

Development Of Local Wisdom Melayu Deli - Based Geometry And Measurement Learning Devices For PGSD Students

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Abstract

This study aims to develop learning tools based on local Wisdom Melayu Deli Melayu Deli of North Sumatra in the subject of Geometry and Measurement for PGSD students. This is based on the conditions in the field that: 1) Learning tools must always be developed to suit the demands of the latest curriculum, 2), Mathematics learning for students must be related to things that are close and real so that they are easier to understand, 3) There are no Geometry and Measurement learning tools that are specifically based on the local Wisdom Melayu Deli of North Sumatra. The benefit of research for lecturers and students is the creation of geometry and measurement teaching materials in accordance with the latest curriculum standards. This research produced geometry and measurement learning tools based on local Wisdom Melayu Deli in students' mathematical problem solving abilities that increased from trial I to trial II with an average increase per indicator of 0.35%; 3.99%; 16.22% and 8.32%. So that the developed learning tools meet the criteria of being effective and feasible to be implemented on students.

Keywords: Learning Tools, Geometry and Measurement, Local Wisdom Melayu Deli

Introduction

Human knowledge is motivated by the environment, social interactions, customs and culture and all kinds of problems that exist in it (Fitriani et al., 2021). So that every human being has a different lens in looking at a

problem, both the way he thinks, the way he expresses information in his mind, and the actions in his behavior. One of the socio-cultural creations is the existence of local Wisdom Melayu Deli in a particular society. Local Wisdom Melayu Deli serves to strengthen character education as well as being a filter for foreign cultures that will damage the personality of Indonesian people (Students et al., 2020). Education Translated from Indonesian to English - www.onlinedoctranslator.com character is very important to be instilled as early as possible because there are so many social and moral changes in the current era of globalization (Putri, 2021). Unfortunately, as time goes by and the times progress, just like most customs, traditions and cultures, the local Wisdom Melayu Deli that exists in various regions is increasingly being eroded by the times, and North Sumatra is no exception. At least the government plays a role in making policies or curricula (Sugiri & Priatmoko, 2020). The Merdeka Curriculum aims to make students and educators become a personlong-life learner or lifelong learner. The word "independence" in the curriculum provides flexibility and freedom for students to choose subjects that suit their interests and talents, as well as educators who can design learning according to the characteristics of students (Daga, 2021).

According to Mannan (2015), with a variety of cultures that exist in Indonesia, it is very supportive to develop a tool that is integrated with the local Wisdom Melayu Deli of the local area. The learning device referred to here is a unity of all components needed by lecturers to achieve learning objectives, arranged to help students complete certain goals, and guide students in independent learning (Mannan & Sopyan, 2007). This also supports the achievement of the vision, mission and objectives of the Elementary School Teacher Education Study Program, namely to produce research products and develop science and technology related to elementary schools and produce learning models according to the characteristics of children based on local Wisdom Melayu Deli (Bao et al., 2022)

With the enactment of the new curriculum, the available learning tools are seen as no longer suitable for the needs of students. To overcome this, reading material is needed as support or guidance, especially in Geometry and Measurement courses (Nuraini et al., 2023). Geometry and Measurement is a compulsory subject for third

semester students in the Elementary School Teacher Education Study Program. This course is a major subject, which is expected to be a basic provision for student teacher candidates to be able to teach geometry material in a fun way without ignoring existing basic concepts (Haka et al., n.d.) Based on the above description, the learning tools are based Local Wisdom Melayu Deli is the right solution in facing learning challenges to develop learning tools based on local Wisdom Melayu Deli of North Sumatra in the subject of Geometry and Measurement for PGSD students.

Literature Review

Learning Media

Minister of Education and Culture No. 22 of 2016 concerning process standards for primary and secondary education states that planning for implementing learning includes preparing learning implementation plans and preparing learning media and resources, learning assessment tools, and learning scenarios. Learning tools needed in managing learning in this study include:

- a. Semester Learning Plan (RPS) RPS for a course is a learning process plan that is prepared for learning activities for one semester in order to fulfill the learning outcomes assigned to the course/module.
- b. Teaching materials Teaching materials are guides that are used as standard references on certain subjects, and have the following characteristics: (1) There are sources of teaching materials; (2) Can be used as a standard reference for certain subjects; (3) arranged systematically and simply; (4) Accompanied by learning instructions (Utami et al., 2018).
- c. Assessment Instrument Assessment is a series of activities to obtain, analyze, and interpret data about student learning processes and outcomes that are carried out systematically and continuously.

Local Wisdom Melayu Deli

Local Wisdom is human intelligence possessed by certain ethnic groups which is obtained through community experience (Rahyono, 2017). That is, local Wisdom is the result of certain communities through their experiences and may not necessarily be experienced by other

communities. The characteristics of local Wisdom are as follows: a. Survive the onslaught of foreign cultures b. Have the ability to accommodate cultures that come from outside c. Able to integrate foreign culture into native culture in Indonesia d. Able to control incoming foreign culture e. Giving direction to the development of culture in society.

According to Wagiran (2022), local cultural wisdom has a broad scope including: (a) thoughts, attitudes, and actions in language, practicing art, and literature, for example literary works (b) thoughts, attitudes, and actions in various cultural artifacts, for example decorations, paintings, and so on; and (c) social thoughts, attitudes, and action (Wagiran, 2022). The application of local Wisdom Melayu Deli values can be used as a technique in the process learning that can help improve student understanding in learning. Local Wisdom Melayu Deli as part of the local culture and national cultural heritage, has a close relationship with the community environment so that it will be a good source of learning and easy to accept (Yuliani & Irham, 2022). One of the local wisdoms that can be seen is the Malayu Deli traditional house. Malayu traditional house is a wooden house or village house in the past as a place to live for Malay people. Nowadays, not many Malayu children know what the true shape of a traditional wooden house is or how it was actually built without nails. The shape of this traditional house building consists of various geometric shapes such as squares, rectangles, triangles. Thus the learning objectives in Geometry and Measurement courses will be more easily achieved.

Figure 1. Examples of Geometry Material Forms and Based Measurements Local Wisdom Melayu Deli in PGSD Students



Geometry and Measurement

courses The basic geometry study subject is included in the Expertise Subjects group with a weight of 3 credits. This course aims to improve students' abilities in conceptual knowledge (conceptual knowledge), procedural knowledge (procedural knowledge), and troubleshooting (problem solving) regarding geometry, including: Fundamentals of geometry; Polygon; Congruence and congruence; Symmetry, rotation and reflection; Flat wake properties; tiling; The circumference and area of a flat shape; Building properties of space; Volume & surface area of the room; and Measurement of weight and capacity (Walkington et al., n.d.). n addition, this course also aims to develop student abilities in connecting one geometric concept to another (connecting); think to solve problems/reasonreasoning); and the ability to communicate mathematical thinking (communication) on the concept of geometry and being able to identify the depth and breadth of geometry material in the elementary mathematics curriculum (Brandl & Vinerean, 2023).

Methods

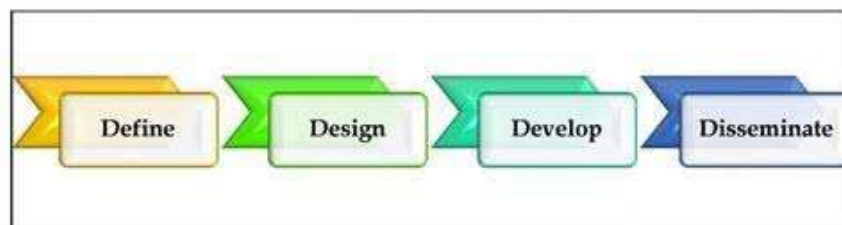
Types of research

This type of research is development research using a modification of the 4-D development model (Four-D Models). According to Sugiyono (2018), the development of the 4-D model consists of four main stages, namely: 1) Define (definition), 2) Design (planning), 3) Develop (development), and 4) Dissimilate (deployment) "Developmental research, as opposed to simple

instructional development, has been defined as “the systematic study of designing, developing, and evaluating instructional programs, processes and products that must meet the criteria of internal consistency and effectiveness.” “That is, development research as distinguished from simple learning development, is defined as a systematic study to design, develop, and evaluate programs, processes, and learning outcomes that must meet internal consistency and effectiveness criteria (Zhang et al., 2020).). Thus, the development is carried out using the development model

Development Procedure

Figure 2. 4D Research Steps



Defining Stage (Define)

Stage define is the stage for setting and defining the terms of learning. Stagedefinelt includes five main steps, namely:

1. Front End Analysis (Front-End Analysis): The front end analysis encountered is that the teaching materials used have never been revised and are still in the form of textbooks.
2. Student Analysis (Learner Analysis) Student analysis is carried out to get an overview of student characteristics, including: (1) level of ability or intellectual development, (2) individual or social skills that are already owned and can be developed to achieve the set learning objectives.
3. Concept analysis (Concept Analysis) Concept analysis is carried out to identify the main concepts to be taught, arrange them in a hierarchical form, and break down individual concepts into critical and irrelevant matters. This analysis helps identify possible examples and non-examples to draw on in guiding the development process. To support this concept analysis, the analyzes that need to be

carried out are (1) an analysis of the learning outcomes of the CPMK course and study materials that aim to determine the number and types of learning tools, (2) an analysis of learning resources, namely collecting and identifying which sources are support the preparation of learning devices.

4. Task Analysis (Task Analysis) Task analysis aims to identify the main skills that will be studied by the researcher and analyze them into the set of additional skills that may be needed. This analysis ensures a thorough review of the tasks in the learning materials. The tasks performed are still manual and concrete values are not immediately obtained.
5. Formulation of Learning Objectives (Specifying Instructional Objectives) The formulation of learning objectives is useful for summarizing the results of concept analysis and task analysis to determine the behavior of research objects.

Design Stage (Design)

The design stage aims to design learning devices. There are four steps that must be carried out at this stage, namely: a) preparation of standard test (criterion-test construction); b) media selection (media selection) according to the characteristics of the material and learning objectives; c) format selection (selection format), namely reviewing existing E-module formats and determining the format of learning tools to be developed; d) make an initial plan (initial design) according to the selected format.

Development Stage (Develop)

This stage aims to produce learning tools for geometry and measurement based on local Wisdom Melayu Deli that are valid, practical, and effective. This development stage includes validity testing, practicality testing, and effectiveness testing. Validity means that the designed learning device will be validated by experts according to their area of expertise (Abbas & Gheisari, 2022). Meanwhile, practicality means that after the validity testing stage, it is then revised and then tested during lectures to find out its practicality. Practicality is the level of practicality of the device when it is applied in the learning process, while effectiveness is the assessment of

the effectiveness aspect of the learning device in the form of student cognitive evaluation results..

Deployment Stage (Disseminate)

The Dissemination Stage aims to promote product development so that it can be accepted by users, both individuals, a group or a system. At this stage, product distribution is carried out on a wider scale. Data analysis technique The data analysis technique used in this research is descriptive quantitative and qualitative data analysis. Data from the expert test and small group test from the questionnaire were analyzed for percentages and explained qualitatively. Analysis activities, including: data reduction, data presentation, and drawing conclusions or verification. Data reduction activities include classifying and coding according to the type of data. Presentation of data in the form of descriptions, tables, diagrams, pictures or other visual forms. The data that has been presented is verified, interpreted, and concluded. Data analysis targets include observation, description, and explanatory levels. At the observation level, data is selected, categorized, and coded. At the description level, data is presented in pattern units, event units, trend units, or meaning units (Belajar, 2020).

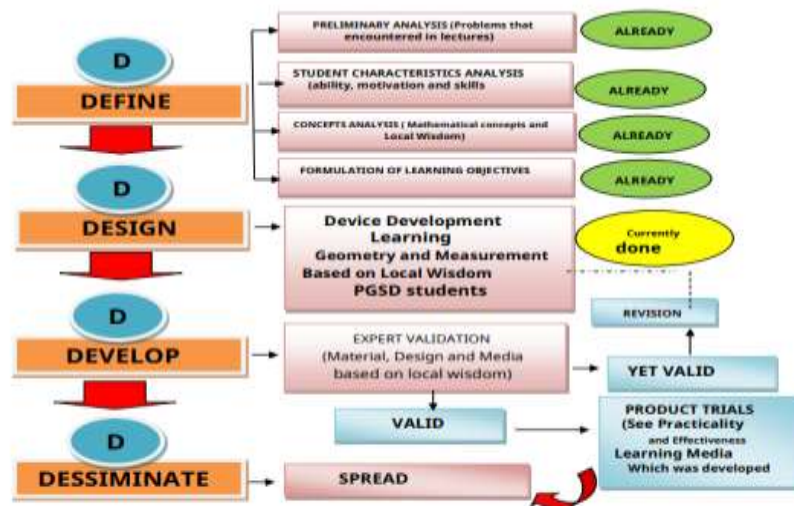


Figure 3. Learning Device Development Procedures Geometry and Measurement Based on Local Wisdom for Students PGSD

Results and Discussion

Description of the Defining Stage (Define)

Defining stage (define) aims to establish and define requirements or learning requirements by analyzing the objectives and limitations of the material. Activity at this stage is the initial-end analysis, student analysis, concept analysis, analysis assignments, and specifications of learning objectives.

Description of the Design Stage (Design)

The purpose of this stage is to design learning tools so that they are obtained prototype (examples of learning devices) for geometry and measurement material based on local Wisdom Melayu Deli. This design stage consists of four phases of preparing the test, media selection, format selection and initial design of learning devices.

Development Stage Description (Develop)

Results of stages define And design produce a preliminary design of a device so-called learning drafts-1. After the wisdom-based learning device local is designed in the form drafts-1, then the validity test is carried out by experts (expert reviews) and field trials.

Table 1. Semester Learning Design Validation Results (RPS)

Aspect	Indicator	Flat-Flat	Category
I	FORMAT		
	1. Clarity of material distribution	4,40	Valid
	2. The numbering system is clear	4,40	Valid
	3. Arrangement of space/layout	4,80	Valid
	4. The type and size of the letters are appropriate	4,60	Valid
II	LANGUAGE		
	1. Grammatical correctness	4,60	Valid
	2. The suitability of the sentence with the level of thinking	4,40	Valid
	3. Simplicity of sentence structure	4,40	Valid
	4. The sentence does not contain a double meaning	4,60	Valid
	5. Clarity of instructions and directions	4,40	Valid
III	CONTENT		
	1. The truth of the content/material	4,40	Valid
	2. Teaching activities and student activities are clearly and operationally formulated	4,20	Valid
	3. In accordance with the mathematical problem solving aspects	4,20	Valid
	4. Appropriateness of indicators in the curriculum used	4,80	Valid
	5. Compliance with local wisdom, enabling students to learn actively	4,40	Valid
	6. Appropriateness of the order of the material	4,80	Valid
	7. Appropriateness of the time allocation used	4,40	Valid
Average		4,49	Valid

From Table 1. it is obtained that the average score of each aspect of the assessment

all five validators are greater than or equal to 4 ($\geq 4,0$)
The overall average score for the RPS assessment is 4.49
with the criteria "valid". The five validators concluded

that RPS can be used properly small revision.) with the criteria of "valid". . The five validators concluded that RPS can be used properly small revision.

Table 2 Results of Activity Sheet Validation (LK)

No.	Rated aspect	Flat-Flat	Category
I.	Format		
	1. Clarity of material distribution	4,60	Valid
	2. The numbering system is clear	4,60	Valid
	3. Arrangement of space/layout	4,60	Valid
	4. The type and size of the letters are appropriate	4,40	Valid
II.	Language		
	1. The correctness of the layout	4,20	Valid
	2. Conformity of the sentence with the level of thinking and reading ability and age	4,40	Valid
	3. Simplicity of sentence structure	4,40	Valid
	4. The question sentence does not contain a double meaning	4,60	Valid
	5. Clarity of instructions and directions	4,40	Valid
III.	Fill		
	1. The truth of the content of the material is grouped into logical parts	4,40	Valid
	2. According to Piaget's learning theory, Vygotsky's learning theory, Bruner's learning theory, and Ausubel's learning theory	4,00	Valid
	3. According to the syntax of the learning approach geometry and measurement based on local wisdom	4,40	Valid
	4. In accordance with the steps of solving mathematical problems	4,40	Valid
	5. There is an expected character	4,20	Valid
	6. Appropriate time allocation	4,40	Valid
	Average	4,40	Valid

From Table 2, the average score for each aspect of the assessment of the five validators is obtained

Activity Sheet Validation and Revision Results (LK)

The validator's assessment of LK includes format, language and content.

Average the overall score for student book assessment is 4.40 with criteria "valid". The five validators concluded that LK can be used properly small revision.

Data Analysis Results of Validation and Revision of Research Instruments

The validator's assessment included aspects of clarity of instructions, content and language. In revising, the researcher refers to the results of the discussion by following the suggestions validator's advice and instructions. The results of the expert validation are presented in the following table.

Table 3 Validation Results of Problem Solving Ability Tests

No.	Validator Assessment								
	Content Validity			Language & Question Writing			Recommendation		
	I	II	III	I	II	III	I	II	III
1	V	V	V	DP	DP	DP	RK	RK	RK
2	V	CV	V	SDP	DP	DP	TR	TR	TR
3	V	V	V	SDP	SDP	SDP	TR	TR	TR
4	V	V	V	SDP	DP	SDP	TR	TR	TR
5	V	V	V	DP	DP	SDP	TR	RK	TR

Information

V	: Valid	DP	: Understood
CK	: Enough Valid	TR	: Without Revision
SDP	: Very Understandable	RK	: Minor Revision

The three validators provide an assessment of the components in the test with a valid or quite valid assessment both in terms of content, understandable or very can be understood in terms of language and writing questions as well as small or no revisions from recommendation side. This shows that the questions can be used at the trial stage field after making improvements to the validator's suggestions.

Learning Outcomes in Field Trials I

After the process of learning to teach material geometry and social measurements using Wisdom-Based Geometry and Measurement learning tools Local on students' mathematical problem solving abilities

Table 4 Results Post-test Mathematical Problem Solving Ability at Trial I

No.	Code Student wow	Question					Total	Scale 1-100	Category Evaluation	Information
		1	2	3	4	5				
1	S1	8	8	8	7	7	38	76	Good	complete
2	S2	7	7	9	8	7	38	76	Good	complete
3	S3	7	8	6	8	8	37	74	Enough	Not Completed
4	S4	7	8	7	9	7	38	76	Good	complete
5	S5	7	7	6	6	5	31	62	Not enough	Not Completed
6	S6	8	7	8	7	9	39	78	Good	complete
7	S7	8	10	8	8	8	42	84	Good	complete
8	S8	7	9	7	8	7	38	76	Good	complete
9	S9	6	8	10	7	8	39	78	Good	complete
10	S10	7	5	7	6	7	32	64	Not enough	Not Completed
11	S11	7	6	10	6	10	39	78	Good	complete
12	S12	9	8	7	9	9	42	84	Good	complete
13	S13	8	9	8	9	6	40	80	Good	complete
14	S14	5	7	6	7	5	30	60	Not enough	Not Completed
15	S15	7	10	7	8	10	42	84	Good	complete
16	S16	9	7	10	6	6	38	76	Good	complete
17	S17	8	9	10	7	6	40	80	Good	complete
18	S18	10	6	9	9	9	43	86	Good	complete
19	S19	9	7	9	7	7	39	78	Good	complete
20	S20	9	9	8	9	7	42	84	Good	complete
21	S21	6	10	9	6	9	40	80	Good	complete
22	S22	7	6	7	8	7	35	70	Enough	Not Completed
23	S23	8	9	8	9	6	40	80	Good	complete
24	S24	9	6	9	8	9	41	82	Good	complete
25	S25	7	5	6	6	5	29	58	Not enough	Not Completed
26	S26	10	7	8	7	8	40	80	Good	complete
27	S27	9	8	9	10	9	45	90	Very good	complete
28	S28	8	9	7	7	9	40	80	Good	complete
29	S29	5	6	7	5	8	31	62	Not enough	Not Completed
30	S30	7	6	9	7	9	38	76	Good	complete
Amount								2292		
Average								76,4		
Percentage of Classical Completeness (PKK)										76.67%

Table 4 shows that the learning outcomes in field trials I out of 30

Table 4 shows that the learning outcomes in field trials I out of 30 students who took part in the study, there were 23 students who received a complete score and 7 other students had not yet completed learning geometry and measurements.

Practicality Analysis of Geometry and measurement-based learning devices local Wisdom Melayu Deli in Trial I Geometry and measurement learning tools based on local Wisdom Melayu Deli are said practical in terms of (1) the assessment of experts/practitioners of learning tools developed are declared usable with little or no revision revision; (2) the results of observing the implementation of learning devices in the classroom include high minimum category ($3 \leq \bar{P} < 4$).

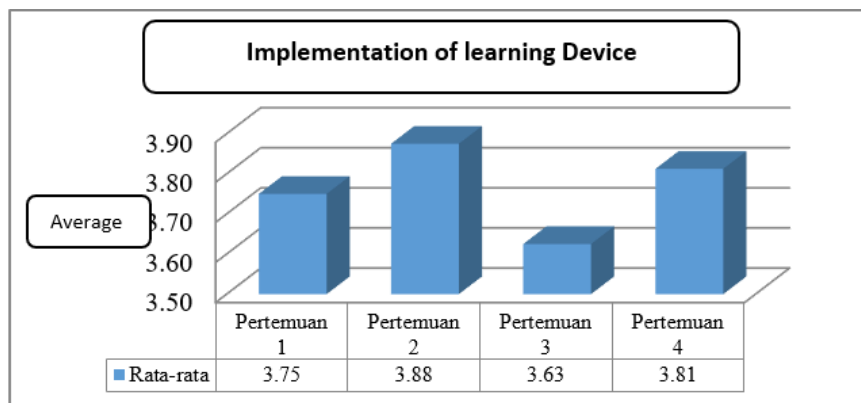
**Table 5 Average Observation Value of Test Learning Device Implementation
Try I**

Average Overall 2 Observer	Meeting				Total Average	Information
	1	2	3	4		
Trial I	3.75	3.88	3.63	3.81	3.77	Tall

Based on the table above, it was found that the overall average was 2

Based on the table above, it was found that the overall average was 2 (two) observers for trial I, the first meeting was 3.75, for the second meeting it was 3.88, for the third meeting it was 3.63, and for the fourth meeting it was 3.81. Furthermore, the total average value of the four meetings is 3.77, namely are in the high category (). Thus it can be concluded that The geometry and measurement learning tools based on local Wisdom Melayu Deli that have been developed are practical in terms of the implementation of the learning tools. For more details can be seen in Figure 4.6 below.

Figure 4 The Implementation of Trial Learning Device I for Each Meeting



Analysis of Effectiveness ResultsDraftsII in Field Trial I

Learning tools based on local Wisdom Melayu Deli are said to be effective in terms of completeness classical student learning, namely at least 85% of students who follow learning is able to achieve a score of 75, the achievement of learning objectives, and responses student. effectiveness resultsdrafts-2 for each indicator is described as follows

1. Classical Student Learning Mastery To see the effectiveness of a learning device one of them is see their level of mastery after being given or using the device developed learning. In the research level of

student mastery viewed from the ability to solve mathematical problems using tests developed mathematical problem solving abilities. Result description students' mathematical problem solving ability in trial I is shown in Table 4.16.

Table 6 Description of the Results of Mathematical Problem Solving Ability in Trial I

Trial I	
Information	Mark
The highest score	90
Lowest Value	58
Average	76,4

Table 6. shows that the average problem solving ability

student mathematics on the resultsposttestis 76.4. By level mastery of students' mathematical problem solving abilities from the resultsposttesttest try I can be seen in Table 7

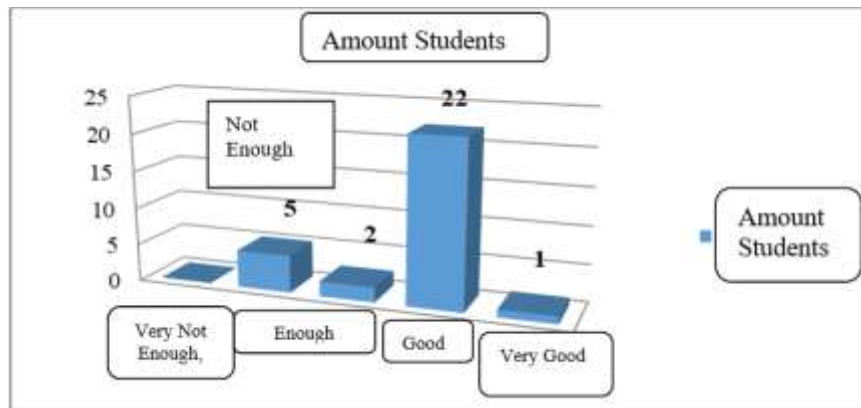
Table 7. Level of Mastery of Mathematical Problem Solving Ability Results Posttestin Trial I

No.	Interval Nilai	Amount Student	Percentage	Category Mark
1.	$0 \leq \text{Skor Total TKPM} < 45$	0	0%	Very Not enough
2.	$45 \leq \text{Skor Total TKPM} < 65$	5	16,67%	Not enough
3.	$65 \leq \text{Skor Total TKPM} < 75$	2	6,67%	Enough
4.	$75 \leq \text{Skor Total TKPM} < 90$	22	73,33%	Good
5.	$90 \leq \text{Skor Total TKPM} \leq 100$	1	3,33%	Very Good

Description TKPM = Problem Solving Ability Tes

Table 7 shows the number of students who scored very category good by 1 person (3.33%), good category by 22 people (73.33%), category 2 people (6.67%) are sufficient, and 5 people (16.67%) are in the less category. For more details can be seen in Figure 2 below.

Figure 5 Yield LevelsPosttest Mathematical Problem Solving Ability Students in Trial I



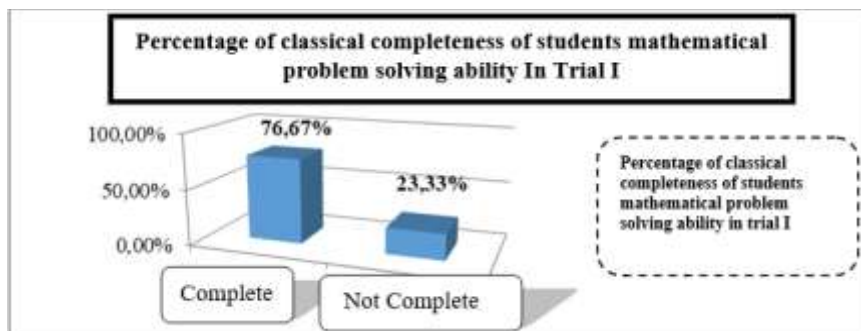
Furthermore, the results of classical mastery of mathematical problem solving abilities students in field trials I can be seen in Table 4.18. following.

Table 8. Level of Classical Completeness of Problem Solving Ability Mathematics in Trial I

Category	Mathematical Problem Solving Ability	
	Number of Students	Percentage
complete	23	76.67%
Not Completed	7	23.33%
Amount	30	100%

Description of the percentage of classical completeness criteria for solving ability students' mathematical problems in trial I are presented in Figure 3 below.

Figure 6 Percentage of Classical Completeness of Problem Solving Ability Mathematics in Trial I



Based on the data in Table 8. and Figure 3. it can be seen that the students' mastery of learning classically from the results of the mathematical problem solving abilities of 30 students, namely the number of students who complete is 23 students (76.67%) and the number of students who do not complete is 7 students (23.33%). In accordance with the criteria of classical student learning completeness, which is a minimum of 85% students who

take part in learning are able to achieve a score of 75. Thus the results posttest the ability to solve mathematical problems in the field trial I did not meet the criteria for achieving classical completeness. So, it can be concluded that in the field trial I the application of the geometry and measurement learning tools based on local Wisdom Melayu Deli that was developed did not meet the criteria for achieving classical mastery. The value of each indicator can be seen in Table 9. below.

Table 9. Student Mastery Level for Each Trial Indicator I Master

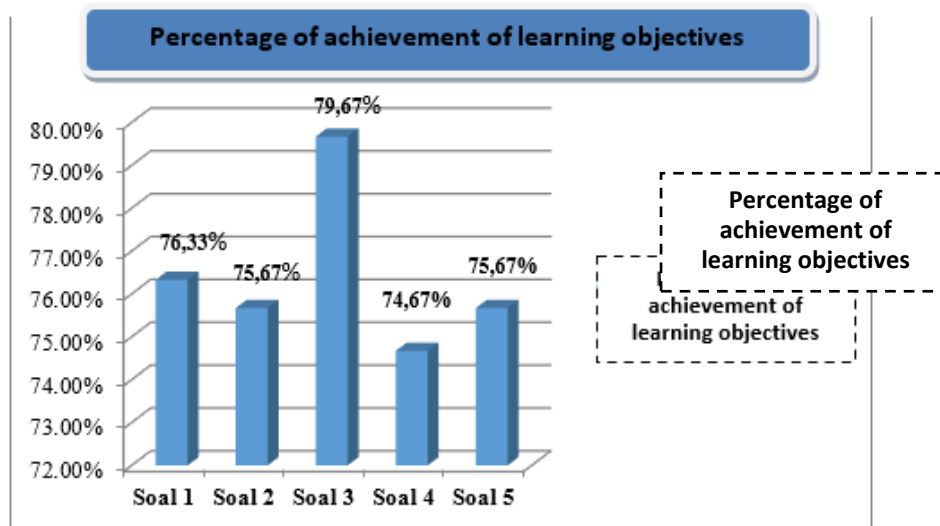
No.	Indicator	Question	Mastery Each Indicator
1.	Understanding the problem	1a	89%
		2a	
		3a	
		4a	
		5a	
2.	Plan a settlement	1b	76,44%
		2b	
		3b	
		4b	
		5b	
3.	Solve the problem	1c	64%
		2c	
		3c	
		4c	
		5c	
4.	Recheck answers	1d	82,33%
		2d	
		3d	
		4d	
		5d	

From Table 9. above it is known that in trial I, the level of mastery students for the indicator of understanding the problem by 89%, the indicator for planning completion of 76.44%, indicators of solving problems by 64%, and the answer re-examination indicator was 82.33%.

2. Achievement of Learning Objectives Analysis of the achievement of learning objectives is carried out to determine the level achievement of learning objectives for each item questions posttest solving ability math problem

**Table 10. Achievement of Learning Objectives on Solving Ability
Field Testing Mathematical Problems I**

No.	Learning objectives	Problem solving skill	
		% achievement Objective Learning	Information
1.	Solving problems related to the value of an item	76.33%	Achieved
2.	Solve problems related to the selling price, buying price, profit, and the percentage	75.67%	Achieved
3.	Solve problems related to rebates and their percentages	79.67%	Achieved
4.	Solve problems related to net, gross, and tare	74.67%	Not achieved
5.	Solve problems related to single flowers	75.67%	Achieved

Figure 7. Achievement of Learning Objectives on Solving Ability Mathematical Problems in Trial I

In accordance with the criteria for achieving learning objectives, it is said to be a goal learning is achieved with the criterion of 75% of the maximum score for each item, thus the achievement of learning objectives in trial I is on the results posttest Mathematical problem solving abilities have been achieved for item 1, item 2, item 3, and item 5. Meanwhile, item number 4 has not been achieved, namely regarding solving problems related to net, gross, and tare.

Student Learning Outcomes in Field Trial II

After the teaching and learning process of geometry and social measurement material was carried out using Geometry and Local Wisdom Melayu Deli-Based Measurement learning tools for students' mathematical problem solving abilities, the student learning outcomes in trial II were as follows.

Table 11. ResultsPost-test Mathematical Problem Solving Ability at Trial II

No.	Student Code	Question					Amount	Scale 1-100	Category Evaluation	Information
		1	2	3	4	5				
1	S1	8	8	8	8	9	41	82	Baik	Complete
2	S2	8	9	8	7	8	40	80	Baik	Complete
3	S3	9	7	8	8	8	40	80	Baik	Complete
4	S4	7	8	7	7	8	37	74	Cukup	Not complete
5	S5	10	8	8	8	9	43	86	Good	Complete
6	S6	8	9	8	7	9	41	82	Good	Complete
7	S7	9	9	8	10	8	44	88	Good	Complete
8	S8	10	8	8	9	9	44	88	Good	Complete
9	S9	9	9	10	9	8	45	90	Good	Complete
10	S10	10	8	9	8	7	42	84	Good	Complete
11	S11	8	8	9	8	10	43	86	Good	Complete
12	S12	9	9	8	10	9	45	90	Good	Complete
13	S13	10	8	10	9	8	45	90	Good	Complete
14	S14	8	9	9	8	8	42	84	Good	Complete
15	S15	8	9	8	9	10	44	88	Good	Complete
16	S16	9	8	10	9	8	44	88	Good	Complete
17	S17	8	9	10	9	8	44	88	Good	Complete
18	S18	10	9	8	7	9	43	86	Good	Complete
19	S19	9	10	9	9	10	47	94	Good	Complete
20	S20	9	9	8	8	8	42	84	Good	Complete
21	S21	9	8	9	10	9	45	90	Good	Complete
22	S22	7	7	7	8	7	36	72	Enough	Not complete
23	S23	8	9	8	9	6	40	80	Good	Complete
24	S24	9	8	9	6	9	41	82	Good	Complete
25	S25	7	9	9	8	8	41	82	Good	Complete
26	S26	10	7	8	8	8	41	82	Good	Complete
27	S27	9	10	9	8	9	45	90	Good	Complete
28	S28	9	7	7	8	9	40	80	Good	Complete
29	S29	8	8	6	6	7	35	70	Cukup	Not complete

No.	Student Code	Question					Amount	Scale 1-100	Category Evaluation	Information
		1	2	3	4	5				
30	S30	7	9	9	6	9	40	80	Good	Complete
31	S31	10	9	8	9	9	45	90	Good	Complete
Amount		269	262	260	253	261		2610	Enough	
Average										84,19
Percentage of Classical Completeness (PKK)										90,32

Practicality Analysis of Geometry and measurement-based learning devices local Wisdom Melayu Deli in Trial II

Geometry and measurement learning tools based on local Wisdom Melayu Deli are said practical in terms of (1) the assessment of experts/practitioners of learning tools developed are declared usable with little or no revision revision; (2) the results of observing the implementation of learning devices in the classroom include high minimum category (). In the following, a discussion will be presented each indicator in measuring the practicality of geometry learning tools and measurements based on local Wisdom Melayu Deli in trial II.

1. Expert/practitioner assessment of learning tools
Based on the mastery of theory and experience, experts and practitioners state that learning tools based on local Wisdom Melayu Deli can be used with minor revisions. To prove this statement, learning tools and instruments that are already valid are tested in the field (in the implementation of classroom learning). The results will be explained inpointNext is the implementation of learning devices.
2. Analysis of the Implementation of Trial Learning Devices II
The implementation of learning tools based on local Wisdom Melayu Deli was measured using an observation sheet on the implementation of geometry learning tools and measurements based on local Wisdom Melayu Deli. The results of the analysis of observational data on the implementation of local Wisdom Melayu Deli-based geometry and measurement learning tools concluded that the achievement level of

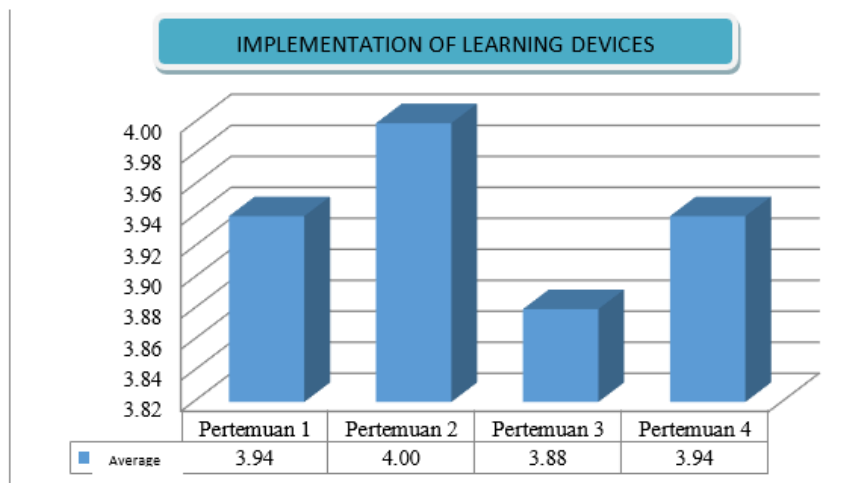
implementation of learning tools in trial II was included in the high category, which means that geometry and measurement learning tools based on local Wisdom Melayu Deli are said to be practical or applicable. The average observed value of learning device implementation for each meeting in trial II is shown in Table 12 below.

**Table 12 Average Observation Value of Test Learning Device Implementation
Try II**

Average Overall 2 Observer	Meeting				Total Average	Information
	1	2	3	4		
Trial II	3.94	4.00	3.88	3.94	3.94	Tall

Based on the table above, it is found that the overall average is 2 (two) people observers for trial I, the first meeting was 3.94, for the second meeting of 4.00, for the third meeting of 3.88, and for the fourth meeting of 3.94. Furthermore, the total average value of the five meetings is 3.94, namely are in the high category (). Thus it can be concluded that The geometry and measurement learning tools based on local Wisdom Melayu Deli that have been developed are practical in terms of the implementation of the learning tools. For more details, can be seen in Figure 4.12 below.

**Figure 8. Level of Mathematical Problem Solving
ResultsPosttestTest Try II**



Classical Mastery of Student Learning

To see the effectiveness of a learning tool one of which is to see level of mastery after being given or using a

learning device that developed. In the study of the level of student mastery in terms of ability solving mathematical problems by using solving ability tests math problems and self-efficacy by using a questionnaire self-efficacy Which developed. This test and questionnaire are given after four learning meetings, the aim is to find out how the level of mastery and completeness students to the subject matter they have learned. Criteria stated students are said to have mastery learning (individual mastery) abilities solving mathematical problems mathematically if the correct proportion of students is 75% and a class is said to have completed its learning (classical mastery) if in class there are 85% of students who have completed their studies. The description of the results of students' mathematical problem solving abilities in trial II is shown in Table 13 below

Table 13. Description of Mathematical Problem Solving Ability Test Results In Trial II

Information	Mark
The highest score	94
Lowest Value	70
Average	84,19

Table 13 shows that the average problem solving ability

Table 13 shows that the average problem solving ability student mathematics on the results posttest is 84.19. By level mastery of students' mathematical problem solving abilities on the results posttest Field trials II can be seen in Table 14.

Table 14. Level of Mastery of Mathematical Problem Solving Ability Results Posttest in Field Trial II

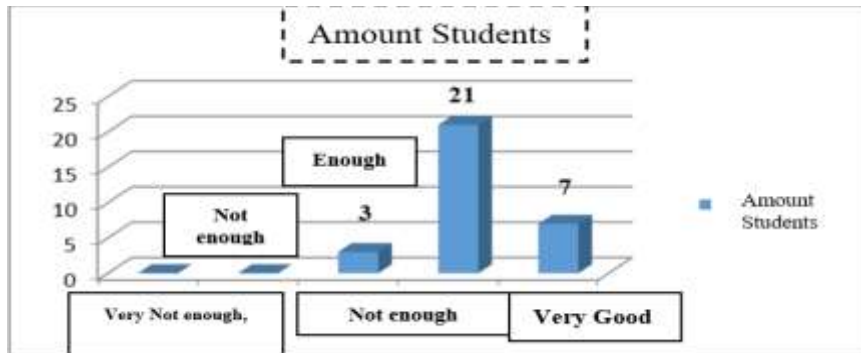
No.	Value Interval	Amount Students	Percentage	Category Mark
1.	$0 \leq \text{Skor Total TKPM} < 45$	0	0%	Very Not enough
2.	$45 \leq \text{Skor Total TKPM} < 65$	0	0%	Not enough
3.	$65 \leq \text{Skor Total TKPM} < 75$	3	9,68%	Enough
4.	$75 \leq \text{Skor Total TKPM} < 90$	21	67,74%	Good
5.	$90 \leq \text{Skor Total TKPM} \leq 100$	7	22,58%	Very Good

Description TKPM = Problem Solving Ability Test

From Table 14. shows the number of students who scored very category good as many as 7 students

(22.58%), good category as many as 21 students (67.74%), sufficient category as many as 3 students (9.68%). For more details, see Figure 5

Figure 9. Level of Mathematical Problem Solving Results Posttest Test Try II

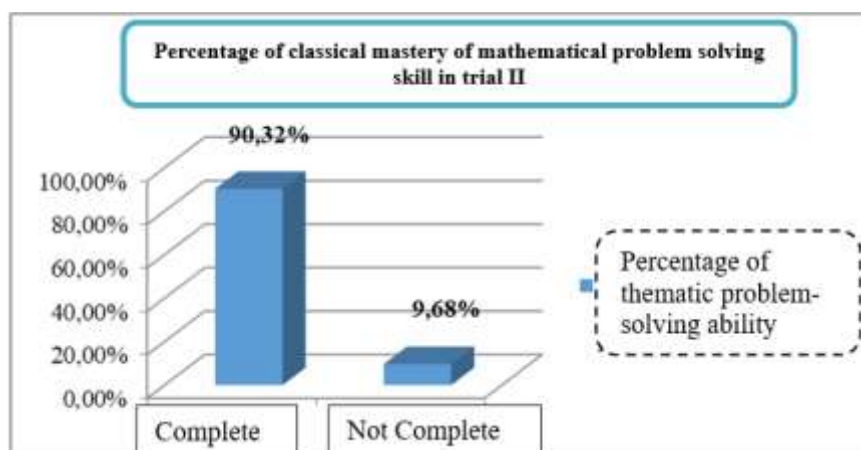


Furthermore, the results of classical mastery of mathematical problem solving abilities students in field trials II can be seen in Table 16. below.

Table 16. Level of Classical Completeness of Problem Solving Ability Mathematics in Field Trials II

Category	Mathematical Problem Solving Ability	
	Number of Students	Percentage
complete	28	90.32%
Not Completed	3	9.68%
Amount	31	100%

Description of the percentage of classical completeness criteria for solving abilities students' mathematical problems in trial II are presented in Figure 6 below



Based on the data in Table 16 and Figure 6, it can be seen that completeness classical student learning from the results of mathematical problem solving abilities to 31 students, namely the number of students who passed was 27 students (90.32%) and the number of students who did not complete was 3 students (9.68%). The average value per indicator can be seen in Table 17 below.

Table 17. Student Mastery Level for Each Indicator In Trial I

No.	Indicator	Question	Ownership Each Indicator
1.	Understanding the problem	1a	89,35%
		2a	
		3a	
		4a	
		5a	
2.	Plan Settlement	1b	80,43%
		2b	
		3b	
		4b	
		5b	
3.	Solve the problem	1c	80,22%
		2c	
		3c	
		4c	
		5c	
4.	Recheck answers	1d	90,65%
		2d	
		3d	
		4d	
		5d	

Description of the Stages of Deployment (Disseminate)

The development of learning devices reaches the final stage when the devices learning has obtained a positive assessment from experts and through tests development. Deployment of geometry and measurement-based learning tools Local Wisdom Melayu Deli in this research was carried out on a limited basis only on partner campuses course on geometry and measurement material.

Description of Increasing Students' Problem Solving Ability Using Developed Local Wisdom Melayu Deli-Based Geometry and Measurement Learning Devices

The data obtained from the results posttest mathematical problem solving abilities students in trial I and trial II were analyzed to find out the increase students' mathematical problem solving ability by comparing the average student scores obtained from the results posttest problem solving skill students' mathematics in trials I and trials II. Description of the upgrade solving student mathematical problems using learning devices geometry and measurement based on local Wisdom Melayu Deli developed in trials I and trial II is shown in Table 18 below.

Table 18. Description of the Results of Mathematical Problem Solving Ability

Information	<i>PosttestAbility</i> Solution to problem Mathematical Trial I	<i>PosttestAbility</i> Solution to problem Mathematical Trial II
The highest score	90	94
Lowest Value	58	70
Average	76,40	84,19

Based on Table 18, the results of the analysis increase solving ability

Based on Table 18, the results of the analysis increase solving ability students' mathematical problems in trials I and trials II showed that the average the average mathematical problem solving abilities of students on the results posttest trial I was 76.40 increased to 84.19 in trial II. This is appropriate data analysis of increasing students' mathematical problem solving skills in chapter III, namely increasing the ability to solve mathematical problems seen from the average average yield posttest trials I and II. Thus it is known that there is an increase the average value of students' mathematical problem solving ability is 7.79.

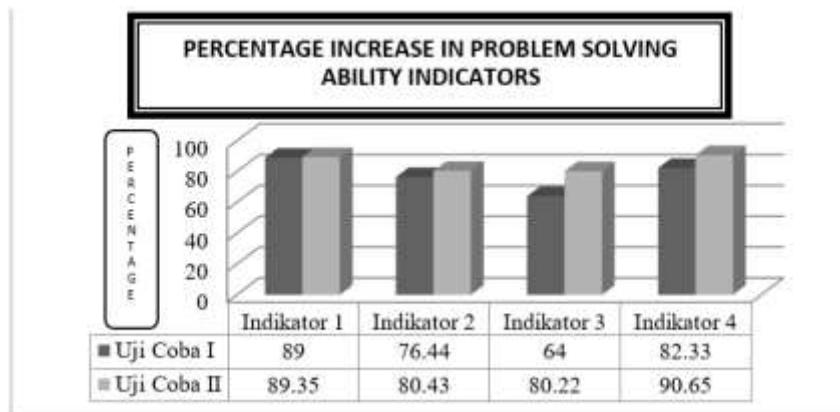
Next, a description of the increase in mathematical problem solving abilities students by using geometry and measurement learning devices based on local Wisdom Melayu Deli which was developed in trial I and trial II for each indicators of students' mathematical problem solving abilities can be seen in Table 19. following.

Table 19. Improved Mathematical Problem Solving Ability Each Indicator

No.	Indicator	Percentage		Enhancement (%)
		Trial I	Trial II	
1.	Understanding the problem	89	89.35	0.35
2.	Plan a settlement	76,44	80.43	3.99
3.	Solve the problem	64	80,22	16,22
4.	Check answers again	82,33	90.65	8,32

Based on Table 19. above, there is an increase in solving ability students' mathematical problems from trial I to trial II for each indicator. On

Based on Table 19. above, there is an increase in solving ability students' mathematical problems from trial I to trial II for each indicator. On the indicator of understanding the problem increased by 0.35%, on the indicator planning a settlement of 3.99%, on the indicator of solving the problem by 16.22%, and on the indicator of checking answers again by 8.32%. For more details can be seen in Figure 4.16.

Figure 10. Improved Mathematical Problem Solving Ability for Each Indicator

Conclusions

Development of geometry and measurement learning tools based on local Wisdom Melayu Deli using the Thiagarajan development model, aims to improve mathematical problem solving abilities. Geometry and measurement learning tools based on local Wisdom Melayu Deli on students' mathematical problem solving abilities increased from trial I to trial II with an average increase per indicator of 0.35%; 3.99%; 16.22% and 8.32%. The learning tools developed have met the criteria

for effectiveness, namely (1) classical student learning completeness in trial I has reached the good category and in trial II has reached the very good category; (2) the achievement of student learning objectives during learning activities meets the set ideal criteria; (3) positive student responses to the components components of learning tools and learning activities developed; and (4) ideal time allocation.

Acknowledgment

Teachers can implement this learning tool even though it has not yet reached the deployment stage. To find out the effectiveness of local Wisdom Melayu Deli-based geometry and measurement learning tools in various subject matter of mathematics and other appropriate subjects, it is suggested to teachers and researchers to implement these local Wisdom Melayu Delibased geometry and measurement learning tools in a wider scope. For other researchers who want to conduct research that measures students' mathematical problem-solving abilities so that they can pay more attention to students' abilities on indicators of understanding problems.

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