Development of Integrated Islamic-Based Student Worksheet in Linear Program Material to Facilitate Mathematical Modeling Skills

Aisyah Khumairoh[1]*, Ulfa Masamah[2], Rosa Amalia Adiafidah[3]

[1,2] Universitas Islam Negeri Maulana Malik Ibrahim, Jl. Gajayana No. 50 Dinoyo, 65144, Indonesia.
[3] Madrasah Aliyah Negeri Kota Batu, Jl. Pattimura No. 25 Temas, 65315, Indonesia.
E-mail: aisyahkhum11@gmail.com

ARTICLE INFO

ABSTRACT

This study aims to develop an integrated Islamic Student Worksheet on linear programming material to facilitate students' mathematical modeling abilities. This study uses the Research and Development (R&D) method with the ADDIE development model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. In the analysis stage, a needs study and curriculum analysis were conducted, followed by the design of student worksheet that combines linear program material with islamic values. The validation results show that student worksheet obtained a percentage of 82.8%, which is included in the valid category, making it suitable for use as teaching material. The implementation of student worksheet has been carried out in the classroom, and the evaluation stage has been completed successfully. The practicality test results also showed that the student worksheet obtained an average score of 83.5% with practical criteria. The N-Gain test results showed an increase in mathematical modeling skills of 0.43 and Islamic financial literacy of 0.59 in the moderate category. This study produced an student worksheet integrated with Islamic values that supports contextual and meaningful mathematics learning.

Penelitian ini bertujuan untuk mengembangkan Lembar Kerja Peserta Didik (LKPD) terintegrasi keislaman pada materi program linear untuk memfasilitasi kemampuan pemodelan matematis peserta didik. Penelitian ini menggunakan metode Research and Development (R&D) atau penelitian pengembangan dengan model pengembangan ADDIE yang mencakup lima tahapan, yaitu Analysis (Analisis), Design (Desain), Development (Pengembangan), Implementation (Implementasi), dan Evaluation (Evaluasi). Pada tahap analisis, dilakukan studi kebutuhan dan analisis kurikulum, kemudian dirancang desain LKPD yang memadukan materi program linear dengan nilai-nilai keislaman. Hasil validasi menunjukkan bahwa LKPD memperoleh persentase sebesar 82,8% yang termasuk dalam kategori valid, sehingga layak digunakan sebagai bahan ajar. Implementasi LKPD telah dilakukan di kelas untuk implementasi LKPD, dan tahap evaluasi telah dilalui dengan baik. Hasil uji kepraktisan juga menunjukkan bahwa LKPD memperoleh nilai rata-rata sebesar 83,5% dengan kriteria praktis. Hasil uji N-Gain menunjukkan peningkatan kemampuan pemodelan matematis 0,43 dan Islamic financial literacy 0,59 pada kategori sedang. Penelitian ini menghasilkan LKPD terintegrasi nilai keislaman yang mendukung pembelajaran matematika kontekstual dan bermakna.

1. INTRODUCTION

Mathematical modeling is a process that applies mathematics to represent and solve real-world problems, a process that can be characterized by the interaction between reality and mathematics (Niss, Blum, & Galbraith, 2007). Mathematical modeling is the process of describing situations and relationships that occur in real life in mathematical form (Nusantara, 2021). Mathematical modeling is an activity of thinking and describing mathematical relationships from complex real-world problems to make them simpler and easier to understand through presentation in the form of models or visualizations (Nursyarifah et al, 2017). Mathematical modeling is the process of converting or translating recognized real-world problems into mathematical symbols or language so that real-world phenomena or problems can be presented in the form of mathematical problems (Pandiangan & Zulkarnaen, 2021).

Linear programming is a method used to determine the optimum value (minimum or maximum) of a linear problem obtained based on the values in the solution set of the linear problem (Monariska & Komala, 2021). Linear programming is a method used to determine the best choice among various alternative activities, taking into account certain constraints or limitations that must be met (Saparwadi & Aini, 2016). In line with the opinion Baiti et al. (2022) to solve a linear programming problem, the first step that must be taken is to determine the objectives and constraints that must be met, then formulate both into a mathematical model.

Mathematical modeling as a way to solve problems requires students to first understand the problem, then describe or represent it in a visual form (Nursyarifah et al., 2017). Therefore, when solving mathematical modeling problems, students need to construct mathematical models based on the information provided in the problem description (Blum & Niss, 1991). Students can easily work on contextual story problems with mathematical modeling (Pandiangan & Zulkarnaen, 2021). Learning through mathematical modeling presents a concrete learning process by involving students in activities of designing models according to the problems encountered in learning.

During the learning process, teachers need to make preparations in advance to facilitate the achievement of the desired objectives (Triyani et al., 2024). Learning objectives can be optimally achieved if the learning process is made interesting for

students (Rini & Pratini, 2023). Meanwhile, to realize this, careful preparation is needed by ensuring that all aspects of learning have been considered, starting from the selection of teaching methods, strategies, learning approaches, to the preparation of teaching materials. One form of teaching material includes Student Worksheets.

The Student Worksheet is a document that provides a summary of information and instructions on the implementation of learning activities, which may include activities, practices, or the application of previously acquired learning outcomes (Rini & Pratini, 2023). Student worksheet is a worksheet that contains a series of activities or tasks that must be completed by students. The existence of student worksheet plays an important role in evaluating the level of understanding and mastery of students of the learning material that has been delivered (Triyani et al., 2024). Based on this understanding, it can be concluded that student worksheet helps teachers see how students are progressing and makes it easier for students to organize and use the knowledge they have learned.

The development of student worksheet involves adjusting the content and format to suit the needs of students. In designing student worksheet, it is important to adapt it to the existing learning situation or conditions so that student worksheet can be tailored to the different abilities and needs of students (Hardiansyah et al., 2023). Student Worksheet developed by researchers integrates Islam to enrich students' learning experiences with Islamic moral and ethical principles. In line with the opinion of Hikmah et al. (2023), the principles in Islamic teachings are essentially guidelines for life that direct humans in their daily lives. Religious education helps students develop broad cultural awareness, critical thinking abilities, historical insight, and ethical values that are vital for both personal development and academic success (Astatke et al., 2024). This is stated in Regulation of the Minister of Education, Culture, Research, and Technology of the Republic of Indonesia Number 7 of 2022, which states that learning integrated with Islamic values can be found in the section regulating the rights of students to practice their religion and beliefs according to their convictions.

The student worksheet developed in this study is designed not only as a guide for learning activities, but also as a means of integrating Islamic values that are relevant to the lives of students. This integration is specifically aimed at strengthening Islamic financial literacy through the context of sharia economic issues in linear program material. Islamic financial literacy describes a person's competence in managing and using financial knowledge guided by sharia regulations (Alsayigh & Al-Hayali, 2022). Islamic financial literacy is the ability of a person or community to recognize issues related to basic Islamic economic concepts, understand the principles of economic activity, and apply them in daily life (Nugraha dkk., 2020).

The results of a preliminary survey conducted through interviews with mathematics teachers at MAN Kota Batu show that the integration of Islamic values in mathematics learning has not been optimally implemented because teachers prioritize the delivery of essential material in order to achieve curriculum targets. As a result, mathematics learning is still focused on procedural aspects and lacks relevance to real-life contexts and Islamic values, even though as a madrasah, this is an important requirement. In addition, students' mathematical modeling skills are relatively low, especially in solving story problems and contextual problems. This condition indicates the need for teaching materials that not only

help students understand the context of mathematics in a meaningful way, but also integrate Islamic values that are relevant to everyday economic life. Therefore, this study presents a novelty through the development of Student Worksheets on linear programming material that simultaneously facilitates mathematical modeling skills and Islamic financial literacy, two aspects that have rarely been integrated into mathematics learning in madrasahs.

2. METHOD

This research is a type of research and development (R&D) study, which is a research method that aims to produce a specific product, which is then tested for effectiveness to ensure that the product is in line with the intended purpose, needs, and functions. (Sugiyono, 2017). Model yang dipilih peneliti adalah model *Analysis, Design, Development, Implementation, Evaluation* (ADDIE). The model chosen by the researcher is the Analysis, Design, Development, Implementation, Evaluation (ADDIE) model. The researcher chose this development model because each stage is carried out in a structured and flexible manner, and every aspect of development is carefully planned and evaluated. This model follows five clear and structured stages, namely Analyze, Design, Development, Implementation, and Evaluation. Each stage plays an important role in ensuring that the learning process runs effectively and efficiently (Hidayat & Nizar, 2021).

In this development study, the researchers used two types of data, namely qualitative and quantitative data. Qualitative data in this development includes observation results, interview results, and assessments from validators and students in the form of suggestions and input on questionnaires. Quantitative data from the questionnaire consists of assessment scores from various experts, such as subject matter experts, language experts, teaching material experts, learning experts, integration experts, mathematical modeling instrument experts, Islamic financial literacy instrument experts, and practitioners. The purpose is to evaluate the validity of the student worksheet developed.

2.1. Research Subjects

The limited test subjects in this development study were 7 students in class X E MAN Kota Batu in the 2024/2025 academic year. The field test subjects were 22 students in class X H MAN Kota Batu in the 2024/2025 academic year. These students were selected as subjects because they were in line with the target users and material designed in the integrated Islamic student worksheet.

2.2. Data Collection

The data in this study were obtained using several techniques, namely observation, interviews, distribution of validation questionnaires, practicality of teachers and students, and written tests including pre-tests and post-tests. Observation was used to obtain preliminary information related to learning conditions in the field using observation sheets. Interviews were conducted with subject teachers to explore the needs and context

of implementing the student worksheet developed using interview guidelines. Meanwhile, the validation questionnaire was used to obtain expert assessments of the suitability of the content, presentation, and integration of Islamic studies in the developed product. The practicality questionnaire collected responses from students and teachers regarding the Islamic-integrated student worksheet designed to facilitate mathematical modeling in linear program material to assess the practicality of the student worksheet. Written tests are used to assess students' learning outcomes, which are then used as a reference in evaluating their achievement in mathematical modeling and Islamic financial literacy.

2.3. Data Analysis

Analysis of the results of the validity test of integrated Islamic student worksheet on linear program material to facilitate mathematical modeling and Islamic Financial Literacy skills in several steps. (1) Determination of answer scores Arikunto (2014) explains how to give Likert scale scores. (2) Calculate the percentage using the following formula.

$$Validity\ level = \frac{score\ obtained}{maximum\ score} \times 100\%$$

(3) Interpreting the data, according to Akbar (2022), the validity criteria are as shown in Table 1 below.

Table 1. Validity Criteria

Achievement Criteria	Validity Level	Description
85,01% - 100,00%	Very valid	Can be used without repair
70,01% - 85,00%	Valid	Can be used but needs minor repair
50,01% - 70,00%	Less valid	Can be used but needs major repair
01,00% - 50,00%	Not valid	Cannot be used

In addition, to assess the practicality of the student worksheet, researchers asked teachers and students to fill out a questionnaire measuring the ease and clarity of the student worksheet presentation. This process involved several stages to ensure that the developed student worksheet was ready for use. (1) Determining the answer score Arikunto (2014) explains how to score the Likert scale. (2) Calculating the percentage using the following formula.

$$Practicality\ level = \frac{score\ obtained}{maximum\ score} \times 100\%$$

(3) Interpreting the data, according to Akbar (2022), Practicality level as shown in Table 2 below.

Table 2. Practicality Level

Achievement Criteria	Practicality level	Description
85,01% - 100,00%	Very practical	Can be used without repair
70,01% - 85,00%	Practical	Can be used but needs minor repair
50,01% - 70,00%	Less practical	Can be used but needs major repair
01,00% - 50,00%	Not practical	Cannot be used

Next, to determine the effectiveness of the learning method applied, the researcher analyzed the improvement in students' mathematical modeling and Islamic financial

literacy skills by comparing the results before and after the treatment using a paired sample t-test. The hypotheses used in this study are as follows:

H0: There is no significant difference in the use of Islamic-integrated STUDENT WORKSHEET in linear program material on the improvement of students' mathematical modeling abilities before and after treatment.

H1: There is a significant difference in the use of Islamic-integrated STUDENT WORKSHEET in linear program material on the improvement of students' mathematical modeling abilities before and after treatment.

H0: There is no significant difference in the use of Islamic values integrated worksheets in linear program material on the improvement of students' Islamic financial literacy before and after treatment.

H1: There is a significant difference in the use of Islamic values integrated worksheets in linear program material on the improvement of students' Islamic financial literacy before and after treatment.

and measure the magnitude of the increase using the Normalized Gain (N-Gain) test. The analysis was conducted using IBM SPSS software version 30.0. According to Sukarelawa et al., (2024), the average N-Gain value obtained is classified based on the criteria for obtaining N-Gain in Table 3 below.

Table 3. N-Gain Value

N-Gain value	Interpretation
$g > 0{,}7$	High
$0{,}3 \leq g \geq 0{,}7$	Medium
$g < 0{,}3$	Low

3. RESULT AND DISCUSSION

3.1. Result

This study produced a product in the form of student worksheet that integrates Islam into linear program material, which is designed to support students' mathematical modeling abilities and has met the validity criteria. The development of this student worksheet was carried out through systematic stages based on the ADDIE model. The details of the development results based on the stages in the ADDIE model are presented as follows.

(1) *Analysis*

The analysis was carried out through three stages, namely needs analysis, field study analysis, and material analysis. At the needs analysis stage, it was found that class X MAN Kota Batu had implemented the Merdeka Curriculum. In its implementation, teaching materials such as student worksheet have not been applied consistently in learning. This is in line with the statement by Milwadi et al. (2022) hat students find it difficult to solve story problems. In addition, mathematical modeling skills are relatively low, especially in the form of story or contextual problems. It is also known that the integration of Islamic values in learning has not been optimal.

The material analysis focuses on linear programming material with reference to indicators of mathematical modeling skills and Islamic financial literacy. Indicators of mathematical modeling skills include understanding contextual problems, developing and

solving mathematical models, and interpreting solutions (Blum & Borromeo, 2009). The indicators can be seen in the Table 4 below.

Table 4. Indicators of Mathematical Modeling

Step	Mathematical Modelling	Indicators	Competencies achieved
1	Problem identification	Identify known elements and other necessary elements.	Students understand the problem and write down the known elements and the required elements.
2	Problem assumptions	Build a mathematical model.	Students create mathematical models from the elements that have been written down.
3	Mathematical manipulation	Answer questions using the mathematical model that has been created.	Students use operations on the models with the correct procedures.
4	Interpretation of results	Interpret the mathematical results obtained in a real-world context.	Students round off and connect the results to the problem.

Islamic financial literacy emphasizes understanding Islamic financial concepts and applying Islamic values in economic decision-making (Alsayigh & Al-Hayali, 2022). These indicators are used as the basis for preparing integrated financial statements with Islamic values and research instruments, and are presented in Table 5.

Table 5. Indicators of Islamic Financial Literacy

No	Aspect	Indicators
1	of understanding	Understanding financing based on Islamic law or understanding the knowledge gained from the use of Islamic financial products and concepts
2	Application	Distinguishing between halal and haram in financial products and services based on sharia.
3	Aspects	Applying for financing based on Islamic law.

(2) *Design*

In the design stage, researchers designed a product in the form of worksheets integrated with Islamic values in mathematics learning on linear programming material. The selection of material was based on the predetermined *Capaian Pembelajaran* (CP) and *Tujuan Pembelajaran* (TP). Table 6 below shows the CP and TP.

Table 6. *Capaian Pembelajaran* (CP) and *Tujuan Pembelajaran* (TP)

Capaian Pembelajaran	*Tujuan Pembelajaran*
At the end of phase E, students can solve problems related to systems of three-variable linear equations and systems of two-variable linear inequalities. They can solve problems related to quadratic equations and functions (including imaginary roots), and exponential equations (based on the same) and exponential functions.	1. Through observation, students correctly identify contextual linear programming problems in everyday life. 2. Through group work, students solve contextual problems by accurately modeling them into linear inequality systems. 3. Through group work, students solve contextual problems by accurately modeling them into linear inequality systems.

The researchers also developed a validation questionnaire to test the feasibility of the STUDENT WORKSHEET in terms of material, teaching materials, language, learning,

and integration. The components used by the researchers included several software programs, such as Microsoft Word and Canva. Microsoft Word was used to compile and collect the contents of the student worksheet, including material, questions, answers, and evaluations. after the student worksheet content was well organized in Microsoft Word, the next step was the visual packaging process using Canva. The student worksheet was compiled in accordance with the components designed at the beginning, including the "Front Cover," "Student Identity Page," "Foreword," "Table of Contents," "student worksheet Description," "CP & TP," "Concept Map," "Mathematical Modeling Skills," "Usage Instructions," "Introduction," "Activities," "Evaluation," "Glossary," "Bibliography," "Author Biography," and "Back Cover."

The front cover contains information such as the title of the student worksheet, author's name, institution name, logo, phase, and grade level. The image serves as the visual identity of the student worksheet. The page design is made as attractive as possible to draw the interest of students before they start using the student worksheet. The following is the cover page developed by the researcher in Figure 1.

Figure 1. Front Cover

The activities page includes learning stages designed for students, such as illustrations, images, tables, and exercises. All of these components are designed to support students' understanding of the learning process presented in Figure 2.

Figure 2. Activities

(3)   Development

The third stage is the development stage, where researchers develop student worksheet integrated with Islamic values based on the design that has been made previously. After the design process is complete, student worksheet validation is carried out with expert validators. This validation aims to assess and ensure the validity level of the developed student worksheet The results of the validation by experts are presented in Table 7 below.

Table 7. Validation

No	Validator	Percentage (%)	Qualification
1	Subject matter expert	97,2	Very valid
2	Teaching materials expert	93	Very valid
3	Language expert	77	Valid
4	Learning expert	75	Valid
5	Integration expert	81,2	Valid
6	Expert in mathematical modeling instruments	81,2	Valid
7	Expert in Islamic Financial Literacy instruments	75	Valid
	Level of Validity	**82,8**	**Valid**

Table 7 shows that the results of the experts validating the integrated student worksheet of Islamic values in linear program material were declared "valid" with a score of 82.8%.

(4)   Implementation

During the implementation stage, researchers conducted trials of the student worksheet integrated with Islamic values and research instruments. The limited trials consisted of seven students from class X E Man Kota Batu. Based on the limited trials, it

was found that there were shortcomings in the learning activities, namely the use of inappropriate words that caused confusion for the students. Therefore, this section was revised during the field trials so that it could be used properly. Picture 8 shows the limited trial with seven students.

The field trial consisted of 22 students from class X H MAN Kota. In the field trial, the researcher applied student worksheet integrated with Islamic values in linear program material in mathematics learning in class X H MAN Kota Batu. Picture 9 shows the field trial in class X H MAN Kota Batu. Students were also given pre-tests and post-tests to measure their mathematical modeling and Islamic financial literacy skills. Next, two subjects were selected to represent the characteristics of the students' abilities based on the results of the pre-tests and post-tests. The students' written responses to the pretest and posttest on mathematical modeling skills are presented in Figure 3 and Figure 4.
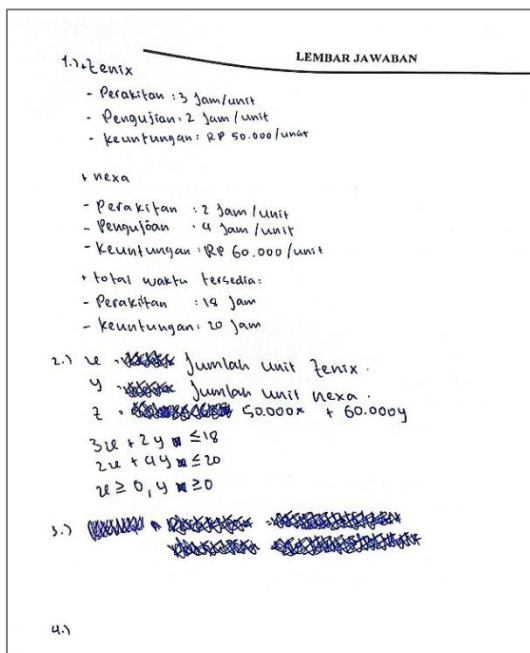
Figure 3. Pretest of Mathematical Modeling Skills
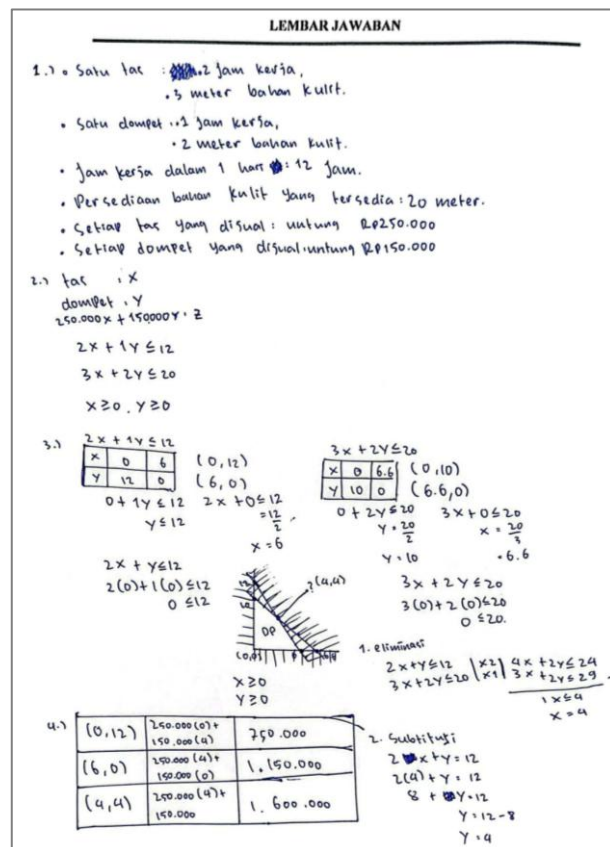
Figure 4. Posttest of Mathematical Modeling Skills

In the pretest, Subject 1 coded as JH was able to identify information and model problems mathematically, but did not complete the stages of solving and interpreting solutions. In the posttest, Subject 1 showed improvement by completing all indicators of mathematical modeling ability, from modeling, solving using tables and graphs, to determining the optimum value. Based on Figure 3 and Figure 4, this improvement shows that the implementation of student worksheet had a positive impact on Subject 1's mathematical modeling ability.

The outcomes of the students' pretest and posttest answers on Islamic financial literacy can be seen in the Figure 5 and Figure 6.
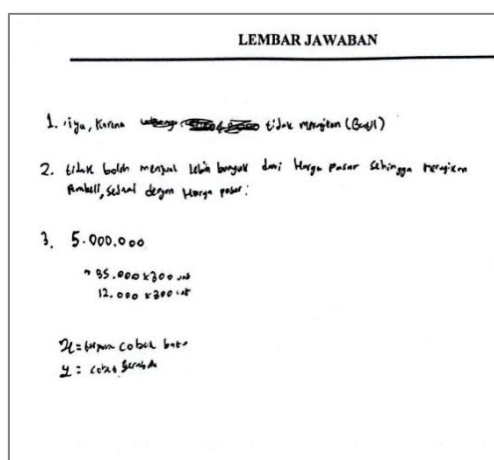
Figure 5. Pretest of Islamic Financial Literacy
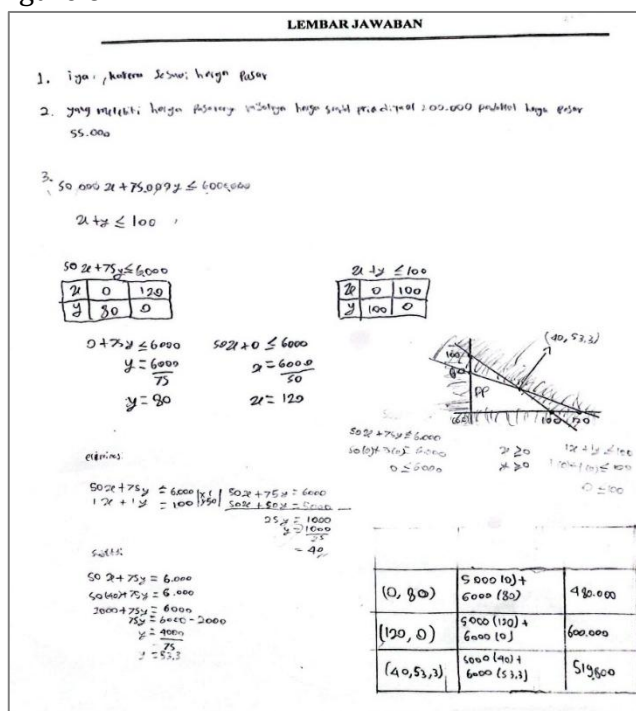
Figure 6. Posttest of Islamic Financial Literacy

In the pretest, Subject 2 coded as BUA did not demonstrate a complete understanding of Islamic financial literacy, as seen from unclear reasons, inappropriate examples, and solutions that were still limited to analogies. In the posttest, Subject 2 showed improvement with more accurate answers, accompanied by reasons and examples in accordance with sharia principles, and solutions to the final stage, although there were still calculation errors. Based on Figures 5 and 6, these results indicate an increase in Subject 2's Islamic financial literacy after learning.

The following are the pretest and posttest data on mathematical modeling and Islamic financial literacy skills as a whole in Table 8.

Table 8. Results of Pretest-Posttest of Mathematical Modeling Skills and Islamic Financial Literacy

No	Subject	Mathematical Modeling Skills		Islamic Financial Literacy	
		Pretest	Posttest	Pretest	Posttest
1	AAM	4	7	4	8
2	ALKN	5	8	5	7
3	BBB	4	6	4	6
4	BUA	7	8	4	8
5	FT	5	10	2	5
6	HWA	6	7	4	6
7	ISWT	3	6	6	8
8	JH	6	7	4	7
9	KF	5	8	4	8
10	MAQH	6	8	3	6
11	MASR	7	11	4	6

No	Subject	Mathematical Modeling Skills		Islamic Financial Literacy	
		Pretest	Posttest	Pretest	Posttest
12	MKN	5	9	6	9
13	MRA	5	10	5	8
14	NAH	7	9	3	6
15	NARR	5	7	5	7
16	NAY	6	8	5	8
17	NII	7	10	3	6
18	RJAR	5	9	4	7
19	RRR	5	7	5	7
20	RZP	6	7	5	8
21	SAYK	6	8	4	7
22	TCI	4	8	4	6
	Average score	**5,40**	**8,09**	**4,22**	**7**

The average score for students' mathematical modeling abilities increased from 5.40 on the pretest to 8.09 on the posttest, an increase of 2.69. Meanwhile, the average score for Islamic financial literacy increased from 4.22 to 7.00, an increase of 2.78. This increase indicates an improvement in both abilities, which was further analyzed to determine its effectiveness using a paired sample t-test and N-Gain test.

Prior to performing the paired-sample t-test, a prerequisite analysis was conducted through a normality test using the Shapiro–Wilk method, as the number of respondents was fewer than 50. The data were considered normally distributed when the significance value exceeded 0.05 and non-normally distributed when it was below 0.05. The results of the normality test for the pretest–posttest data on mathematical modeling skills are presented in Table 9, while those for Islamic financial literacy are shown in Table 10.

Table 9. Results of The Normality Test of the Pretest–Posttest Mathematical Modeling Skills

Tests of Normality							
Pretest-Posttest		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Test MMS	1.00	.191	22	.036	.915	22	.061
	2.00	. 209	22	.014	.929	22	.116

As shown in Table 9, the significance values for the pretest 0.061 and posttest 0.116 of students' mathematical modeling skills exceed 0.05, indicating that the data are normally distributed and therefore suitable for analysis using a paired-sample t-test. The normality test results for the Islamic financial literacy pretest and posttest data are provided in Table 10.

Table 10. Results of The Normality Test of the Pretest–Posttest Islamic Financial Literacy

Tests of Normality							
Pretest-Posttest		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Test IFL	1.00	.215	21	.012	.915	21	.068
	2.00	.179	23	.054	.918	23	.059

Based on Table 10, the Shapiro–Wilk test results show that the significance value of Islamic financial literacy in the pretest is 0.068 and in the posttest is 0.059, both of which are greater than 0.05. Thus, the data are normally distributed and meet the requirements for a paired sample t-test.

The paired-sample t-test is applied to examine differences between the means of two related data sets and to decide hypothesis acceptance based on the significance level. A significance value above 0.05 indicates that H_0 is accepted, whereas a value below 0.05 leads to the rejection of H_0. The paired-sample t-test results for students' mathematical modeling and Islamic financial literacy abilities, analyzed using IBM SPSS version 30.0, are shown in Table 11 and Table 12.

Table 11. Results of the Paired Sample T-Test on Mathematical Modeling

Paired Samples Test										
		Paired Differences							Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	pretes-posttest	-2.772	1.192	.25424	-3.2357	-2.127	-10.0	21	<,001	<,001

Based on Table 11, the significance value of the paired sample t-test is <0.001, which is less than 0.05, so H_0 is rejected. This result shows that there is a significant difference between the pretest and posttest scores, so the use of integrated Islamic student worksheet in linear program material is effective in facilitating the mathematical modeling abilities of MAN Kota Batu students.

The results of the paired sample t-test for the pretest-posttest data on Islamic financial literacy of students are presented in Table 12.

Table 12. Results of the Paired Sample T-Test on Islamic Financial Literacy

Paired Samples Test										
		Paired Differences							Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	pretes-posttest	-2.772	.68534	.14612	-3.076	-2.468	-18.9	21	<,001	<,001

Based on the results of the paired sample t-test in Table 12, the significance value (Sig. Two-Sided p) obtained was <0.001 (<0.05), so H_0 was rejected and H_1 was accepted. This indicates a significant difference between the results before and after the use of integrated Islamic student worksheet in linear program material, so that this learning is effective in facilitating Islamic financial literacy for students at MAN Kota Batu.

After the normality test and paired sample t-test were conducted, N-Gain analysis was used to determine the effectiveness of the integrated Islamic worksheets based on the increase in pretest and posttest scores. The effectiveness qualification was determined based on the applicable gain criteria. The results of the N-Gain analysis of the mathematical

modeling and Islamic financial literacy abilities of students are presented in Table 13 and Table 14.

Table 13. Results of the N-Gain Analysis of the Mathematical Modeling

No	Subject	Islamic Financial Literacy		N-Gain	Qualification
		Pretest	Posttest		
1	AAM	4	7	0,3	Medium
2	ALKN	5	8	0,4	Medium
3	BBB	4	6	0,2	Low
4	BUA	7	8	0,2	Low
5	FT	5	10	0,7	Medium
6	HWA	6	7	0,1	Low
7	ISWT	3	6	0,3	Medium
8	JH	6	7	0,1	Low
9	KF	5	8	0,4	Medium
10	MAQH	6	8	0,3	Medium
11	MASR	7	11	0,8	High
12	MKN	5	9	0,5	Medium
13	MRA	5	10	0,7	Medium
14	NAH	7	9	0,4	Medium
15	NARR	5	7	0,2	Low
16	NAY	6	8	0,3	Medium
17	NII	7	10	0,6	Medium
18	RJAR	5	9	0,5	Medium
19	RRR	5	7	0,2	Low
20	RZP	6	7	0,1	Low
21	SAYK	6	8	0,3	Medium
22	TCI	4	8	0,5	Medium
	Average score	**5,40**	**8,09**	**0,40**	**Medium**

Based on Table 13, seven students were in the low category, 14 students were in the medium category, and one student was in the high category, with an average of 0.40. This shows that the implementation of integrated Islamic student worksheet was able to facilitate students' mathematical modeling abilities at a medium level.

The results of the N-Gain test on Islamic financial literacy can be seen in the Table 14 below.

Table 14. Results of The N-Gain Analysis of the Islamic Financial Literacy

No	Subject	Islamic Financial Literacy		N-Gain	Qualification
		Pretest	Posttest		
1	AAM	4	8	0,8	High
2	ALKN	5	7	0,5	Medium
3	BBB	4	6	0,4	Medium
4	BUA	4	8	0,8	Medium
5	FT	2	5	0,4	Medium
6	HWA	4	6	0,4	Medium
7	ISWT	6	8	0,6	Medium
8	JH	4	7	0,6	Medium
9	KF	4	8	0,8	High
10	MAQH	3	6	0,5	Medium
11	MASR	4	6	0,4	Medium
12	MKN	6	9	1	High
13	MRA	5	8	0,7	Medium
14	NAH	3	6	0,5	Medium
15	NARR	5	7	0,5	Medium

No	Subject	Islamic Financial Literacy		N-Gain	Qualification
		Pretest	Posttest		
16	NAY	5	8	0,7	Medium
17	NII	3	6	0,5	Medium
18	RJAR	4	7	0,6	Medium
19	RRR	5	7	0,5	Medium
20	RZP	5	8	0,7	Medium
21	SAYK	4	7	0,6	Medium
22	TCI	4	6	0,4	High
	Average score	**4,22**	**7**	**0,59**	**Medium**

Based on Table 14, 19 students were in the moderate N-Gain category and 3 in the high category, with an average N-Gain of 0.59 falling into the moderate category. This shows that integrated Islamic student worksheet is able to facilitate Islamic financial literacy among students at a moderate level.

After testing the developed student worksheet, a questionnaire was distributed to mathematics teachers and 22 students as respondents to determine their responses to the practicality of the student worksheet in the learning process. The questionnaire results provided an overview of the extent to which the student worksheet could be used easily, its contents understood, and its ability to facilitate students' mathematical modeling skills in understanding linear programming material integrated with Islam. Table 15 presents the questionnaire results from teachers and 22 students who were the subjects of the trial.

Table 15. Practicality Survey Results

Subject	Number of Scores	Maximal Score	Percentage	Qualification
Students	31,81	40	79,54	Practical
Teachers	35	40	87,5	Very Practical
Average assessment	**33,40**	**40**	**83,5**	Practical

Based on the Table 15 average practicality assessment from teachers of 87.5% and from student responses of 79.54%, the overall average practicality of the student worksheet product in facilitating the mathematical modeling abilities of students at MAN Kota Batu is 83.5%. Referring to Table 15, this score indicates that the student worksheet falls into the practical category.

(5)   Evaluation

After going through a series of research stages, the researchers then analyzed all the data that had been collected. The data obtained from the evaluation stage consisted of quantitative and qualitative data. This evaluation process was carried out based on assessments, input, and comments from experts. The evaluation stage aimed to assess the validity and feasibility level of the product, namely the student worksheet integrated with Islamic values on linear programming material.

3.2. Discussion

The student worksheet integrated with Islamic values in the linear program material developed is in the form of hardcopy or printed form as a means of facilitating students' mathematical modeling abilities. The student worksheet facilitates students'

understanding of learning materials through its design, which accommodates structured, active learning activities and the realization of ideas in practice (Pratama & Saregar, 2019). The student worksheet contributes to the progressive construction of students' understanding by providing instructions, questions, and exercises in line with the established learning objectives (Rini & Pratini, 2023).

Islamic-integrated student worksheet on linear program material was developed to facilitate students' mathematical modeling abilities, which not only hone mathematical thinking skills but also instill Islamic values in the learning process. The results of validation by experts show that the student worksheet is "valid" with a percentage of "84.68%," indicating that the student worksheet is suitable for use in learning. The practicality score obtained is 83.5 with a "practical" qualification, indicating that the STUDENT WORKSHEET is easy to use.

The effectiveness of using student worksheet in facilitating students' mathematical modeling abilities was evaluated through an analysis of pretest and posttest results in a class consisting of 22 students at MAN Kota Batu. The results of the paired sample t-test showed a Sig. (Two-Sided) value of <0.001, so H_0 was rejected and H_1 was accepted, which means that there was a significant difference in mathematical modeling abilities before and after the use of student worksheet. Furthermore, the N-Gain analysis results showed an average of 0.40 in the moderate category, indicating that student worksheet integrated with Islamic values in linear program material was quite effective in facilitating the improvement of students' mathematical modeling abilities. This is in line with the opinion of Blum & Borromeo, (2009), who stated that contextual problem-based learning can improve mathematical modeling abilities through the stages of understanding problems, modeling, solving, and interpreting solutions.

The effectiveness of student worksheet integrated with Islamic values in facilitating Islamic financial literacy was analyzed by comparing the pretest and posttest results. The paired sample t-test results showed a significance value of <0.001, indicating a significant difference in Islamic financial literacy skills before and after learning. Furthermore, the N-Gain analysis results showed an average of 0.59 in the moderate category, indicating that the student worksheet integrated with Islamic values in linear program material was quite effective in improving students' Islamic financial literacy. Thus, the developed student worksheet is declared suitable for use as teaching material because it meets the criteria of validity, practicality, and effectiveness in the moderate category based on statistical test results and N-Gain.

4. CONCLUSION

Based on the results of the study, the use of student worksheet integrated with Islamic values in linear programming material is effective in facilitating students' mathematical modeling and Islamic financial literacy skills, as indicated by significant differences between pretest and posttest results and moderate improvement based on N-Gain analysis. Contextual problem-based learning integrated with Islamic values encourages students to be more active in modeling problems and making financial decisions in accordance with Islamic principles. Further research is recommended to

develop worksheets for other mathematics subjects, involve a wider sample, and use a more robust experimental design in order to obtain a more comprehensive picture of effectiveness.

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