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Development of Environmental Character E-Comic Media Based on Google Sites for MTS Students in Pati District

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Abstract: The purpose of this study is to analyze the needs, develop designs, test the feasibility and test the effectiveness of the Google Sites-based environmental care E-Comic media for MTs students in Pati Regency. This type of research is Research and Development with the ADDIE model. Data collection techniques include interviews, observations, incidental notes, and questionnaires. Validation is carried out by content experts, practicality experts, and media experts. The research subjects involved 45 students and 5 teachers to test the feasibility of the product. The effectiveness test involved 16 experimental class students for an environmental care attitude questionnaire through a pretest-posttest group experimental class. While the data analysis techniques used are t-test and N-gain test. The results of this research and development obtained an average content validation score of 98.2%, practicality validation of 99%, and media validation of 93.2%, so the design of the Google Sites- based environmental care E-Comic media is feasible and can be used by MTs students in Pati Regency. Student responses to the Google Sites-based E-Comic media showed 100% agree responses so that it is categorized as very feasible. The t-test results are less than 0.05, so it can be concluded that the experimental class of E-Comic media cares about the environment successfully increases environmental care attitudes. The results of the N-gain test for the experimental class were 91.1% with an effective category and the N-gain for the control class was 36.3% with an ineffective category, so the experimental class is effective in increasing environmental care attitudes.

Keywords: e-comic, environmental care, google sites

1. Introductions

Education plays a crucial role in the character formation of the nation's younger generation. Building national character takes time and must be done continuously (Uswatun Khasanah et al., 2022). The government, represented by the Ministry of National Education, has made numerous efforts to improve the quality of character education in Indonesia, particularly to produce a generation with noble morals.

The Ministry of National Education of the Republic of Indonesia has established 18 character values in an effort to integrate them into subject areas. Environmental character education is one of the eighteen character values established by the Ministry of National Education. Environmental character is described as attitudes and actions that consistently strive to prevent damage to the surrounding natural environment and develop efforts to repair existing damage (Kemendiknas, 2010).

Based on initial observations conducted in March 2024 at several Islamic Junior High Schools (MTs) in Pati Regency, researchers found that many MTs students still lack environmental responsibility. This is evident in the large amount of trash scattered around the madrasah. Madrasahs, as educational institutions, must be able to maximize the full potential of students, including cognitive, affective, and psychomotor aspects. Character education is integrated into all subjects, enabling character development through education (Khamalah, 2017).

Instilling environmental awareness in students can be achieved using learning media. Therefore, teachers need educational learning media to deliver subject matter while simultaneously instilling environmental values in their students. As technology advances, teachers, as educators, must be able to keep up with developments to support the educational process. One communication tool frequently used by all groups, both young and old, is the smartphone or mobile phone. Therefore, educators can utilize smartphones as a learning medium in the classroom to achieve more effective and efficient learning objectives (Sadikin & Hamidah, 2020; Nurfadhillah et al., 2021).

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In this regard, researchers took the initiative to utilize e-comics as a learning tool to discuss environmental issues and efforts to preserve them. This is an alternative for researchers to utilize technological advances in the form of Google Sites-based e-comics that can be accessed online and contain material on environmental change and efforts to address environmental issues.

1.1 Conceptual framework

Character education is an effort that is designed and implemented systematically and in a planned manner to help students understand the values of human behavior related to God Almighty, themselves, other humans, the environment, and nationality which are manifested in thoughts, attitudes, feelings, words, and actions based on religious norms, law, etiquette, culture, and customs (Ngatiman & Ibrahim, 2018).

In the independent curriculum, the development and strengthening of student character is outlined. in the vision of Indonesian education, namely to realize a sovereign, independent, advanced Indonesia and personality through the creation of Pancasila students. One of the means of achieving the profile Pancasila students through the implementation of the Pancasila Student Profile Strengthening Project (Satria et al., 2024). The implementation of the Pancasila Student Profile Strengthening Project has several themes. has been determined by the Ministry of Education, Culture, Research and Technology. Themes that can be implemented at the level of Elementary to high school is a Sustainable Lifestyle. Next topic that can be developed on the theme of a sustainable lifestyle, namely a character that cares about the environment which focuses on the development of morals towards nature and produces works and actions the original.

The environmental care character indicators according to the Ministry of National Education (2010) are attitudes and actions that always strive to prevent damage to the natural environment surrounding areas and develop efforts to repair the natural damage that already occurred. One factor that supports successful learning is learning media. Teachers use media to convey information to students and enable more effective communication between them (Halimah et al., 2021). Engaging media will help students understand the material and prevent them from getting bored and motivate them to learn. Education utilizes digital technology to support teaching and learning activities through learning media (Hasna Nur Alifah et al., 2023). Therefore, digital comics are the most effective learning medium for building environmentally conscious character. One platform that can be used to create website-based e-comics is Google Sites. The use of Google Sites is different from other websites because it has many interesting advantages to learn (DA Suryanto, 2018). With Google Sites, students no longer have to download material presented by the teacher, so their internet quota is not significantly reduced.

The results of Putri & Wibawa's research, 2023, showed that the use of e-comic media oriented towards environmental character education was categorized as effective in increasing students' environmental awareness. Use of mediae-comic character environmental care basedgoogle sites It is hoped that this will be able to increase caring attitudes environment on students.

1.2 Research objectives

The purpose of this study is to improve environmental care character attitudes by developing Google Sites-based environmental care character E-Comic media for MTs students in Pati Regency.

2. Methodology

2.1 Research design

The type of research on the development of environmentally friendly character e-comic media based on Google Sites for MTs students in Pati Regency uses research and development procedures (Research and Development) by combining two types of quantitative and qualitative approaches by Creswell (2016) called mixed methods. The design of this research development uses the ADDIE model. Tegeh et al. (2014) revealed that the ADDIE model has 5 stages for developing products, including (1) analysis (Analyze), (2) planning (Design), (3) development (Develop), (4) implementation (Implementation), (5) evaluation (Evaluation). The following is the ADDIE development model.

Figure 1. Addie Model

2.2 Respondents of the study

The primary data sources in this study were teachers and students from three Islamic junior high schools (MTs) in Pati Regency, namely MTsN 2 Pati, MTs Darun Najah, and MTs Thowalib. The data sources were obtained from needs analysis interviews with three teachers from three madrasas, responses to Google Sites-based character e-comic media from five teachers, and nine media development experts as validators. In addition, data were obtained from needs analysis interviews and questionnaire responses from 45 students regarding media development.E-comic environmentally friendly characterGoogle Sites and the pretest-posttest experimental class environmental care attitude questionnaire of MTs students. Meanwhile, the secondary data sources in this study are all data obtained by the researcher from research documentation, researcher notes, and other supporting data used by the researcher as a reference.

The collected data will then be analyzed using qualitative and quantitative data analysis techniques. In this qualitative data analysis technique, the researcher used an interactive model based on the theory of Miles and Huberman. These stages include data reduction (Data Reduction), data presentation (Data Display), and Conclusion or verification (Conclution Drawing/Verification). In the quantitative data analysis technique, data was obtained from the validation results that were tested and analyzed to determine the validity of the product in terms of content validation, practicality validation, and validation of the environmentally friendly character E-comic media based on Google Sites. The product that has been developed is said to be valid when the assessment is on valid criteria. The formula for calculating the ideal percentage is as follows:

$$HASIL = \frac{\Sigma \text{ Skor yang diperoleh}}{\text{Skor maksimum}} \text{ X } 100\%$$

Table1. Data Validity Criteria

Score in percentage (%)	Criteria
0-20%	Highly Infeasible
21-40%	Not Feasible
41-60%	Fairly Feasible
61-80%	Feasible
81-100%	Highly Feasible

The next quantitative data analysis technique is to test the effectiveness of using an environmental attitude questionnaire through the class.pretest-posttest group experiment. Meanwhile, the data analysis techniques used are the t-test and the N-gain test.

3. Findings and Discussion

E-Comic This Google Sites-based environmental character comic was developed in the form of a link that can be accessed from a mobile phone or laptop connected to the internet. The Google Sites-based environmental character e-comic aims to increase knowledge and foster attitudes in MTs/SMP students towards environmental character values.

The data for the needs analysis comes from initial observations, media needs analysis interviews conducted with teachers and students, and a questionnaire on students' environmental attitudes. The results of the needs analysis are reviewed from several aspects, including 1) Development of environmentally conscious character education. Madrasah efforts to develop environmentally conscious character already exist through several activities, namely P5PPRA with a sustainable lifestyle theme, community service activities, and fashion shows made from waste materials. However, these efforts are not consistent and sustainable. They only occur at certain times. 2) Students' knowledge and understanding. Students' knowledge and understanding in learning are still lacking, this is due to the lack of media used by teachers in learning. 3) Media availability. The availability of media by the madrasah for developing students' understanding of knowledge is still lacking, as well as the use of available media is only used by a few teachers. 4) The need for e-comic products for environmentally conscious characters based on Google Sites. The need for media such as e-comic products for environmentally conscious characters is very necessary to improve students' environmental attitudes.

The media design begins with the collection of materials. The comic material is adapted to the environmental care character indicators according to the Ministry of National Education (2010: 11) which are attitudes and actions that always strive to prevent damage to the surrounding natural environment and develop efforts to repair natural damage that has occurred. The material is presented in two different comic themes. The first comic is entitled "Greening Our Earth" which contains the problem of air pollution from vehicle exhaust, the dangers of motor vehicle exhaust, efforts to reduce and prevent air pollution problems and real actions for environmental management through greening. Meanwhile, the second comic material is entitled "Separate My Waste". This second comic contains material about the problem of accumulating waste, how to overcome problems with waste management and waste management actions. To understand the material contained in the comic, two games or games from the Educaplay application are prepared adapted from the material contained in comics 1 and 2.

In the development stage through the steps to enter the Google Sites platform and log in using a Google account, create a Page Menu, create an E-Comic Cover Menu on the Home page, create an E-Comic menu Green Our Earth, create an E-Comic menu "Separate My Waste", create a menu "Let's Play and Learn!", insert text instructions for image functions, and finally publish the results of the Google Sites design.

The following is an image of the results of the development of the Google Sites-based Environmental Care E-Comic:

Figure 2. Development resultsE-Comic

A Google Sites-based e-comic trial was conducted with 45 students and five teachers from three Islamic junior high schools (MTs) in Pati district. The trial was conducted directly outside of class hours during breaks using each student's mobile phone. Learning activities began with an opening and core presentation of the material using the Google Sites-based e- comic. Students also worked onka quiz-based practice question using a question link from educaplay contained in the Google Sites-based E-Comic. After the trial, interviews were conducted by teachers and students and using a student response questionnaire. The interview results stated that the design of the Google Sites-based E-Comic for environmental care was presented very attractively, so that students could more easily understand the material. The presence of shortcut buttons makes it easier for teachers and students to access the desired menu. Using the Google Sites-based E-Comic by clicking the shared link or by scanning the QR code provided by the teacher will certainly make it easier for students. This is because students do not need to install the application first when they want to use the Google Sites- based E-Comic for environmental care.

Table 2. Uji T (Paired Sample T-test)

Mean	Post-test 96.328125	Pre-test 57.89063
Variance	3.639322917	41.39974
Observations	16	16
Pearson Correlation	-0.002651977	
Hypothesized Mean Difference	0	
df	15	
t Stat	22.89321531	
P(T<=t) one-tail	2.20902E-13	
t Critical one-tail	1.753050356	
P(T<=t) two-tail	4.41804E-13	

The results of the pretest and posttest were tested using a difference test through the paired sample T-test and the N-gain test. The results of the paired sample T-test in table 2 state that there is a difference between the control class and the experimental class. The Paired Sample T-test shows a sig. (2-tail) value or a significance value of 0.00. Based on the output, the sig. (2-tail) value is 0.00 <0.05, so as a basis for making the decision above, it can be concluded that H0 is rejected and Ha is accepted. There is a difference between the experimental gain score and the control gain score, namely the average experimental gain score is 43.47 and the control gain score is 31.22. So it can be said that the implementation of the Google Sites-based E-Comic media experiment in the experimental group has succeeded in improving student learning outcomes. Providing Google Sites-based E-Comic media treatment to the experimental group is said to be effective in improving learning outcomes.

Table 3. N-Gain

Group	**N-gain Score**	**Interpretation**
Eksperimen	91,1%	Effective
Kontrol	36,3%	Not Effective

Meanwhile, the results of the N-gain test were used to determine the effectiveness of using certain treatments in the study, as can be seen in Table 3. The N-gain in the experimental class and the control class showed a difference. The N-gain of the experimental class was 91.1, categorized as effective, and the N-gain of the control class was 36.6, categorized as less effective. Therefore, it can be said that the experimental class implementing learning using Google Sites-based E-Comic media can be categorized as effective.

The results of the questionnaire were used as an evaluation to determine the extent to which the implementation of the use of Google Sites-based environmentally friendly e-comics influenced changes in students' environmental attitudes.

4. Conclusions and Recommendations

Based on the research and development that has been done, it can be concluded that the analysis of learning media needs to improve environmental care character requires media that can be accessed via mobile phone/laptop. The design of environmentally friendly E-Comic is categorized as very feasible, so that Google Sites-based E-Comic media can be used in improving environmental care attitudes. Google Sites-based E-Comic media can be categorized as quite effective in improving environmental care attitudes. To increase the utilization and development of research products, there are several suggestions, including increasing the provision of infrastructure to support the process of developing environmentally conscious characters, optimizing the provision and utilization of technology as a learning medium and teachers are expected to be more creative, innovative and able to utilize information technology-based learning media.

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Conflict of Interest

The authors declare there is no conflict of interest.

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