

Impulse and Momentum Linear Teaching Materials with Al-Quran Verses to Practice Problem Solving Skills of Students: Practicality and Effectiveness

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Abstract

This study aims to describe the practicality and effectiveness of impulse and linear momentum teaching materials containing verses of the Koran to train students' problem-solving skills. This research is research and development (R&D) using the ADDIE model and tested on 12 students of class X MIPA 1 MAN 2 Banjarmasin. Data collection was obtained through a questionnaire instrument for student responses, and a test of students' cognitive learning outcomes and analyzed descriptively quantitatively. The results showed that: (1) teaching materials obtained a fairly practical category with a score of 2.48, (2) teaching materials obtained in the less effective category the N-gain value is 0.13 with a low category. It was concluded that the teaching materials were quite practical but not effective for practicing problem solving skills

Keyword: effectiveness; linear impulse and momentum; practicality; problem solving skills; teaching materials.

INTRODUCTION

Minister of Education and Culture Regulation No. 36 of 2018 concerning the 2013 Curriculum which is designed to develop spiritual and social attitudes, knowledge, and skills and apply them in various situations in schools and communities. Spiritual attitude is an attitude related to morals that is able to provide understanding to distinguish what is right and wrong based on faith and piety to God Almighty (Aslamiyah et al., 2017; Atika, 2014; Wati et al., 2020). The 2013 curriculum was developed in such a way that every educator is expected to be able to integrate the competence of spiritual attitudes related to the formation of students who are faithful and pious (Marlina et al., 2021b; Oviana, 2015). Every teacher who implements the 2013 curriculum must be able to present material and learning processes that lead to the achievement of core competencies, namely spiritual attitudes (Komalasari, 2018; Mastuang et al., 2019).

Problem solving ability is an important aspect, because it can motivate students to

make the best decisions when facing problems in their lives (Setianingrum et al., 2016; Susilowati et al., 2020; Thersia et al., 2019). If students have the readiness to face problems in learning, they will also be able to prepare mentally in dealing with various problems in their lives (Cahyani & Setyawati, 2017; Devanti et al., 2020).

Problem solving is divided into four areas, namely: 1) defining the problem, where students are able to show evidence that they have identified a particular topic, and make an argument as to why they chose that topic. 2) planning problems, where students are able to identify variables, separate variables, do brainstorming, select appropriate materials and develop questions. 3) problem execution, where students are able to show evidence that they have collected the right data and chose the right delivery technique. 4) problem evaluation, where students are able to find errors in the data, their causes and possible solutions. They also have to find solid evidence to support their conclusions (Solihah, 2019).

There is a problem at MAN 2 Banjarmasin, namely the low problem-solving

skills in answering written assignments for physics subjects for students of class X MIPA 1. Problem solving skills can be seen from the answers to students' written assignments on application questions, no students define the problem, it is obtained 75% of students who plan problems, 46% of students who execute problems, there are no students who evaluate problems. The number of students in class X MIPA 1 Banjarmasin is 35 people consisting of 11 boys and 24 girls with an age range of 14-17 years. This age is included in the formal operational stage category based on cognitive theory (Ali & Asrori, 2014). Piaget, where students should be able to think logically and be able to solve problems even though they are still simple. Based on the findings in the field that the learning process rarely contains spiritual aspects with learning materials. And the existing books only contain physical material without being related to the spiritual aspects of the verses of the Qur'an. Coupled with the COVID-19 pandemic, where learning is carried out remotely.

Based on the results of the initial research, it is considered interesting to train students' problem solving abilities, especially in physics material. One way that can be done so that students are trained in solving problems is through guidance from the teacher according to the supporting learning tools (Amrita et al., 2016; Izzati et al., 2020). One of the material for SMA class X even semester is Linear Impulse and Momentum. In this material there are many mathematical calculations or analyzes used in solving physics problems, so it is very suitable to be applied to practice students' problem solving skills. with Basic Competence to be achieved in the material of impulse and linear momentum is applying the concepts of momentum and impulse as well as the law of conservation of momentum in everyday life. Also, presenting the results of testing the application of the law of conservation of momentum, for example a ball in free fall to the floor and a simple rocket. Impulse material and linear momentum, many events that occur in everyday life are related to impulses, momentum and collisions, so that the material will be easily understood by students. Impulse

and linear momentum material is not only taught through the delivery of information, but it is necessary to carry out experimental or experimental activities where students learn in research groups so that students can understand the material being taught in more depth. So based on the description of the problem above, one of the efforts that can be made to overcome these problems is to develop teaching materials containing verses of the Qur'an on impulse and linear momentum material to train students' problem solving skills.

Several previous studies have conducted research by integrating the Qur'an in physics learning. The results of this study indicate that learning that is integrated with the Qur'an can improve student learning outcomes (Aslamiyah et al., 2017; Mastuang et al., 2019; Miriam et al., 2022; Nurhafizah et al., 2015; Wati et al., 2020) and student problem solving skills (Komalasari, 2018; Suhendi et al., 2022). Other research also shows that the development of physics teaching materials containing verses from the Koran is effective and practical in improving student learning outcomes and other skills (Chandra & Lizelwati, 2022; Marlina et al., 2021a; Wati et al., 2020).

This research is the development of impulse and linear momentum teaching materials containing the verses of the Qur'an to practice problem solving skills. This teaching material seeks to meet the demands of basic competencies that are integrated with verses of the Qur'an, so as to fulfill basic competencies, as well as increase students' religious, as well as students' problem solving skills. This article aims to describe the practicality and effectiveness of the developed teaching materials, namely impulse and linear momentum teaching materials containing the verses of the Qur'an to practice problem solving skills.

METHOD

The development model used in the development of impulse and linear momentum teaching materials containing the verses of the Qur'an to practice problem solving skills is the ADDIE development model. The following steps are used in the research in Table 1

Table 1 Stage of ADDIE

Stage	Activity
Analysis	Competency analysis, analysis of student characteristics, and analysis of teaching materials.
Design	Designing teaching materials containing verses of the Koran to practice problem solving skills.
Development	Develop teaching materials, carry out validation, and carry out simulations.
Implementation	Application of teaching materials developed to determine the effectiveness and feasibility of teaching materials. Implementation was carried out on students of class X MIPA 1 MAN 2 Banjarmasin.
Evaluation	Formative evaluation is carried out to collect data at each stage carried out for refinement and summative evaluation is carried out at the end of the program to determine its effect on student learning outcomes and the quality of learning in order to obtain teaching materials with the desired specifications.

The subject of research is teaching materials containing verses of the Koran. In the initial data collection section, a test was carried out to determine the level of problem solving skills of students.

Teaching materials have been validated and show valid results. This article focuses on practicality and effectiveness. Practicality seen from the student response questionnaire. Student response questionnaires were given by submitting 20 statements containing statements that were positive or negative with a vulnerability in filling out the questionnaire from strongly agree to strongly disagree to determine the level of practicality of the teaching materials developed. Practicality is analyzed using percentages and categorized into very practical, practical, enough, poor, and

impractical.

Effectiveness is reviewed from the pretest and posttest. The test is carried out by giving questions that contain indicators of problem solving skills as many as 6 questions. Questionnaires and tests are carried out online by distributing a google form link to students. The data analysis technique was carried out from the results of the validation sheet assessment with a minimally valid category (Widoyoko, 2016), to measure the practicality of teaching materials based on a response questionnaire with a minimally practical category, and effectiveness based on the N-Gain obtained from the pretest and posttest results (Hake, 1998).

RESULT AND DISSCUSSION

The product developed is in the form of impulse and linear momentum teaching materials containing Al-Quran verses to train students' problem solving skills. The results of the development of teaching materials are used to support the process of teaching and learning activities according to the characteristics of students and the characteristics of the impulse and linear momentum material for class X SMA in even semesters. For the cover and content of teaching materials, see Figure 1 and Figure 2.



Figure 1. Display of Teaching Material Cover

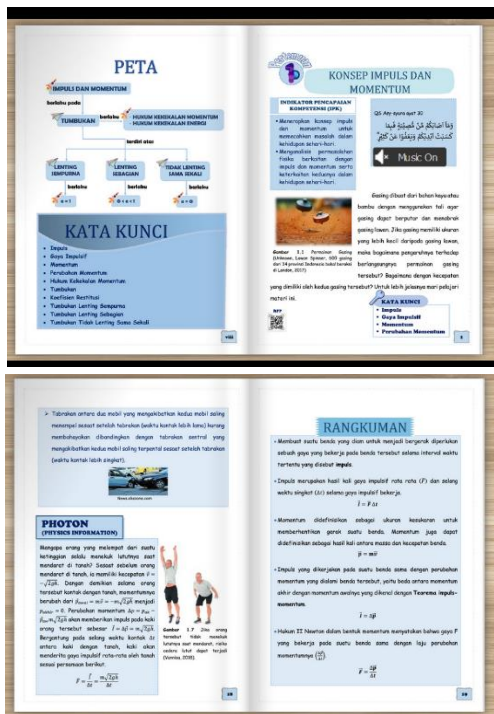


Figure 2. Display of Teaching Material Content

The teaching materials have been tested for validity by practitioners and academics. The results of the validation of the teaching materials that were developed were stated in the very good category. These results indicate that the teaching materials developed are valid. The reliability results obtained are in the high category (Azhary et al., 2021).

Practicality

The practicality of the teaching materials developed were reviewed based on the results of the student response questionnaires distributed through the goggle form as shown in Table 3.

Table 3 Practical Results of Teaching Materials

No	Indicator	Average	Category
1	Benefit	2.36	Enough
2	Efficiency	2.95	Practical
3	Convenience	2.49	Enough
Total Average		2.48	Enough

There were 13 students who filled out the response questionnaire as test subjects. Questionnaire statements are prepared based on standard aspects that determine whether teaching materials are practical or not, namely from the benefits of digital teaching materials, efficiency in using digital teaching materials,

ease of use of digital teaching materials and the use of digital teaching materials to improve problem solving skills.

The aspect of the convenience of digital teaching materials based on the average score per aspect obtained a practicality value with a fairly good category. The indicators developed in this aspect of convenience are regarding the ease of digital teaching materials to assist students in understanding the subject matter, Thus, this teaching material can be used as a reference in learning impulse and momentum. such as the use of language, size and form of writing, the ease of accessing digital teaching materials, and the ease of accessing the features provided in the program. digital teaching materials.

Aspects of the benefits of digital teaching materials based on the average score per aspect obtained practical values in the good category. The indicators developed in this aspect of benefit can be seen from regarding the use of digital teaching materials in physics learning activities (Hidayat et al., 2021), such as can these teaching materials help students understand the material, understand the concepts/principles/laws of physics independently, and make students motivated and not bored in learning (Dewantara et al., 2019). study. Aspects of the benefits of teaching materials that get good categories indicate that on average students respond positively to the benefits of digital teaching materials that students use in learning activities (Marlina et al., 2021a).

The efficiency aspect of digital teaching materials based on the average score per aspect gets a practical value in the very good category. The indicators developed in this aspect of efficiency are regarding the accuracy or suitability of teaching materials in physics learning activities, such as the timeliness of learning by using teaching materials and the use of time to access digital teaching materials. The efficiency aspect of teaching materials that obtained the very good category showed that some students responded positively about the efficiency of digital teaching materials that students used in learning activities.

The results of obtaining the average

score of all aspects of the student response questionnaire are categorized as good. This shows that the digital teaching materials developed meet the standard characteristics of good teaching materials, especially online learning or online teaching and learning activities using the internet to improve students' problem solving abilities on impulse and linear momentum materials. This is in accordance with the expression (Landa et al., 2021) which states that students will find it easier and faster to get information on subject matter, anytime and anywhere as long as they can access the internet.

Effectiveness

The effectiveness of the developed digital teaching materials is assessed from the results of student learning tests, namely based on pre-test and post-test scores. Learning outcomes test filled in by students, instructions for filling out the test, 6 essay questions and answers. The value of effectiveness is obtained from the average score of each aspect of problem solving skills. There are 4 aspects that are counted in problem solving skills, namely (1) Understanding of problems where students are able to write down known variables, be asked, and describe their physical situation. (2) Create a problem-solving plan where students are able to write standard formulas and their formulations according to questions. (3) Carrying out the plan, namely students doing mathematical calculations. (4) Re-checking as a whole, namely students checking the completion procedure by ticking each stage and writing conclusions.

To practice the understanding aspect of the problem, habituation is needed by frequently working on the available questions so that students are accustomed to identifying known variables and unknown variables. To practice the aspects of making plans, carrying out plans and checking again, lots of examples and exercises are needed so that students get used to writing formulas correctly, doing calculations correctly and checking again. As shown in table 4.6, the pre-test for aspects of understanding the problem has a pretty good category. For aspects of planning problems,

solving problems and checking back, it was in a very unfavorable category. This shows that students' problem solving skills are still low which is in accordance with the results of the initial study. Meanwhile, from the post-test learning outcomes test, the aspect of understanding the problem gets a good category. For aspects of planning problems and solving problems, the category is not good. The aspect of checking back was in a very unfavorable category. This means that the teaching materials developed are less effective for use in learning, especially for improving students' problem-solving skills.

The results of the effectiveness of the electronic module containing scientific literacy are reviewed from the pretest and posttest as well as the calculation of the N-gain test. The following is Table 4.

Table 4 N-gain score result

Average of Pre-test	Average of Post-test	<g>	Category
13.81	25.79	0.13	Low

Based on the n-gain test shown in table 4 which shows that the n-gain gain is in the low category. Even though it was still in the low category, there was an increase in the average post test score. This shows that the problem-solving skills of students are better than during the pre-test, namely when participating in teaching and learning activities using impulse and linear momentum teaching materials containing verses of the Koran which were developed to train students' problem-solving skills.

Meanwhile, teaching materials are categorized as less effective and have low n-gain results. Some of the reasons are that many students are still not working properly and incompletely in answering them and learning is only through group chats on Telegram. This can also be seen from the results of the calculation of student answers (attachment). On questions 4 and 5 almost all students get low scores and for questions 4 and 5 are questions with the cognitive domain of C3 (counting). So, it can be seen that many students have difficulty in solving problems in the counting category. In line (Baharuddin & Wahyuni, 2015), the factors that influence student learning outcomes are

divided into two, namely: 1) Internal factors, which consist of physiological factors, namely factors related to individual physical and psychological factors, namely a person's psychological state. that affect the learning process such as interests, motivations, attitudes, and talents. 2) External factors, which consist of social environmental factors and non-social environmental factors. Social environmental factors that affect student learning outcomes, namely the social environment of the school (teachers, administration, and friends), the social environment of the community, and the social environment of the family (family tension, nature of parents, location of the house, and family management). Non-social environmental factors that influence student learning outcomes, namely the natural environment, instrumental factors (school buildings, school equipment, learning facilities, curriculum, syllabus, school regulations, etc.), as well as factors of the subject matter taught to students. educate.

CONCLUSION

The results of the development and trial of these teaching materials resulted in the conclusion that the teaching materials developed were quite practical but not effective for training students' problem solving skills, which can be seen from: (a) The practicality of teaching materials in terms of student responses obtained a sufficient category good (b) The effectiveness of teaching materials in terms of the average pre-test and post-test which experienced a slight increase and the n-gain value of 0.13 in the low category

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