

Development of Static Fluid Teaching Materials Containing Quranic Verses to Improve Student Learning Outcomes

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Article Info	Abstract
Article history: Received: August 27, 2025 Accepted: October 28, 2025 Published: November 11, 2025 Keywords: Learning outcomes Quranic verses Static fluid Teaching materials This article is licensed under a creative commons attribution-share alike 4.0 international license © 2025 Jurnal ilmiah Pendidikan Fisika	The preliminary observation results revealed the limited availability of teaching materials that incorporate spiritual aspects, particularly the Quran. This study aims to describe the instructional material development process and analyze the suitability of the instructional material in enhancing students' learning outcomes, based on validity, practicality, and effectiveness. The study was conducted with students of Class XI MIPA 1 at MAN 1 Banjarmasin, utilizing the ADDIE model. Data were collected from the results of validating teaching materials using the lesson plan implementation sheet, as well as student learning outcomes in the pre-test and post-test. The results of this study indicate that the developed teaching materials have a validity level categorized as valid, a practical level of teaching materials categorized as practical, and a level of effectiveness categorized as effective or moderate, with an N-gain value of 0.69. This study found that the teaching materials for static fluid materials with Al-Qur'an verses to improve student learning outcomes are declared suitable for use based on the validity, practicality, and effectiveness of the teaching materials.
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INTRODUCTION

Education is the fundamental foundation of a country's life, reflecting the quality of its education. In the scope of education, character formation and conceptual understanding occur in students ([Novita et al., 2021](#); [Santyasa et al., 2018](#); [Wahyuni et al., 2024](#)). Education aims to create learning conditions and processes that encourage students to actively develop their potential, enabling them to grow into individuals who are devoted to God Almighty, knowledgeable, creative, and independent. They must be ready to adapt to the increasingly developing technological and scientific advances ([Hasibuan & Hufri, 2018](#); [Ramadhani & Yarshal, 2023](#)). In the context of education, there are important studies on the development of innovative and effective teaching materials in order to produce increased student learning outcomes and form professional educators ([Yulaika et al., 2020](#)). The teaching materials that are prepared and used must facilitate the delivery of the material, enabling students to understand it well and produce improved learning outcomes ([Sari & Yustiana, 2021](#)). The method that can be done is to prepare teaching materials that are interesting, relevant, motivating, and prioritize students' understanding of concepts, and are in accordance with previously established competencies ([Ilyas, 2019](#); [Yulaika et al., 2020](#)).

In line with the goals of education in Indonesia, there are efforts to equalize learning

containing religious values in various fields of knowledge in order to develop the potential skills and spiritual strength of students ([Hasanah et al., 2023](#); [Rahayu, 2021](#)). Learning containing religious values is considered capable of producing a generation of knowledge and good attitudes, because the Qur'an is a guideline that contains advice, lessons, and sources of all knowledge ([Nisa et al., 2016](#)). This also includes physics. In general, the study of physics is explained by the Qur'an and can be supported by existing physics theories ([Lizelwati & Chandra, 2019](#); [Mariska et al., 2025](#); [Mastuang et al., 2019](#); [Santoso et al., 2023](#)). The relationship between physics material and the verses of the Qur'an during the teaching and learning process is expected to foster faith and awareness of the greatness of His creation in students ([Aisyah, 2022](#)). According to [Zainuddin et al. \(2020\)](#), by studying the verses of the Qur'an in physics lessons, students can realize, understand, and recognize that the phenomena they experience can be related to the field of physics that students have studied and are signs of the greatness of Allah SWT, making learning more meaningful.

Facts on the ground indicate that the learning process in schools is minimal in applying various spiritual aspects of religion to physics learning; in this case, physics material is not linked to verses from the Qur'an. The teaching materials in schools only contain physics material and do not contain verses of the Qur'an, so that learning becomes less spiritually meaningful for students ([Aisyah, 2022](#); [Saputra & Advinda, 2018](#)). Based on the research of [Santoso et al. \(2023\)](#), it is known that physics teaching materials used in schools that contain spiritual aspects of religion, such as verses from the Qur'an, are very few and rarely used, meaning that learning is not explicitly related to religious aspects. Another problem is that some students have difficulty understanding physics material due to a lack of understanding of the concepts, and the learning models used are not diverse, namely, the direct learning model that emphasizes educators as the center of learning. The lecture method frequently employed by teachers makes students less accustomed to discovering knowledge independently. However, conceptual mastery is a crucial factor in successfully learning physics ([Bahrudin & Yogihati, 2022](#)).

This is in line with the results of preliminary research using the interview method at MAN 1 Banjarmasin; it is known that in the learning process at school, there is minimal integration of religious spiritual aspects in the form of verses of the Qur'an in physics material, and limited learning resources for students in the form of LKS that do not contain verses of the Qur'an. Learning models that are not varied and centered on educators make students less active, easily bored, and difficult to accept learning materials, so that the learning outcomes obtained by students are relatively low. This can be seen from the results of the initial test given at the beginning of physics learning for class XI MIPA 2, with an average score of 27.33, which indicates a fairly large gap due to the minimum completion criteria applied of 76.

There are various ways to create an effective classroom atmosphere for learning, one of which is the use of a generative learning model. The generative learning model is a learning model that emphasizes the active integration of existing knowledge in students with newly acquired knowledge. Generative learning requires students to be more active, allowing it to be implemented more optimally ([Lutfi, 2021](#)). The generative learning model tends to direct students to explore knowledge in depth, allowing them to obtain new knowledge based on previous knowledge, which is then interrelated with other knowledge ([Irwandani & Rofiah, 2015](#)). The advantages of this learning model are providing opportunities for students to exchange opinions and communicate the concepts learned, training students to respect each other's ideas and initial concepts put forward, being aware of misconceptions that occur in students and correcting each other in improving them, providing opportunities for students to develop their own knowledge, creating an active classroom atmosphere

because students can compare their ideas with the ideas of other students under the guidance of the teacher, and making teachers creative in constructing concepts to be learned and skilled in understanding students' perspectives ([Irwandani & Rofiah, 2015](#)). The physics material chosen is static fluid, which was introduced in the odd semester of grade XI. It is observed that this material can be taught using a generative learning model, as it involves achieving Basic Competencies, one of which is analyzing concepts.

The solution to the above problems is the need for teaching materials that incorporate the relationship between physics and the verses of the Qur'an, utilizing a generative learning model in their implementation. According to [Husna et al. \(2020\)](#), materials related to the Qur'an have the ability to enhance students' awareness of Allah's greatness, thereby improving their learning outcomes in an Islamic manner. Several studies have shown that learning with verses from the Qur'an is effective in increasing students' motivation, understanding, and learning outcomes ([Husna et al., 2020](#); [Khoiri et al., 2017](#)). Research ([Nurokhmah, 2019](#)) indicates that teaching materials, such as physics modules integrated with Al-Quran verses, aim to enhance cognitive learning outcomes and spiritual attitudes among students. These teaching materials can also be used in classroom learning so that students can practice religious teachings and increase their faith because they realize the relationship between physics material and the greatness of God who created it. In addition, students can integrate Al-Quran verses with physics concepts, allowing them to practice religious teachings and strengthen their faith by understanding the relationship between static fluid material and the greatness of God, who created it ([Zainuddin et al., 2020](#)).

Based on the above, a study was conducted entitled "Development of static fluid teaching materials containing verses of the Qur'an to improve student learning outcomes." The product developed is static fluid teaching materials containing verses of the Qur'an. The purpose of this study is to describe the feasibility of the teaching materials developed based on a review of the aspects of validity, practicality, and effectiveness.

METHODS

This type of research is a form of research and development (R&D) that is adapted based on the ADDIE development model. In this study, static fluid teaching materials containing verses from the Qur'an were developed, utilizing a research design as presented in Figure 1.

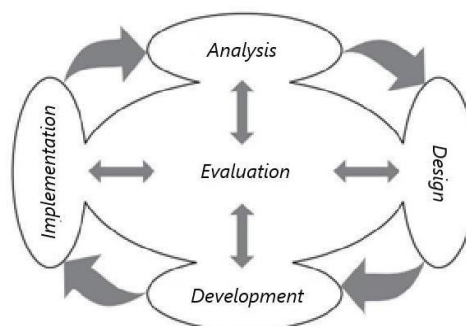


Figure 1 ADDIE development research design ([Peterson, 2003](#))

The first stage is analysis, covering three aspects: analysis of the curriculum used by MAN 1 Banjarmasin in the form of the revised 2013 curriculum; analysis of student characters who have an age range of 16-17 years and, based on Piaget's theory, the age of these students is at the formal operational stage, which indicates that students are able to think abstractly; and finally in the form of analysis of the characteristics of teaching materials, namely static fluid material containing material in the form of hydrostatic pressure, Archimedes' law, Pascal's law, and surface tension, capillarity, and viscosity.

Each subtopic material is associated with the appropriate verses of the Qur'an, namely QS. Ar-Rahman: 19-20, QS. Luqman: 31, QS. As-Shaad: 36, and QS. Al-Fatir: 12.

The second stage involves designing the developed teaching materials, which comprise a lesson plan, student worksheets, and teaching materials that include verses from the Qur'an and test learning outcomes. These steps involve designing learning activities. The third stage involved developing teaching materials, which included lesson plans, student worksheets, teaching materials containing verses of the Qur'an, and test learning outcomes. An assessment of the teaching materials and product revisions was then carried out. The fourth stage involves implementing teaching materials within the scope of small class trials and also in Class XI IPA 2 MAN 1 Banjarmasin for the 2022/2023 academic year. The fifth stage is the evaluation at each step of the activity; the use of teaching materials was evaluated, and their feasibility was measured based on validity, practicality, and effectiveness.

The trial design used was a one-group pretest-posttest design. The study was conducted in November 2022 on trial subjects, namely 21 students of class XI IPA 2 MAN 1 Banjarmasin in the 2022/2023 academic year. The purpose of this study was to determine the feasibility of static fluid teaching materials containing verses of the Qur'an to improve student learning outcomes, wherein, in its application, a generative learning model was used. During the study, the researcher played the role of a teacher.

Data collection was carried out by assessing the validity of teaching materials, response questionnaires, and learning outcome tests related to students' cognitive abilities. The teaching materials developed in the study were validated by three experts, consisting of two academic experts and one practitioner expert. The results of the validation assessment were calculated using the average value of the total score for each aspect of the assessment. The calculation results were then adjusted according to the assessment criteria, adapted from [Widoyoko \(2019\)](#) outlined in Table 1.

Table 1 Validity criteria for teaching materials

Average Score	Category
$X > 3.4$	Very good
$2.8 < X \leq 3.4$	Good
$2.2 < X \leq 2.8$	Fairly good
$1.6 < X \leq 2.2$	Poor
$X \leq 1.6$	Very poor

The reliability of the validation results was calculated using the Cronbach's Alpha equation, which was analyzed based on the reliability criteria, adapted from [Arikunto \(2014\)](#) shown in Table 2.

Table 2 Reliability assessment criteria

Reliability	
Coefficient	Criteria
$0.80 \leq r \leq 1$	Very good
$0.60 \leq r < 0.80$	Good
$0.40 \leq r < 0.60$	Fairly good
$0.20 \leq r < 0.40$	Poor
$0.00 \leq r < 0.20$	Very poor

Practicality is calculated by averaging the scores obtained based on the results of the lesson plan implementation sheet. The score results are adjusted to the criteria, adapted from [Widoyoko \(2019\)](#) in Table 3.

Table 3 Criteria for the practicality of teaching materials

Intervals	Criteria
$\underline{x} > 3.4$	Very Practical
$2.8 < \underline{x} \leq 3.4$	Practical
$2.2 < \underline{x} \leq 2.8$	Quite Practical
$1.6 < \underline{x} < 2.2$	Less Practical

The effectiveness of teaching materials is reviewed based on the pre-test and post-test results of students in the cognitive domain. The N-Gain score indicates the level of achievement in student learning outcomes after the application of the developed teaching materials; this score was categorized according to the levels outlined in Table 4.

Table 4 N-gain category

Value	Category
$g > 0.7$	High
$0.7 \geq g \geq 0.3$	Medium
$g < 0.3$	Low

Adapted from [Hake \(1998\)](#)

RESULTS AND DISCUSSION

This study aims to describe the process of developing teaching materials and to analyze the feasibility of these materials in improving student learning outcomes in static fluid materials using a generative learning model. According to [Rochmad \(2012\)](#), to obtain quality development results, an assessment is needed that includes three criteria, namely validity, practicality, and effectiveness. Therefore, the developed teaching materials are required to undergo a feasibility test, including a lesson plan, teaching materials containing verses of the Qur'an, student worksheets, and test learning outcomes. The following is a description of the results of developing the teaching materials.

In this study, the ADDIE model was used, which includes the stages of analysis, design, development, implementation, and evaluation. The first stage is analysis, which includes analysis of the curriculum applied at MAN 1 Banjarmasin, namely the Revised 2013 curriculum; analysis of student characteristics at the formal operational stage; and analysis of the teaching materials used, namely static fluids containing Al-Quranic verses. The second stage is the design stage, which involves designing teaching materials in accordance with the analysis results and the set learning objectives, as well as preparing assessment instruments to collect research data.

The third stage of development involves preparing teaching materials, which are then validated by validators, namely academic experts and lecturers. Practitioner experts, on the other hand, are conducted by physics subject educators at MAN 1 Banjarmasin. Product deficiencies can be identified through validation, allowing for improvements to be made. Revisions are made after receiving input and criticism from validators. After revisions, the teaching materials can be tested on students. The appearance of the development product's results, presented in the form of teaching materials containing verses from the Qur'an, is shown in Figure 2.

The developed teaching materials must create interesting learning so that students do not easily forget the material taught, or in other words, create meaningful learning, foster learning motivation in students, be relevant to the learning material, and make it easier for teachers to apply it ([Magdalena et al., 2020](#)). According to Mahmud (2011), as cited in [Gayari et al. \(2019\)](#), teaching materials in the form of student books are an important element in implementing the teaching and learning process in the classroom, essential for achieving learning objectives. In this case, the developed teaching materials must be able

to combine physics materials, specifically static fluids, with verses from the Qur'an in an engaging manner, allowing learning objectives to be achieved effectively after being assessed by three experts, consisting of two academic experts and one practitioner expert. A learning medium is considered valid if it meets the established criteria, namely when the test results are in accordance with the specified standards ([Nurfiriani et al., 2023](#)). The following is a description of the results of the development of teaching materials, the results of the trial, and their discussion.



Figure 2 Development of a product in the form of teaching materials containing verses from the Qur'an

Validity is a measure that is able to show the level of validity of a development and can be said to be valid or good if it is categorized as at least valid or good enough using an assessment instrument that is able to measure what is desired ([Arikunto, 2010](#)). While validation is an activity carried out to obtain approval in a study based on certain criteria, it was validated by a team of experts or validators ([Gonibala et al., 2019](#); [Ridho et al., 2020](#)).

The lesson plan developed is based on the revised 2013 curriculum and employs a generative learning model. Its validity was tested based on several assessment aspects, including the format, language, and content of the lesson plan, as shown in Table 5.

Table 5 Results of lesson plan validation

Aspect	Validity		Reliability	
	Value	Category	r11	Category
Lesson plan format	3.48	Very Good	0.81	Very Good
Language used in the lesson plan	3.42	Very Good		
lesson plan contents	3.67	Very Good		
Average	3.52	Very Good		

Based on the results of the average validity of the lesson plan above, it is known that the lesson plan developed obtained a very good category in terms of format, language and content and has a very good reliability coefficient, so it can be said that the lesson plan developed has met the good lesson plan category because it is in accordance with

Permendikbud number 22 of 2016 concerning the format for making lesson plan with the 2013 curriculum, in accordance with the rules for using good and correct Indonesian, and has complete content and is able to describe the learning model used ([Akbar, 2017](#); [Daryanto & Cahyono, 2014](#)). The validity test of teaching materials contains two assessment aspects, namely the content and appearance of the teaching materials; this is included in Table 6.

Table 6 Results of validation of teaching materials

Aspect	Average Score	Category
Content	3.29	Good
Appearance	3.44	Good
Validity	3.37	Good
Reliability	0.64	Good

Based on the results of the average validity of the teaching materials above, it is known that the teaching materials developed have a good category in terms of content and appearance, and have a good reliability coefficient, so it can be said that the teaching materials developed are classified as good. In line with the opinion of Kurniawan et al. (2017) and Marlina et al. (2020), as cited in [Ariyanti et al. \(2022\)](#), teaching materials that have attractive content and appearance can increase students' learning motivation. This can be done by adding images that are in accordance with the material being studied and directing students to solve existing problems based on previously acquired knowledge.

Student worksheets are presented in the form of experimental worksheets, each related to the material taught. For example, student worksheets 1 cover hydrostatic pressure, student worksheets 2 explore Archimedes' law, and student worksheets 3 examine surface tension, viscosity, and capillarity. The validity test of student worksheets encompasses several assessment aspects, including content (organization, language, and content of the Qur'an verses) and appearance (attractiveness, format, and size and shape of letters), as listed in Table 7.

Table 7 The student worksheets validation results

Assessment Aspect	Average Score	Category
Content	3.57	Very good
Appearance	3.72	Very good
Validity	3.65	Very good
Reliability	0.77	Good

Based on Table 7, it is known that the developed student worksheets has an average validity category of very good. This is in line with the opinion of [Salimah et al. \(2019\)](#) that student worksheets is said to be valid if it meets the didactic requirements, construction requirements, and technical requirements. The language used in the developed student worksheets is in accordance with good and correct Indonesian language rules, is easy to understand, does not cause double interpretation, and is in accordance with the cognitive development of students, so that this is in accordance with the construction requirements. Construction requirements include vocabulary, sentence structure, language use, level of difficulty, and clarity in the student worksheets ([Astriani, 2020](#)). In terms of appearance, the student worksheets receives a very good category, indicating that it has an attractive and simple design, which is a key technical requirement. This is in accordance with the statement by [Salimah et al. \(2019\)](#), which states that the student worksheets format aspect describes the appearance of a well-designed student worksheet, using attractive colors and motivating students. This also includes the formulation of indicators, text and image illustrations, appropriate font types and sizes, and printing with good quality; these are included in the technical requirements.

The validity results of the student worksheets have a good category reliability coefficient. This means that the assessment of the three validators has a very high level of confidence because the three validators have assessments that are not much different in each aspect of the assessment. Therefore, these student worksheets can be said to be reliable and feasible and can be tested by teachers in the classroom.

test learning outcomes is an assessment and measurement of student learning outcomes, especially related to cognitive assessments related to mastery of the material that has been taught, and in accordance with the learning objectives to be achieved (Fauzi, 2017) in (Aisyah, 2022). The validity test of test learning outcomes encompasses all aspects of assessment, including general construction and language, as outlined in Table 8.

Table 8 Test learning outcomes validation results

Review Aspect	Validity		Reliability	
	Value	Category	r11	Category
General Construction	3.63	Very Good	0.81	Very Good
Language	3.67	Very Good		
Average	3.65	Very Good		

Based on Table 8, it is known that the validity of the test learning outcomes is categorized as very good with a very good reliability coefficient. This indicates that all questions contained in the test learning outcomes are in accordance with the learning objectives and apply good and correct Indonesian language rules (Daryanto & Cahyono, 2014), meeting the general construction and language requirements (Osna et al., 2016) as outlined in Salimah et al. (2019).

The practicality of teaching materials refers to the ease of use for users after the materials are applied in the teaching and learning process (SC et al., 2020). In addition, the quality of teaching materials is also reflected by the practicality of the teaching materials developed (Marlina, 2021) in (Aisyah, 2022). This data can be analyzed from the lesson plan implementation sheet (Widoyoko, 2016) in (Qalbi et al., 2019). In this study, the practicality of teaching materials was measured through the implementation of the lesson plan, using an implementation sheet completed by three observers. The observers filled in the observation sheet, which contained learning steps according to the lesson plan, and included a score column ranging from 1 to 4, along with a notes/suggestions column. The assessment of the lesson plan implementation was conducted in three meetings. The results of the calculation for implementing the lesson plan are presented in Table 9.

Table 9 Results of the calculation of the lesson plan implementation

Learning Model	Observation Aspect	Meeting					
		1		2		3	
		Value	Cat	Value	Cat	Value	Cat
Generative Learning	Phase 1	3.38	P	3.57	VP	3.57	VP
	Phase 2	3.42	P	3.50	VP	3.50	VP
	Phase 3	3.47	VP	3.53	VP	3.67	VP
	Phase 4	3.50	VP	3.50	VP	3.67	VP
	Phase 5	3.11	P	3.44	VP	3.56	VP
	Closing	3.47	VP	3.60	VP	3.67	VP
Overall Average		3.39	p	3.52	VP	3.60	VP
Coefficient Reliability		0.60	Good	0.76	Good	0.60	Good

Information: VP = Very Practical, P = Practical, Cat= Category

In each meeting, the teacher uses a generative learning model, the syntax of which has 5 phases, namely: (1) recall, (2) challenge and confrontation, (3) reorganization of the conceptual framework, (4) application and consolidation of concepts, and (5) reflection ([Zainuddin & Suriasa, 2014](#)). Meeting 1 discusses the material on hydrostatic pressure, Meeting 2 discusses material related to Archimedes' law, and Meeting 3 discusses surface tension, viscosity, and capillarity.

Based on the results of observations of the lesson plan implementation in Table 9, it is evident that the teaching and learning process has been in accordance with the syntax of the generative learning model. In addition, it is known that from meetings 1 to 3, the average is categorized as practical/very practical and has a good reliability coefficient, which means that the lesson plan developed is suitable for use by teachers in the learning process ([Purwanto, 2016](#)). Teachers strive to ensure that each stage is carried out properly, allowing learning to occur in both directions.

The effectiveness of teaching materials is the standard of educational quality that can be measured based on the achievement of a learning objective derived from the learning outcome test ([Rohmawati, 2015](#)). In this study, a learning outcome test was administered in the form of 5 descriptive questions, which were administered to students before the learning process began, using the developed teaching materials as a pre-test. The students were retested after learning activities were carried out using the developed teaching materials as a post-test ([Nurhaliza, 2018](#)). The effectiveness of teaching materials can be measured from the analysis of the pre-test and post-test of student learning outcomes. The questions consist of one C3 question, one C4 question, and three C5 questions. The results of the learning outcome test are used to calculate the N-Gain value. This is in line with [Astriani \(2020\)](#); the results of the pre-test and post-test are needed to measure N-Gain to determine effectiveness. Of the 34 students, 21 of whom were able to take both the pre-test and post-test, an N-gain value of 0.69 was obtained, indicating moderate effectiveness, as presented in Table 10.

Table 10 Student test results through pre-test and post-test

Average Pre-test	Average Post-test	N-Gain	Criteria
27.33	77.38	0.69	Medium

Based on Table 10, the results of the pre-test of students were 27.33 in the low category. After the material was taught using the developed teaching materials, the test learning outcomes were retested, and the post-test results for students were 77.38 in the moderate category, while the n-gain results were 0.69 in the moderate category. This shows an increase in student learning outcomes after the application of the developed teaching materials. This is in line with research ([Mulyana et al., 2018](#)), where the pre-test score increased after being given treatment; this is evident in the post-test results obtained by students. Thus, the use of developed teaching materials in learning can improve student learning outcomes in the moderate criteria.

CONCLUSION

The teaching materials, which contain verses from the Quran and are developed to improve student learning outcomes, are suitable for use in learning activities. This is based on the n-gain of 0.69, which is categorized as moderate. Furthermore, the results of the data analysis indicate that the teaching materials created meet the criteria of validity, practicality, and effectiveness. The implications of this research are to help create more effective physics teaching materials by incorporating verses from the Quran, as well as to enhance understanding of the importance of integrating science and religion in the learning process.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS STATEMENT

All authors have contributed to the conceptualization, methodology, formal analysis, investigation, and writing of this article.

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