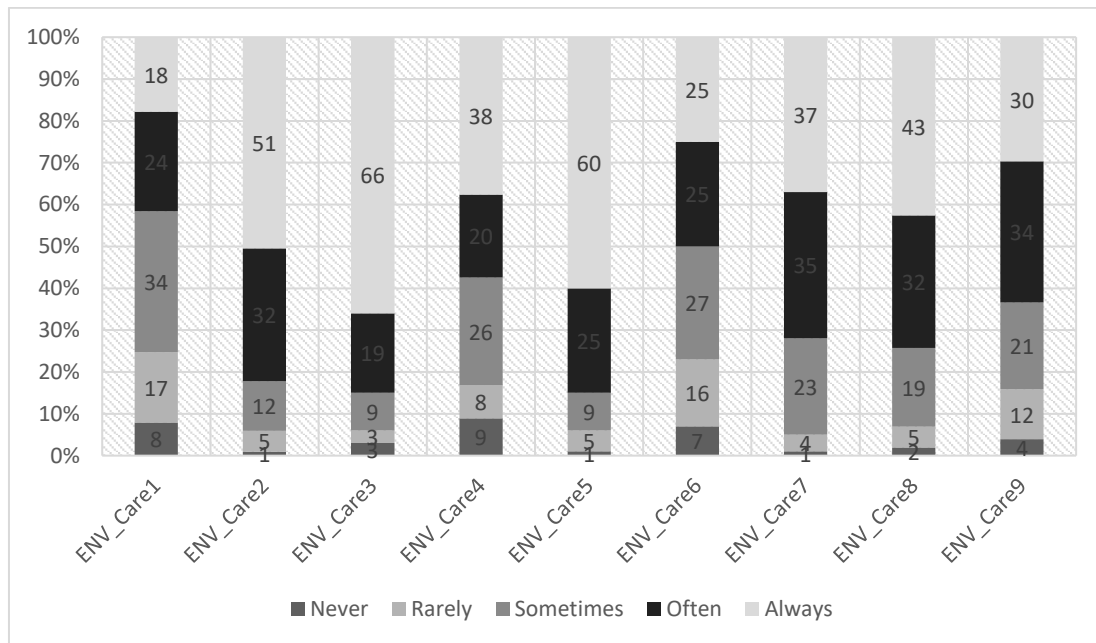


Figure 1. Percentage of Students' Responses Regarding Environmental Awareness Through Ecoliteracy of Folktale-Based Digital Comics

Figure 1 shows the percentage of elementary school students' responses about environmental awareness values adapted from digital comics of folktales. There are 9 items related to environmental awareness which show the aspects related to environmental awareness values, namely caring for flora and fauna, ecosystems and physical environments, the manifestation of nature as a central object, environmental education and ethics, concerns and participation, and environmental degradation. Based on the previous data in Figure 1, elementary school students' understanding of environmental awareness values through ecoliteracy of folktale-based digital comics can be said to be good. It can be viewed in figure 1 which shows that the categories of never and rarely are still lower than the categories of sometimes and always. Digital comics of folktales are effective in instilling environmental awareness values so that the students are able to implement it in real actions to prevent environmental damage issues.

V. DISCUSSION

In Figure 1, it can be viewed that elementary school students' understanding of environmental care values and their literacy using digital comics have been carried out well. They obtain more understanding about environmental care values regarding problems of environmental care values, namely caring for animals and plants, protecting ecosystems, complying

with and implementing environmental policies, carrying out environmental education ethics and principles, showing empathy and caring for natural disasters. This study also shows that digital comics of folktales are effective alternative as a learning media of ecoliteracy in elementary school level. The students' responses to digital comics of folktales as ecoliteracy are very good. They have done several things related to environmental sustainability, for example by caring for flora and fauna, protecting nature from damage, planting plants, helping others who get natural disasters, contributing to prevent natural damage, believing in myths as an effort to preserve the environment. Environmental care values have a positive impact on building an attitude of caring for the environment, a sense of willingness to be environmentally friendly, and participating in volunteer activities (Sharma et al., 2023). The value of environmental education is not only related to environmental knowledge. However, it also motivates students to take real actions and actively participate in preserving the nature. Research conducted by Yilmaz et al. (2023) shows that the value of environmental education is better when it is practiced directly rather than in the classroom. This allows students to be able to implement directly in protecting and preserving the environment. In addition, they are not just knowing and understanding the value of environmental care. Therefore, it does not only provide knowledge. However, students are able to take real actions to save the nature.

Digital comics are a digital literacy media which presents texts and visuals materials about folktales that can stimulate students' imaginations in understanding and implementing environmental care attitudes. This is in line with the findings of research conducted by Santa María et al. (2022) in which digital literature can be used by children to understand meaning and feelings using various identities and roles in learning experiences. Students can choose digital literary works and understand them more easily because it can be easily accessed by children. In addition, literary works in form of short stories containing environmental themes, such as concern for living things, ecosystems and physical environments, nature as a central subject (local wisdom and religious values), the implementation of environmental education and ethics, participation in social service activities and cooperation to prevent environmental damage, and adaptation to environmental change (Juanda et al., 2024). These literary works make students to be able to respond the environmental issues appropriately. Moreover, digital comics of folktales as ecoliteracy media can build the ecological wisdom values of elementary school students. Therefore, they can apply ecological knowledge and experience in everyday life.

VI. CONCLUSION

Based on the results of study, students' responses regarding the environmental values are on average score of 4 which belongs to the *often* category. Students are able to understand and strengthen these values in everyday life by utilizing digital comics of folktales. This digital comic of folk tales is very effective as ecoliteracy media. Elementary school students can easily understand and apply an attitude of environmental concern. Comics display visuals that support the narrative texts, so it is easier for students to understand it. Students can see and feel directly the characters and events in folktales, so they can emulate the characters' attitudes in environmental concern. They are able to act preventively in overcoming environmental damage. Therefore, the use of digital comics of folktales with environmental theme is very important in building students' attitude to maintain the nature. The implication of this study is that digital comics of folktales can be utilized as alternative media in learning ecoliteracy for elementary school students. In addition, instilling environmental care attitude is very important because it is in line with character education. Moreover, the use of folktale-based digital comics is able to preserve Indonesian local wisdoms. It can be said that this study becomes an effort to create sustainable environment and conduct global disaster mitigation. In the future research, this study facilitates the understanding of environmental issues using digital-based ecoliteracy.

APPENDIX





Figure 2. Digital Comics of Folktales

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