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DEVELOPMENT OF COMIC LEARNING MEDIA TO IMPROVE STUDENT'S CONCEPT UNDERSTANDING AND LEARNING INDEPENDENCE

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Abstract

This research aims to produce learning media in the form of science comic that can improve conceptual understanding and learning independence of class VI students. This development research adapts the development of 4- D model media, but only until the Develop stage. The trial design carried out is the validation test of material experts and media experts as well as teachers, limited trials and field trials. The data collection instruments use questionnaires, question sheets and validation sheets to obtain qualitative and quantitative data. The questionnaires and questions used to collect the data are also validated first. The results show that the media developed by experts is in the "very good" category, the student assessments show that this media are practical and efficient for learning so that the media is feasible to use. The results of the field test based on the data analysis, the effect-size value of concept understanding of 0.758 is in the high criterion, and the learning independence of 0.540 is in the high criterion. These results according to the effect-size analysis mean that learning media in the form of science comic can improve conceptual understanding and learning independence of class VI students in the high category.

Keywords: learning media, comic, understanding concept, learning independent.

Abstrak

Penelitian ini bertujuan untuk menghasilkan media pembelajaran berupa komik sains yang dapat meningkatkan pemahaman konsep dan kemandirian belajar siswa kelas VI. Penelitian pengembangan ini mengadaptasi pengembangan media model 4-D, tetapi hanya sampai tahap Develop. Desain uji coba yang dilakukan adalah uji validasi ahli materi dan ahli media serta guru, uji coba terbatas dan uji coba lapangan. Instrumen pengumpulan data menggunakan lembar angket, lembar soal dan lembar validasi untuk mendapatkan data kualitatif dan kuantitatif. Angket dan soal yang digunakan untuk mengumpulkan data juga divalidasi terlebih dahulu. Hasil penelitian ini menunjukkan bahwa media yang dikembangkan mendapatkan penilaian dari para ahli dengan kategori "sangat baik", penilaian siswa yang menggunakan media ini menyatakan praktis dan efisien digunakan untuk belajar sehingga media ini layak digunakan. Hasil uji lapangan berdasarkan analisis data, nilai effect-size pemahaman konsep sebesar 0,758 berada dalam kriteria tinggi, dan kemandirian belajar sebesar 0,540 berada dalam kriteria tinggi. Hasil tersebut menurut analisis effect-size berarti bahwa media pembelajaran berupa komik sains dapat meningkatkan pemahaman konsep dan kemandirian belajar siswa kelas VI dalam kategori tinggi.

Kata Kunci: media pembelajaran, komik, pemahaman konsep, kemandirian belajar.

INTRODUCTION

Schools in Indonesia use the 2013 Curriculum. The curriculum has changed the role of the teacher from being a learning resource to being a facilitator, thus requiring students to be active in learning. A facilitator is a person who helps someone to understand something such us a teacher helps students to understand the subject matter.

The teacher is an important component in the implementation of the 2013 curriculum. The success of students in learning is generally influenced by the way the teacher teaches. Teachers can also attract the attention of students to like a subject. In this case, a teacher should have the ability to arouse students' enthusiasm for learning. However, the role of the teacher as a facilitator does not seem to be able to be put into practice. Some schools, especially Madrasah Ibtidaiyah (MI), still have teachers who are a source of learning in the classroom.

Dependence on teacher has an impact on decreasing student learning independence. The Big Indonesian Dictionary (KBBI) defines learning independence as a condition where students can study alone without any help from others. A student who is independent will learn on their own by reading books about the subjects what students wants to study. They don't wait or ask the teacher to explain what they need. Schunk (2012) explains learning independence as a student's talent to be able to control himself, self-observation, and self-evaluation so that individual who understands his abilities can be created.

It is in line with Weinstein, Acee, and Jung (2011) who explain learning independence as the ability of students to control their cognitive processes through the process of planning, setting goal, monitoring and evaluating their understanding of learning material. Learning independence is the ability of a student to control, organize, and plan learning activities with full awareness without coercion or pressure from outsiders. They have the motivation to learn independently. Motivation is an important component for students to develop themselves in terms of learning. For students with low learning motivation, it will be difficult to receive lessons from the teacher. This causes students' conceptual understanding to decrease.

Understanding based on the revised results of Bloom's taxonomy described by Anderson and Krathwohl is defined as the ability to make their own meaning from subject matter such as reading and listening to teacher explanations. The subject matter that students receive either from reading books or listening to the teacher's explanations will be interpreted by them or they conclude themselves based on the understanding they catch. Novitasari (2016) states that understanding can be defined as the ability to capture the meaning of a concept. Furthermore, Fahrudhin, Zuliana, and Bintoro (2018) define concept understanding as the ability to explain a situation in different words and be able to draw conclusions. From the understanding they obtain that it can be used to solve a problem.

Based on the problems above, it is necessary to have variations in the teaching and learning process such as the use of learning media. Learning media has an important role in bringing information or material from learning resources to recipients (Khairi, 2016). Arda, Sahrul, and Darsikin (2015) define media as something which can be used to provide information and can stimulate students' thinking and feeling so that a desire to learn arises. The use of media in learning is very important because learning media is really helpful for teacher in teaching so that the delivery of material can be maximal, effective, and efficient. Lestari and Projosantoso (2016) also state that media which can make students happy in learning will make it easier for students to understand the material.

Based on direct interviews with several students, learning by using visual media is preferred. They prefer to read illustrated stories such as comics rather than textbooks. As stated by Widyawati and Projosantoso (2015) that students who like pictures indicate that they like picture books such as comic. Comic is readings in which there are stories and pictures equipped with supporting characters (Lubis, 2018). According to Fadillah (2018), apart from functioning as entertainment, comic can also be used for educational purposes. Comic can be used as teaching aids and learning media which can be used by students themselves (Saputro, 2015). The use of comic as a medium of learning will be very excelent because students can be interested in reading them.

Comic has interesting pictures and has storylines which will conduct students curious so that students will continue to read the comics until they are finished on their own accord. Tricia, Stepanie, and Vanda (2016) state that in classroom learning, comic can increase students' motivation to learn and train students in interpreting stories in the form of pictures. Comic media can also increase students' visual thinking power as well as entertainment media (Novianti & Syaichudin, 2015). In addition, students seem to be in real events so that there will be an impression that is attached to students and can be remembered for a long time.

Research on the use of comic as a medium of learning has been carried out for learning Indonesian, mathematics, social sciences (IPS), natural sciences (IPA) and others. In this study, researchers are interested in developing and researching science comics. There are researchers who also develop science comics such as the development of science comics on skeletal material in elementary schools by Wicaksono, Jumanto, and Irmade in 2020. There is also Jariah (2017) who develops comic-based learning media on blood clotting process materials.

Researchers choose science subject (IPA) because elementary school students still have many difficulties in understanding the material. This is in line with Sari (2017) which states that the problem that is often faced by elementary school students in learning science (IPA) is the difficulty of understanding the material. The material is usually abstract material such as simple electrical circuit material. Studying electricity includes studying something which is abstract but real such as electric current. The development of science comic is expected for students to be able to understand and discover science concepts on their own without the help of a teacher. As stated by Azizi and Prasetyo (2017) that science comic can function as independent learning media because students can find science concepts on their own without the help of teachers. Science comic learning media makes it easier for students to understand the subject matter so that learning will be effective and efficient (Nugraha, Yulianti and Khanafiyah, 2013).

This problem is a serious problem in education that must be immediately found a solution. One way to make students have the will to be independent in learning and understand the concepts being studied is to use comic learning media which can improve understanding of concept and learning independence for class VI students on simple electrical circuit material.

Based on the description above, this research is feasible to produce learning media in the form of science comics that can improve understanding of concepts and learning independence of grade VI students.

RESEARCH METHOD

This research is a research and development (R&D). The development procedure adapts the development of 4-D model media. Thiagarajan states that there, in development research, are 4 stages (4-D) such as Define, Design, Develop, and Desiminate (Trianto, 2011). Product trials are validation test, limited trial, and field trial. The validation test is carried out by material expert and

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media expert as well as 2 teachers. This test is to assess the product quantitatively and qualitatively and the results become the basis for product revision. The limited trial is conducted by 10 students. The data obtained is an assessment of students' comment and suggestion on the product and is used to revise the product. The field trial involved 2 classes (control and experiment class). The research was conducted in Class VI from semester 1 of Madrasah Ibtidaiyah Development Boarding School (MI PP) Cibeunying, Majenang District, Cilacap Regency for the 2020-2021 academic year.

The data collection instrument used (1) a questionnaire sheet which is utilized to obtain data about product quality in terms of material, media, student response and student learning independence, (2) pretest and posttest question sheets are used to determine students' conceptual understanding, and (3) Observation is used for data collection in making proposals. Questionnaire sheets and question sheets are validated before being used for research. The validity accustomed is content validity. After being validated then analyzed and converted into four categorization criteria in Table 1. The instrument is declared suitable for use for research if the validation results are at least within good criteria.

Table 1. Convert Likert Scale to Four Criteria

No.	Scor Interval	Criteria
1	$M_i + 1{,}5SD_i < \overline{M} \leq M_i + 3{,}0SD_i$	Very good
2	$M_i + 0\ SD_i < \overline{M} \leq M_i + 1{,}5SD_i$	Good
3	$M_i - 1{,}5SD_i < \overline{M} \leq M_i + 0\ SD_i$	Enough
4	$M_i - 3{,}0\ SD_i \leq \overline{M} \leq M_i - 1{,}5\ SD_i$	Less

With, ***Mean Ideal*** (M_i) **= ½ (maximal score + minimal score**
Ideal Standard Deviation (SD_i) = 1/6 maximal score – minimal score)
Mean $(\overline{M})$ = The average score obtained

The data obtain from the limited trial validation and field trial is qualitative data (in the form of comments and suggestions from material experts and media experts, teachers, and student representatives) and quantitative data (in the form of quality and feasibility values of learning media which are assessed using a Likert scale, student learning independence questionnaire scores, and concept understanding test scores).

The first, analysis of the validation result of the developed learning media is the scores obtained are then analyzed and converted into four criteria with references as shown in Table 1. The learning media is declared valid and suitable for research if the validation results are at least within good criteria; and data in the form of comments and suggestions from validation tests and product trials were analyzed descriptively qualitatively. The second, result analysis of field trials uses data on understanding concepts and student learning independence.

The analysis prerequisite test, namely the normality test and homogeneity test, is carried out before the analysis test (manova test). If in the normality test the significance value is greater than 0.05, then the data is normally distributed. In the homogeneity test, if the significance value is greater than 0.05, then the data comes from a homogeneous population. After the data is normally distributed and homogeneous, then the manova test is carried out. If the resulting significance is less than 0.05 then the hypothesis is accepted. The hypothesis in this study is that there is a difference in increasing understanding of concepts and learning independence between students whose learning uses comic and students whose learning does not use comic.

After the manova test is carried out. then, the t test is carried out. The t-test produces a t-value which is then used to calculate the effect-size. Effect-size is used to compare two different variables, or in other words, the effect-size coefficient indicates the magnitude of the effect of treatment on the posttest score. The effect-size criteria according to Cohen are presented in Table 2.

Before the test was carried out, the test results data and student questionnaires on the pretest and posttest were tested for gain firstly. The following is the gain test equation used.

Table 2. Criteria *Effect-Size*

Effect Size	**Criteria**
0,00 s.d. 0,20	Low
0,30 s.d. 0,50	Medium
0,60 s.d. 0,80	High
0,90 s.d. 2,00	Very high

Before the test was carried out, the test results data and student questionnaires on the pretest and posttest were tested for gain firstly. The following is the gain test equation used.

$$g = \frac{s_f - s_i}{\text{maximal score} - s_i}$$

with:
g = gain
S_f = *posttest* score
S_i = *pretest* score
Classification score of *gain* can be described by Tabel 3.

Table 3. Classification Score of *Gain*

Gain Coefficient	**Classification**
$g < 0,3$	Low
$0,3 \leq g < 0,7$	Medium
$g \geq 0,7$	High

The product development stage chart is presented in picture 1.

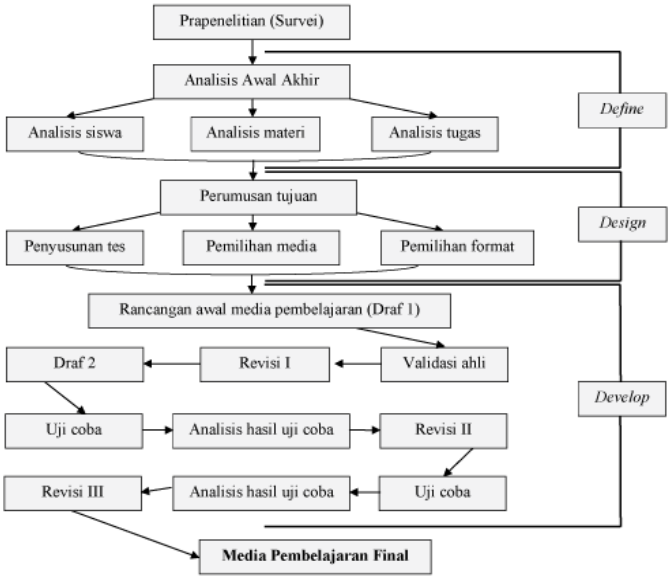

Image 1. Development Model

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RESULT AND DISCUSSION

Development and Research Result

The development of learning media (comic) begins with the preparation of material, designing the presentation of the material and compiling the script as a whole to become a story. Making products use simple language and stories to make it easy for students to understand. Products are also presented with colorful images. The comic design developed is as follows.

The first, cover is the initial page that displays the title of the developed learning media, namely comic. The front cover includes the author's name and the STKIP Majenang logo. On the cover, there is a science comic inscription so that the reader when looking at the cover knows that the comic can also be used for learning and the most important thing on the cover is the comic title which describes the content of the story and the science subject matter that will be discussed in the story. The comic cover is presented in Picture 2.

Image 2. Cover

The second is the content page. The content of each page of this comic is equipped with colorful images and utilize a simple language with the aim that the delivery of science subject matter can be easily understood. The material discussed is simple electrical circuits. There are five characters in the comic who tell about the implementation of school assignments given by the teacher in groups. Experimental step and experimental drawing such as electric circuits are also presented in the comic. An example of a simple conversation in the comic is presented in Picture 3 and an example of a conversation displaying the material is also presented in Picture 4.

Image 3. A simple conversation

Image 4. A conversation shows the material.

After the comic is finished, the product is tested. The product trials in this study are validation test, limited trial, and field trial. The first is validation test. The product developed is validated by a material expert and media expert as well as 2 teachers. This test is to provide an assessment quantitatively (in the form of the value of the quality of learning media which is assessed using a Likert scale) and qualitatively (in the form of comments and suggestions) and

the results become the basis for product revision. Assessment of learning media in the validation test is presented in Table 4.

Table 4. The assessment of Learning Media in Validation Test

No.	Validator	Score	Criteria
1	Media Expert	85	Very Good
2	Material Expert	88	Very Good
3	Teacher	90	Very Good
4	Teacher	83	Very Good
Average		86,5	Very Good

The average score for product assessment in the validation test is 86.5 with very good criteria. This means that the resulting product is valid and feasible to be used for research. The products that have been validated and given input are then revised. The revisions made are presented in Table 5.

Table 5. Product Revision of Comic-Based Learning Media

No	Validator	Suggestion
1	Media Expert	Facial expression and movement to be made in accordance with the spoken word.
2	Material Expert	Submission of material is made in simple words and easy for students to understand.
3	Teacher	Conversation is made simpler and material can be conveyed.
4	Teacher	The material is equipped with pictures which are easy for students to understand.

An example of a comic learning media development product before and after being revised based on input from the validator is presented in Picture 5.

Before Revision After Revision

Image 5. Example of a comic learning media development product

The second is limited trial. This test is carried out after the validator approves the results of the media improvement. This test involved 10 students. Assessments in this trial include an assessment of the aspects of material, language, presentation, display, and use. The results of the average of each aspect are presented in Table 6.

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Table 6. Average Score of Every Aspects of Assessment

Respondent	Score				
	Material	**Language**	**Presentation**	**Display**	**Use**
Limited Trial	87	95	88	93	90
Criteria	Very Good	Very Good	Very Good	Very Good	Very Good

Based on Table 6, the average respondent give a very good response to every aspect of the assessment of comics learning media. Based on these results, it means that this media is practical and efficient to use for learning so that this media is feasible to use.

The results of student responses in the limited trial are used as input for revising the product. This final revision stage is carried out until the experts state that this product is suitable for research. Most of the students enjoy learning by using this comic. There are also those who think that this comic is less funny. The researcher believes that if this comic is too funny, what will be remembered is not the material but the humor presented in the comic. Experts also think so.

The third is field trial. This test is carried out after making the comics declared valid and feasible for research. This test is carried out in Islamic elementary school of VI class with simple electrical circuit material. There are 2 classes used, namely the experimental class using comics and the control class without using comics. Data collection instruments in the form of questionnaires and questions utilize for pretest-posttest before being used for data collection in which the validation process is performed firstly. There are 4 validators in the validation of this instrument. The validation results are presented in Table 7.Tabel

Table 7. Validation Result of Questionnaire Sheets and Questions

No	Validator	Questionnaire		Questions	
		Score	**Criteria**	**Score**	**Criteria**
1	Validator 1	80	Very Good	85	Very Good
2	Validator 2	84	Very Good	83	Very Good
3	Validator 3	87	Very Good	75	Good
4	Validator 4	89	Very Good	83	Very Good
Average		85	Very Good	81,5	Very Good

Based on the analysis of the validation results, the average score for the validation of the questionnaire is 85 which is in very good criteria so that the questionnaire is worthy of use for research. As for the question sheets, the average score of 81.5 is in the very good criteria, meaning that the questions are also valid and suitable for research.

Before the study, both classes are given a pretest. After knowing the two classes have the same initial ability, learning is carried out. At the end of the lesson, a posttest is conducted for both classes. The results of the pretest and posttest are then calculated the gain value. The results of the calculation of the average gain are presented in Table 8.

Table 8. Gain Average

Data	Average	Classification
Gain of Understanding the Experiment Class Concept	0,755	High
Gain of Understanding Control Class Concept	0,513	Medium
Gain of Independent Learning Experiment Class	0,537	Medium
Gain of Independent Learning Control Class	0,352	Medium

The gain value above is used to calculate the hypothesis test. Before testing the hypothesis, a prerequisite analysis test is carried out firstly. The normality test uses the Kolmogorov Smirnov (K-S) test utilizing the SPSS 16 program. The results of the test output are presented in Table 9.

Table 9. Normality Test Results

Data	Significance	Mean
Understanding the Experiment Class Concept	0,565	Normal
Understanding Control Class Concept	0,540	Normal
Independent Learning Experiment Class	0,900	Normal
Independent Learning Control Class	0,354	Normal

Based on Table 9, it is obtained that the output significance of the normality test calculation in both classes is more than 0.05, meaning that the sample data taken are normally distributed or meet the normality test requirements. The next analysis prerequisite test is the homogeneity test. The homogeneity test is presented in Table 10.

Table 10. Homogeneity Test Results

Data	Significance	Mean
Problem understanding concept	0,216	Homogeneous
Learning independence questionnaire	0,125	Homogeneous

Based on the test, it is found that the significance of the calculation of the data for understanding the concept and learning independence of students is 0.216 and 0.125 which means that the data come from homogeneous variants. Prerequisite tests have been carried out and the results are that the data are normally distributed and come from homogeneous variants. This means that the test can be continued on the hypothesis test, namely the Manova test. The results of this hypothesis test are presented in Table 11.

Table 11. Multivariate Test Result

Effect	Value	F	Sig.
Hotelling's Trace	48,331	1,377	0,000

The significance of the calculation in this test is 0.000, meaning that there is an effect of using comics on understanding concepts and learning independence. To find out how much the increase is by calculating the *effect-size*. The *effect-size* value is calculated using the t-value obtained from the t-test.

Table 12. t test results

Variable	t Score	Sig	Cohen's d Score	*Effect-size* Score	Criteria
Concept Understanding	8,872	0,000	2,329	0,758	High
Independent Learning	4,897	0,000	1,286	0,540	High

The t-test on the concept understanding data is 8.872. The t value is used to calculate Cohen's d value and Effect-size value. The calculation results obtain Cohen's d value of 2.329 and Effect-size of 0.758. Based on the Effect-size criteria, the understanding of the concept is 0.758 which is in the high criteria. These results according to the effect-size analysis, the treatment in the experimental class has an effect on increasing understanding of concepts in the high category So that it can be concluded that learning using comic-based learning media can improve students' conceptual understanding.

Meanwhile, for learning independence data, the t-value of the t-test calculation results is 4.897. Furthermore, the t value is used to calculate Cohen's d value and Effect-size value. The Cohen's d value is 1.286 and the Effect-size value is 0.540. Based on the Effect-size criteria, the

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learning independence data of 0.540 is in the high criteria. These results according to the effect-size analysis means that the treatment in the experimental class has an effect on increasing student learning independence in the high category. So, it can be concluded that learning using comic-based learning media can increase student learning independence.

Discussion

The use of comics learning media in science lessons has proven to be effective in increasing the understanding of concepts and learning independence for class VI students. During a pandemic such us today, students require to study independently at home. Comic as learning media can be utilized by students for independent study both at school and at home. The use of comic learning media with direction from the teacher will more easily provide understanding of the material to students and will train students to be able to learn independently.

The developed comic learning media is based on the basic competencies of sixth class science material about simple electrical circuits. Electrical components and their functions in simple electrical circuits are presented in comics. In addition, there are also simple electrical circuit experiments in series and parallel. The material is presented in a situation that describes a child who is conducting an experiment with the aim that students who read it will be carried away as if a child is the ones who is experimenting. This comic is made with colorful images and in simple language to make it easy for readers to understand.

This science comic is validated by media experts, material experts, and 2 teachers. There are several aspects which are assessed such as aspects of comic anatomy, appearance, material, language, presentation, and use. Based on the validation of the four validators, the comic received a "very good" rating. In a limited trial involving, 10 students also received a "very good" rating. Thus, this comic learning media is feasible and can be used for research.

This study uses 2 data collection instruments, namely a questionnaire sheet and a question sheet. Before being used, this instrument is also validated by 4 validators. The results of the validation of the questionnaire sheet with an average of 85 and the question sheet 81.5. Both of these instruments are in very good criteria which means they can be used for research. After the comic and data collection instrument are validated and declared fit for use. Additionally, field trials are carried out.

The main purpose of this development research is to produce learning media in the form of science comic which can improve the understanding of concept and learning independence of class VI students. The material used is a simple electrical circuit which discusses electrical components and their functions and simple electrical circuit experiments in series and parallel. Based on the results of field trials, the treatment in the experimental class whose learning uses comic-based learning media has an effect on increasing understanding of concepts in the high category. These results are based on Cohen's d value of 2.329 and Effect-size of 0.758 which are in high criteria so that it can be concluded that learning using comic-based learning media can improve students' conceptual understanding or it can be said that the combination of images and text can improve students' understanding of the concepts being studied (Indaryati and Jailani, 2015).

Based on the results of field trials, the treatment in the experimental class whose learning uses comic-based learning media has an effect on increasing students' learning independence in the high category. These results are based on Cohen's d value of 1.286 and Effect-size value of 0.540 which is in the high criteria so that it can be concluded that learning

using comic-based learning media can increase student learning independence or it can be said that the use of comics can affect student learning independence. , 2019).

Based on the results of the study, the provision of learning media should be adjusted to the interests and abilities of students as in this study. The use of science comics in learning will be more effective than textbooks. The same thing was also stated by Avrilliyanti, Budiawati, and Jam (2013). the use of comics media in science lessons is better than the use of textbooks. Students will more easily understand the lesson and they can also learn anywhere and anytime. They get entertainment as well as knowledge.

Science comic as learning media that is developed can be used to help students understand the material of simple electrical circuits. This comic is made with interesting pictures and storylines so that it can be used as a support for students to learn independently both at school and outside of school. However, this science comic has limitations in terms of the material presented. Limited to simple electrical circuit material which discusses electrical components and their functions and simple electrical circuit experiments in series and parallel. For further research, the development of comic learning media for other subject matter is abstract and difficult for student to understand. Thus, student will be more enthusiastic to learn.

CONCLUSION

The conclusions of the research and development based on the results of research and discussion are, the first, the comic learning media developed has a validation value with an average of 86.5 being in very good criteria. This means that the resulting product is valid and feasible to use for research. The second, this learning media received a positive response from students with the acquisition of an average score which is in very good criteria. Based on these results, this media is practical and efficient to use for learning so that this media is suitable for research. The third, the results of field trials based on data analysis, the effect-size value of concept understanding of 0.758 is in the high criteria, and learning independence of 0.540 is in the high criteria. These results, according to the effect-size analysis, mean that the learning media in the form of science comics can increase the understanding of concepts and learning independence of sixth graders in the high category.

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