



DEVELOPMENT OF COMIC-BASED LIVE WORKSHEET STUDENT WORKSHEETS TO IMPROVE LEARNING OUTCOME OF SOLAR

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Abstract

One of the uses of technology in education is to use e-learning-based learning media. E-learning media is a learning media equipped with web access. E-learning can make it easier for teachers to access various materials, worksheets and teaching materials through various media, one of which is by using Live Worksheets. The cause of low learning achievement is that students are less creative in learning, lack of practice questions and less interesting questions. Based on this, learning media is needed that can support the teaching process through comic-based student worksheets. The development of comic-based student worksheets aims to determine the validity of the media, students' responses to the media, and the effectiveness of the media developed in improving student learning outcomes. The method used in media development is ADDIE. Data collection techniques used in this study include: interviews, questionnaires or questionnaires and test techniques. The data analysis in this study is descriptive analysis and N-gain test. The sample used in this study is one lecturer who is a material expert, design expert, media expert, and 30 seventh grade students at the state junior high school 24 Medan. The validation results obtained from material experts, design experts, media experts are feasible to use. The responses obtained from students are also very good and learning media can improve student learning outcomes, it can be seen from the N-gain test calculation score, which is 0.71 in the high category

Keywords: E-Learning, Student Worksheets, Live Worksheet

Introduction

In the modern era of technology as it is today, everything is developing rapidly as well as in the field of education. The purpose of education in a country will continue to grow to match the needs of the community every year. Therefore, educators are required to be able to follow the development of existing technology in order to achieve the intended educational goals and can meet the needs of the community. One form of using technology in education is the use of e-learning-based learning media. E-learning media is a learning media that is carried out using internet access. The use of e-learning-based media is very popular because it can support the learning process so that it can develop with the desired goals optimally. According to research conducted by Simanullang (2022), students need innovative learning media in the process of implementing science learning to become something that can be used because they get very high scores. E-learning media is an innovative media that can make it easier for teachers to access various materials, worksheets and teaching materials through various media such as: google classroom, teacher's room, brainly, zenius. However, the e-learning that will be used in this research is to use a Live Worksheet. According to Andriyani (2020), the Live Worksheet application is an application provided by Google. Through Live Worksheets, teachers can change traditional printable worksheets (pdf, document, jpg or PNG) as interactive online exercises as well as check the results of student worksheets by sending answers online as well.

There are various advantages when using Live Worksheets, including: it can make it easier for teachers to correct students' answers, so that in the end when students have answered the questions asked by the teacher, the scores obtained by students will appear by themselves, can be used anywhere and anytime as long as the network supports, the elements contained in the interactive Live Worksheet are adjusted to the creativity and needs that will be used by the teacher. One of the products that can

be created using Live Worksheets is student worksheets. According to Nengsi (2021), student worksheets are a guide for students in doing certain jobs that can improve and strengthen learning outcomes. Teaching materials developed in the form of student worksheets are usually equipped with material, colorful pictures, and varied questions so that they can arouse students' interest, curiosity so that the material presented becomes more easily understood by students and the teaching and learning process will be more meaningful. Student worksheets can help teachers because teachers no longer need to convey too much material in learning.

The level of creativity is also very necessary when you want to use the Live Worksheet student worksheets, one of which is by creating Student Worksheets by adding some cartoon characters and creating a storyline about the material discussed with conversations between characters and making it like a comic story in general. Comics are often found on the internet and in printed books. However, the research that will be carried out will be different because it creates student worksheets Live Worksheets with comic storylines which usually only contain fictional stories, but in this research the comics produced are based on education which is expected to increase students' knowledge, the learning process becomes more interesting and improve learning outcomes.

Based on the results of the distribution of questionnaires conducted by Angga., et al (2020) on the selection of media preferred by students, it was found that 90% of students chose comic media. The reason is that students tend to like to see pictures and short text, so the teacher can convey material easily and can be well absorbed by students when receiving information. According to research conducted by Asmi et al., (2018) said that junior high school students prefer reading comics or magazines rather than textbooks and think that student worksheets if they have a comic-like appearance can stimulate students' brains to be curious to read them, so student learning outcomes to increase.

Based on a preliminary study conducted by researchers at state junior high school 24 through an analysis of differences in student worksheets that students use at public junior high schools 24 Medan with student worksheets that will be developed, among others, student worksheets used in schools still use variations of essay questions and multiple choice. Of course, the presentation of material and questions can only be seen visually, does not contain many elements of images, student worksheets can only be submitted to the teacher when meeting face to face and checking student answers manually. While the student worksheets that will be developed by the researchers include: more variety of questions such as analyzing images by moving them around interactively, accessible visually and audiovisually because they can include videos in them.

In addition, the teacher at the Medan 24 State Junior High School also said that student worksheets were still used in the learning process and the teacher always provided evaluation questions along with other short questions. However, the student worksheets used by the teacher are still in print and the appearance is still ordinary. Questions that are collected to the teacher are done by taking photos or giving them directly to the teacher. This attracts research attention to make it easier for teachers, namely by using Live Worksheet media, students only access it via a link sent by the teacher and can answer it directly. The teacher's work is made easier because automatic student answers can be checked directly through several settings in the Live Worksheet. Besides that, the public junior high school teacher 24 Medan also said that if you give questions that are too difficult, then students will not understand how to do it, it will have an impact on collecting assignments that are getting longer, the level of student achievement on the value obtained is that not all students work on the questions optimally. There are even those whose average value is below the minimum completeness criteria. The student worksheets that the researchers designed are expected to make it easier for students because in it there are several conversations

that students can practice through guessing who I am, videos, and others. Student worksheets in previous schools did not understand what students were doing because the questions were too difficult, the researcher minimizes the level of student understanding by making several creations of presenting material and various ways of answering questions. Because according to researchers, the level of understanding of the material affects student learning outcomes. Assessment of learning outcomes is an effort to measure the level of achievement of educational goals which include progress in thought processes, progress in using the five senses and abilities in moral and personality development. It is known that previously students at the Medan 24 State Junior High School only saw a series of materials and questions. There is a possibility that students do not understand because there is only the composition of the material. In addition, to strengthen researchers conducting this research, namely because the Live Worksheet student worksheets have never been used in schools that will be studied before. So, according to the researcher, the Live Worksheet student worksheet is very suitable to be applied in schools. The results of research conducted by Andriyani et al., (2020) suggest that student activity can increase from 53% to 86% when using the Live Worksheet Student Worksheet. The results of observations made at the State 24 Medan first high school in science subjects, it was found that as many as 53% of students had not completed, and 46% of students had completed the daily tests given by the teacher.

Based on the background of these problems, it is necessary to develop comic-based worksheets to improve learning outcomes of the solar system. The purpose of this study is to determine the validity of the media, student responses to media and the effectiveness of the media developed in improving student learning outcomes.

Research Method

The type of research method used is Research and Development (R&D), using the ADDIE development model (Analysis,

Design, Development, Implementation, Evaluation). The Research and Development (R&D) method can be defined as a scientific method for researching, designing, producing, and testing the validity of the products that have been produced (Sugiyono, 2019). The ADDIE model uses five development stages, namely: (1) Analysis, the analysis stage is conducting a preliminary study including: interviews and distributing questionnaires, in addition to identifying problems and solving problems taken. (2) Design, the design stage is the stage carried out in designing the student worksheet learning media Live Worksheet. (3) development, at this stage the researcher develops the product through several stages of development and validates the product against experts such as: material experts, design experts and media experts. (4) Implementation, implementation is the stage in testing the Live Worksheet student worksheets. (5) Evaluation, at this evaluation stage is carried out to provide an assessment of student worksheets through the feasibility and N-gain test.

The population used in this study were science lecturers and all seventh grade students at the 24 Medan public junior high school in the 2021/2022 academic year.

The samples studied were natural science lecturers as material experts, design experts and media experts. The selection of lecturer samples used purposive sampling. The sample used in class VII students is 30 students. The sampling technique of students in this study was using simple random sampling in a random way.

Data collection techniques used in this study are interview techniques, questionnaires or questionnaires and test techniques. Data analysis in this study is descriptive analysis and N-gain test.

Result and Discussion

The results of each step of the ADDIE method can be described as follows:

Analysis Stage

The analysis phase aims to determine the needs of students and teachers in the teaching and learning process. The process consists of an analysis of student needs in

the form of differences in student worksheets at school with the developed student worksheets and analysis of teacher needs in the form of interviews obtained results such as tables 1.

Table 1. Results of Needs Analysis in the Form of Problems and Student Needs

No	Problems and Needs of Educators
1.	The limited ability of teachers in making learning media and lack of student response in the use of the learning media.
2.	Teachers need learning media that can visualize science learning materials so that student learning outcomes can be improved
3.	Teacher requires learning media that can be accessed by students anywhere and anytime.

Design Stage

This stage resulted in the planning of a learning media. The design stage aims to prepare the media design that will be made later. The learning media that will be planned is a comic-based Live Worksheet for students. The concepts that will be compiled by the researchers include: 1) compiling learning materials, (2) compiling learning media according to learning objectives, (3) determining the components of writing student worksheets, (4) determining the design format of the developed student worksheets. Determination of the student worksheet design format, (5) Options in determining the media to be used and (6) Determining the validation sheet.

Development Stage

The stages of development are carried out based on the preparation steps that have been previously planned. Validation is needed at this stage of development including validation of material, design and media experts.

Material Expert Validation

The results of the validation of the material expert's assessment can be seen in Figure 1.

Based on the assessment of the material expert, the student worksheet was declared feasible by the researcher with the percentage of conformity with the 2013 curriculum 100%, the truth of the content 87,5% and 100% linguistic. Then the average percentage is 91,67%, then this achievement score is included in the very feasible criteria. It can be concluded that the student worksheets that have been developed are declared feasible in learning natural sciences in class VII of Medan 24 State Junior High School.

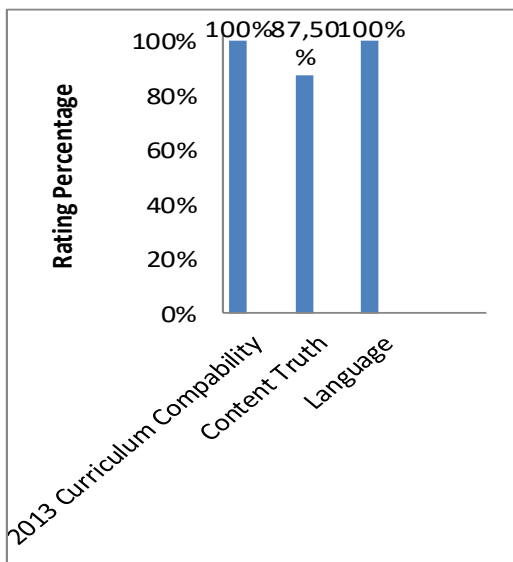


Figure 1. validation results by material experts

Design Expert Validation

Design expert validation considers three aspects, namely aspects of student worksheet format, student worksheet cover design and student worksheet design in the content section. The results of the assessment by design experts can be seen in Figure 2.

Based on the design expert's assessment, the student worksheet is said to be valid by the researcher with the percentage of student worksheet format being 100%, cover design 90% and content design 100%. Then the average percentage is 95,83%. So this achievement score is included in the very feasible criteria. It can be concluded that the student worksheets that have been developed are feasible if used

in learning natural sciences in class VII of Medan 24 junior high school

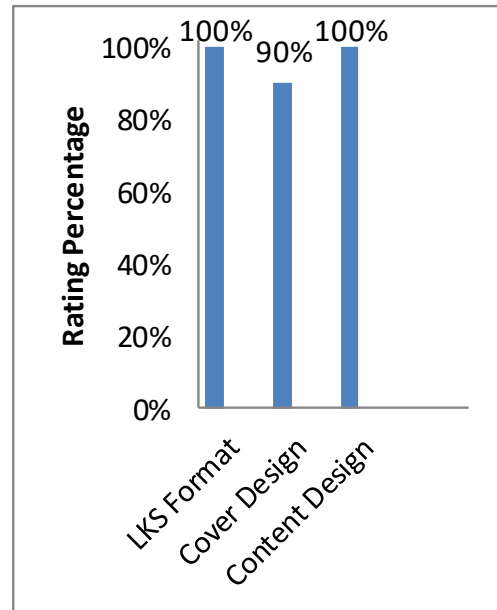


Figure 2. Design Expert Validation Results

Media Expert Validation

The media expert validation was given to the media expert validator, namely the Unimed natural science lecturer. The results of the assessment by media experts can be seen in Figure 3 below.

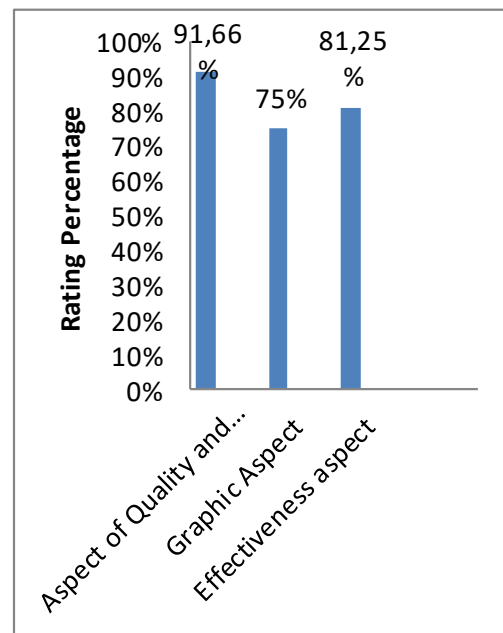


Figure 3. Media Expert Validation

Based on the table above, the media validation assessment of the comic-based

Live Worksheet Student Worksheet obtained the presentation of quality and objective aspects of 91,66%, graphic aspects of 75% and effectiveness aspects of 81,25%. Then the average presentation is 83%. So this achievement score is included in the feasible criteria. It can be concluded that the student worksheets that have been developed are suitable for use in learning natural sciences in class VII of the State Junior High School 24 Medan.

Implementation Phase

The implementation stage is a continuation of the development stage, where at the stage it produces student worksheet products that have been compiled and validated by material experts, design experts and media experts. Student responses to the development of student worksheets can be seen in the following picture.

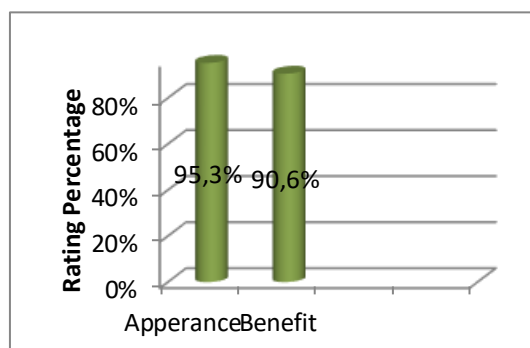


Figure 4. Students Response

Based on the results of the percentage of students' responses to student worksheets, data obtained that the display is 95,3% and the benefits are 91,6%. Then the average score obtained is 93,45%.

Evaluation

The next stage is evaluation. The evaluation stage is carried out by giving several tests to students through pretest and posttest. Based on the data obtained from the test results, the average pretest score was 32,47 and the posttest average score was 80,63. The data converted in the N-Gain formula can be seen in the table below:

Table 2. Data Pretest and Posttest Student Learning Outcomes

Types of observed data	Pretest results obtained	Posttest results obtained
The highest score	53	93
Lowest value	13	63
Number of students who completed (≥ 70)	0	28
Number of students who have not completed (<70)	30	2
Average score	32,47	80,63

Table 3. Category of N-Gain . score acquisition

No	N-Gain Index	Inter pretation	Fre que ncy	Percen tage	Ave rag e N-Gai n
1	$g > 0,70$	Tall	17	56,57%	0,71
2	$0,3 < g < 0,70$	Curre ntly	13	43,33%	
3	$g < 0,30$	Low	0	0	
Amount			30	100	

The results of the discussion of the analysis of student worksheets, namely the teacher has not maximized the process of using student worksheets in the classroom. The student worksheets used by teachers are still simple, containing only written material and questions, so the researchers took the initiative to think of interactive student worksheets that can be useful in learning and can improve student learning outcomes. The interactive student worksheets are designed to be as attractive as possible for students. In line with that, Yusuf (2010) said that the causes of low learning achievement include students being less creative in learning, lack of literature in learning, lack of practice

questions. Students lack social practice because students lack confidence in the answers obtained between right and wrong because the questions are not interactive, the questions that are displayed are less interesting. Creativity is needed in compiling student worksheets, so that the atmosphere in learning can be more lively. Yusuf (2010) also said that student worksheets in the form of print have not been effective as a learning tool. So that when working on student worksheets in printed form there is a feeling of lack of enthusiasm and carelessness. So it can be concluded that interactive student worksheets are needed as a support in learning. So that when working on student worksheets in printed form there is a feeling of lack of enthusiasm and carelessness. So it can be concluded that interactive student worksheets are needed as a support in learning. So that when working on student worksheets in printed form there is a feeling of lack of enthusiasm and carelessness. So it can be concluded that interactive student worksheets are needed as a support in learning.

Interactive student worksheets can be accessed through the website, according to Amalia (2021) a website that can be used in developing more interesting student worksheets that can be used in learning is Live Worksheets. According to research conducted by Andriyani, et al (2020) said that Live Worksheet is a service that can be accessed for free on Google which plays a role in making worksheets interactive online.

The results of the design discussion in the form of a comic-based Live Worksheet student worksheet starting with determining the title, collecting various supporting sources according to the title to be designed, making a learning implementation plan that refers to the syllabus, identifying basic competencies, indicators and learning objectives and designing the format for preparing the worksheet. students such as a cover consisting of the title, class/semester, student identity. The contents of the comic-based Live Worksheet student worksheets consist of a table of contents, basic competencies, indicators, objectives,

instructions for using student worksheets, concept maps, materials, varied questions and quizzes, so that they can give a different impression on student worksheets. in the previous school. Next, determine the validation and assessment based on the rubric of the assessment of material, design and media experts. The purpose of the design stage is that the resulting product can be arranged properly and sequentially so as to produce a comic-based Live Worksheet student worksheet that is worthy of being tested to improve student learning outcomes and in compiling the instrument sheet it is carried out properly in accordance with the selected indicators and reviewed to support feasibility. student worksheet. The selection of the Live Worksheet student worksheet is because the student worksheet has advantages for both teachers and students. The advantages obtained for teachers are that it makes it easier for teachers to automatically correct students' answers and save more paper, while the advantages for students are that learning can be more fun, interactive and motivating so that students are more interested in learning and are expected to improve learning outcomes. In line with the research put forward by Nissa (2021) that the existence of a Live Worksheet can be a motivation for students from previously students who have never done several tasks digitally, but through Live Worksheets students can do their work directly and the tasks that are done in the end get a score. and learning outcomes.

The results of the development stage discuss the preparation of comic-based Live Worksheet student learning steps to improve student learning outcomes which have been linked to the previous stage to produce product student worksheets. In addition, the development stage was also carried out to measure the feasibility of the product and the instruments used in the research before being tested on students. research by Anwar and Muharram (2019) argues that the development stage consists of aspects of the feasibility of the product produced and the instrument before proceeding to the implementation stage.

The next stage is to validate the student worksheets through validation by material

experts, design experts and media experts, as well as revisions are carried out according to the suggestions of each validator, so that the comic-based Live Worksheet student worksheets on solar system material are valid and suitable for use in the process. learning at school. In line with the opinion of Kusni (2010) said that the improvement or validation of a learning process is the result of the implementation of the evaluation of the implementation of learning and the application of a feedback system in the learning process.

Aspects of the material expert assessment of the comic-based Live Worksheet student worksheets are carried out by lecturers who are experts in their fields. As for the aspects assessed, namely conformity with the 2013 curriculum, the truth of the content and language. Based on the results of validation by material experts, it said that the comic-based Live Worksheet student worksheets were very feasible to use with the presentation of eligibility for compliance with the 2013 curriculum of 100%, content correctness of 87,5% and 100% linguistics. Then the average presentation obtained is 91,67%. Based on the presentation obtained, it can be seen that the LKS Live Worksheet that has been developed has been adapted to the 2013 curriculum and the correctness of the contents. The resulting student worksheets have been adapted to core competencies, basic competencies, indicators of achievement and learning objectives. In line with that, the Ministry of National Education (2004) says that basic competencies are made to help students in the learning process and students also know the abilities of students after going through the learning process. Presentation in terms of language is considered very feasible if used in learning because it uses language that can be understood by students. As for using good language, it must be adjusted to the rules that are adjusted to EYD, KBBI and use standard language or sentences so that there is no double interpretation in understanding the material. According to Hidayah (2016) argues that the use of language is the process of choosing linguistic forms in conveying meaning and language is a means of forming

human thinking abilities, for that in using that must be simple and easy to understand by students. In accordance with research conducted by Widjanti (2008) said that student worksheets must be written in clear, straightforward and simple language.

Aspects of the design expert's assessment of the comic-based Live Worksheet student worksheets with the aspects assessed were student worksheet format, cover design and content design. The validation carried out by design experts showed that the comic-based Live Worksheet student worksheets were very feasible to use with 100% student worksheet format percentages, 90% cover designs and 100% content designs. Then the average obtained based on the presentation score is 95,83%. The result of the revision of the validator is that the letters are too small and not proportional to other letters besides that there are parts of the writing style that must be replaced.

Aspects of the media expert's assessment of the comic-based Live Worksheet students' worksheets with the aspects assessed were quality and purpose, graphic aspects and effectiveness aspects. Based on the validation carried out by design experts, it was found that the percentage of quality and objectives was 91,66%, the graphic aspect is 75% and the effectiveness aspect is 81,25%. Then the average percentage obtained is 83%. Based on the advice given by the validator, he said that the written learning objectives to understand the solar system were replaced with describing the characteristics of the solar system and references should be added with the latest references.

The results obtained at the implementation stage were conducting trials on the comic-based Live Worksheet student worksheets that had been developed to examine the effectiveness of student worksheets in improving student learning outcomes. This trial was conducted by 30 students of class VII . The effectiveness of the student worksheets can be seen in the data analysis through the pretest and posttest conducted to see how the learning outcomes of the solar system material increase. The final product produced in this research is a

student worksheet based on comics based on the solar system material that can be used by class VII students during learning in the first semester of high school.

Comic-based Live Worksheet student worksheets are given to students, the first step is the teacher must prepare student worksheets that have been given suggestions by validators from various experts, the next step is to explain first how the system is used, then share links to access the Live Worksheet-based student worksheets. comic. Furthermore, the instructions for using student worksheets are also explained so that students understand when they are working, so it will be easier to understand and fun when used.

The results of the presentation of student responses obtained display data of 95,3% and benefits of 90,6%, then the average obtained was 92,95% included in the good category and can be used in the teaching and learning process. Based on research conducted by Astuti (2018), the LKS trial can be categorized as feasible and effective if it can provide a positive response from students. The positive response given by students indicates that students are interested in participating in the process of teaching and learning activities and are more challenged to solve the problems in it.

Based on the table obtained in analyzing the worksheets that have been developed and applied and revised the final product based on the evaluation of the trial. The evaluation stage, presented the results of increasing student learning through N-Gain. The students tested were 30 students, so the N-Gain was obtained in the medium category, which was 0.71. Based on the data obtained, it can be concluded that the student worksheets tested are feasible if used in the teaching and learning process and student learning outcomes can increase.

Conclusion

Based on the results of research and discussion on the development of comic-based Live Worksheets on the solar system material in class VII previously stated, conclusions can be drawn:

1. The comic-based Live Worksheets developed by the ADDIE method on the solar system material were declared valid after being validated by material experts, design experts and media experts. The results obtained at the level of validity of the worksheet with an average percentage of 91,67%, 95, 83% and 83%.
2. The comic-based Live Worksheet that was developed is effective in improving student learning outcomes on the solar system material. The percentage results obtained with an average score of 33,87 pretest and 80,63 posttest and N-Gain is 0,71.

The comic-based Live Worksheet that was developed is suitable for use in student learning by providing a response questionnaire to 30 students. The results obtained are 93,45%.

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