Geometry and Islamic Values: Validity of Teaching Materials Based on Modified Project-Based Learning Model

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Abstrak

Bahan ajar geometri yang ada saat ini kurang efektif dalam mendukung siswa dalam menemukan konten melalui tugas berbasis proyek ilmiah, juga tidak memasukkan nilai-nilai Islam ke dalam proses pembelajaran. Penelitian ini bertujuan untuk mengevaluasi validitas bahan ajar geometri berbasis model Project-Based Learning (PjBL) yang dimodifikasi dan diintegrasikan dengan nilai-nilai Islam. Penelitian ini menggunakan pendekatan Research and Development (R&D) dengan menggunakan model 4-D yang terdiri dari empat tahap yaitu mendefinisikan, merancang, mengembangkan, dan menyebarluaskan. Instrumen validasi yang digunakan adalah angket yang menilai integrasi media, konten, dan nilai-nilai Islam. Analisis validitas dilakukan dengan menghitung rata-rata skor yang diberikan oleh validator. Hasil penelitian menunjukkan bahwa materi dan media yang divalidasi oleh ahli pendidikan matematika memperoleh skor rata-rata 4,3 sehingga masuk dalam kategori valid. Berdasarkan temuan tersebut dapat disimpulkan bahwa bahan ajar geometri berbasis model PjBL yang dimodifikasi dan mengandung nilai-nilai Islam, valid dan layak digunakan. **Kata Kunci**: Bahan Ajar; Geometri; Nilai-nilai Islam; Project Based Learning

Abstract

The current geometry teaching materials do not effectively support students in discovering content through scientific project-based assignments, nor do they incorporate Islamic values into the learning process. This study aims to evaluate the validity of geometry teaching materials based on a modified Project-Based Learning (PjBL) model integrated with Islamic values. The research follows a Research and Development (R&D) approach using the 4-D model, consisting of four stages: define, design, develop, and disseminate. The validation instrument employed is a questionnaire, which assesses media, content, and Islamic value integration. The validity analysis was performed by calculating the average scores provided by the validators. The results indicate that the materials and media, as validated by mathematics education experts, achieved an average score of 4.5, categorizing them as highly valid. Additionally, the Islamic value integration received an average score of 4.3, placing it in the valid category. Based on these findings, it can be concluded that the geometry teaching materials, which are based on a modified PjBL model and incorporate Islamic values, are valid and suitable for use.

Keywords: Teaching Materials; Geometry; Islamic Values; Project-Based Learning

I. INTRODUCTION

Teaching materials encompass all forms of resources used in classrooms to support teaching and learning activities (Santoso et al., 2020). The use of such materials meaningfulness enhances the and engagement of learning experiences (Yulia et al., 2024). This is because teaching materials facilitate students' understanding of concepts, reducing their reliance on teacher explanations (Yulia et al., 2021). By allowing students to construct their own knowledge, teaching materials encourage them to further develop the information they acquire. а more active Furthermore. and communicative learning environment can be fostered, minimizing excessive teacher dominance in the learning process (Mariana et al., 2021). Given the various benefits of using teaching materials, it is crucial for researchers to develop innovative resources that are tailored to the characteristics and needs of students. Effective teaching materials should appealing content, clear possess conceptual frameworks, and engaging presentation methods. and Unique interesting materials are essential for achieving optimal learning outcomes, as they aid students in grasping the concepts being presented (Magdalena et al., 2020).

To this end, teaching materials should encourage students to engage directly with the content, explore knowledge independently, and stimulate their curiosity in the learning process (Rahmawati & Rizki, 2017). As such, teaching materials play a pivotal role in supporting lecture activities, providing the foundation upon which lecturers can deliver content according to planned objectives and ensuring that desired learning outcomes are achieved (Yulia et al., 2024).

In line with the vision and mission of Islamic higher education, one of the key educational goals is to produce students who embody Islamic morals. A way to accomplish this is by integrating Islamic into the lecture values process (Imamuddin et al., 2023). The integration of Islamic values into academic activities is distinguishing feature of Islamic а institutions, where the curriculum and all teaching activities are expected to align with Islamic principles (Kurniati, 2016). However, lecturers in general disciplines within religious universities often face challenges in incorporating Islamic values, mathematics particularly in the department. This difficulty arises because many mathematics courses are typically taught without explicit connections to Islamic content, despite the fact that several mathematical concepts have links to the Qur'an, such as addition, multiplication, lines and angles, sets, numbers, measurements, and arithmetic sequences (Fitrah & Kusnadi, 2022). Courses in mathematics that are more such as geometry, abstract, pose particular challenges in this regard. Geometry focuses on the study of twoand three-dimensional shapes, measurements, and spatial relationships (Aini & Suryowati, 2022). Mastering geometry helps develop essential skills, such as logical thinking, reasoning, problem-solving, and creativity (Nasution et al., 2021; Afhami, 2022; Marianti, 2023). Thus, geometry plays a significant role in mathematics, contributing to students' creative thinking abilities within the learning process (Ammade et al., 2020; Ja'faruddin & Naufal, 2023).

In general, there is no inherent connection between geometry and Islamic values, as the geometric figures commonly studied originate primarily from Western sources and do not possess distinct Islamic characteristics. Consequently, the foundations of geometry education have not yet fostered an Islamic spirit in learning (Dalimunthe, 2022). Students often struggle to comprehend geometry concepts or problems when they are integrated with other fields, such as Islamic studies, without undergoing thorough investigation and formulation of solutions. This aligns with findings from (Zurzaq et al., 2020) who highlight limitations in students' understanding and mathematical modeling when faced with geometry problems that incorporate values. Another significant Islamic challenge is the scarcity of mathematics teaching materials that integrate religious values. (Juhaevah, 2021) also points out that many educational media products remain suboptimal due to their failure to integrate Islamic, scientific, and technological components within the curriculum.

To address this gap, there is a need for learning models that can support geometry instruction integrated with Islamic values, particularly through the inclusion of project-based assignments. Project-Based Learning (PjBL) is an aligned with the Higher approach Education Curriculum (KPT) and emphasizes the use of project assignments as a central element to achieve learning objectives (Nirmayani & Dewi, 2021; Kartikasari, Rahman, & Ahyan, 2023). PjBL encourages students to explore, discover, and apply various forms of information they acquire in lectures. The model aims to sharpen students' abilities to solve problems within a broader context.

The Project-Based Learning model involves several key stages, including formulating questions, planning investigations, collaborating, utilizing supporting technology, and drawing conclusions (Krajcik & Blumenfeld, 2016; Nurhikmayati & Sunendar, 2023). The Modified Project-Based Learning (PjBL) model, on the other hand, consists of six steps: 1) defining the problem; 2) planning: 3) implementation; 4) supervision; 5) analysis of results; and 6) evaluation (Nirmayani & Dewi, 2021).

Difficulties in integrating Islamic values into geometry lessons can be addressed through the use of narratives, stories, or parables that invoke Islamic principles. One example is the integration of the story of Prophet Noah's Ark. The Modified Project-Based Learning model can serve as a framework for project assignments that involve describing the size, shape, area, and volume of Noah's Ark. This approach enables students to engage in deeper analysis and problem-solving, particularly when dealing with complex issues (Wahyuni & Rahayu, 2021).

The implementation of the Modified PjBL model includes an inquiry phase, where lecturers present guiding questions and encourage students to participate in collaborative projects. In this case, students can be tasked with presenting descriptions of Noah's Ark, based on specified dimensions, using teaching materials developed by the lecturer. These materials might include various geometric shapes such as rectangles, parallelograms, trapezoids, and others.

Several relevant studies have explored the development of teaching materials integrated with Islamic values. (Hikmah et al., 2023) conducted a literature review and identified the integration of Islamic values in mathematics instruction, both in the instructional tools and learning frameworks. Similarly, (Andani, 2023) developed mathematics teaching materials incorporating Islamic values. These materials, focused on guadrilaterals and triangles, were designed using a scientific approach and were found to be valid, practical, and effective. (Rozigien & Zainil, 2023) also developed mathematics

teaching resources that integrated Islamic principles, while (Nufus et al., 2023) investigated the integration of Islamic values and mathematical communication skills within linear programming textbooks.

Despite these efforts, none of the existing studies have focused on teaching materials that developing integrate Islamic values into geometry content. Moreover, the teaching materials developed in previous studies were not based on a modified Project-Based Learning (PjBL) model. Therefore, this study aims to evaluate the validity of teaching materials geometry that integrate Islamic values within the framework of a modified PjBL model, with a focus on the aspects of content, media, and Islamic values.

II. METHOD

This study employs a Research and Development (R&D) approach utilizing the 4-D model, which consists of the following stages: define, design, develop, and disseminate (Rustamana et al., 2024). The research focuses on developing teaching materials for geometry integrated with Islamic values, specifically centered on the story of Prophet Noah's Ark, for students majoring in Mathematics Education.

The study subjects comprised all students in Class 2A of the Mathematics Education Department at IAIN Kerinci, totaling 15 students enrolled in the geometry course for the 2022/2023 academic year. A purposive sampling

technique was employed to select the sample. Purposive sampling involves selecting participants based on specific criteria or considerations (Rustamana et al., 2024).

The primary instrument used in this study was a validity questionnaire. The teaching materials were evaluated by three validators: two experts in mathematics education and one expert in Islamic cultural history. The validation process covered three key aspects: content validity, media validity, and the validity of the integration of Islamic values.

Data analysis was conducted using a Likert scale, with responses for each item rated as follows: very valid (5), valid (4), quite valid (3), less valid (2), and not valid (1). The validity analysis was performed by calculating the average score from the validators, with the criteria outlined in the table below:

Validity Criteria				
No	Score Range	Criteria		
1	0.00 - 1.00	Not Valid		
2	2.00 - 2.99	Less Valid		
3	3.00 - 4.49	Valid		
4	4.50 - 5.00	Very Valid		
Source: (Mamondol 2021)				

Table 1.

Source: (Mamondol, 2021)

III. **RESULT AND DISCUSSION**

This study aims to evaluate the feasibility and validity of geometry teaching materials based on a modified Project-Based Learning (PiBL) model integrated with Islamic values. The research conducted was in the Mathematics Education Department of

IAIN Kerinci. Following the 4D development research model, the study progresses through four stages: definition, design, development, and dissemination.

In the definition stage, a preliminary analysis is conducted to assess student characteristics, analyze the content, and determine learning needs. The primary objective of this phase is to identify the key challenges students face, examine the learning content and materials—such as the course syllabus and Semester Learning Plan (RPS)—and review the current curriculum. Data for this analysis were collected through questionnaires, interviews, and observations. The findings provided essential insights into the underlying issues and learning gaps among students.

1) Analysis of Student Characteristics

The students in this study were secondsemester students from the Mathematics Education Department at IAIN Kerinci. Observations and interviews conducted to analyze their characteristics are summarized in Table 2 below:

Tabel 2.					
Student Characteristics					
No	Character	Good	Poor		
1	Independent	5	10		
2	Strong Will	4	11		
3	Like Challenges	6	9		
4	Critical Thinking	5	10		

As shown in Table 2, 33% of students demonstrate independence, 27% have strong will, 40% enjoy challenges, and 33% exhibit critical thinking. The remaining

students lack self-directed learning skills, preferring structured material and detailed explanations. These students struggle to independently explore and comprehend the content before lectures and are not proactive in seeking references or preparing themselves for class. This finding aligns with research by (Razekiah et al., 2022), which reported 35.97% of students that in the Mathematics Education program at Labuhanbatu University showed critical thinking abilities.

Additionally, students tend to avoid challenges and exhibit low levels of critical thinking. This is evidenced by their reluctance to engage with problems that differ from those previously explained. When faced with unfamiliar questions, students often make errors and have difficulty finding solutions, opting to wait for guidance from lecturers or peers rather than attempting to solve the problems independently. They generally prefer easier tasks. This behavior is consistent with (Siswono, 2016), who noted that students tend to pursue lowerlevel, practical solutions when developing ideas. avoiding complex, more conceptually challenging tasks.

2) Material Analysis

The analysis of learning materials was conducted by reviewing the Semester Learning Plan (RPS) and the curriculum. The Mathematics Education Department at IAIN Kerinci follows the KKNI curriculum. In the basic geometry course, students study topics such as lines and angles, triangles, quadrilaterals, circles, common tangents of circles, points, lines, and planes in space, spatial angles, and volumes of geometric shapes. These concepts are applied to problem-solving exercises.

The geometry teaching materials developed in this study are based on a modified Project-Based Learning (PjBL) model integrated with Islamic values, focusing on points, lines, triangles, quadrilaterals, and the volume of geometric shapes. This approach aligns with research by (Muslimin & Sunardi, 2021), which highlighted the potential of developing spatial geometry materials for enhancing students' learning outcomes.

3) Learning Needs Analysis

A learning needs analysis was conducted to identify the types of teaching materials preferred by students. This analysis involved a learning needs questionnaire distributed to 15 students, which explored the types of teaching materials frequently used, those provided by lecturers, and the materials students desired. The results are presented in Figure 1 below:



Figure 1. Use of Teaching Materials

Based on Figure 1, 73% of students reported using learning materials from the internet, 20% from books, and 7% from modules. Additionally, the questionnaire revealed that 67% of students found the current geometry course materials unengaging lacking in color. and Furthermore, 80% of students stated that the materials included too many questions and assignments, and 60% felt that the materials had not effectively aided their understanding of the subject.

These findings are consistent with the research conducted by (Ikashaum et al., 2019), which reported that 83% of respondents at IAIN Metro Lampung experienced difficulty in studying geometry materials provided by lecturers. The materials were found to be inadequate in facilitating students' understanding of geometric representation.

Students expressed preferences for teaching materials that are engaging, easy to understand, visually appealing, and include meaningful content and example problems. They also indicated a preference for teaching materials in the size of a notebook, making them easy to carry. This aligns with findings by (Irawati & Saifuddin, 2018), who discovered that students desire teaching materials created by lecturers that are concise, written in student-friendly language, and supplemented with example questions to help clarify the material. Additionally, 41.56% of students preferred teaching materials in textbook form.

4) Design Stage

The second stage of the research involves the design phase, which focuses on developing assessment instruments for teaching materials. This includes creating a validity instrument sheet for material and media aspects, as well as practicality questionnaire sheets for both teachers and students, and a test sheet for assessing mathematical critical thinking skills. Additionally, this design phase encompasses the selection of appropriate media and the format to be used. The framework for the geometry teaching materials, which are based on the modified Project-Based Learning (PjBL) model integrated with Islamic values, is formulated according to the results of the previously administered learning needs questionnaire.

5) Developing Stage

During the development stage of the geometry teaching materials, which are based on the modified Project-Based Learning (PjBL) model integrated with Islamic values, validation is conducted by

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three experts. The validity assessment focuses on content validity, evaluated by two mathematics education experts and one expert in the field of Islamic civilization history. The objective of content validity is to ascertain the alignment of the designed teaching materials with the Semester Learning Plan (RPS). Additionally, construct validation aims to determine the appropriateness of the components within the teaching materials concerning the indicators of the intended learning model, specifically the modified PjBL model integrated with Islamic values.

Upon completion of the expert validation, the teaching materials are analyzed using a Likert scale. The validity analysis is based on the average scores derived from the validators. The results of this validation analysis are presented in Table 3 below:

Validation Result					
No	Aspect	Score	Description		
1	Material	4,4	Valid		
2	Media	4.6	Very Valid		
3	Islamic	4,3	Valid		

Table 3.

The data presented in Table 3 indicates that the material and media aspects, as validated by two mathematics education experts, received an average score of 4.5, categorizing them as "very valid." In contrast, the analysis of the Islamic value validation, conducted by the same experts, yielded an average score of 4.3, which is considered "valid." Integrating Islamic

values into lectures is an essential component of the vision and mission of the Mathematics Education Department, which aims to produce professional graduates with strong moral character rooted in Islamic principles.

Research conducted by (Fitriyani & 2019) supports this Kania, notion, emphasizing that the incorporation of religious values in learning activitiesparticularly in mathematics-can be enhanced through the strategic use of technology and the integration of Islamic values within mathematics curricula. This approach not only fosters meaningful active learning experiences for students but also contributes to the development of positive character traits essential for their future.

The validated geometry teaching materials, which are based on the modified Project-Based Learning (PjBL) model and integrated with Islamic values, are illustrated in Figure 2 below:

adalah nabi ketiga sesudah Adam, dan Idris. Ia merupakan keturunan kesembilan dari Adam. Ayahnya adalah Lamik (Lamaka) bin Mutawasylah (Matu Salii) bin Idris bin Yarid bin Mahlail bin Qainan bin Anusyi bin Svits bin Adam. Antara Adam dan Nuh ada rentang 10 generasi dan selama periode kurang lebih 1642 tahun. Nuh hidup selama 950 tahun. Nuh adalah rasul pertama yang diutus



saja. Kaum Nabi Nuh AS terus-menerus menentang apa yang beliau dakwahkan. Kadar kekufuran, kejahatan, dan pembangkangan mereka, baik dengan perkataan maupun perbuatan sudah mencapai puncaknya. Para orang tua, apabila melihat anaknya sudah beranjak dewasa

Figure 2. Geometry Learning Material

Bentuk Bahtera Nabi Nuh

Ahli sejarah berselisih pendapat tentang panjang dan lebarnya bahtera tersebut. Ada yang menyatakan panjangnya 80 *ditro'* dan lebarnya 50 *ditro'*, ada yang menyatakan panjangnya 300 *ditro'* dan lebarnya 50 *ditro'*. Kalau 1 *ditro'* samadengan 0,5 meter, hitunglah berapa luasnya. Tetapi mereka bersepakat bahwa tingginya 30 *ditro'*.

Perahu itu mempunyai 3 lantai, lantai dasar untuk binatang buas dan merayap, lantai kedua untuk manusia, dan lantai ketiga untuk unggas dan burung-burung. Perahu itu mempunyai pintu yang terletak di tengah dan mempunyai daun pintu yang mengunci rapat dari atas. Di setiap ruas kayu, baik dari dalam maupun luar, dilumuri dengan tir yang berfungsi menahan air azar tidak bisa masuk.

Ketika Nabi Nuh 4S memulai membuat perahu yang sangat besar. Kaumnya bukannya makin sadar akan kekhilafan mereka, tetapi malah menjadi-jadi dalam mengejeknya. Allah SI/T menceritakan,:

ن منكم كما المنظرون وتسلط طلله ولكما من عليه مذا من طبع مدروا مله فال إن المنظروا مان فإن المنط "Dan mulatlah Nabi Nuh membuat bahtera. Dan setiap kali pemimpin kaumnya berjalan melewati Nabi Nuh, mereka mengejeknya. Berkatalah Nabi Nuh, jika kalian mengejek kami maka sesunggulunya kami pun nanti akan mengejek kalian sebagaimana kalian mengejek kami." (QS. Hud: 38)

Allah S#T menghibur Nabi Nuh AS untuk jangan bersedih hati atas apa yang mereka lakukan. Allah S#T telah memberi kabar kepadanya bahwa sekali-kali tidak akan bertambah orang yang beriman dari kaumnya. Allah S#T menyatakan:

Figure 3. Islamic material in Geometry teaching materials

As illustrated in Figure 3, the Islamic values integrated into geometry learning pertain to the length and width of Noah's Ark, measured using Dziro' units converted into meters. Additionally, various images of the Ark are utilized by students to represent the geometric shapes associated with this biblical narrative. The validation results concerning material, media, and Islamic values indicate that the geometry teaching materials based on the modified Project-Based Learning (PjBL) model are deemed valid and suitable for instructional use.

This conclusion aligns with findings by Ridho et al. (2020), who state that valid teaching materials are essential for effective classroom learning. Furthermore, research conducted by Muslimin and Sunardi (2021), and also Damayanti and Kartini (2022) support this notion, as their study found that the problem-based learning module in spatial geometry, which integrated Islamic values, was also validated through expert evaluations focusing on both content and construct validity.

IV. CONCLUSION

The validity analysis is based on the average scores provided by the validators. The validation results for the materials and media assessed by mathematics education experts yielded an average score of 4.6, categorizing them as very valid. In contrast, the validation of Islamic values, also assessed by mathematics education experts, resulted in an average score of 4.3, classifying it as valid. Consequently, it is concluded that the geometry teaching materials, based on the modified Project-Based Learning (PiBL) model and integrated with Islamic values, are deemed valid and suitable for use.

Given the findings presented, the researcher aims for these teaching materials to be effectively utilized in the lecture process, progressing towards the stages of practicality and effectiveness. Furthermore, future research could focus on developing geometry teaching materials that integrate Islamic values with additional subjects, thereby enriching the incorporation of Islamic principles in educational contexts.

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