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Effectiveness Analysis of an Ecolliteracy-Based Fiqh Instructional Design Developed through the Plomp Model

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ABSTRACT. This study aims to develop and evaluate the validity, practicality, and effectiveness of an ecoliteracy-based *Fiqh* learning design for Islamic Junior High Schools (*Madrasah Tsanawiyah*). This study uses the Plomp development model, which includes the initial investigation, design, construction, and evaluation phases. The research participants were 32 students of MTs Negeri I Tapanuli Selatan. Data were collected through validation sheets, observation sheets, and learning outcome tests, and analyzed using expert assessment, practitioner evaluation, and t-test. The research findings indicate that the learning design was assessed as appropriate by experts ($M = 3.48$) and very appropriate by practitioners ($M = 3.52$). The practicality assessment showed an average score ($M = 3.31$). The effectiveness test showed a significant increase in student learning outcomes ($t = 4.26$, $p < 0.05$) with a moderate N-Gain of 0.38. These results indicate that the ecoliteracy-based *Fiqh* learning design is valid, practical, and effective. This design can serve as an innovative learning resource to support the integration of ecological literacy into *Fiqh* education.

Keywords: *Ecolliteracy-Based Fiqh, Innovative learning resource, Plomp development model*

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INTRODUCTION

Ecoliteracy-based learning is gaining increasing attention as an innovative approach to fostering sustainable attitudes and contextual understanding among students (Bissinger & Bogner, 2018; Lopez-Leon & Encino-Muñoz, 2020; Tomás et al., 2022; Joy et al., 2024). Integrating ecological literacy into religious education is crucial, as it not only enhances cognitive learning but also shapes students' character and moral responsibility towards the environment (Mardhiah et al., 2021; Amrullah et al., 2025) and provides a strong moral foundation for respecting and protecting nature as part of God's creation (Mardhiah et al., 2021; Meydan et al., 2025). These studies contribute to the growing knowledge on how ecoliteracy principles can be effectively integrated into education to foster more relevant and meaningful learning experiences.

Ecoliteracy emphasizes understanding ecological principles and applying them to everyday life decisions (Capra & Luisi, 2014; Boehnert, 2015; Lopez-Leon & Encino-Muñoz, 2020; Amalia, 2024). In educational settings, ecoliteracy-based learning encourages students to connect classroom content to their surroundings, fostering critical thinking and environmental stewardship (McBride et al., 2013). From an Islamic perspective, humans are designated as caliphs (stewards) of the earth, tasked with maintaining the balance and sustainability of natural resources (Tasgheer & Fatima,

2022; Alfiyah et al., 2024). This ethical imperative aligns with the goals of ecopedagogy, which emphasizes sustainability, equity, and justice in the learning process (Misiaszek, 2015).

Despite the recognized benefits of contextual and ecoliteracy-based learning, *Fiqh* lessons in many Islamic schools (*Madrasah*) are still dominated by traditional lectures and memorization (Johan, 2024; Kamali & Sugiyanto, 2024; Nuraeni, 2024), lacking engagement with students' lived experiences or their environment (Noor, 2024). This situation results in low motivation and limited internalization of Islamic values related to ecological responsibility. Previous research has demonstrated the positive impact of ecoliteracy-based approaches on environmental attitudes and learning outcomes in general education (McBride et al., 2013; Ramadhan & Surjanti, 2022; Pratiwi & Muharam, 2022). However, empirical research is still lacking in exploring how ecoliteracy principles can be systematically integrated into *Fiqh* learning materials in Islamic junior high schools (*Madrasah Tsanawiyah*). Most existing materials are developed solely based on textbook content without a structured ecological perspective or needs analysis tailored to students' contexts (Alshumaimeri & Alharbi, 2024; Apriadi et al., 2024).

Several studies have confirmed that integrating contextual and ecological elements into the curriculum can increase student engagement, critical thinking, and environmental awareness (Monroe et al., 2019). For example, McBride et al. (2013) found that ecoliteracy-based learning significantly improved students' knowledge and pro-environmental behavior. Similarly, Parhan and Suteja (2019) found that contextual learning processes made learning more meaningful and interactive because students engaged in discussions, reflections, and problem-solving relevant to real life, thus increasing their learning motivation. However, this evidence is still general and limited in its specific application to *Fiqh* learning.

Observations at MTs Negeri 1 Tapanuli Selatan indicate that *Fiqh* learning still relies on passive lecture methods, with minimal use of the surrounding environment as a learning resource. As a result, students often perceive *Fiqh* as monotonous and irrelevant to real life. This problem will likely occur in other schools (*Madrasahs*) in Indonesia, where innovation in *Fiqh* learning design is still limited. Therefore, this study aims to develop and evaluate the validity, practicality, and effectiveness of an ecoliteracy-based *Fiqh* learning design for *Madrasah Tsanawiyah* (Islamic junior high school).

METHOD

Research Design

The method used in developing eco-literacy-based *Fiqh* learning designs is development research with the Plomp (1997) model, which consists of the initial investigation stage, the design stage, the realization/construction stage, and the testing, evaluation, revision, and implementation stages (Nieveen, 1999). The initial investigation stage involves analyzing students' learning needs and their learning environment. Facts and students' learning environments are used as sources of problems to inspire the discovery of concepts and principles of teaching materials (de Jong et al., 2023). Social interaction patterns can be used as educational patterns that condition students to collaborate, discuss, and share knowledge. The design stage involves activities in designing learning designs, including: further study and determination of theories underlying the content and construction of learning designs, designing learning design components based on supporting theories, and selecting formats for teacher and student books. The realization stage is the creation of an initial script or prototype of eco-literacy-based *Fiqh* learning designs and the realization of the design results. The testing, evaluation, and revision stages involve the following main activities: Conducting validity tests on all instruments by education experts and practitioners, validating the *Fiqh*-based ecoliteracy learning design and all related learning materials, assessing the effectiveness of the learning design based on the theoretical knowledge and experience of experts and practitioners, and conducting field trials (de Jong et al., 2023).

Participants and Setting

The subjects of this study were eighth-grade students of MTs Negeri 1 Tapanuli Selatan in the even semester of the 2023/2024 academic year. Subjects were selected using a purposive sampling technique, considering that students had taken the *Fiqh* course and demonstrated problems achieving the Minimum Competency (KKM) and low engagement in contextual learning. The field trial sample consisted of 25 students in the individual and small-group testing phases, and 60 students in the large-group testing phase. Furthermore, the product validation test participants included three experts (a learning design expert, a *Fiqh* material expert, and an education practitioner).

Procedures

The stages of learning design development in this study began with an initial investigation in the form of a learning needs analysis, field observations, and an in-depth literature review of the *Fiqh* material and the concept of ecoliteracy. This stage aims to formulate relevant problems and determine the direction of product development. Next, in the design stage, the researcher developed the learning design structure, established supporting theories, determined the ecoliteracy approach used, and designed the format of the teacher's book and student's book. The construction stage was completed by preparing an initial draft or prototype of the ecoliteracy-based teaching materials. This product was evaluated through expert validation testing, student trials, and revisions based on field findings and input from various parties. The final stage was implementation, namely the application of teaching materials in *Fiqh* learning to measure their effectiveness in improving student learning outcomes.

Instruments

The instruments used in this study consisted of several types. First, an expert validation sheet was used to assess the developed product's content, language, presentation, and usability aspects. The assessment used a four-point Likert scale with indicators compiled based on the theory of teaching materials development. Second, a practicality observation sheet was used to assess the implementation of the learning design from the teacher's perspective and student engagement in the learning process. Third, a learning outcome test was used to measure students' mastery of Islamic jurisprudence concepts, consisting of 20 multiple-choice questions based on higher-order thinking skills (HOTS). This test instrument was tested for content validity by two experts, and its reliability was tested using the Cronbach's Alpha coefficient with a value of $\alpha = 0.82$. Fourth, a student activity assessment sheet was used to evaluate students' active participation during learning.

Data Analysis

Data analysis in the study is done using several techniques. First, the validity and practicality of the product are analyzed based on the average assessment score from experts and practitioners' education. A product is declared valid or practical if it gets an average score ≥ 3.00 on a scale of 1–4. Second, the teaching developed is used to test statistics, paired sample t-test, with SPSS software version 25, for test effectiveness material. The test is done to compare students' pretest and posttest scores. The product is considered adequate if the mark t count is more than 5 from the table at a significance level 0.05. Third, N-Gain analysis is used for a study to see the magnitude of improvement results. N-Gain category consists of high (≥ 0.7), medium (0.3–0.69), and low (< 0.3). Finally, to minimize bias and increase data credibility, triangulation was carried out through involvement from one validator and matching between observation data, test results, learn, and documentation learning. Techniques are used to ensure consistent results and strengthen the validity of the study's findings.

RESULT AND DISCUSSION

Result

The results of the validity assessment of the teacher's book developed were obtained from three validators, namely one learning design expert, one subject matter expert, and one education practitioner, as follows:

Table 1. Recapitulation of Expert and Education Practitioner Assessments Regarding the Teacher's Book

Expert	Assessment Indicators	Score	Category
Learning Design	Clarity of learning objectives, appropriateness of methods, sequence of materials, and delivery strategies	3.50	Very valid
Context	The relevance of the material to environmental issues, relevance to the reality of students' lives	3.43	Valid
Education Practitioner	Instilling Islamic values, character, and ecological awareness in the learning process and content	3.50	Very valid
	Average	3.48	Valid

Referring to the validity test of the teacher's book, it is stated that if the average score calculation result is ≥ 3.00. Because the cumulative average score of the validity assessment for the student book is 3.48 > 3.00, it can be concluded that the developed learning design product is valid for use. The results of the validity assessment by learning design experts, subject matter experts, and education practitioners on the developed student book are as follows:

Table 2. Recapitulation of Expert and Education Practitioner Assessment Regarding the Student Book

Expert	Learning Design	Subject Matter	Education Practitioner	Score	Category
Learning Design	3.40	3.50	3.40	3.43	Legitimate
Context	3.60	3.50	3.70	3.60	Very valid
Education Practitioner	3.50	3.60	3.50	3.53	Very valid
			Average	3.48	Valid

Referring to the validity test of the student book, which is whether the average score calculation result is ≥ 3.00. Because the cumulative average score of the validity assessment of the student book is 3.52 > 3.00, it can be concluded that the developed learning design product is valid for use. The results of individual, small group, and field group trials on the developed product are listed in the following:

Table 3. Recapitulation of Field Test Results

Test Group	Learning Design Expert	Subject Matter Expert	Education Practitioner	Average Score	Category
Individual	3.47	3.55	3.57	3.53	Very valid
Small Group	3.45	3.51	3.55	3.51	Very valid
Field Group	3.52	3.60	3.60	3.57	Very valid
		Cumulative Average Score		3.54	Very valid

Referring to the validity testing of the book product by individual trial subjects, small groups, and field groups, the average score calculation result is ≥ 3.00. Because the cumulative average score of the validity assessment for the student book is 3.54 > 3.00, it can be concluded that the developed learning design product is very valid for use. The results of the practicality assessment of the implementation of learning using the *Fiqh* learning design based on ecoliteracy from the teachers' perspective obtained an average score of 3.31, categorized as practical. Furthermore, the results of the practicality assessment of the ec-literate-based *Fiqh* learning design, conducted from the perspective of student learning activities, are 3.17, which falls into the practical category.

A paired sample t-test was conducted on pretest and posttest scores to test the effectiveness. The statistical test results obtained a t-value of 4.26 and a t-table value at $\alpha = 0.05$ of 1.99. Because the t-statistic value is greater than the t-table value, there is a difference in student learning outcomes before and after using the eco-collaboration-based *Fiqh* learning design. The difference in learning outcomes before and after using the eco-literacy-based *Fiqh* learning design was proven significant through t-test testing, thus it can be concluded that the eco-literacy-based Fiqh learning design can indeed improve student-learning achievement. Furthermore, a normalized gain (N-Gain) test was conducted to see the effectiveness of the eco-tourism-based Fiqh learning design.

$$\text{N-Gain} = \frac{\text{Posttest} - \text{Pretest}}{\text{Maximum Score} - \text{Pretest}} = \frac{75 - 60}{100 - 60} = \frac{15}{40} = 0.375$$

Based on the calculation, the N-Gain value was obtained as 0.375, which was then rounded to 0.38, which is included in the moderate category. This category refers to Hake's classification, namely high (≥ 0.7), moderate (0.3–0.69), and low (< 0.3). This value indicates that the ecoliteracy-based *Fiqh* learning design significantly increases learning outcomes. To increase data validity and strengthen the research findings, triangulation was conducted by comparing the results of observation sheets, learning outcome tests, and documentation of the learning process. This approach was taken to balance quantitative and qualitative approaches as recommended in the Plomp model, which emphasizes the importance of multi-perspective validation and revision cycles. During the development process, product revisions were carried out twice: the first stage revision was based on input from learning design experts, *Fiqh* material experts, and education practitioners; while the second stage revision was carried out based on findings from individual, small group, and large group trials, including feedback from teachers and students during the initial implementation stage.

Discussion

Validation results show that the teacher's textbook obtained an average score of 3.48 and the student's textbook 3.52, both of which are in the "valid" and "very valid" categories. The assessment score of experts and educational practitioners regarding the student's textbook was 3.50, while the highest score was found in the field context indicator (3.54). Although the score range was relatively narrow, this indicates an adequate level of inter-rater consistency. It strengthens the argument that the learning design suits the learning process. This conclusion is consistent with previous theories and research findings that emphasize the importance of validity as a primary parameter in the development of educational instruments. A valid product will effectively support the achievement of learning objectives, in line with modern curriculum approaches and pedagogical principles (Kioupi & Voulvoulis, 2019).

Implementing effective, efficient, and engaging learning begins with a systematic learning design process. Therefore, a high-quality learning development plan is needed, which teachers and students can use as a guide in conducting the learning process. Meanwhile, the quality and success of learning fundamentally depend on the quality of the learning design itself. Therefore, it is truly naive if learning is conducted without a clear plan, or it is even very ironic if learning is conducted without any plan, or flows as it is without any design from the beginning.

Teachers are crucial in designing a learning process; in this case, teachers must have a clear vision and sharp analysis of their lesson plans to facilitate student learning. In other words, the primary goal of lesson planning is to make learning more efficient and effective in its implementation, to avoid students' learning difficulties. In other words, the quality and success of learning fundamentally depend on the lesson plan prepared by the teacher beforehand. Efforts to improve the quality and success of learning require teachers to have the ability to make changes in teaching towards a higher quality. Learning should ideally enable students to construct or build their knowledge, not just merely receive the transfer of knowledge from the teacher. To achieve this, the learning conducted in the classroom is an intentional activity designed by the teacher for the students to achieve specific goals in the form of expected competencies after participating in the learning process.

The experts' validity assessment of the student book shows a score of 3.45 in the valid category. It indicates that the developed student book is suitable for use in learning. The role of student books as learning resources is to assist students in following the lessons. It is emphasized by Yaumi (2013), who states that learning resources serve as a means to achieve competency standards, basic competencies, or learning objectives, and optimize student services. A similar explanation is provided by Siregar and Nara (2011) regarding the benefits of learning resources, which are: (1) they can provide a more concrete and direct learning experience, (2) they can present something impossible to hold, visit, or see directly, (3) they can add and expand the scientific horizons within the classroom, (4) they can provide accurate and up-to-date information, (5) they can help solve educational problems both macro and in micro environments, (6) they can provide positive motivation, especially when organized and designed appropriately, and (7) they can stimulate critical thinking, encourage a more positive attitude, and promote further development.

Using the developed student book adds a unique dimension for students, allowing them to learn in and outside the classroom to seek learning resources anywhere and anytime (Rahmadani et al., 2024; Astari, 2022). The learning that takes place in this manner proves that students have their interests, motivation, and hard work to acquire knowledge and skills. This explanation suggests that learning activities facilitate students to learn actively. In addition, student books are intended for learners, so the aspects of language rules and readability must be urgently considered. Fulfilling language rules and readability is important in learning development, so students can easily understand it. The urgency of readability in student books from students' perspective as users is because students have individual differences in absorption capacity and cognitive development. It indicates that students have different characteristics from one another. Hence, the readability factor of student textbooks becomes an important aspect to consider because it will facilitate students in understanding the teaching material.

The student book is designed as printed materials consisting of a series of writings, so they must be written in language rules and readability levels that are easy to understand and capture students' attention, because learners have different individual characteristics from one another. It is emphasized by Seels and Richey (1997) that the characteristics of learners are the background experiences of the learners that influence the effectiveness of their learning process. The ecolliteracy-based *Fiqh* learning design is a planned or by-design printed learning resource used in *Fiqh* education for the middle school level. Related to the planned learning resources (by design), AECT (1986) explains that learning resources can be categorized into two parts: (1) planned learning resources (by design), which are all learning resources developed explicitly as components of the instructional system to provide directed and formal learning facilities; and (2) utilized learning resources (by utilization), which are resources not explicitly designed for learning purposes but can be found, applied, and used for learning purposes.

Teaching materials designed with the daily lives of students play an important role in the learning process as explained by Sanjaya (2014) as follows: (1) learning is the process of activating existing knowledge; (2) learning to acquire and add new knowledge; (3) understanding knowledge;

(4) practicing that knowledge and experience; and (5) reflecting on the development of knowledge. The ecolliteracy-based *Fiqh* learning design defines learning outcomes from a conventional structure to an ecolliteracy-based constructivist structure. This ecolliteracy-based *Fiqh* learning design is a reference for teachers and students in the learning process. Furthermore, it is understood that the use of eco-literacy-based *Fiqh* learning design can not only be utilized in *Fiqh* education but can also be applied to various disciplines. The selection of the learning design used must be appropriate for the subject matter to be delivered. The logical consequence of the ecoliteracy-based *Fiqh* learning design, transitioning from a conventional structure to a constructivist structure, implies that other developers should explore the cognitive sources within students when designing learning materials. Through the exploration of these cognitive sources, it will enrich the repository of knowledge, especially in the learning process at *Madrasahs*.

However, this validation has limitations. The omission of standard deviation analysis or inter-rater reliability testing reduces the inferential strength of the assessment results. The validity obtained is normative and still influenced by the experts' subjective perceptions. To increase objectivity, statistical techniques such as inter-rater reliability in subsequent validation stages are recommended. The development process followed the complete Plomp model, including two revision cycles based on expert input and field trial results. Data triangulation through observation, learning outcome tests, and documentation enhanced construct and internal validity. It demonstrates a commitment to the principles of systematic, evidence-based development.

This study offers a novel approach to integrating ecoliteracy values into Islamic jurisprudence (*Fiqh*) learning in *Madrasahs*. Unlike previous research, which was more conceptual (Husnussaadah et al., 2024; Royani & Junaidi, 2024), this study develops and tests applicable learning products in a formal *Madrasah* context. These findings support Kioupi and Voulvoulis' (2019) view that a learning approach that strategically links socio-ecological aspects with religious values contributes to sustainable education. However, the results' generalizability is still limited to the context of MTs Negeri 1 Tapanuli Selatan. Replication of the study in different locations is needed to test the design's broader applicability. Theoretically, this research strengthens the constructivist paradigm based on local and spiritual values when developing teaching materials. The developed design reflects the principles of contextual learning, is oriented toward sustainability, and is relevant to the needs of contemporary Islamic education.

CONCLUSION

This research successfully developed a valid, practical, and effective ecoliteracy-based *Fiqh* learning design for the junior high school level. The research objectives were achieved by demonstrating the device's validity through an average score of 3.48 (teacher's book) and 3.52 (student's book), as well as practicality, with a score above 3.00 indicating ease of implementation and active student involvement. The effectiveness of the design was statistically proven through a t-test ($t = 4.26 > t\text{-table} = 1.99$) and an N-Gain value of 0.38 (moderate category), indicating a significant increase in learning outcomes. The theoretical contribution of this research lies in strengthening the constructivist paradigm based on spiritual and local values. In contrast, its practical contribution is seen in preparing contextual and environmentally friendly *Fiqh* teaching materials. This design deepens students' religious understanding and fosters ecological awareness based on Islamic values such as monotheism, trustworthiness, and *rahmatan lil 'alamin*. The implication is that *Fiqh* learning can effectively build environmental awareness from an early age. However, the study's limitations lie in its location, which involved only one *Madrasah* (Islamic school), and the lack of interrater reliability analysis during the validation phase. Therefore, it is recommended that future research test this design in various Islamic educational institutions with diverse student characteristics and expand the application of ecoliteracy to other subjects through a mixed methods approach and inter-inspector reliability analysis to increase the validity and generalizability of the results.

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