

24. Sukri

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Submission date: 26-May-2023 03:45AM (UTC-0500)

Submission ID: 2102322844

File name: Artikel 24.pdf (256.06K)

Word count: 4802

Character count: 26905



The Effect of Local Excellence-Based Comic Media on Conceptual Understanding and Environmental Care Attitudes of Islamic Boarding School Students of Different Genders

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Received: January 30, 2023

Revised: March 27, 2023

Accepted: March 30, 2023

Published: March 31, 2023

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DOI: [10.29303/jppipa.v9i3.3954](https://doi.org/10.29303/jppipa.v9i3.3954)

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Abstract: Understanding the concept and attitude of environmental care attitudes is necessary for preserving local excellence. This study aims to determine the effect of implementing local excellence-based comic media on the conceptual understanding and environmental care attitude of Islamic boarding school students of a different gender. This research is quasi-experimental, using a one-group pre-test and post-test design. The research was conducted in three Islamic boarding schools, i.e. MTS MT Mamben, SMP IT Putra Ar-Risalah Paok Lombok, and SMP IT Putri Ar-Risalah Paok Lombok, involving 38 female and 30 male students. The research instrument used a test to determine students' conceptual understanding of local excellence and a questionnaire to assess students' environmental care attitudes. Data were analyzed using N-gain, one-way ANOVA, and continued with post hoc tests to determine the effect of implementing comic media in each experimental group. A DIF analysis was carried out on questionnaire items using RASCH to determine students' environmental care attitudes of different genders. The results showed that (a) the implementation of comic media based on local excellence at Islamic boarding schools could increase students' understanding of local excellence (N-gain = 0.44 to 0.60) and increase students' environmental care attitude (N-gain = 0.33 to 0.58), (b) there are differences in concept understanding and environmental care attitude in the experimental group (Sig <.05). These results indicate that there is a relationship between conceptual understanding and students' environmental care attitudes. The higher the conceptual understanding, the higher the students' environmental care attitude, and vice versa, and (c) female students tend to have a better environmental care attitude than male students. However, on the other hand, male students can think logically and rationally, so they tend to care about the causes of damage to local excellence, especially coral reef ecosystems.

Keywords: Comic media; Conceptual understanding; Environmental care attitude; Islamic boarding school; Local excellence

Introduction

Local excellence is the potential in each region that is useful for improving people's welfare (Subijanto, 2015; Bahri, 2016). Local excellence needs to be introduced to students (Situmorang, 2016) to foster caring attitude students towards their local excellence (Sukri et al., 2020a). One of the local excellence West Nusa Tenggara Province possesses is the coral reef ecosystem (Sukri et al., 2018). Coral reef ecosystems are national assets (Amin, 2009) and are one of the world's coral reef triangles (Giyanto et al., 2018). Unfortunately, coral reef

ecosystems, especially in NTB, are damaged and threatened with extinction (Bachtiar & Mayes, 2014; Aulia et al., 2017). Besides being caused by natural factors, damage to coral reef ecosystems in NTB is also caused by humans (Bachtiar & Mayes, 2014). Damage to coral reefs by humans is caused by a lack of understanding and public awareness of the importance of coral reefs. Therefore, efforts to grow students' knowledge regarding local excellence need to be carried out (Sukri et al., 2018).

Efforts to integrate local excellence into teaching materials have not been carried out optimally

How to Cite:

Sukri, A. (2023). The Effect of Local Excellence-Based Comic Media on Conceptual Understanding and Environmental Care Attitudes of Islamic Boarding School Students of Different Genders. *Jurnal Penelitian Pendidikan IPA*, 9(3), 1589–1595. <https://doi.org/10.29303/jppipa.v9i3.3954>

(Fatkhayani & Suhada, 2018). Integrating local excellence into teaching materials is essential to foster understanding, concern for and conservation of local excellence (Sukri et al., 2020b; Sukri et al., 2020c). The integration of excellence can use learning media that can attract students' interest in learning (Kusumaningrum & Masruro, 2022), can develop literacy and problem-solving (Hasibuan et al., 2022), foster environmental conservation (Ni'mah et al., 2021), and what is essential is that it can increase students' environmental care attitudes (Lana et al., 2019). One media that can be used is comics (Sukri et al., 2018). Comics are a visual communication medium that conveys information in a popular and easy-to-understand way (Ambaryani & Airlanda, 2017), has the form of illustrated stories, have various situations and are sometimes funny (Rahmi & Rahmati, 2020). Comic media is easy to read and visually appeals to the audience (Toledo et al., 2014); comics can also erode the gap between theory in the classroom and practice (Da Silva et al., 2017).

On the other hand, the results of research by Sukri et al. (2016 and 2020b) revealed that most elementary, middle and high school students who were the study subjects did not know, understand and did not care about their local excellence. This reveals the importance of introducing local excellence to students. The results of implementing comic media integrated with local excellence for elementary school students show that comic media can improve students' understanding of conservation concepts and attitudes (Sukri et al., 2020a; Sukri et al., 2020b). In addition, comic media based on local excellence can also increase junior high school students' conceptual understanding (Sukri et al., 2023) and high school students environmental care attitudes (Sukri et al., 2020c). This research is still not comprehensive because it has not tested all aspects of environmental care and is still limited to elementary, middle and high school students. Meanwhile, there has been no similar research for Islamic boarding school students. According to Yansyah et al. (2021), formal and non-formal institutions such as Islamic boarding schools are places to form students who care about the environment. Therefore, understanding Islamic boarding school students' concepts and caring attitudes needs to be analyzed to develop the competence of students who are always required to solve community problems, including environmental problems (Yansyah et al., 2021). This study aims to describe the results of implementing local excellence-based comic media on the conceptual understanding and environmental care attitude of Islamic boarding school students of a different gender.

Method

Research design

This research is quasi-experimental (Gopalan et al., 2020) with a one-group pre-test and post-test design (Campbell & Stanley, 2015). This study used three experimental groups where each experimental group was given a pre-test, treatment using comic media based on local excellence, and finally given, a post-test. The research design is shown in Table 1.

Table 1. Research design

Experimental group	Pre-test	Treatment	Post-test
A	Y1	X	Y2
B	Y1	X	Y2
C	Y1	X	Y2

Note:

- A : MTs MT Mamben School
- B : SMP IT Putri School
- C : SMPT IT Putra School
- Y1 : Pre-test of concept understanding and environmental care attitudes
- X : Treatment using comic media based on local excellence
- Y2 : Post-test of concept understanding and environmental care attitudes

Research Sample

This research was conducted in three Islamic boarding schools in East Lombok Regency, which were randomly selected (Endo et al., 2016). The three schools include MTS MT Mamben, SMP IT Putra Ar-Risalah Paok Lombok, and SMP IT Putri Ar-Risalah Paok Lombok. The research activity was carried out in the even semester of the 2019/2020 school year involving 68 students consisting of 38 female students and 30 male students.

Research Instruments and Data Analysis

The research instrument uses tests and questionnaires. The test is used to measure students' conceptual understanding of coral reefs. The test uses multiple-choice, which consists of 20 questions and an essay test which consists of 5 questions. The test was adopted from a concept understanding test developed by Sukri et al. (2023) and met the valid and reliable criteria (Nuswowati et al., 2011). The questionnaire was used to measure students' environmental care attitudes. The questionnaire consists of three aspects, eleven indicators and twenty-eight statement items. The three aspects of the questionnaire include concern for the environment and related issues, responsibility for the environment, and the influence of human activities on the environment. The questionnaire is in the form of a Likert scale consisting of three answer choices, namely 3

= strongly agree, 2 = disagree and 1 = disagree for positive statements, while negative statements are vice versa (Sukri et al., 2022). The environmental care attitude questionnaire has met valid and reliable criteria. Items are said to be valid if $r_{count} > r_{table}$ ($n = 28, r = 0.374$) (Yansyah et al., 2021). The calculation results show that all items' Corrected Item-Total Correlation value is > 0.374 , so all items meet the valid criteria. For reliability, items are said to be reliable if Cronbach's Alpha value ≥ 0.8 (Khumaedi, 2012). The results of the calculation of the reliability of items show the value of Cronbach's Alpha = 0.88. Therefore, all items meet the reliable criteria. The data from the questionnaire results were then converted into nominal values using the successive interval method (Green, 2017).

Test and questionnaire data were analyzed using N-gain (Hake, 1998) to determine the effect of implementing local excellence-based comic media on students' concepts understanding and environmental care attitudes. The analysis was continued using one-

way ANOVA (Yeager, 2021) and post hoc (Zhang et al., 2019) to find differences in student's conceptual understanding and environmental care attitudes in each experimental group. Differential Item Function Analysis (Iseppi et al., 2021) questionnaire using RASCH was carried out (Sumintono & Widhiarso, 2015) to determine the environmental care attitude of students of different genders.

Result and Discussion

The Influence of Local Excellence-Based Comic Media on Students' Conceptual Understanding and Environmental Care Attitudes

N-gain analysis was conducted to determine the effect of implementing local excellence-based comic media on students' conceptual understanding of coral reefs and students' environmental care attitudes. The results of the N-gain analysis are shown in Table 2.

Table 2. The results of the N-gain analysis of concept understanding and environmental care attitudes

Experimental group	N-gain		Category
	Concept understanding	Environmental care attitudes	
MTs MT Mamben	0.44	0.33	Moderate
SMP IT Putri	0.60	0.38	Moderate
SMP IT Putra	0.57	0.58	Moderate

The results in Table 2 show that implementing local excellence-based comic media influences students' conceptual understanding of coral reefs and students' environmental care attitudes (Sukri et al., 2023). This is evidenced by the N-gain value, which shows a range of values from 0.44 to 0.60 in the moderate category for concept understanding and values from 0.33 to 0.58 in the moderate category for environmental care attitudes. The influence of comic media on environmental care attitudes and students' concepts understanding is probably because comic media is easy to read and understand and has visual appeal for readers (Sukri et al., 2020a). In addition to these factors, Sukri et al. (2022c) describe three other aspects that cause changes in students' environmental care attitudes after being treated using comic media, namely (1) the material in comics is arranged from the simplest material to the

most complex material and following students' cognitive level, (2) comic media displays contextual examples following the conditions that occur in the field, and (3) comics have images that are attractive and easily understood by students.

Differences in Environmental Care Attitudes and Students' Conceptual Understanding in Each Experimental Group

A one-way ANOVA analysis and a post hoc test was conducted to find differences in student's conceptual understanding and environmental care attitudes in each experimental group. Before the ANOVA analysis, homogeneity and normality prerequisite tests were carried out, whose results are shown in Table 3. The one-way ANOVA and post hoc results are shown in Tables 4 and 5.

Table 3. Test for normality and homogeneity of students' conceptual understanding and environmental care attitude variables

Variable	Normality Test (Kolmogorov-Smirnov)			Homogeneity Test (Levene test)		
	Statistic	df	Sig	Levene Statistic	df	Sig
	Concept understanding	.986	67	.285	1.368	67
Environmental care attitudes	1.023	67	.246	1.400	67	.254

Table 4. The results of the one-way ANOVA test on the variables of students' conceptual understanding and environmental care attitude variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Concept understanding					
Between Groups	.444	2	.222	7.101	.002
Within Groups	2.034	65	.031		
Total	2.478	67			
Environmental care attitudes					
Between Groups	487.894	2	243.947	6.965	.002
Within Groups	2276.540	65	35.024		
Total	2764.434	67			

Table 5. The results of the post hoc analysis (Tukey HSD) variables of students' conceptual understanding and environmental care attitude

Concept understanding			Environmental care attitudes		
Schools	N	Subset for alpha = 0.05	Schools	N	Subset for alpha = 0.05
		1 2			1 2
MTS MT Mamben	23	2.5078	MTS MT Mamben	23	83.5917
SMP IT Putri	25	2.6376	SMPIT Putri	25	87.8800
SMP IT Putra	20	2.7065	SMPIT Putra	20	90.1790
Sig.		1.000 .397	Sig.		1.000 .197

The results of the one-way ANOVA analysis in Table 4 show differences in the students' conceptual understanding and environmental care attitude in each experimental group (Sig < .05 = .002). This is reinforced by the post hoc test shown in Table 5, which shows that the environmental care attitude of students at SMP IT Putri is not significantly different from SMPT IT Putra, but significantly different from MTs MT Mamben. These results also show that students' understanding of concepts is lowest at MTS MT Mamben, followed by SMP IT Putri and SMP IT Putra. Descriptively, the value of the environmental care attitude at SMPT IT Putra was higher than SMP IT Putri, but statistically, it was not significantly different. The existence of differences in the environmental care attitude in each experimental group is thought to be caused by the low understanding of students' concepts which affects the low development of environmental care attitude (Irfianti et al., 2016). This is evidenced by the existence of linearity between the value of students' concepts understanding and the value of students' environmental care attitude. The higher the value of concept understanding, the higher the environmental care attitude of students, and vice versa (Table 5).

Students' Environmental Care Attitudes of Different Genders

A questionnaire analysis was carried out using RASCH to find out the environmental care attitude of students in different genders. Reliability analysis was

carried out between the person and the item to determine whether the respondent answered the items in the questionnaire correctly. The person and item reliability analysis results are shown in Table 6.

Table 6. Reliability of persons and items

	Mean Logit (SD)	Separation	Reliability	Alpha Cronbach
Person	1.54 (0.61)	1.17	0.58	0.67
Item	0.00 (0.86)	2.76	0.88	

Table 6 shows the reliability of respondents and instrument items using the respondent or person separation index value (1.17) and the separation item index (2.76). The greater the separation person index, the more likely the respondents are to correctly respond to the questionnaire items (Boone et al., 2014). As for the separation index item, it shows how wide the spread of the questionnaire item is in defining the item's difficulty level. The higher the separation value, the better the questionnaire will be used. Cronbach's alpha coefficient value (0.67) describes the interaction of 68 people and 28 questionnaire items. A reliability score of 0.67 shows a fairly good classification (Sumintono et al., 2014), so it shows a fairly good level of interaction between respondents and the items in the questionnaire.

DIF is used to determine differences in students' environmental care attitudes of different genders. DIF analysis results are shown in Figure 1.

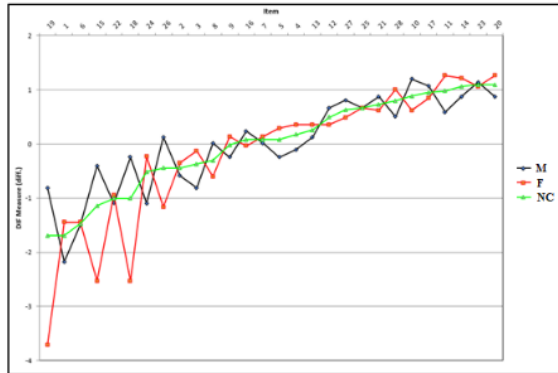


Figure 1. DIF analysis results (M = Male, F = Female, NC = normal curve)

Figure 1 shows the DIF plot by gender. DIF analysis showed that 9 statement items (No: 19, 6, 18, 26, 8, 13, 27, 21, and 10) were answered better by female students, and nine other statement items (No: 1, 24, 3, 5, 4, 13, 28, 11, and 14) were answered better by male students. Question item 19 (Keeping the beach clean can maintain the marine ecosystem balance) shows a very different impact where female students are much more concerned than male students. The same can be seen in items 15 (To protect the coral reef ecosystem, I always dispose of trash in its place) and 18 (Casting fish must use environmentally friendly equipment to not damage the coral reef ecosystem). However, items 4 (Throwing household waste into the river does not cause damage to the coral reef ecosystem) and 5 (Disposing of factory waste to the beach can cause damage to the coral reef ecosystem) shows the opposite condition, where male students understand and care more about garbage and waste can interfere with the growth of coral reefs. Items 11 (Illegal logging and destroying forests can damage coral reef ecosystems) and 28 (Snorkeling activities carried out by tourists will not damage coral reef ecosystems) show that male students are more caring than female students.

The results showed that female students were more concerned about the cleanliness of the coastal ecosystem than male students. This attitude relates to the behavior and tendencies of female students who like cleanliness. The concept of cleanliness as a woman's responsibility that has been instilled since childhood in the family environment can be a factor causing the attitude tendency shown by these female students (Sarkawi et al., 2017). Male students showed a more logical and rational attitude through their thoughts on waste streams that would disturb the coastal ecosystem without considering the cleanliness of the ecosystem. One reason that can be stated is that this is related to the two's mindsets and differences in knowledge and experience.

Thinking logically and rationally, male students make their activeness and willingness to study nature higher than female students, so they tend to think about possible causes of damage (waste) to coral reefs in coastal ecosystems. The results of research by Sarkawi et al. (2017) show that male students' attitudes are greatly influenced by experience, thinking activities and interest in studying science compared to female students. The results of this study support previous research conducted by Nurhidayati et al. (2022), which revealed that female students have a better caring attitude towards the environment than male students. The high attitude toward caring for the environment in female students is not only caused by the concept of cleanliness that is owned by a woman (Sarkawi et al., 2017); it is also possible that women have a better level of understanding regarding coral reef ecosystems than men so that women tend to take care of the surrounding environment (Sukri et al., 2023).

Another thing that influences the attitude of caring for the environment, especially coral reef ecosystems, is the knowledge and scientific thinking concepts students possess during their education. This is shown by Zelezny et al. (2000), which revealed that women are less concerned about the environment is not proven. This means that the attitude of concern for the environment relatively gives the impact and possibility of the same behaviour between the two. These results generally reveal that female students at Islamic boarding schools tend to have a better environmental care attitude than male students. However, on the other hand, male students can think logically and rationally, so they tend to care about the causes of damage to coral reef ecosystems.

Conclusion

Implementing local excellence-based comic media at Islamic boarding schools can increase students' understanding of local excellence and improve students' environmental care attitudes. Furthermore, the study's results revealed differences in students' conceptual understanding and environmental care attitude in the experimental group. There is a linearity between conceptual understanding and the environmental care attitude of students. The higher the value of concept understanding, the higher the environmental care attitude of students, and vice versa. This study also revealed that female students at Islamic boarding schools tend to have a better environmental attitude than male students. However, on the other hand, male students can think logically and rationally, so they tend to care about the causes of damage to coral reef ecosystems.

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