

## Student's Worksheet Design Assisted with Liveworksheets to Improve Student's Concept Understanding Skills on Quadrilaterals and Triangles

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### ABSTRACT

*Concept understanding is the most basic ability that students should have in learning mathematics. In today's era of online learning, math teachers are required to use technology-assisted learning media so that it can be more easily distributed to students. For that, electronic teaching materials are needed that can accommodate this. So the purpose of this research is to develop electronic liveworksheets assisted student worksheets to improve the concept of understanding the skills of students in the seventh grade of Junior High School 1 Sungailiat. This type of research is research and development using the ADDIE model (analyzing, designing, developing, implementing, and evaluating). Data collection techniques use interviews, observations, questionnaires, concept understanding ability tests, material expert validation questionnaires, and media experts. The data sources in this study are seventh graders of Junior High School 1 Sungailiat, Indonesia, two material expert validators, and two media expert validators. After that, the curriculum, learning model, learning resources, and characteristics of the student are the objects of this research. The results of this study show that: (1) the ability to understand students' concepts still tends to be low so that an analysis of student worksheet needs is needed to improve those abilities, (2) researchers develop electronic liveworksheets-assisted student worksheets containing cover, introduction, core competencies, and basic competencies, problem exercises according to indicators of concept understanding, and the identity of the author, (3) the results of media design are then validated by material experts and media experts who It shows that all experts state that media is in a good category, so that valid media is used. This research will continue to the implementation and evaluation stages.*

**Keywords:** *Concept Understanding; ADDIE model; Student's Worksheets; Liveworksheets.*

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### INTRODUCTION

Concepts understanding is the most basic ability that students should have in studying mathematics. Lee (2017) said that mathematics is a formal science that uses symbolic language to learn concepts such as numbers, structures, and variants. This fact is by the objectives of mathematics learning according to The Ministry of Education No. 22 of 2006 where it is explained that students can understand mathematical concepts, explain the relationships between concepts, and apply concepts or algorithms flexibly, precisely, and efficiently. According to Darminanto (Faizah, 2019: 27), the indicators for understanding the concepts that students must master include: (1) restate a concept; (2) classify certain traits; (3) give an example; (4) represent concepts; (5) Use concepts to solve problems.

But in reality, the ability to understand the concept of students tends to be below. Based on the results of the interview showed that students still have difficulty understanding the mathematical concept this is shown by when students are given a problem that is slightly different from the example of the problem they will have difficulty solving the problem contained in the problem. In addition, based on the results of initial ability tests also showed that as many as 66.7% of students were still unable to get the appropriate grades or exceed the minimum completion criteria determined by the school. The average score obtained by students at the time of taking the concept comprehension ability test is only 52.8 quite far from the minimum completion criteria of the school with a score of 70.

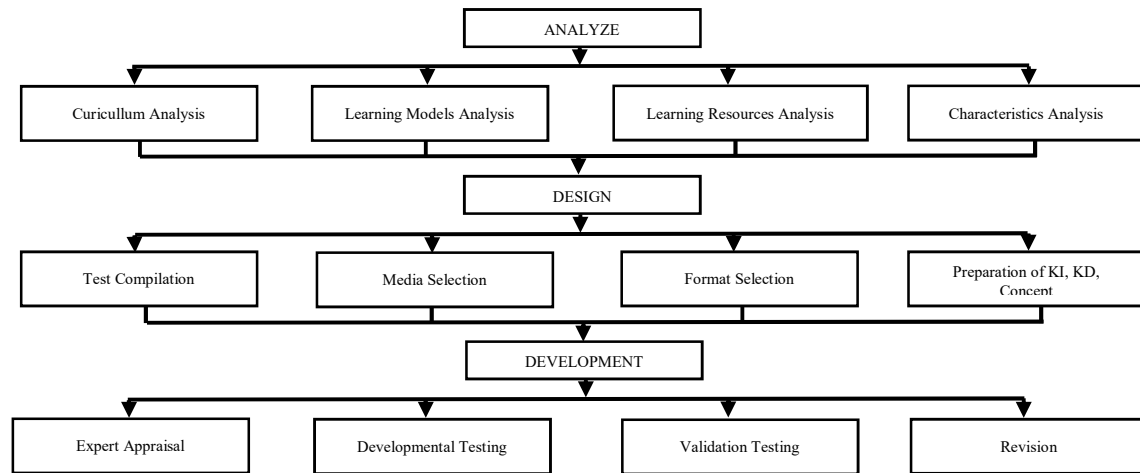
The ability to understand concepts means that students must have the ability to solve problems with different solutions. This can be supported by using teaching material while learning takes place. One of the teaching materials that can be used to improve the ability to understand student concepts is the

student worksheet. Student worksheets are learning resources that serve as a guide for learners to be able to apply and integrate various concepts (Marhaeni, 2020). Student worksheets can also be used as an alternative to teaching materials for learners during the learning process. Widjajanti (2008) suggested that student worksheets can be developed by teachers as facilitators as teaching materials in the teaching and learning process. Student worksheets can be used as an alternative teaching material suitable for students, because student worksheets help students to complete information about concepts that have been learned through systematic learning activities (Basri, 2019: 23). According to Trianto (2009), the student worksheet contains a set of fundamental activities that must be done by learners to maximize understanding in an effort to establish basic abilities in accordance with indicators of achievement of learning outcomes that must be taken.

During this pandemic period, the learning process that usually takes place in schools with face-to-face between teachers and students must now turn into non-face-to-face learning or commonly referred to as online learning. For that, teachers must utilize technology-assisted learning media so that it can be more easily channeled to students. Student worksheets that are usually in print form can be changed in such a way using the application/website into electronic student worksheets. Teachers can use electronic devices such as smartphones, laptops, or PCs to distribute electronic student worksheets created. In addition, by converting student worksheets into electronic student worksheets, teachers can make the appearance more attractive because there are so many features that can be utilized and one of the websites that teachers can take advantage of is Liveworksheets. Liveworksheets is a website that teachers can use to create e-worksheets or worksheets that can be done online. Liveworksheets websites offer a variety of features that can be used to display learning materials in the form of audio, video, or other interesting symbols that can help increase learners' learning motivation. Based on the description, researchers intend to know the validity of the design of liveworksheets-assisted electronic student worksheets to improve the ability to understand the concept of seventh-grade students of junior high school.

## **METHOD**

This type of research is research and development with the ADDIE (Analyze, Design, Development, Implementation, Evaluation) model. This research aims to analyze students' needs for teaching materials that can facilitate students to discover and construct mathematical concepts and know the validity of the product. The data sources from this study are seventh grade A students of junior high school 1 Sungailiat, Indonesia which amounted to 35 students, two material expert validators, and two media expert validators. The time of this research is in November - December 2021. Data collection techniques use interviews, observations, questionnaires, concept understanding skills tests, media expert validation questionnaires, and material expert validation questionnaires. Observations were made in the classroom during the learning process while interviews were conducted with math teachers in class VII SMPN 1 Sungailiat about curriculum, learning methods, student characteristics, obstacles during math learning, and also the needs of electronic math teaching materials. For the test, the test is done to find out the ability to understand the student's concept. As well as for questionnaires conducted to find out the mobile device that students use and to find out what kind of learning students are interested in. While the validation questionnaire is used to find out the validity score of the product developed. Where if the total score is in a good category then the product is declared valid. The research will continue at the implementation and evaluation phases.



**Figure 1.** Development Course

## RESULT AND DISCUSSION

### Result

The development model used in this research is the ADDIE model. The ADDIE model is one of the systematic learning models. The selection of this model is based on the consideration that this model is developed systematically and based on the theoretical foundation of learning design. This model consists of five steps, namely: 1) analyze, 2) design, 3) development, 4) implementation, and 5) evaluation. Here are the results of this research.

- Analyze Phase

This phase of analysis conducted by researchers is to analyze the curriculum used during learning, learning methods, learning resources as well as the characteristics of students of seventh grade Junior High School 1 Sungailiat. To obtain the data needed to maximize this stage of analysis, researchers conduct observations, interviews, questionnaires, and provide preliminary test questions to find out the extent of understanding the concept of learners. At the observation stage, researchers observe learners during the mathematical learning process. Interviews are conducted with math teachers to find out the curriculum, student characteristics, and constraints during the math learning process. Questionnaires are given to find out what mobile devices students use and the difficulties and learning media that students like. Furthermore, the provision of test questions is done by providing a problem understanding of concepts in algebraic materials.

- Curriculum Analysis

Based on Law No. 20 of 2003, the curriculum is a set of plans and an arrangement regarding the objectives, content, and subject matter, and the means used as guidelines for the implementation of learning activities to achieve certain educational goals. The purpose of this curriculum analysis is to find out the curriculum used during learning. From the results of interviews and observations conducted by researchers, it is known that the curriculum used in the seventh grade of Junior High School 1 Sungailiat, Indonesia is an emergency curriculum given that currently the Covid-19 pandemic still exists. Teachers already have RPP creation manuals, basic competencies, and also indicators of student competency achievement by the curriculum. Based on the curriculum used, the following are basic competencies in quadrilateral materials and triangles of seventh grade Junior High School 1 Sungailiat.

**Table 1.** Basic Competence

No.	Basic Competence
3.11	Associates the roving and area formulas for different types of quadrilaterals (square, rectangle, rhombus, parallelogram, trapezoid, and kite) and triangles
4.11	Solve contextual problems related to the area and circumference of the quadrilateral (square, rectangle, rhombus, parallelogram, trapezoid, and kite) and triangles

- Learning Models Analysis

During the covid-19 pandemic, there has been limited face-to-face learning. Each subject is only given 45 minutes. Based on the results of the interview obtained that the teaching method used in the

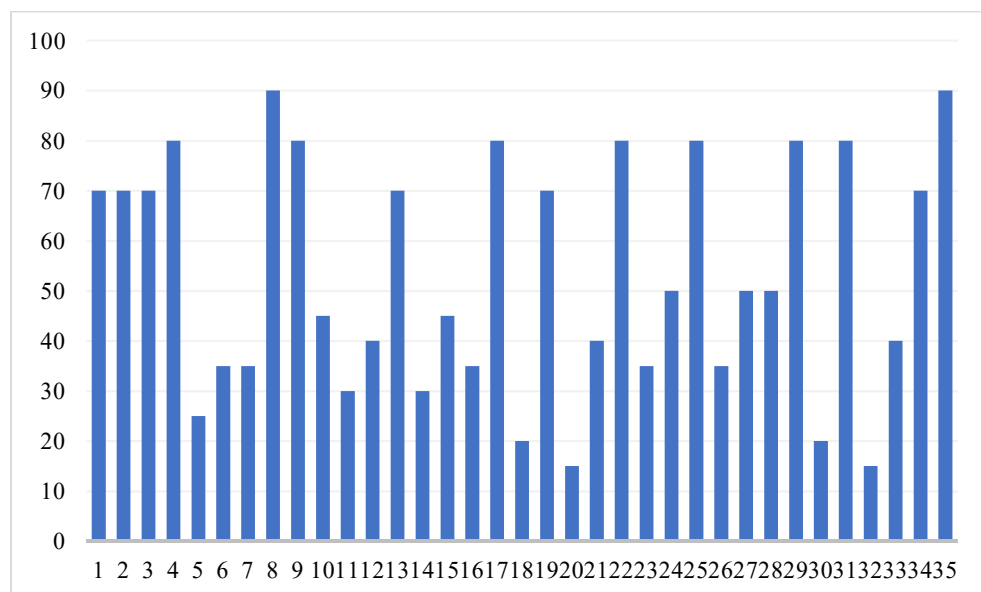
form of lecture and question and answer methods. Teachers have not been able to use the learning model before the pandemic due to a very limited time. From the results of the interview, it was also obtained that this learning model cannot be said to be an effective learning method because students are still less active in answering the questions asked so it can be concluded that the learning methods used today have not been fully able to improve the understanding of student concepts.

- Learning Resources Analysis

Based on the results of observations and interviews it is known that the teaching materials used in the math learning process are student and teacher handbooks issued by the government as well as modules as companion books. However, in both books is not enough to be able to improve the ability to understand the concept of students. In addition, the appearance of the companion book used is also less attractive because it only has two colors, namely black and white. The images used in both books also attracted less attention from students. At the time of the interview, the teacher also said that there have been no student worksheets that she has developed so far and also the teacher has never used technology device-assisted teaching materials during face-to-face learning in pandemic times.

- Students Characteristics Analysis

Analysis of student characteristics is carried out to find out the character, activities, and constraints of students during the mathematical learning process. Based on the results of interviews with teachers, researchers know that during the process of learning mathematics students tend to be passive and also get bored quickly. Students are less focused when the learning process takes place. In addition, based on the results of the questionnaires found that as many as 79.4% of students consider that mathematics is a difficult subject and as many as 62% of students have difficulty understanding mathematical concepts. The graph of the student concept understanding test scores is found in Figure 2.



**Figure 2.** Results of Test Scores understanding the concept seven grade A Junior High School 1 Sungailiat

In addition, based on the results of the study concept understanding test consisting of 5 essay questions found that the understanding of learners' concepts is still relatively low. Where it was obtained that the average score of the learner concept understanding test of 52.8 is quite far from standard with a score of 70. From the results of the interview, it is also known that when the teacher gives a slightly different problem from the example of the problem students will find it difficult to do it. This indicates that the ability to understand the student's concept is still low.

Based on the results of the questionnaire that as many as 94.1% of students tend to prefer to learn to use teaching materials that have an attractive appearance and also have color. In addition, 94% of students said they would prefer to study mathematics using students' worksheets. Students are also interested in using the help of technology at the time of math learning and interested in using electronic student worksheets. Especially at the time of this pandemic students

are more likely to learn to use electronic devices as well as smartphones. Based on the above exposure this shows that students need electronic teaching materials to stimulate their concept understanding skills.

- Design Phase

The design phase is the phase where the researcher makes a product picture design that wants to be developed based on the results of the analysis that has been done. At this phase, the researcher chooses a product developed in the form of students' worksheets assisted liveworksheets on quadrilateral and triangular material then the researcher makes the framework and contents of students' worksheets by the basic competencies that have been made. Student worksheets contain indicators of understanding concepts such as interpreting, inferring, exemplifying, classifying, and comparing. Draft 1 is the result of the beginning design.

- Cover

The cover entitled "Lembar Kerja Peserta Didik; Segiempat dan Segitiga Kelas VII SMP/MTs." The student's worksheets are designed with indicators of understanding concepts on the quadrilateral and triangular materials of seventh-grade junior high school. The cover is shown in Figure 3.

- Core and basic Competence

The achievement of learning outcomes that must be achieved by students contains in the results of curriculum analysis. That is basic competence and can be seen in Figure 4.

- Exercise

For the exercise, the problem adjusts to the indicator of understanding the concept and is shown in Figure 5-10.

- Writer's Identity

The writer's identity can be seen in Figure 11.



Figure 3. Cover



Figure 4. Core and Basic Competence



Figure 5. Classifying

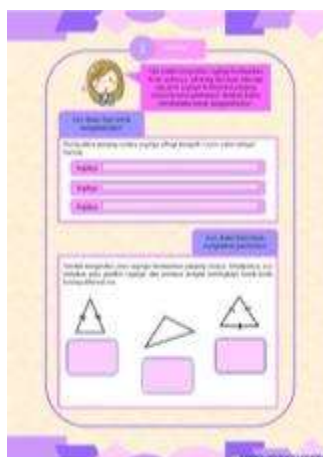


Figure 6. Inferring



Figure 7. Interpreting & Exemplifying

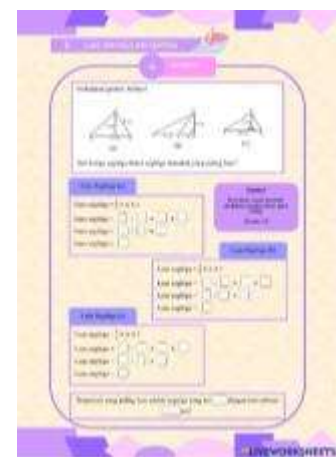
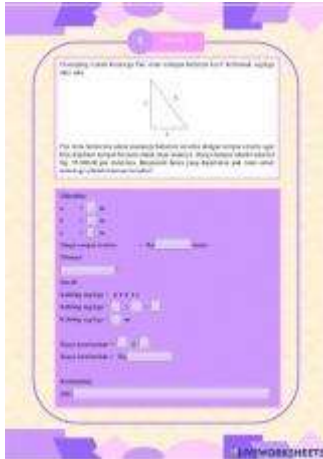


Figure 8. Comparing



**Figure 9. Inferring**



**Figure 10. Inferring**



**Figure 11. Writer's Identity**

- **Development Phase**

In the development phase, researchers conduct activities to translate design specifications at the design stage into physical form so that this activity produces a prototype development product in the form of liveworksheets-assisted student worksheets to improve the ability to understand student concepts. In addition to developing products, researchers also develop material expert validity instruments, media expert validity instruments, learners' response questionnaire instruments, and pretest and posttest instruments of concept understanding.

Based on the results of the review by the validator, namely the review of media instruments and materials. The instrument is declared valid and fit for use. Furthermore, the researcher continues the development stage by validating the student's electronic worksheet. Here are some feedback and suggestions from expert materials summarized in table 2 below.

**Table 2. Feedback and Suggestions and Follow-Up**

No	Feedback and Suggestions	Follow-Up
1	Some image views need to be clarified	The picture has been clarified
2	Some command sentences still need to be effective	Command sentences have been effective
3	Some pictures need to be arranged	The picture has been arranged
4	Color blends are less appropriate	The color mix has been fixed
5	The image displayed must be tailored to the student level	Images have been adapted to the student level

The result of students' worksheets assessment of design validation was obtained from learning media design validation using a Likert Scale. The Likert scale is a scale that is used to measure a particular problem. After validation of the result obtained, then the results are compared with the ideal assessment criteria table, in table 3 for material and table 4 for media.

**Table 3. Ideal Assessment Criteria for Material**

No	Score	Criteria
1	$\bar{X} > 92,4$	Very Good
2	$74,8 < \bar{X} \leq 92,4$	Good
3	$57,1 < \bar{X} \leq 74,8$	Enough
4	$39,5 < \bar{X} \leq 57,1$	Less
5	$\bar{X} \leq 39,5$	Very Less

**Table 4. Ideal Assessment Criteria for Media**

No	Score	Criteria
1	$\bar{X} > 63$	Very Good
2	$51 < \bar{X} \leq 63$	Good



3	$39 < \bar{X} \leq 51$	Enough
4	$27 < \bar{X} \leq 39$	Less
5	$\bar{X} \leq 27$	Very Less

The results of validation of electronic student worksheet design were carried out by two media experts, Dr. Suharno, and Bayu Sudarmaji. While the material expert validators are Ageng Triyono and Riska Kurniati. Validation results by the four experts are presented in table 5.

**Table 5.** Result of Validation from Material Expert

Validator	Position	Score	Criteria
Ageng Triyono, M.Pd.	Lecture in College of Teacher Training and Education Kusuma Negara and Curriculum Researchers & Developer Widya Edutech – PT Widya Kreasi Bangsa	103	Very Good
Riska Kurniati, S.Pd.	Teacher at Junior High School 1 Sungailiat	102	Very Good
Number of scores		205	
Average Scores		102,5	
Criteria		Very Good	

**Table 6.** Result of Validation from Media Expert

Validator	Position	Score	Criteria
Dr. Suharno, S.Pd., S.Pd.T., M.Pd.	Lecture in Mathematics Education at Mercu Buana University of Yogyakarta	68	Very Good
Bayu Sudarmaji, S.Pd.	Principal of Vocational high school Assalafiyah Sleman and Manager at CV ASA Multimedia	52	Good
Number of scores		120	
Average Scores		60	
Criteria		Good	

In Table 5 the product design of electronic student worksheet development has been said to be valid because all are in a good category. Thus, learning media can be used for learning by students to improve students' concept-solving skills.

## Discussion

The purpose of this research is to develop learning media in the form of electronic student worksheets assisted by liveworksheets that are otherwise valid for use by media experts and material experts. At the assessment stage, researchers consider input from students related to media that are of interest to students and can improve students' problem-solving abilities. So that the developed media contains questions, videos, and features that are tailored to the wishes of students. At the development stage, researchers sought the opinions of two material expert validators and two expert media validators. For material experts to provide media input and advice, namely; (1) Some images should be clarified, (2) Some command sentences should be effective (3) Some images must be spruced up. From these inputs researchers have improved and discussed again with the validator so that the product is declared valid to be used. In addition, from two expert media validators provide input and suggestions, namely (1) The color blend is not appropriate, (2) The image displayed must be adjusted to the student level. It has also been revised and revised. So from the validator aspect, the product has been declared valid to use.

Things that are considered by researchers to design liveworksheets-assisted electronic student worksheets to improve the ability to understand the concept of seventh-grade students first because there has been similar research, the title of the results of research conducted by Amalia & Lestyanto in 2021 entitled "Scientific Based Student Worksheets Based on Live Worksheets to Understand Mathematical Concepts in Social Arithmetic." The study used a 4D model. Validation results get an average score of 3.97 with valid criteria. As for practicality results get an average score of 3.65 with effective criteria.

The study concluded that the products developed meet valid, practical, and effective criteria to improve the understanding of students' mathematical concepts.

## CONCLUSION

Based on the results of the study showed that (1) the ability to understand the concept of students tends to be low, so developed media based on electronic student worksheets assisted liveworksheet; (2) Creation of Microsoft Word assisted applications, then converted using liveworksheets to become Elektronik students' worksheets; (3) this Elektronik students' worksheets contains covers, introductions, materials, exercises, quizzes and indicators of understanding concepts that include, interpreting, inferring, exemplifying, classifying, and comparing; (4) The validation results of material experts and media experts show that valid products used with category averages are good. As for the first material expert score of 103 and the second material expert by 102. Meanwhile, the first media expert score was 68 and the second media expert score was 52. The research will continue at the implementation and evaluation phases.

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