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Research Article

Validity of Mathematics Learning Devices with a Sedekah Context to Enhance Mathematical Communication Skills and Awareness of No Poverty

Nurniqta[1], Rahmah Johar[2*], Dr Anwar[3]
[1] *Student*
2,3 Professor
[1,2,3] *Department of Mathematics Education, Universitas Syiah Kuala, Banda Aceh, Indonesia*
Email: nurniqta1212@gmail.com, rahmah.johar@usk.ac.id, anwarramli@usk.ac.id
Orchid Id number: 0009-0001-0088-0840, 0000-0003-3622-6813, 0009-0005-9996-185X
Corresponding Author: Rahmah Johar*

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ABSTRACT

Education plays a crucial role in achieving the Sustainable Development Goals (SDGs), particularly through Education for Sustainable Development (ESD). Implementing ESD requires higher-order thinking skills, which are currently still low among Indonesian students. One important aspect of higher-order thinking is mathematical communication skills, which can be enhanced using the Problem-Based Learning (PBL) model. Sedekah is a part of charity in the Islamic perspective and is relevant to SDG Goal 1 on No Poverty. By implementing a PBL device about sedekah, it is hoped that both mathematical communication skills and awareness of No Poverty can be improved. This study aims to describe the validity of a mathematics learning device with the context of sedekah in enhancing students' awareness of No Poverty and their mathematical communication skills. The learning device includes teaching modules, student worksheets, and learning outcome tests. This research is a developmental study, especially validation test. The research instrument is a validation sheet for the learning device. The learning device was validated by seven experts. The results showed that the validated learning device achieved a valid category, with an average score of 4.5 for the teaching module, 4.4 for the student worksheets, and 4.3 for the mathematical communication tests. Based on these results, it can be concluded that the mathematics learning device with the context of sedekah for enhancing students' mathematical communication skills can be used for the next development stage.

Keywords: No-Poverty, Mathematical Communication Skills, Problem-Based Learning, Validity

1) INTRODUCTION:

Education plays a crucial role in achieving the goals of the Sustainable Development Goals (SDGs) [1]. Several countries, including Indonesia, have agreed to the SDGs with the aim of eliminating poverty, maintaining environmental integrity, and minimizing social inequality.

One component of the SDGs in the field of education is Education for Sustainable Development (ESD), which prepares students to face global challenges through the integration of educational, economic, social, and environmental aspects [2]. ESD can be understood as education directed towards sustainable development to raise awareness among the community about the environment and to actively contribute to supporting sustainable development.

UNESCO focuses on the 2030 agenda with the program ESD for 2030, aiming to build a sustainable world through the achievement of 17 SDG components, one of which is No Poverty (poverty alleviation). ESD has been implemented in several educational levels in Indonesia, involving basic competencies such as writing, reading, and arithmetic [3]. ESD encompasses higher-order thinking skills, creativity, problem-solving, and students'

competencies in acting [4]. However, Indonesian students' higher-order thinking skills remain low [5]. This is reflected in the results of the 2018 Programme for International Student Assessment (PISA), where Indonesia ranked among the bottom six out of 79 countries. One of the abilities measured in PISA is students' mathematical communication skills [6].

Mathematical communication skills are a way for students to express ideas about the problems they face, allowing them to solve these problems collaboratively and act critically for the future (Ssodiqin). Mathematical communication skills refer to students' abilities to express mathematical ideas through spoken or written words and to demonstrate them visually [7]. Additionally, according to NCTM, mathematical communication skills are crucial during student discussions, where students are expected to state, explain, describe, listen, question, and collaborate to understand mathematics more deeply [8]. Based on this explanation, it can be concluded that mathematical communication skills are essential for students to express mathematical ideas in problem-solving.

In Indonesia, many teachers generally apply teacher-centered learning activities in the classroom. Many teachers have not yet implemented problem-based learning or provided problems that can enhance students' mathematical communication skills, and teachers rarely design their own problems with contexts relevant to daily life. Instead, they often rely on problems from textbooks and frequently overlook challenging problems [9]. Additionally, teachers have not yet considered the SDGs in their teaching [10]. As a result, students are less trained in problem-solving and in improving their mathematical communication skills. This is because students are not encouraged to express their mathematical ideas and are not given enough freedom, leading to low mathematical communication skills. To enhance students' mathematical communication skills, teachers are encouraged to apply cooperative learning methods, such as the Problem-Based Learning (PBL) model. This model guides students to learn through problem-solving and to use their experiences to solve problems [11]. In this learning approach, students are given non-routine problems related to real-life situations [12]. One context that can be used is linking mathematics learning with the first SDG component, which is No Poverty (poverty alleviation). The incorporation of Islamic values into the mathematics learning process can serve as a bridge to achieving knowledge, understanding, and applying Islamic values. Islamic values integrated into mathematics education include values of faith, Sharia, and ethics [13]. An everyday Islamic value is giving sedekah (charitable donations) to others in any form. Additionally, the application of sedekah values can have a broader impact. For example, using sedekah to provide business capital or aid can significantly help in alleviating poverty, thereby balancing income and reducing the gap between the rich and the poor [14].

Several studies have been conducted to assess the validity of teaching materials based on Islamic contexts and Problem-Based Learning (PBL) materials. The results of these studies show that the developed teaching materials fall into the valid category, meaning that these materials are suitable for use and can serve as an alternative for teachers to address difficulties in understanding mathematics [15]. Furthermore, other research findings indicate that the development process of these teaching devices results in valid devices, and the learning conducted using these devices is effective [16].

From previous studies, there has been a limited amount of research on the validity of mathematics teaching materials with the context of sedekah (charitable giving) for improving students' mathematical communication skills and awareness of poverty alleviation, particularly in the topic of exponents. Therefore, this study aims to describe the validity of mathematics teaching materials with the context of sedekah on the topic of exponents. The developed materials include teaching modules, student worksheets, and learning outcome tests.

2) METHODS AND METHODOLOGY

This study uses the Plomp and Nieveen research and development model, which consists of three development stages: preliminary investigation, prototype development, and assessment [17]. However, in this study, the author focuses only on the prototype and assessment stages.

The subjects of this study are validators and high school students. Seven validators were involved in this research. Four of them (A1, A2, A3, and A4) are high school mathematics teachers, and the other three (A5, A6, and A7) are mathematics education lecturers. Additionally, 15 students from a high school in Banda Aceh, Indonesia, participated in this study.

This study were collected using validation and readability sheets. The average scores from the validators' assessments were used to determine the validity criteria. The validity criteria [17] can be seen in Table 1.

Tabel 1. Validity Criteria for Teaching Materials

criteria	Average
Very valid	4 < VC < 5
Valid	3 < VC < 4
Not valid	2 < VC < 1
Invalid	1 < VC < 2

The table above represents the criteria for validity.

3] RESULTS

The results of this study include the validity of mathematics teaching materials in terms of scale and proportion. These teaching materials will be used for application in mathematics instruction, with the goal of enhancing students' mathematical communication skills and awareness of poverty alleviation. The results of the validation completeness of the teaching materials by the validators are presented in Table II.

Tabel 2 Results of Teaching Materials Validation

No	Material instructions	Aspects are assessed	Average	Validation average	Validity criteria
1	Teaching module	Content	4.5	4.5	Very valid
		Language	4.5		
2	Student worksheet	Content	4.4	4.4	Very valid
		Language	4.3		
3	Learning outcomes test	Content	4.6	4.3	Very valid
		Language	4.7		
		construct	3.8		

Table II shows that the average validation score for the teaching module is 4.5, indicating that the module meets the criteria for being very valid in both content and language aspects. Additionally, the developed student worksheets (LKS) also meet the very valid criteria with an average score of 4.4. Therefore, both the teaching module and the student worksheets can be used for the next development stage after making revisions. Overall, the developed learning outcome test received an average score of 4.3 from the validators. The learning outcome test meets the very valid criteria and can be used for the next development stage after making minor revisions. The validators also recommended improvements to the teaching materials with an Islamic context on the topic of exponents.

1. Revision of Teaching Module

The validation results obtained from the teaching module include suggestions and comments provided by the validators to the researchers. These include making the module more engaging and aligning it with the curriculum policies in place. Table 3 describes all the suggestions and comments from the validators on the teaching module and the results of the revisions.

Tabel 3 Results and Comments from Validators on the Teaching Module

Validator	Comments and suggestions	Repair
Validator 1	Material boundaries based on indicators must be clear At the first meeting, don't just teach about the general form and definition of exponents but also include the properties of exponents	The indicators have been revised so that they are appropriate At the first meeting, two exponential properties were also included,
Validator 2	Match learning objectives with indicators Adapt the format to the new curriculum	Learning objectives have been revised according to the indicators The format has been changed to an independent curriculum format
Validator 3	The boundaries of material in sub-material must be clear The language used is more simplified	Material limits have been adjusted based on the student's textbook
Validator 4	The module design is good, but there are several instructions and instructions contained in the module that need to be improved	Instructions and directions in the module have been adjusted
Validator 5	Pay attention again to the verses of the Koran that are associated with components, because not all of them can be linked	The linked verses of the Koran have been adjusted
Validator 6	The moral message is not only about alms, but links alms with exponents	The moral message has been adapted to the context in which it is applied
Validator 7	In the main activity section, include a photo of the part the student is working on	The core activities have been adjusted as suggested

From Table 3, one of the validators' comments was to

Petugas rumah Amal mengamati perkembangan banyak orang yang bersedekah. Hari pertama ada tiga orang yang bersedekah. Misalnya di hari selanjutnya setiap orang mengajak beberapa orang lain untuk bersedekah, dan ada juga setiap orang mengajak 2 orang lain untuk bersedekah setiap harinya, ada juga yang setiap hari hanya bertambah 1 orang dan seterusnya. Bantulah petugas rumah amal menyelesaikan masalah berikut.

A. Tuliskan beberapa kemungkinan banyak orang yang terlibat dalam bersedekah setiap harinya selama 9 hari.

B. Apabila tiga orang yang bersedekah mempengaruhi dua orang lainnya untuk bersedekah dan banyaknya orang yang terpengaruh setiap harinya sama, berapa jumlah orang yang bersedekah pada rumah Amal setelah 9 hari?

Figur 1 (a) Result of the teaching module revision

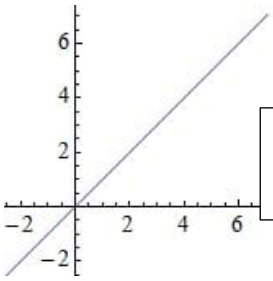
2. Revision of Student Worksheets (LKS)

Tabel 4 Results and Comments from Validators on LKS

Validator	Comments and suggestions	Repair
Validator 1	In the story section, replace the sentence that the mosque is undergoing renovations with renovations being carried out Bring up the question of brsedekaah awareness	The words in the story have been adjusted The corrected questions have been adjusted. For example, based on this verse from the Koran, what can you conclude about giving alms?
Validator 2	At meeting 1, let the students make the diagram	The diagram in problem one has been deleted.
Validator 3	Explain the categories of alms taken Make worksheets more interesting	The context of the alms taken has been adjusted The LKS design has been improved
Validator 4	Provide instructions for creating a diagram Add a table for students to answer questions with different numbers, until students can find the definition of exponent	Instructions have been added Tables have been added as suggested
Validator 5	At meeting 5, don't just ask whether the graph is right or wrong, but ask which graph is the relationship between alms	Questions have been adjusted
Validator 6	Pay attention to the words that are still wrong	Typing that hasn't been fixed yet has been adjusted
Validator 7	It is necessary to add details about awareness of giving alms	For every problem in the LKPD, questions have been raised about awareness of giving alms

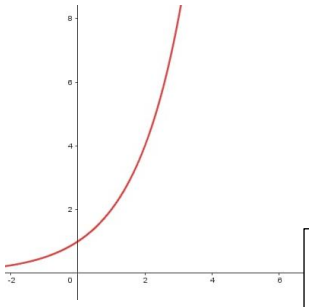
The validators' suggestions align with the argument in [19] that activities in the student worksheets (LKS) should be easy to read and understand, and the design of the worksheets should be engaging. Below is the revised student worksheet.

Choose the graph below that shows the relationship between *rezeki* and *sedekah*. Give reasons if you answered right or wrong



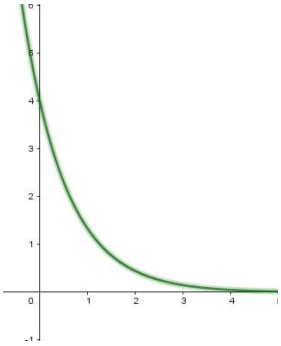
Horizontal axis is *rezeki*

Vertical axis is *sedekah*



Horizontal axis is *sedekah*

Vertical axis is *rezeki*



Horizontal axis is *sedekah*

Vertical axis is *rezeki*

Figur 1(b) Result of the LKS revision

3. Revision of Learning Outcome Test

Based on the comments and suggestions from the seven validators, the learning outcome tests need to be adjusted and clarified. All questions must align with the established indicators. All the comments and suggestions from the validators, along with the results of the revisions, are presented in Table 5.

Tabel 5 Results and Comments from Validators on the Learning Outcome Tests

Validator	Comments and suggestions	Repair
Validator 1.5	Correct typing errors	The incorrect post has been revised
Validator 2	The image must match the context in which it is taken	Image has been adjusted
Validators 3, 6	The questions need to be simplified again	The questions have been revised but still follow the levels of mathematical communication ability indicators

The validated test questions were then assessed for readability by 16 students from a high school in Banda Aceh. The analysis of the students' responses is presented in the following Table 6.

Tabel 6 Readability Results of Test Items for Students

Test the readability of the question items	Repair
Students have difficulty seeing the graphs attached to the questions because the colors are too dark	Researchers made graphs that were clearer, brighter in color, and larger in size
Students do not understand what is meant by a mathematical model	The researcher did not revise the word mathematical model because the researcher explained the meaning of the word directly
Students do not know the meaning of being moved by their hearts	Researchers revised the word moved to become the word affected

4] DISCUSSION

The result of the validity evaluation of the mathematics learning tool with the context of *sedekah* indicate that the tools are valid in several aspects. The content validity of the tools, assessed trough reviews by subject matter and education experts, confirm that the content aligns with the mathematics curriculum and is relevant to the context of *sedekah*. This means that the material not only support mathematical learning objectives but also integrates important social

The suggestions and comments provided by the validators have been incorporated. Therefore, the mathematics teaching materials with the context of *sedekah* (charitable giving) using the PBL model on the topic of exponents that have been developed meet the criteria of being very valid and are suitable for use. The teaching module and student worksheets (LKS) are designed following the stages of PBL learning, as they use contextual problems that guide students to learn through problem-solving and consider their experiences to address these problems [11]. Thus, during the problem-solving process, students can gain knowledge about the awareness of charitable giving, helping them realize that giving sedekah can reduce poverty.

The developed test questions meet the criteria for being very valid. However, there are some suggestions and comments from the validators. The test can be used with minor revisions, and the researchers have revised it accordingly.

Based on the comments and suggestions from the students, the researchers concluded that the developed test questions are generally well understood. However, there were some sentences or words that were difficult, making it challenging for students to comprehend the test questions. Consequently, the researchers revised these questions. Based on the validation results from the validators and the readability test results from fifteen students, the mathematics teaching materials with the context of sedekah on the topic of exponents can be considered very valid for all the developed teaching materials.

Construct validity is also deemed adequate, as the tools effectively measure student's mathematical communication skills. Evaluation instrument such as questionnaires and test show that students can apply mathematical concepts in real life situation related to sedekah, enchancing their understanding and skills in mathematical communication

5] CONCLUSION

This study concludes that the mathematics teaching materials with the context of sedekah (charitable giving) for enhancing students' mathematical communication skills and awareness of poverty alleviation have met the validity criteria. They are suitable for use with minor revisions. However, the mathematics teaching materials still need to be tested for practicality and effectiveness in teaching.

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8] DATA AVAILABILITY

The data that support the findings of this study are available from source "the corresponding author".

9] CONFLICT OF INTEREST

No conflict of interest.

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