



## Braille Geometry Teaching Materials for Low Vision Students

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### Abstract

Braille geometry teaching materials have media that can be touched by low vision students' sense of touch. This study aims to obtain conclusions about the feasibility and description of braille geometry teaching materials for low vision students. This research was conducted at SLBA Bina Insani Bandar Lampung and MTsLB Yaketunis Yogyakarta. The research subjects were 10 low vision students and 4 teachers. The research instrument is a feasibility questionnaire for low vision teachers and students. From the results of data analysis and discussion, it can be concluded that: (1) required mathematics learning media contained in teaching materials for low vision students, (2) braille geometry teaching materials get an average score of 91%, the appropriate category of material experts and learning, (3) braille geometry teaching materials obtained from students an average score of 86.6% included in the Very Appropriate category and from teachers with an average score of 94% included in the Very Eligible category.

### Abstrak

Bahan ajar geometri braille memiliki media yang dapat disentuh oleh indra peraba siswa low vision. Penelitian ini bertujuan untuk memperoleh kesimpulan tentang kelayakan dan gambaran bahan ajar geometri braille bagi siswa low vision. Penelitian ini dilakukan di SLBA Bina Insani Bandar Lampung dan MTsLB Yaketunis Yogyakarta. Subjek penelitian adalah 10 siswa low vision dan 4 guru. Instrumen penelitian berupa angket kelayakan guru dan siswa low vision. Dari hasil analisis data dan pembahasan dapat disimpulkan bahwa: (1) dibutuhkan media pembelajaran matematika yang terdapat pada bahan ajar bagi siswa low vision, (2) bahan ajar geometri braille memperoleh skor rata-rata 91%, kategori sesuai ahli materi dan pembelajaran, (3) bahan ajar geometri braille yang diperoleh dari siswa rata-rata skor 86,6% termasuk dalam kategori Sangat Sesuai dan dari guru dengan skor rata-rata 94% termasuk dalam kategori Sangat Layak.

**Keywords:** Teaching Materials; Braille; Student Low Vision.

### INTRODUCTION

Teaching materials are one of the supporting elements to achieve optimal results in learning. Teaching materials should be made by the teacher by adjusting the cognitive conditions of students.

For the process of making teaching materials, the teacher can first analyze the situation and conditions of the students who will be given learning. Teaching materials should be able to attract interest and increase students' desire to learn. The teaching materials used in learning should

be adjusted to the students' abilities. Teaching materials should be able to help students solve problems in learning (Farida & Agustina, 2017). From this statement, teaching materials were needed following the conditions of students in learning. Teaching materials that are prepared directly by the teacher will be more following the conditions of students who will participate in the learning.

Teaching materials should be arranged according to the conditions of students. Teaching materials made by the teacher can adjust to the needs of students. One of the ways to improve the quality of learning process is by using appropriate teaching materials. Teaching materials adapted to the conditions of students and the environment are needed in learning (Suratmi, Laihat, Santri, Sriwijaya, & Sriwijaya, 2018). Mathematics teaching materials should be able to change the abstract nature of mathematics to be more real and easily understood by students. More material in mathematics learning is presented in the form of formulas and descriptions so they cannot understand the conditions of the problems given and cannot find solutions to existing problems. In learning mathematics, teaching materials are needed that can help students understand the concepts being learned. The concept of learning mathematics is a fundamental matter of learning mathematics (Farida; Nurul & Agustina; Rina, 2017). In learning mathematics teaching materials are needed that can help students better understand the concepts being learned.

In mathematics books that are widely used, the delivery of material mostly uses high language so that it makes students feel bored and lazy to understand it (Raharjo, 2014). From the results of Raharjo's research, a mathematics book was needed that uses an attractive appearance and

language that is easily understood by students.

Mathematics is one of the compulsory subjects in the formal education level. Mathematics is not only studied for normal schools but also studied for special schools is called SLB. In SLB, the conditions of many students are found with various limitations. Starting from the condition of mentally retarded students (mental retardation), blind (low vision), and deaf. In learning mathematics, students with special needs are still difficult to use the 2013 curriculum textbooks provided. This difficulty is because existing textbooks have not been adapted to the conditions of students with special needs (Jazim, Agustina, Nurlaila, & Farida, 2017). The results of the research by Jazim, et al. Show that in mathematics learning the use of teaching materials has not been adjusted to the limitations experienced by students. The conditions of teaching materials that have not been adjusted to the conditions of the limitations of students will result in less-than-optimal learning.

One of the obstacles experienced by special school students is low vision. The level of visual acuity for the visually impaired is determined by the breadth of vision. The definition of visually impaired is based on the level, there is what is called low vision. Type of visual impairment blind vision (Vuletić, 2016). From Velutic's statement, one category of visual impairment is low vision. Low vision students experience visual barriers in visual activities.

In low vision students, in learning mathematics they usually use braille books to support learning activities. To see the condition of braille mathematics teaching materials, researchers made preliminary observations at the Metro State Special School, Lampung Province. From the observation, the researcher found the fact that the braille mathematics teaching materials used still need improvement to

overcome the visual barriers of low vision students. In learning mathematics, especially geometry material, low vision student only read the formulas used in braille teaching materials. Low vision students cannot find the real form of the object being studied. In the braille teaching materials available in schools, it has not facilitated the real shape of the existing geometry material. In teaching materials, needed 3D geometry shapes being studied so that students can know clearly from kinds of shapes geometry 3D. Besides, researchers also conducted interviews with teachers who taught mathematics. In braille mathematics teaching materials, need special code for mathematics and science. This special code in mathematics can help students to solve math problems (Dhanalakshmi & Murthy, 2016). From the results of Dhanalakshmi, in braille mathematics teaching materials a special design was needed to student low vision can solve existing problems.

From the results of the interview, the teacher said that media assistance was needed in textbooks that could be used with low vision students' sense of touch in learning mathematics. Teachers face difficulties when teaching blind students using classical methods. To overcome these difficulties, the teacher must prepare students to understand and verify results and balance their attention (Annie, Ndhlovu, & Kasondeng, 2015). From this research results, it was found that teachers had difficulty delivering learning materials to low vision students if they were not equipped with learning media.

One of the materials in mathematics learning is three-dimensional. In the material of three-dimensional, students are directed to be able to observe the condition of the building space in the surrounding environment. For low vision students, learning materials on three-dimensional is difficult to understand. This is because low

vision students cannot observe any shapes from the material. Geometry material can encourage students' ability to solve problems in everyday life. In geometry material, there are student difficulties, one of which is the difficulty of solving geometry problems (Fauzi & Arisetyawan, 2020). So far, in studying geometry material, students can't know shapes of the kind's geometry. In studying geometry material, students do not get real shapes from the types of space they observe. This is because there is no geometry media on the geometry material in teaching materials. To overcome the limited condition of low vision students, aids in teaching materials that can be used by students' sense of touch are needed.

Based on the condition of the teaching materials on the problem background, other supporting teaching materials that can be used by low vision students in learning mathematics is needed. This teaching material can be used by the conditions of the existing low vision student. Therefore, researchers will develop Braille Geometry Teaching Materials for Low Vision Students.

## METHOD

This research is a type of development research. When the research was carried out in August and September 2020. The research site was SLBA Bina Insani Bandar Lampung (hereinafter referred to as school 1 and MTsLB Yaketunis Yogyakarta (here in after referred to as school 2). The development model used is the Plomp Development Model which consists of 3 stages as the following:

**Preliminary research:** needs and context analysis, review of literature, development of a conceptual or theoretical framework for the study.

**Prototyping phase:** iterative design phase<sub>3</sub> consisting of iterations, each

being a micro cycle of research<sup>4</sup> with formative evaluation as the most important research activity aimed at improving and refining the intervention.

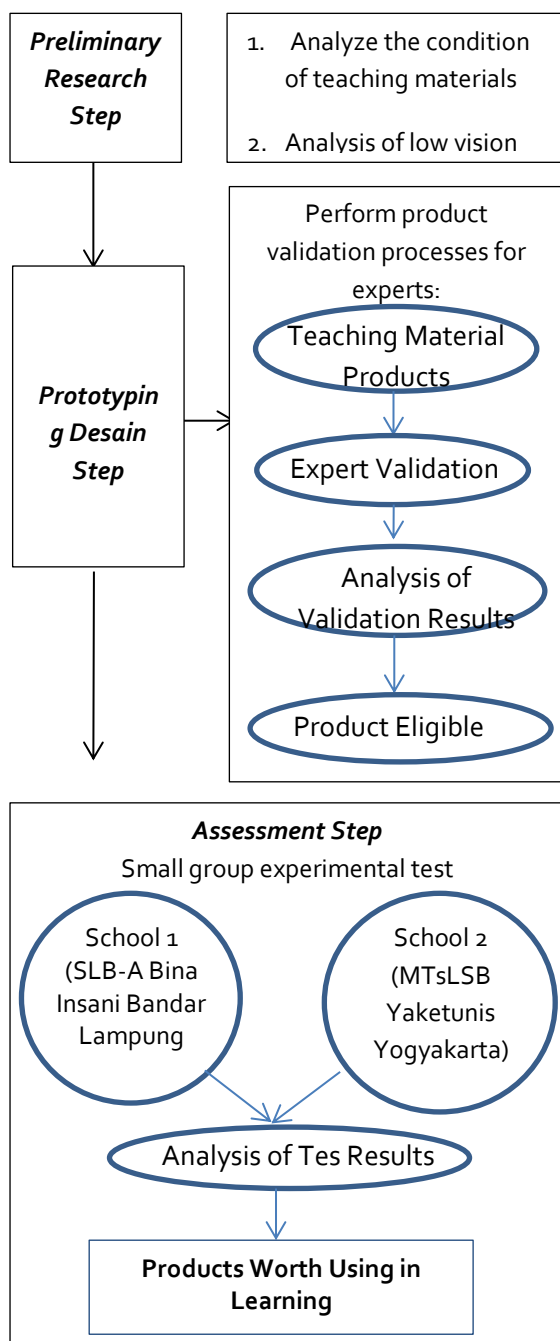


Chart 1. Development Stages

**Assessment phase:** (semi-) summative evaluation to conclude whether the solution or intervention meets the pre-determined specifications. As also this phase often results in recommendations for improvement of the

intervention, we call this phase semi summative. (Plomp; Tjeerd & Nienke, 2010)

Based on the Plomp development model, the stages of development are made as in Chart 1.

The research instrument used in this study was the initial questionnaire, validation of the product questionnaire by experts, and the feasibility of teaching materials given to teachers and students. This feasibility questionnaire includes aspects of the material, language, and 3D geometry design. For the criteria used in braille geometry teaching material questionnaire, the following criteria are used in Table 1:

Table 1. Eligibility Criteria

Score	Category	Percent (%)
5	Very Eligible (SL)	$80 < X \leq 100$
4	Eligible (L)	$60 < X \leq 80$
3	Quite Eligible (CL)	$40 < X \leq 60$
2	Ineligible (TL)	$20 < X \leq 40$
1	Very Uneligibel (STL)	$\leq 20$

(Jazim; Agustina, Rina; Nurlaila, Siti; Farida, 2018)

The collection data technique used in this study is divided into 3, namely:

**Initial data collection** consists of the following activities: a. Observation on the condition of the available teaching materials; and b. Interviews with teachers and students regarding the condition of teaching materials. **Validate** the product of teaching materials to material experts and learning experts.

**Conduct small trials at school 1 and school 2 for Data collection at school 1<sup>st</sup> and 2<sup>nd</sup>.** The first activities consist of activities as follows: a. Distributing teaching materials to 5 low vision students and 2 teachers; b. Conducting the test feasibility of teaching materials with the help of the teacher who explains the material face to face; and c. Fill out a feasibility questionnaire for braille geometry

teaching materials for low vision students with the help of the teacher.

Data collection at school 2, consists of activities as follows: a. Sending braille geometry teaching materials files and eligibility questionnaires to the addresses of 5 students and 2 teachers; b. Conduct a feasibility test for braille geometry teaching materials online using the WhatsApp group video call with the help of the teacher who explains the material; c. Fill out a feasibility questionnaire for low vision teachers and students who are assisted by their families at home.

The data analysis techniques used in this research were: Analyze data from observations and interviews; Adjusting the mathematics teaching material needs of low vision students; Analyze the results of product validation by the validator; Adjust the results of the validation of teaching materials; Collecting data from the trial questionnaire results from low vision students and teachers at school 1; Calculating and analyzing data analysis from school questionnaires 1; Collecting data from student trial questionnaires from low vision students at school 2; Counting and analyzing the results of questionnaires from school 2; and Compile the results of data analysis on the trial of braille geometry teaching materials for low vision students.

The weakness of the method used is that the questionnaire given to low vision students has not used a braille letter questionnaire. The questionnaire still uses the usual form for normal students. In the process of filling out the teaching material questionnaire, low vision students still need help from others.

## RESULTS AND DISCUSSION

### Research results

The initial stage of development carried out is the primary research stage. At this stage, observations and questionnaires

were distributed at the Bina Insani Metro Special School. From the results of observations and distribution of questionnaires, it is found that: there are no learning media, especially for three-dimension. Besides, existing teaching materials have not been adapted to the cognitive conditions of students. In practice, questions are also still difficult to implement because students cannot participate in learning optimally. From the results of this analysis, it requires mathematics teaching materials that are equipped with media that can be touched by low vision students' sense of touch. In learning mathematics, especially geometry material, supporting tools are needed to achieve optimal results. Tools that are measured and obtained are good results from students and teachers (Laksmiwati & Retnowati, 2019). Based on the results of the analysis at the plenary research stage, braille geometry teaching material product is prepared that is ready for testing by the validator. The results of the development at the plenary research stage are in line with the results of Laksmiwati & Retnowati research that in learning geometry material supporting tools are needed in learning.

At the design prototyping stage, validation is carried out by material experts and learning experts. From the results of expert validation, the following data were obtained in Table 2.

Table 2. Product Validation Results

No.	Validator	Value	Category
1.	Material 1	93 %	SL
2.	Material 2	91 %	SL
	Average	92 %	SL
1.	Learning 1	92 %	SL
2.	Learning 2	88 %	SL
	Average	90 %	SL

From Table 2, 3D mathematics teaching materials get an average score of 92% in the very feasible category from the

material aspect. Besides, from the learning aspect, an average value of 90% is very feasible. From material experts and learning experts it can be concluded that at the stage of making this design prototype braille geometry teaching materials get an average score of 91%, a very feasible category. The development of geometry learning tools requires excellent tools from the results of the validation process assessment (Laksmiwati & Retnowati, 2019). From the average value obtained, the product of braille geometry teaching materials is ready for the next stage, namely the small group test. The results of this product assessment are in line with the results of Laksmiwati's research which supports if product development must get results that are very suitable for use.

The initial research phase was carried out on Saturday, August 29, 2020, at SLB-A Bina Insani Bandar Lampung. This activity was carried out face-to-face with 5 low vision students by implementing the Covid-19 health protocol. In this activity, each student is given 3D braille math teaching materials, then the teacher helps explain a little of the material for 30 minutes. After the explanation of the material from the teacher, students are asked to understand the problems that exist in the braille geometry teaching material.

The ability of students' cognitive aspects can be the reason for different their spatial and mathematical abilities. In mathematics such as geometry, the use of braille is still limited to reading mathematical formulas. Difficulty reading braille math formulas causes more complex problems for students in learning mathematics (Biiter, 2013). From this opinion, it shows that learning geometry requires media that can be touched by low vision students. At the end of the activity, students are asked to fill out a feasibility questionnaire for teaching materials with the help of the teacher. Apart from students,

teachers are also given a feasibility questionnaire for the teaching material. The following is Table 3. The results of the feasibility questionnaire for 3D braille mathematics teaching materials in schools 1.

Table 3. Results of Small Trial of Braille Geometry Teaching Materials in Schools 1.

No.	Student	3D Math Teaching Materials	
		Value	Category
1.	Student 1	94%	SL
2.	Student 2	100%	SL
3.	Student 3	82 %	SL
4.	Student 4	82 %	SL
5.	Student 5	92%	SL
	Average	90%	Very Eligible (SL)
1.	Teacher 1	94 %	SL
2.	Teacher 2	88%	SL
	Average	91 %	Very Eligible (SL)

In Table 3, each low vision student gave a very feasible category for braille geometry teaching materials with an average value of 90%. Besides, the results of the eligible questionnaire by the teacher also gave an average score of 91% in the very feasible category. Based on the value of the questionnaire from low vision students and teachers at school 1, it can be stated that the value of braille geometry teaching materials is very suitable for use by low vision students in learning mathematics, especially in three-dimension.

The second small trial was carried out at MTsLB Yaketunis Yogyakarta. At MTsLB Yaketunis, face-to-face trials could not be carried out because the covid-19 pandemic conditions were still quite high in the school environment, so the test second small group was carried out online. Before the feasibility test was carried out, the braille geometry teaching material and a feasibility questionnaire were sent to the addresses of each student and teacher to be studied first. The feasibility trial was carried out on Wednesday, September 16, 2020, using the WhatsApp application group video call. This feasibility trial lasted for 30 minutes. In this due diligence



activity, the teacher helps explain three-dimension material online. Furthermore, students understand the problems and solutions using geometry media in teaching materials. After the due diligence, students and teachers to fill out the eligibility questionnaire.

The speed of reading the braille letters of students can find out by their perceptual factors. Lack of clarity on the problems presented, can make reading skills take longer to understand the material (Radojichikj, 2015). From Radojichikj's opinion, an attractive presentation of braille teaching materials can affect the ability to read the material on teaching materials. This interesting presentation is found in braille geometry teaching materials because the teaching materials contain real geometric media. The following is Table 3. The results of the feasibility test for Braille Geometry Teaching Materials at MTsLB Yaketunis Yogyakarta.

Table 4. Small Trial Results of Braille Geometry Teaching Materials at MTsLB Yaketunis Yogyakarta

No.	Student	Braille Geometry Teaching Materials	
		Value	Category
1.	Student 6	90 %	SL
2.	Student 7	86%	SL
3.	Student 8	78 %	L
4.	Student 9	82 %	SL
5.	Student 10	80 %	L
	Average	83,2 %	Very Eligible (SL)
1.	Teacher 3	96 %	SL
2.	Teacher 4	98 %	SL
	Average	97 %	Very Eligible (SL)

In Table 4, the results of the feasibility test by 5 low vision students get an average score of 83.2%, including in the Very Appropriate (SL) category. Besides, the teacher's average feasibility test score was 88.5% in the Very Appropriate (SL) category. In the results of the feasibility trial at SLB-A Bina Insani and MTsLB Yogyakarta, the average was 83.5% in the Very Appropriate category of students

and 89.75% in the Very Appropriate category from the teacher. Blind children use braille with the sense of touch. The symbolic representation in braille forms what conveys the material well (Njue et al., 2014). According to Njue, the representation of braille teaching materials represents material for low vision students. This is also found in braille geometry teaching materials which contain designs of real geometric shapes to help low vision students in learning mathematics.

## Discussion

From the results of data analysis at the preliminary research stage, it was found that one of the conditions of the teaching materials needed by low vision students was teaching materials equipped with learning media. The completeness of learning that can be achieved by students with special needs in learning mathematics reaches 80% if it is equipped with learning media (Sari, Pratama, & Permatasari, 2020). From the results of Lisna Sari's research, there is a similarity with the results of preliminary data analysis that low vision students need special learning media for learning mathematics.

At the prototyping design stage, the teaching material product received an average score of 92% in the very feasible category from the material aspect. Material validator experts are 2 mathematics education lecturers who are competent in the field of mathematics. In developing learning media, excellent validation results are needed from the material aspect (Nugroho, Putra, Putra, & Syazali, 2017). The results of the validation of this material expert were 92%, the category was very feasible to support the results of the material expert validator said that the material presented in the teaching material was by the cognitive level of students used as subjects, namely junior high

school students (SMP). Besides, the material presented in teaching materials is also quite easy for students to implement.

From learning experts, the average score obtained for this geometry math teaching material is 92%, a very feasible category. The learning validator expert is 2 teachers who teach low vision students. the learning expert validator said that the geometry media used in teaching materials helped students to be able to see the shape of the space being studied. In the development of instructional media, responses that do not get attention are very attractive to students. This media development can use application programs or media according to the needs of students (Masykur,, Nofrizal,, & Syazali, 2017). The results of the development of this geometry design, it is in line with the results of Masykur, Nofrizal, and Syazali's research which explains that the use of media must match the needs of students. Besides, with the geometry form, students become more interested in participating in learning and to stimulate the motor skills of low vision students more.

From the results of a small trial at school 1, overall students provide a very feasible assessment of using braille geometry teaching materials. So far, students with low vision do not see the shapes when learning the three-dimension. With the 3D media in this braille mathematic teaching material, it can attract more students' interest in learning. Low vision students who have not been able to see images of spatial shapes all this time, using geometry media in their teaching materials, can feel and imagine various shapes of space. *"Blind children are generally different from children with normal vision. blindness can affect all areas of development, particularly eating, language, motor skills, and social skills."* (Drezek, 2012). The existence of geometry media in braille mathematics teaching materials is supported by

research by Drezek, W which states that low vision students need more media to train their motor skills in learning. There is a significant difference in learning outcomes if learning uses instructional media compared to not using media (Nwike & Catherine, 2013). From the research results it is shown that the learning medium is very helpful for students to be able to achieve better learning outcomes. This can be seen in the student's eligibility questionnaire explaining that geometry media in teaching materials helps students to understand the shapes of the shapes being studied so that it makes it easier for students to understand the material.

In the results of a small trial questionnaire by the teacher, all the teachers provided value very worthy. According to the teacher, the presence of geometry media attached to the braille book makes it easier for teachers to convey material of three-dimension. In learning mathematics, the use of textbooks is still assisted by teachers. Besides, the form of media that is separate from books causes the media to often disappear after being used (Agustina & Farida, 2019). From the results of this study, it was found that the learning of low vision students had not been equipped with media so far. With the existence of geometry media in mathematics teaching materials, braille can make it easier for students to understand the material. This is also supported by students' statements in the questionnaire which explain that low vision students have a better understanding of the material three-dimension with the help of geometry media attached to braille teaching materials. Besides, teachers also find it easier to direct students to use geometry media. The following is picture 1. Sample documentation of a small trial at school 1.





Figure 1. Sample Feasibility Test for Braille Geometry Teaching Materials at Bina Insani Special School.

From the results of a small trial of braille geometry teaching materials at MTsLB Yaketunis, 2 students gave decent scores and 3 others gave very decent scores. Of the 5 students who were given a feasibility questionnaire, it was seen that there were still students who were not used to using media in learning. This results in the existence of geometry media in teaching materials that students cannot use independently in learning. During the due eligible test activity, it was also seen that each student felt confused by the existing geometry shapes. With the teacher's explanation and assistance in directing students to be able to feel the geometry shape, students can touch the geometry shape being studied.

For other students, this geometry shape can train their motor skills when learning. This can be seen during the trial activities; some students are interested in forming spatial using geometry nets available in braille mathematics teaching materials. Limitation of blind conditions becomes one of the problems in learning geometry material. the teacher must maximize the condition of the students' sense of touch in learning (Arlin, Janu & Heri, 2015). According to Arlin, in learning conditions that maximize low vision students' sense of touch to achieve optimal results.

In learning to use braille, students need motivation to want to learn. The examination of braille teaching materials is

required (Herzberg, Rosenblum, & Robbins, 2017). From Herzberg's opinion, the braille teaching materials needed motivate students' low vision to learn the material. In addition, the real geometric shapes found in teaching materials can attract students to understand concepts.

*"Blind students have good abilities in learning mathematics like other students in general. This ability can be optimal if blind students who are supported by the teacher use the right method and are given sufficient study time to be able to complete math assignments"* (Mwangi, 2016). From the results of Mwangi's research, low vision students have good abilities in mathematics if given the right method and time. The results of a small trial questionnaire from MTsLB Yaketunis students provided data that students liked the way to solve existing practice questions by being given geometry media on braille mathematics teaching materials. In learning, blind students will be more optimal when using learning media. Media that can be used properly are those that support the sense of hearing and the sense of touch that are still functioning properly (Agustina & Farida, 2019). The research results are also in line with the results of a small trial which states that students can solve problems on teaching materials more easily with geometry media in braille geometry teaching materials.

From the results of a small trial questionnaire by teachers at MTsLB Yaketunis Yogyakarta, it was found that the category was very feasible for each teacher. According to one teacher at MTsLB Yaketunis, geometry model nets are very helpful for teachers to deliver the material. Besides, the material contained in this braille geometry teaching material is following the basic competencies that will be achieved by students. The practice questions given in this teaching material are also by the cognitive level of low vision

students. So far, there is still a lack of innovation in mathematics learning for blind students. So far, blind students' mathematics learning has only been limited to the use of braille books. Innovation in braille books is needed so that it doesn't feel monotonous (Agustina & Farida, 2019). From the research results, there is a fact that there is indeed a need for innovation in existing braille teaching materials. One of the innovations in braille mathematics teaching materials is the presence of geometry media that is attached to the teaching material. With the presence of geometry media that is adhered to teaching materials, it will minimize the media that has often happened.

"For students with special needs in the implementation of learning, they must pay attention to many things, especially in the aspects of implementing mathematics subjects related to individual assignments. These constraints are due to the different types of obstacles and abilities of students with special needs, but the material provided by the teacher is still general" (Agustina; Farida, N; Vahlia, I; Linuhung, N; Rahmawati, Y; Nurlaila S, 2019). From the results of Agustina's research, and all, in learning mathematics for students who have obstacles, a special organization is needed. This is because the material presented is still general, so it is difficult for students to apply. Agustina's results and all of this are also in line with the results of a small trial of research that states that teachers need a way to convey mathematics material to low vision students. With the geometry form of braille mathematics teaching materials, this is a different way that can be implemented more easily by low vision students. The development of media and learning tools for students with disabilities must be following the conditions and needs of students. Blind students need artificial aids from real objects to make

them more real in learning activities (Rudiyanti, 2015). The following is picture 2. A sample of documentation of a bold small trial at MTsLB Yaketunis Yogyakarta.



Figure 2. Online Trial Samples at MTsLB Yaketunis Yogyakarta

Based on the results of small trials in 2 schools SLB-A Bina Insani and MTsLB Yaketunis Yogyakarta, conclusions can be drawn in Table 4.

Table 4. Recapitulation of Small Trial Results of Braille Geometry Teaching Materials at Bina Insani Special School in Bandar Lampung and MTsLB Yaketunis Yogyakarta

No.	School	Subyek	Value and Category	Average
1.	SLB-A Bina Insani Bandar Lampung	Student	90% (Very Eligible)	86,6 %
2.	MTsLB Yaketunis Yogyakarta	Student	83,2 % (Very Eligible)	Very Eligible (SL)

No.	School	Subyek	Value and Category	Average
1.	SLB-A Bina Insani Bandar Lampung	Teacher	91% (Very Eligible)	94 % Very eligible
2.	MTsLB Yaketunis Yogyakarta	Teacher	97% (Very Eligible)	(SL)

From Table 4. 3D braille mathematics teaching materials get a feasibility score

from students of 86.6% in the very feasible category (SL) and the teacher of 94% in the very feasible category (SL). From the results of this feasibility test, it can also be seen that students find it easier to learn mathematical material specifically three-dimensions because there are 3D media that matches the obstacles faced by low vision students. The development of learning media that gets very good on material aspects and learning media aspects that get very good grades (Nugroho et al., 2017). With the presence of geometry material media, low vision students can feel the real form of the mathematics material being studied. According to the math teacher, the existence of geometry shapes in teaching materials helps teachers to be able to visualize abstract forms of material to be more real for low vision students.

## CLOSING

### Conclusion

Based on the results of data analysis and discussion, it can be ignored that: (1) mathematics learning media is needed in the teaching materials for low vision students, (2) braille geometry teaching materials get an average score of 91%, the Very Eligible category from material experts and Learning, (3) braille geometry teaching materials obtained from students an average score of 86.6% included in the Very Eligible category from teachers with an average score of 94% included in the Very Eligible category.

### Suggestion

From the conclusions of this study, the following suggestions are: (1) teachers to be able to use this braille geometry teaching material in mathematics learning, especially three-dimension, (2) students to be able to independently learn braille geometry materials both in school and at home.

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