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DEVELOPING ISLAMIC PHYSICS MATERIAL USING ADDIE MODEL BASED ON CURRICULUM PERSPECTIVE

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ABSTRACT

Recently, many physics books have been developed for Senior High Schools. However, physics books based on Islamic values are rarely developed. Therefore, this research wants to develop an Islamic physics book as enrichment material using a systematic and systemic approach of ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). In developing these lesson materials, five physics teachers and five physics lecturers, as well as 20 senior high school students were involved. In the analysis phase, the researcher used self-evaluation to ensure the appropriateness of the analysis. In addition, researchers also use expert appraisal on prototypes I and II. After the try out, the teacher interviewed the potential users of the lesson materials and also distributed questionnaires to the students. The results of basic competency analysis (KD), national education goals, local contents, and other results are used for the design phase. In this phase, prototype I was developed in the form of a table of contents, and then prototype II was developed in the form of a number of chapters involving one religion lecturer. Furthermore, these chapters were tried out to see how far the developed book was practically used. In the final phase, the researcher evaluates the results of the development book in terms of validity, practicality, and effectiveness. The results show that the lesson material is valid because it contains up-to-date material, has important components as a learning material, and its components are strongly linked with each other. Meanwhile, its practicality shows that the book is easy to use in the teaching and learning process. The lesson material is also very effectively used in learning physics. In conclusion, using the ADDIE model improves the quality of the lesson material.

Keywords*: Islamic-based physics, lesson materials, ADDIE model, curriculum, teacher lecturer collaboration*

1. INTRODUCTION

In this day and age, there is a desire by the government to develop curriculum and curriculum products based on local knowledge, including physics books. Moreover, the Aceh government has long implemented Islamic law and is given privileges in the fields of education, customs, and religion. Therefore, it is necessary to develop books that help achieve this goal, including physics books. The development of physics books here does not mean that physics books that already exist in schools or madrasas cannot be used as teaching materials in schools or madrasahs. However, the physics books that have been circulating so far and sold on the market generally have not fully reflected local knowledge, so the students have lost knowledge of their own culture in their learning.

Sahriani et al. (2021), explained that the increase in science literacy among high school students can be done using appropriately developed science books, so there is a significant increase in science literacy. Furthermore, the high school physics' textbook based on Batak Language Budaya has met valid, practical, and effective criteria (Lubis et al., 2021). The same thing was also conveyed by Gribova et al. (2021), significantly and practically updating the methodological support of primary school education in the Russian Federation. In addition, Drljača et al. (2017) also explain that the use of textbooks for physics learning can improve conceptually. In addition to student understanding, it also meets the student's character, discipline, curiosity, communicative, and independence by using the ADDIE model. Finally, Zulkarnaini et al. (2022) also revealed that the development of teaching materials carried out by Abulyatama University lecturers is to ensure the quality of teaching materials in supporting the effectiveness of learning in each current semester. The development of physics material is not only seen from a curriculum perspective, but this development can also be carried out through other approaches, as expressed by Zulkarnaini et al. (2020). He said that learning through Phet simulation was better than conventional learning. Still, Zulkarnaini (2018 and 2019) also explains that there is an influence of the Make a Match learning model on development results, including the development of physics, which can be done using a virtual laboratory.

Therefore, the researcher felt the need to design and develop Islamic and locally based physics supplement books in a collaborative way that directly involved potential users. In the design and development of physics books, the author reviews them in terms of the validity of the designs and practicality of their use, both of which are locally based. The government in this case has provided opportunities for regional parties to formulate and determine a curriculum that is in accordance with the characteristics of the region concerned, both culturally, socially, and economically.

Regarding validity and practicality, both in the design and use of physics books, curriculum experts Akker and Nieveen (1999; 2009) explained that the quality of a curriculum product such as books can be seen from the extent to which the content is valid, practical in its use, and effective for the achievement of student learning goals. However, in this article, the author wants to know the effect of using the ADDIE model on the validity of local-based physics book designs and the practicality of using local-based physics book designs. However, in this article, the author wants to find out how the use of the ADDIE model influences the validity of locally based physics book designs and the practicality of using locally based physics book designs. As stated by Drljača et al. (2017), the ADDIE model proved itself to be a very useful learning model in the preparation of traditional teaching materials, and there is a strong intention to use this model for electronic and online teaching materials. then Zulkarnaini, et al. (2022) said that the development of teaching materials was carried out by lecturers at Abulyatama University through the use of the ADDIE model to ensure the

quality of teaching materials and support the effectiveness of learning in each semester.

2. LITERATURE REVIEW

The following is a review of the curriculum and its functions, and previous studies related to curriculum development, especially subject matter with an Islamic style.

2.1 Curriculum Representation

Table 1 describes the six levels of curriculum representation proposed by Thijs and Akker (Eds) (2009), as cited by Thijs and Akker, ranging from ideal, formal, perceived, operational, experiential, to learned levels.

Table 1 Curriculum Representation

Levels (tier)		**Representation** (representativeness)
Intended	Ideal (Which is in the head of the curriculum developer, according to the vision, philosophy of the country, etc.)	Vision (rationalization or philosophy underlying a curriculum)
	Formal/Written (written)	Desires contained in curriculum documents and learning materials.
Implemented	Perceived (perceived)	A curriculum that is understood by its implementers, such as teachers.
	Operational (operated/worn)	Curriculum applied in the classroom.
Attained	Experiential (Experienced by students)	The learning experience experienced by students who study with the curriculum.
	Learned (which students achieve through tests)	The scores of the students' test results.

Based on the level of curriculum representation in Table 1 above, it can be understood that textbooks are at level 2, which is the formal/written level. The content of the formal level is of course very dependent on the ideal level, because it concerns the wishes of the government which are then poured in written form.

2.2 Quality Curriculum Product Criteria

As a curriculum product, a textbook need to be evaluated based on the criteria of a good curriculum product. The criteria of a curriculum product have been developed by a number of experts (Nieveen, 1999), which are based on six levels of curriculum representation developed by Goodlad (1994) and revised by van den Akker (1999). The criteria are validity, practicality and effectiveness.

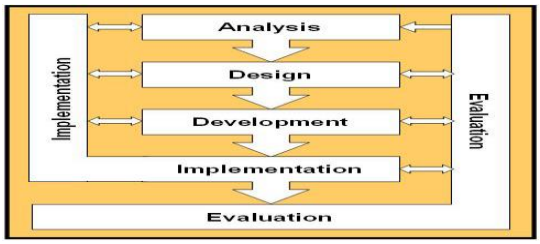
Table 2. Curriculum Product Criteria

Curriculum Level		Criterion
Intended	Ideal	Validity
	Formal /written	
Implemented	Perceived	Practicality
	Operational (used in class)	
Attained	Experiential (experienced)	Effectiveness
	Learned	

As mentioned in Table 2 above, the three criteria of a curriculum product (validity, practicality, and effectiveness) are assessed in various levels of curriculum representation, ranging from ideal level to learned level. This is done to strengthen the quality at each of these levels. Validity is intended to assess curriculum products at an ideal and formal level. Practicality is at the perceived and operational level, and effectiveness is experience and learning or reaching the level.

In terms of validity, it is necessary to evaluate whether the curriculum is valid in terms of what it is intended and what is written. While, the validity itself is divided into content and construction validity. With the validity of the content, it is necessary to see if the curriculum has important components (for example, objectives, learning materials, learning activities, and evaluations). Next, the validity of the construction talks about whether the components of the curriculum are consistently related to each other.

Furthermore, practicality is related to whether the curriculum is practical when used in the teaching and learning process. This can be understood from the user or implementer of the curriculum. Last is effectiveness, which is about whether the curriculum is effective for use in learning as experienced by students. All findings resulting from the three criteria will be taken into account in revising curriculum products.



1. Analysis of needs and context, literature review, and conceptual framework development.
2. The results were used to design a Prototype 1 book, starting from the table of contents.
3. The design continued with the development into Prototype 2, and Prototype 3.
4. Prototype 3 tested implementation (Implementation).
5. The last step is to evaluate (Evaluation) the book: formative & summative.

2.3 Development of Islamic Physics Materials

A number of previous studies have also been carried out to strengthen efforts to build Islamic character for students through physics learning based on science-Islamic integration, such as Khoiri, Agussuryani, and Hartini (2017), Husna, Hasan, Mustafa, Syukri, and Yusrizal (2020), and Asysyifa, Sopyan, and Masturi (2017). All of these studies reveal the application of learning based on science-Islamic integration using developed materials that can improve learning outcomes and Islamic character in the form of honesty and student cooperation in physics subjects. Of course, these Islamic values really need to be instilled in today's younger generation through Physics textbooks or by developing existing textbook supplements. If this is done, Islamic values will be continuously transmitted through all disciplines, including the field of science.

Based on the positive results of previous studies, this Research & Development (R&D) research seeks to develop Physics learning materials for high school students in Aceh by integrating Islamic values. This is done by involving education stakeholders in the hope of providing higher quality results. According to curriculum experts, a quality curriculum product must be viewed from three things, namely validity, practicality, and effectiveness. In short, the quality of a curriculum product produced can be seen from the curriculum components reflected in the supplement book, starting from the objectives, materials, and evaluation. It is also important to see how the entanglements between these components are. Furthermore, it is also seen the element of practicality, namely ease and pleasure in its use by its users. Equally important should also be seen is the effectiveness, that is, the extent to which the ease with which the supplement book is used by students in achieving learning objectives, which in this study is a Physics lesson.

He added that the use of textbooks for physics learning can improve conceptually. Not only student understanding, but also fulfilling the student's character, discipline, curiosity, communicative, and independent. On that basis, the presence of proposals using this model is expected to produce a supplement design for the Madrasah Aliyah Physics textbook using a number of stages, such as ADDIE theory (Analysis, Design, Development, Implementation, Evaluation). So, this research turned out to be very supportive of our next research, especially the development of Physics material education with Islamic enrichment in Aceh.

3 METHODS

This research uses a Research and Development (R&D) approach. This approach is important to use in order to evaluate existing subject matter and develop subject matter that is more relevant for Physics education. Not only that, this research is also very suitable for the education of the younger generation in Aceh as well as an emphasis on Islamic character education. However, in this study, the authors only focused on supplementing the subject of Islamic Physics which was used as an addition to the books already used in high schools, such as the results of interviews with researchers involving staff from the Department of Education and Culture & Ministry of Religion, lecturers, teachers, students so as to produce Islamic Physics which developed using the ADDIE model. Thus, this supplement will become an enrichment material for physics textbooks in high schools in Aceh, Indonesia..

To produce the supplement design of the high school physics textbook in question, researchers used a number of stages, such as ADDIE theory (Analysis, Design, Development, Implementation, Evaluation) (McKenney, 2018). As for the model in question, it can be seen in the following figure:

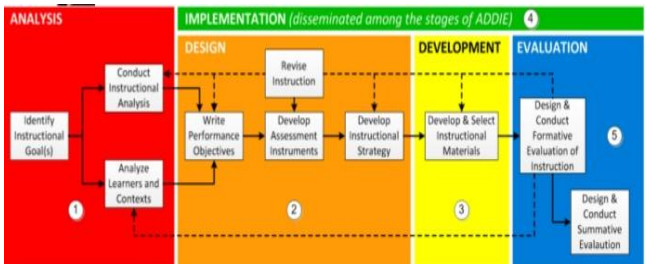


Figure 1. The ADDIE model in the development of physics supplements

First, analysis of needs and context, literature review, and conceptual framework development. Second, the results will be used to design (Design) Prototype 1 book, which is in the form of a table of contents. Third, the existing design continued with the development into Prototype 2, and Prototype 3. Fourth, Prototype 4 is tested for implementation. The final step is to evaluate the book. However, formative and participatory evaluations are carried out at each stage. In evaluating each prototype of a physics lesson enrichment book supplement, this study used two criteria such as validity and practicality.

In the development of the physics book in question the author will involve a number of parties, as shown in Table 3 below:

Table 3. Summary of data collection and participants

Criterion	Instruments and Participants					
	Self-evaluation	Expert appraisal	Question-naire	Interview	Try-out	FGD
Validity	Researc h-ers	Staff of Dinas Dikbud & Kemena g, Lecturer s	Teacher	Lecturers and teachers	Teachers and Lecturers	Research-ers, staff of Dinas Dikbud & Kemenag, lecturers, teachers, students
Practi-cality			Teacher	Lecturers and teachers	Teachers & Lecturers	

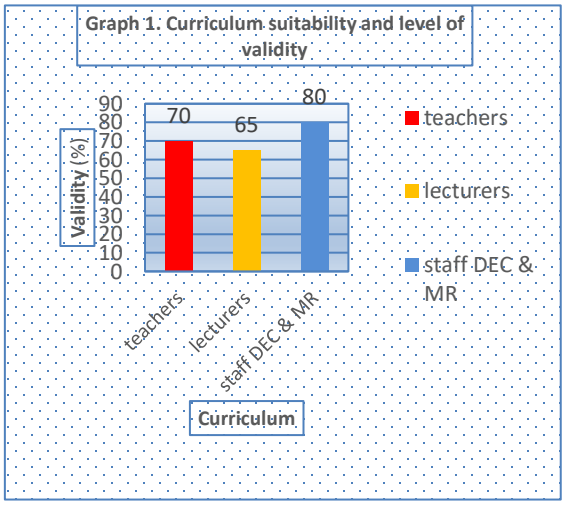
Data collected from expert appraisals will be analyzed using the Miles and Huberman (1994) framework in Lau et al. (2018) ranging from reducing interview texts, verification, and making conclusions. Meanwhile, the Likert scale questionnaire data from the questionnaire will calculate the percentage of response tendency of students taking Physics subjects.

Focus Group Discussion (FGD) will also be held towards the end of the completion of the book. This was done to obtain opinions from all participants about the Physics textbook being developed. The FGD forum made an assessment based on three criteria, namely validity and practicality as previously described.

4 RESULTS & DISCUSSION

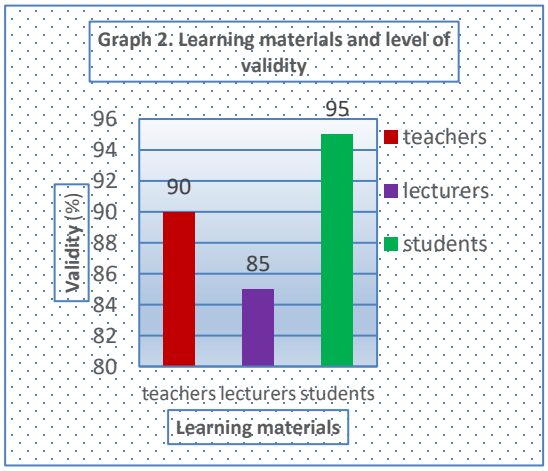
This research focuses on the development of Islamic Physics material which serves as an addition to books that have been used in high schools (SMA). Thus, this supplement will serve as an enrichment material for physics textbooks at high schools in Aceh, Indonesia.

The validity of the development of Islamic Physics material is evaluated by the researcher himself using self-evaluation. Furthermore, the Education and Culture Office and the Ministry of Religion (Kemenag) were involved in supplying information about the government's expectations for physics lesson supplements carried out by teachers and researchers. Furthermore, teachers and lecturers also give opinions on validity. It turned out that the teachers involved viewed that the supplement book had high validity because it contained physics material based on local and Islamic knowledge. Furthermore, the components of the book such as objectives, materials, delivery methods, and assessments are closely related. This is as shown in the graph 1 below;



from the graph 1 it can be seen that the validity level for 3 respondents regarding local knowledge-based curricula and Islamic physics obtained each validity value as follows, namely 60% from physics lecturers at USK and Abulyatama University, 70% from physics teachers at MAN Model Banda Aceh and 80% of DEC & MR staff.

while what physics learning materials are written in the curriculum are in accordance with the important components contained in the development of Islamic physics books, for example related to objectives, learning materials, learning activities, and evaluation. Meanwhile, the desires contained in curriculum documents and learning materials are consistently related to one another so that it makes it easier for students to understand physics. For more details can be seen in graph 2 below.



Meanwhile, to evaluate the practicality of the Physics lesson supplement that is being developed, teachers and lecturers are also involved. Their opinions and experiences in using the book will be used to improve the quality of the product to make it easier to use or user-friendly. In this case, 5 lecturers who have expertise in the field of physics supplements and teach the course from two different universities, namely the teaching faculty in Aceh Besar and Darussalam. Lecturers in these two teaching faculties are involved in evaluating one by one about the practicality of the physics lesson supplement chapter. They were interviewed to understand their perception of the extent to which physics lesson supplements could be used with ease. In addition, teachers also distributed questionnaires about their perceptions and experiences in learning to use (try-out) the book. The result is that teachers view this book as easy to use in the teaching and learning process in the school where he teaches.

5 CONCLUSION

Based on the discussion above involving several participants, it can be concluded as follows: (1) The teachers involved consider that the supplement book has high validity because it contains physics material based on local and Islamic knowledge, (2) The components of the book such as objectives, materials, delivery methods, and assessments are closely related, and (3) Teachers consider that this book is easy to use in the teaching and learning process in schools.

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