

Development of Religion-Based Digital Comic Media to Improve Environmental Literacy in Primary School Students

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Abstract

This study aims to develop digital comic media based on religious values to improve environmental literacy among sixth-grade students. This study uses a research and development (R&D) approach with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) instructional design model. Each ADDIE stage is adapted to ensure the resulting media are valid, practical, and pedagogically effective. A needs analysis revealed that existing learning media were contextually irrelevant and failed to integrate Islamic values. During the design phase, learning objectives were formulated based on the 2013 curriculum and integrated the values of Khalifah, Tahārah, and Amanah into the digital comic narrative developed using Canva and Krita. Validation by subject matter, media, and language experts showed a very high level of validity (85–90%). Implementation at SDN Simogirang 1 involved 25 students using a single-group pretest-posttest design. Practicality test results showed positive responses from 89.3% of teachers and 85.2% of students. Effectiveness testing using N-Gain and paired-sample t-tests revealed a significant increase in environmental literacy among students (N-Gain = 0.61, $p < 0.05$). This religion-based digital comic medium has proven to be highly valid, practical, and effective in enhancing environmental literacy in Islamic religious education at the primary school level.

INTRODUCTION

Environmental issues such as waste accumulation, pollution, and ecological degradation have become pressing global concerns with profound implications for human health, social stability, and ecological sustainability (Singh & Singh, 2016; Tyagi et al., 2014). These challenges are compounded by rapid urbanisation, industrial expansion, and poor waste management practices, particularly in developing nations (Ferronato & Torretta, 2019; Ukaogo et al., 2020). Environmental degradation further threatens biodiversity and the long-term availability of natural resources, highlighting the urgent need for educational, technological, and behavioural responses (Sadhu et al., 2018; Owen & Pickering, 2006). In Indonesia, the rise in consumerism has intensified household waste production (Pohan et al., 2023), while Islamic teachings have increasingly been interpreted as a moral framework for environmental protection through the maqāṣid al-sharīah approach (Rohma & Putri, 2024). Hamdani and Wathoni (2024) further argue that Islamic education is vital in shaping ecological awareness among young learners. Within this context, environmental education—especially at the primary school level—is viewed as a strategic entry point to foster lifelong environmental literacy and responsibility.

Environmental literacy encompasses more than acquiring ecological knowledge; it involves cultivating pro-environmental attitudes, values, and behaviours that support sustainable living (Moseley, 2000; McBride et al., 2013). Strong environmental literacy equips students to understand ecological systems, critically evaluate environmental issues, and make informed decisions (Fang et al., 2022; Teksoz et al., 2012). Scholars differentiate between weak and strong literacy, with the latter

involving cognitive, affective, and behavioural engagement (Stables & Bishop, 2001; Pe'er et al., 2007). Empirical studies show that education significantly contributes to environmental literacy by integrating knowledge, attitudes, and real-life applications (Negev et al., 2008). In the Indonesian education system, environmental literacy has been formally embedded in the 2013 curriculum, especially within science subjects (Kusumaningrum, 2018), while school initiatives like Adiwiyata have demonstrated effectiveness in enhancing student engagement with environmental practices (Afrianda et al., 2019; Maesaroh et al., 2021). Hence, fostering environmental literacy from early grades is essential to prepare ethically responsible citizens capable of addressing current and future environmental challenges.

A promising direction in environmental education is the integration of religious values into innovative pedagogical media. Islamic teachings emphasise ecological stewardship through khalifah (vicegerency), the imperative of cleanliness, compassion for all living beings, and the wise use of natural resources (Abu-Hola, 2009; Rahman, 2025). These values align with character education's objectives, which seek to develop moral responsibility, empathy, and civic engagement (Cholifah, 2024; Anggraini et al., 2022). Studies show that integrating Islamic principles into environmental education enhances students' pro-environmental attitudes and moral sensitivity (Muslih, 2021; Idris et al., 2022; Husamah et al., 2022). Furthermore, media-based approaches to religious instruction—such as digital storytelling and reflective comic narratives—provide a flexible and affective learning environment that promotes moral reasoning and environmental motivation (Vrabec et al., 2013; Rackley, 2021). As a result, combining Islamic values with digital media formats emerges as a practical pedagogical approach to promote environmental literacy while simultaneously fostering students' spiritual and ethical development, particularly at the primary level, where identity formation and value internalisation are most formative.

Digital learning media provide pedagogical solutions to enhance student engagement and address the limitations of conventional instruction. The rise of interactive technologies offers personalised and accessible tools that support multimodal learning experiences (Gan et al., 2015; Ismail & Ling, 2025). Digital content, such as comics, videos, and augmented reality, helps bridge abstract concepts with real-world applications, especially in problem-based and moral education contexts (Hoffmann & Ritchie, 1997; Birla, 2023). In Islamic education (PAI), platforms like Instagram, gamified applications, and digital comics have been found effective in communicating complex moral and theological messages in a relatable and student-friendly format (Laily et al., 2022; Syahrifar et al., 2023; Tamami et al., 2024). When effectively designed, these media enhance conceptual understanding and learning motivation and facilitate more profound reflection on values such as environmental responsibility and digital ethics (Perdana, 2024). Thus, digital learning media hold considerable promise for bridging education's cognitive, affective, and spiritual aspects, particularly when applied to integrated content such as religion and environmental awareness.

Research has demonstrated that integrating environmental literacy into Islamic Religious Education (PAI) can improve students' ecological understanding, strengthen their religious values, and cultivate digital ethics, particularly when supported by engaging media (Izhar et al., 2022; Ninsiana et al., 2024; Azhar et al., 2024). Using gamified worksheets, augmented reality, and video series has been shown to foster environmental literacy from early ages (Ardyansyah & Rahayu, 2023; Indriyanti et al., 2024; Aliman & Mutia, 2021). Comics and digital storytelling, in particular, have gained recognition as effective media for environmental and religious education, offering engaging narratives that support comprehension, value internalisation, and character development (Rutta et al., 2020, 2021; Azman et al., 2015; Akinyemi & Makinde, 2024). These tools are especially relevant for primary school students, whose learning is often more responsive to visual and narrative forms (Arya Pageh et al., 2020; Ehrenkonig, 2025; Hancock, 2023). Therefore, the convergence of religion, digital media, and environmental literacy presents a promising pathway for holistic education that supports intellectual, moral, and ecological growth.

Despite growing empirical support, practical challenges persist in classroom settings. Preliminary observations at SDN Simogirang 1, Prambon Subdistrict, Sidoarjo Regency, reveal that existing visual learning media—particularly in PAI—lack creativity, interactivity, and contextual relevance. Materials are predominantly static images with limited pedagogical impact, failing to engage students meaningfully or support the internalisation of ecological and religious values. This limitation is particularly concerning in upper primary education, where students are developmentally ready to engage in critical thinking and value-based reflection. There is a pressing need for innovative, contextually relevant, and visually engaging media that support environmental literacy while reinforcing Islamic character education to address this gap. In this light, the development of religion-based digital comic media is proposed as a strategic educational intervention. Explicitly designed for sixth-grade students, this media aims to integrate Islamic ecological values—such as *khalifah*, *ṭahārah* (cleanliness), and environmental responsibility—into accessible, interactive comic narratives that align with students’ digital preferences and cognitive development. Through this approach, the study seeks to promote environmental literacy, support moral formation, and enhance the overall quality of Islamic education in primary schools.

METHODS

This study employed a Research and Development (R&D) methodology using the ADDIE instructional design model, which consists of five systematic stages: Analysis, Design, Development, Implementation, and Evaluation. The model was selected for its structured and iterative approach to instructional media development, which has been widely adopted across various educational and health contexts due to its effectiveness in aligning learning goals with user needs and content delivery (Ding & Toran, 2025; Norouzkhani et al., 2025; Widyastuti, 2019). In the context of this study, ADDIE guided the development of a religion-based digital comic media designed to improve environmental literacy among sixth-grade students in Islamic Religious Education (PAI). Each stage was adapted to ensure the resulting media would be valid, practical, and pedagogically effective. The research was conducted at SDN Simogirang 1, Prambon Subdistrict, Sidoarjo Regency, during the 2024/2025 academic year, involving collaboration between media experts, subject matter experts, teachers, and students.

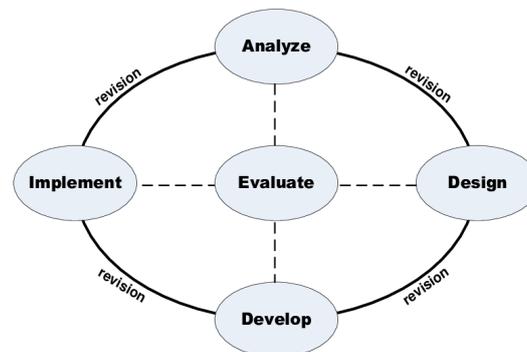


Figure 1. The R&D ADDIE Models

1. Analysis Stage

The initial phase involved a needs assessment through classroom observations and interviews with Islamic Religious Education (PAI) teachers and students. The findings revealed that the instructional media used lacked contextual relevance to environmental issues and failed to engage students. Materials were predominantly static images and did not integrate Islamic values. This analysis served as the foundation for media development focused on strengthening environmental literacy through religious integration.

2. Design Stage

The design stage focused on transforming the analysis phase results into a systematic instructional blueprint. The process began with the formulation of learning objectives, which referred

to the Basic Competencies (Kompetensi Dasar) specified in the 2013 National Curriculum for Islamic Religious Education (PAI) and Natural Sciences (IPA) at the primary level. These objectives were constructed to align the competencies targeted in environmental literacy and the religious-moral values embedded within Islamic teachings. Subsequently, instructional content was selected by identifying core Islamic values relevant to environmental stewardship. These values included khalifah (vicegerency), which emphasizes human responsibility in maintaining ecological balance; ṭahārah (cleanliness), reflecting the Islamic obligation to preserve environmental hygiene; and amanah (trust), which teaches accountability in managing natural resources.

The next step involved developing storyboards and comic panels to communicate these values visually. The storyboard served as a narrative framework containing contextualized environmental problems that students might encounter daily. Each scene had specific learning messages and dialogues reinforcing scientific and religious content. The comic illustrations and layout were created using Canva and Krita, two digital design tools that support flexible, high-resolution graphic development suitable for interactive visual learning. In parallel, several research instruments were developed to support the validation and evaluation process. These included:

- Expert validation sheets—designed separately for material and media experts—to assess the content’s accuracy, religious integration, visual appeal, clarity of language, and alignment with learning objectives;
- Response questionnaires for both teachers and students, using a Guttman scale to measure practicality, ease of use, and engagement during implementation;
- A set of pretest and posttest items constructed to measure students' cognitive and affective dimensions of environmental literacy before and after the intervention.

All validation instruments were constructed based on clearly defined indicators, as detailed in Table 1 (Material Expert Validation Grid) and Table 2 (Media Expert Validation Grid), which served as the foundation for evaluating the feasibility and relevance of the developed digital comic media.

Table 1. Validation Blueprint for Material Experts

No	Aspect	Indicator	Item No.	Total
1	Curriculum	Relevance to learning outcomes and goals	1–2	2
2	Content	Completeness, accuracy, and attractiveness	3–7	5
3	Evaluation	Alignment between the material and the evaluation	8–9	2
Total				9

Table 2. Validation Blueprint for Media Experts

No	Aspect	Indicator	Item No.	Total
1	Appearance	Visual appeal, color, instruction clarity	1–3	3
2	Strategy	Motivation, attention, self-practice	4–7	4
3	Evaluation	Understanding and learner adaptability	8–9	2
Total				9

3. Development Stage

The digital comic was created based on the storyboard and validated by two material experts and two media experts. The validation results were averaged and converted into percentages. The feasibility of the media was determined using the following criteria (Table 4):

Table 4. Eligibility Criteria Based on Validation Scores

Average Score	Percentage Range	Feasibility Category
> 4.2	81–100%	Very Feasible
> 3.4–4.2	61–80%	Feasible
> 2.6–3.4	41–60%	Fairly Feasible
> 1.8–2.6	21–40%	Less Feasible
≤ 1.8	0–20%	Not Feasible

Source: Arikunto (2006)

Before implementation, all aspects of the comic (content, visuals, and interactivity) were revised based on feedback.

4. Implementation Stage

The developed media was implemented using a **one-group pretest-posttest design** with 25 students. Students used the digital comic in PAI classes over two sessions. Feedback was collected through teacher and student questionnaires to assess practicality.

The practicality was interpreted using the criteria in Table 5:

Table 5. Criteria for Teacher and Student Practicality Responses

Score Percentage	Practicality Category
81–100%	Very Practical
61–80%	Practical
41–60%	Fairly Practical
21–40%	Less Practical
0–20%	Not Practical

5. Evaluation Stage

The evaluation phase aimed to measure the effectiveness of the developed religion-based digital comic media in enhancing students' environmental literacy. To achieve this, pretest and posttest assessments were administered to evaluate students' understanding before and after the learning intervention. The test instrument was carefully constructed to capture cognitive (knowledge and comprehension) and affective (attitudes and awareness) dimensions of environmental literacy. The collected data were analyzed using a paired sample t-test, with the significance level set at $p < 0.05$ to determine whether there was a statistically significant improvement. Additionally, the magnitude of learning gain was assessed using the Normalized Gain (N-Gain) formula, quantifying the relative improvement in student performance. These analyses provided a comprehensive view of the media's pedagogical impact on students' environmental literacy development.

RESULTS AND DISCUSSION

Results

Developing and implementing religion-based digital comic media in sixth-grade students at SDN Simogirang 1, Prambon Subdistrict produced several findings about the media's validity, practicality, and effectiveness.

1. Field Observations and Initial Needs Analysis

Table 1. Summary of Initial Observations and Interviews at SDN Simogirang 1

No	Aspect	Findings	Source
1	Availability of Digital Equipment	LCD projector (2 units), active speakers, Wi-Fi (limited to the staff room)	School Observation
2	Use of Digital Media in Class	Dominantly static visuals (textbook images, PowerPoint), minimal student interaction	Observation
3	Teacher Readiness	Limited digital media development skills among PAI teachers	Interview: Principal
4	Time Allocation for Preparation	Teachers are often constrained by administrative workloads, reducing time for media innovation.	Interview: Mr. E
5	Student Engagement	Students tend to lose focus on long reading materials in PAI lessons	Interview & Class Note
6	Perceived Media Needs	Interest in more visual, narrative-based materials (e.g., comics, videos)	Interview: Mr. E
7	Learning Culture	Students are more responsive to story-based or discussion-centered activities.	Observation
8	Instructional Barrier	Lack of contextually relevant media linking religion and environment	Interview: Principal

Initial observations and interviews were conducted with the principal, Dra. Is, and the sixth-grade homeroom teacher, Mr. E., Both highlighted that teachers often face difficulties in designing digital learning media due to limited time and uneven digital literacy. The school is relatively well-equipped for its rural context, with LCD projectors and audio systems available in classrooms. However, instructional media still relies heavily on static resources, and students often lose interest, particularly when engaging with long reading passages in Islamic Religious Education (PAI). These findings strengthened the rationale for developing an interactive digital comic as a pedagogical alternative.

2. Content and Media Validation

Three experts—subject matter, media, and language—validated the digital comic using an instrument based on content relevance, religious integration, accuracy, visual appeal, and language clarity. The results of the validation are summarized in Table 2.

Table 2. Results of Expert Validation

Validator	Validation Score (%)	Category
Material Expert	87.5%	Very Valid
Media Expert	85.0%	Very Valid
Language Expert	90.0%	Very Valid

Based on the criteria in Arikunto (2019), a validation score above 81% is categorized as "very valid", indicating that the media strongly meets the required quality standards for educational use. The material expert's score of 87.5% confirms that the content is accurate, comprehensive, and aligned with the learning objectives and competencies of the 2013 Curriculum for Islamic Religious Education and Environmental Education. The media expert scored 85.0%, suggesting that the digital comic has a high-quality visual layout, appropriate color combinations, and user-friendly navigation. It also reflects good interactivity and attention appeal, which are essential for digital learning tools aimed at elementary students. The language expert scored 90.0%, the highest among the three, indicating that the media uses clear, age-appropriate language that is communicative and consistent with Islamic values. The narrative style, dialogue, and vocabulary were considered suitable for Grade VI students and supportive of literacy development. Overall, the average validation score of these three experts indicates that the media is very valid and feasible for classroom implementation without significant revisions. Minor suggestions from validators were addressed in the final version, including refining illustration resolution, enhancing story coherence in transitions, and adjusting some religious terminology for clarity.

3. Practicality of the Digital Comic Media

The practicality of the media was measured based on teacher and student responses following classroom implementation. Questionnaires were distributed to one teacher and 22 students after a two-session lesson using the comic media. The results are shown in **Table 3**.

Table 3. Practicality Scores from Teacher and Students

Respondent	Average Score (%)	Category
Teacher Response	89.3%	Very Practical
Student Response	85.2%	Very Practical

Based on the practicality interpretation scale, both scores fall within the 81%–100% range, indicating that teachers and students consider the digital comic "very practical."

Teacher's Perspective (89.3%)

The teacher's response reflects a high level of practicality across several key indicators:

- **Ease of Use:** The media was perceived as easy to operate using the available school infrastructure (LCD projector and speakers).
- **Time Efficiency:** The comic lesson fit well within the allocated instructional time without causing delays.
- **Relevance to Lesson Objectives:** The storyline and embedded Islamic values were viewed as closely aligned with the competencies in the 2013 Curriculum for PAI and environmental education.
- **Classroom Engagement:** According to the teacher, students showed more enthusiasm and attentiveness than conventional lecture-based delivery methods.

These findings indicate that the media fits technical requirements and supports the teacher's pedagogical workflow. This aligns with previous findings by Rosmana et al. (2024), who argued that digital visual media enhances instructional clarity and saves preparation time.

Student's Perspective (85.2%)

From the students' point of view, the comic media was also rated very practical, based on the following observations:

- **Enjoyment and Engagement:** The visual storytelling format was considered fun and relatable. Students responded positively to the combination of images and dialogue bubbles, which made learning more enjoyable.
- **Comprehensibility:** The language used in the comic was easy to understand, and the illustrations helped clarify abstract environmental and religious concepts.
- **Accessibility:** Several students mentioned that they could re-read the comic at home, which suggests flexibility and interest beyond the classroom context.
- **Motivational Impact:** The media stimulated discussion and curiosity, particularly regarding Islamic teachings on environmental responsibility.

Additionally, informal follow-up interviews revealed that students continued engaging with the comic even after class, with several reporting that they re-read the comic at home—an indicator of sustained interest and practical relevance. Together, the teacher and student responses provide strong empirical evidence that the digital comic is technically feasible, pedagogically user-friendly, content-relevant, and motivational. These findings confirm the practicality dimension in the ADDIE model and justify its broader implementation in similar instructional settings.

4. Effectiveness in Improving Environmental Literacy

Pretest and posttest assessments were administered to assess the media's effectiveness. The data were analyzed using normalized gain (N-Gain) and a paired sample t-test. The statistical outcomes are presented in Table 4.

Table 3. Results of the Environmental Literacy Test

Assessment Type	Mean Score	N-Gain	p-value	Interpretation
Pretest	56.4	–	–	–
Posttest	83.2	0.61	0.000*	Significant Effect

*Note: $p < 0.05$

The average N-Gain score of 0.61 is moderate to high, indicating a substantial increase in students' environmental literacy. Furthermore, the p -value < 0.05 confirms a statistically significant improvement between pretest and posttest results. This demonstrates that the media was pedagogically effective in improving knowledge and awareness of environmental issues within a religious framework.

The religion-based digital comic media was validated as feasible, highly practical, and statistically effective. Integrating Islamic values with environmental themes in a comic format enriched content relevance and increased student engagement and learning outcomes. Therefore, this media is

well-suited for primary Islamic education to promote environmental literacy in a character-based and contextualized manner.

Discussion

The findings of this study provide compelling empirical evidence that the development of religion-based digital comic media holds significant potential for enhancing environmental literacy among primary school students. This enhancement is not limited to cognitive understanding of environmental issues but extends to affective engagement and the internalization of ecological values rooted in religious teachings. Such outcomes reflect the capacity of well-designed educational media to bridge the gap between abstract environmental concepts and learners' lived realities and belief systems. In this section, the implications of the results are examined through the lens of relevant theoretical frameworks and prior empirical studies in instructional media design, environmental and character education, and faith-integrated pedagogy. Specifically, the discussion draws on principles of multimodal learning theory, constructivist approaches to environmental education, and the integration of Islamic values in curriculum design to demonstrate how digital comics can function as tools for delivering content and as catalysts for value formation and behavioral transformation.

The validation results, which indicated expert agreement in the "very valid" category across material, media, and language aspects, demonstrate that the developed digital comic media meets high instructional standards regarding content accuracy, visual design, and linguistic clarity. This aligns with findings by Habiddin et al. (2022) and Rohmanurmeta and Dewi (2020), who reported that digital comics effectively support science and character education when designed by pedagogical principles. The material validation score (87.5%) also confirms alignment with the 2013 Curriculum, while media and language experts highlighted the clarity of narrative flow and visual coherence, echoing Zaibon et al. (2019), who emphasized the importance of usability criteria in evaluating educational comics. Previous studies have shown that digital comics can enhance literacy (Fitria et al., 2023), foster engagement (Khotimah & Hidayat, 2022), and improve communication skills (Ghofur, 2022), particularly when integrating culturally and contextually relevant content (Sagri et al., 2018; Umairah & Amaliyah, 2022). Moreover, research affirms that combining text and visuals in a narrative format enhances students' cognitive and emotional engagement (Mayer, 2009; Arief et al., 2022; Belda-Medina, 2024), thereby reinforcing the pedagogical potential of digital comics as an inclusive and impactful learning medium.

The results from teacher and student responses indicated that the digital comic media was perceived as highly practical, with respective scores of 89.3% and 85.2%. These findings affirm the practicality dimension of educational media, as highlighted by Figna et al. (2020) and Salsabila et al. (2022), who emphasize that instructional tools must be user-friendly, accessible, and aligned with learners' needs. Teachers acknowledged the ease of integrating the media into lesson plans. They reported increased time efficiency, consistent with Kay et al. (2009) and Ghavifekr et al. (2016), who noted that digital media supports instructional effectiveness when it complements pedagogical workflows. Meanwhile, students expressed enjoyment and improved conceptual understanding, which parallels findings by Fajriati and Putra (2023) and Bader et al. (2021), showing that visually rich and interactive digital tools can enhance cognitive engagement. The fact that students continued to access the media beyond the classroom suggests the development of autonomous learning, echoing constructivist principles wherein learners build knowledge through active and sustained exploration (Widyastuti & Utami, 2018; Hadianti & Rohmah, 2021; Siahaan et al., 2023).

With a normalized gain of 0.61 and a statistically significant improvement in posttest scores ($p < 0.05$), the digital comic media demonstrated moderate-to-high effectiveness in enhancing students' environmental literacy. This finding supports previous studies indicating that comics can facilitate conceptual understanding and ecological awareness when designed with educational and environmental contexts (Wajdi et al., 2022; Idayanti et al., 2022). Integrating narrative, visual elements, and local wisdom within digital formats aligns with research by Hudhana (2025) and

Priyangga et al. (2022), who found that e-comics effectively engage students through contextual storytelling and outdoor-based learning strategies. Furthermore, embedding Islamic values such as *khalifah* (stewardship) and *taharah* (purity) within the media provided a moral and religious framework that reinforced both cognitive and affective learning outcomes, resonating with the model of faith-based environmental education (Usman et al., 2024; Farida et al., 2024). Additionally, students' increased interest and retention are consistent with the constructivist paradigm, which emphasizes knowledge construction through multimodal, student-centered experiences (Asli, 2025; Abidin et al., 2023; Utara & Utami, 2024).

Integrating Islamic values, such as *khalifah* (stewardship) and *taharah* (purity), into environmental education has proven to enhance both the cognitive and affective aspects of learning, as demonstrated in digital comic media. Studies show that embedding religious principles into environmental education fosters a more holistic understanding of ecological issues while reinforcing moral and social responsibility. Sintiya (2025) argues that the Green Madrasah Movement, which integrates environmental values within Islamic educational frameworks, successfully fosters ecological awareness and sustainable practices. Similarly, Setianingrum et al. (2024) highlight that Islamic values promote a sense of duty toward environmental conservation, creating a strong link between faith-based learning and ecological stewardship.

The environmental education curriculum incorporating Islamic principles significantly influences students' environmental culture, as evidenced in Lutfauziah et al. (2024), who found that students in Islamic boarding schools exhibit stronger pro-environmental behaviors when their education integrates Islamic teachings and ecological issues. Farida et al. (2017) further emphasize the effectiveness of project-based learning in internalizing environmental literacy with Islamic values, providing an experiential learning approach that fosters deep engagement with faith and environmental responsibility. Moreover, integrating environmental conservation values in school textbooks, as analyzed by Zabidi et al. (2021), demonstrates that the infusion of Islamic teachings in educational materials can positively shape students' attitudes towards environmental sustainability. These findings align with the current study, suggesting that combining multimodal learning and Islamic values in digital comic media effectively enhances students' environmental literacy, promoting long-term engagement and moral responsibility.

These findings underscore the potential of religion-based digital comics as an innovative instructional medium that supports content mastery and promotes character education grounded in Islamic values. The media developed in this study is particularly relevant for Islamic schools or madrasahs, where integrating religious principles into the curriculum is essential. By combining moral instruction with environmental literacy in a visually engaging and pedagogically sound format, this study contributes meaningfully to the emerging field of digital religious education. However, the study has certain limitations that must be acknowledged. The intervention was implemented in a single class within one school, limiting the generalizability of the results, and the implementation duration was relatively short. Future research should consider longitudinal studies to assess sustained impacts, scalability across diverse educational contexts, and the inclusion of broader religious or scientific themes. Moreover, exploring student-generated digital comics may provide valuable insights into learner autonomy, critical thinking, and deeper engagement with instructional content.

CONCLUSION

In conclusion, this study has demonstrated that religion-based digital comic media is a valid, practical, and effective tool for enhancing environmental literacy among sixth-grade students in an Islamic primary school context. The media was developed in response to observed needs at SDN Simogirang 1, where teachers faced constraints in designing engaging digital content and students exhibited low interest in traditional PAI materials. Expert validation results confirmed that the media met high standards across content accuracy (87.5%), visual and technical quality (85.0%), and language clarity (90.0%). Teacher and student responses rated the media as "very practical," citing

ease of use, relevance to curriculum objectives, and increased engagement. Moreover, the implementation led to a statistically significant improvement in environmental literacy scores, with a normalized gain of 0.61 ($p < 0.05$), indicating moderate-to-high effectiveness. These findings suggest that integrating Islamic values and environmental content through digital storytelling can enrich cognitive and affective learning outcomes. While the study was limited to a single class and short intervention period, the results offer a promising foundation for broader application and future innovations in digital religious education. Further research is recommended to explore scalability, longitudinal impacts, and the potential of student-generated digital comics in fostering deeper engagement and critical thinking.

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