Development of Mathematical Comics Media based on Realistic Mathematic Approach to Improve Problem Solving Skills of VII Garde Students of Middle School

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Abstract. The aim of this study is to increasing problem solving skills of middle school seventh grade students. The study was designed as research and development method 4-D models by Thiagarajan semmel & semmel (1984), media comics based on mathematical realistics, the study conducted during the pandemic 2020-2021 academic year. The data were obtained from problem solving skills test, students questionnaire. According to the findings, it was found that there are developments in students average score test, students reported that using media comics mathematics is positive and fun. These results show that media comics mathematics increase problem solving student skills.

Keywords: "Comi Media, Problem Solving Skill Student".

1 Introduction

In education, mathematics is a science that is an important role in life. Mathematics is needed by all scientific disciplines as well as in real life because it can increase and hone the power of human thought, because the power of thought has a major contribution to the development of the character of students at school. Characters that appear in students are expected to help students instill competencies or abilities in students that are useful for the present and the future.

In fact of the pandemic, this is currently the era of the COVID-19 virus pandemic, in Indonesia itself the covid-19 pandemic entered Indonesia in 2020. The World Health Organization has decided that COVID-19 is a pandemic situation, and the Indonesian authorities suddenly closed schools and moved to learning online.

Transition to online class, that to support learning, the use of mathematical comics media can help students to learn mathematics, book media as learning media is a tool that serves to deliver learning notes or as a bridge for delivering notes to students, as a result , the way of communication between students and the base. goes well. In this case, the learning book media will run optimally if the learning notes are informed that they are built in a real and interesting way (Masjudin, 2020).

2 Subject of Study

Lester (Hasratuddin, 2015) states that a problem is someone who will solve the problem, but does not yet have a direct handling method that can be applied to solve the problem. Polya (Hasratuddin, 2015) said the forms and methods of solving problems that were categorized into problem solving in stages were: 1) understanding the problem; 2) devising a plan; 3) carrying out the plan; 4) looking back.

Arsyad (2014) said that the media originated from the Latin medius which literally means middle, intermediary or introduction. So in broad terms, media can be referred to as people, modules, or events that create an atmosphere and situation that allows students to understand insights, skills and actions.

Sudjana (at all, 2013) comics are a form of cartoon images that reveal characters and act out a story in a sequence of pictures to provide entertainment to the readers. In this study, it is thought that development media comic mathematics to increase problem solving skills of middle school seventh grade.

3 Method

In this study, a research & development method design in 4-D models (wich is define, design, develop, and disseminate) used was applied. The 4-D models is defined by Thiagarajan semmel & semmel (1984). In order to determine the effect of the use media comics on students success, an achievement test with 5 questions on the social arithmetics wich is in the field of mathematical relaistics learning was developed. The achievement test of 5 essay question and was developed by researches and obtained by experts. With the reliability score as .642 (Cronbsch's alpha = .642) validity which is Correlation product-moment refers to the basis of decision making if r count > r table then the question is valid or vice versa if r count < r table then the question is invalid. Then determine whether the question is valid or not seen from the significance if sig < 0.05 then the question is valid, if sig > 0.05 then the question is invalid . . Achievement test was applied in the form of pretest and posttest, before and after the topic of social arithmetics. The pre-test and post-test method provides clues about the effect of use media comics on problem solving skills students with an application by comparing the data before and after it (Creswell2019). In order to determine the effective media comic mathematics used on students a problem solving skills scoring key was developed by (Hasratuddin, 2015). In this context, to determine media comics though effectively when the scoring key funded by the scores are evaluated, it is found that there is moderate agreement in the dimensions of " 1) achievement of learning objectives;2) students classicity score ;3) 80 % students respond positive ; 4) Ideal of the time."

4 Result and Discussion

The achievement test developed by researchers was used to measure the effect of media comics on problem solving skills students. The students were 7 th grades, the lesson mathematics and the topic was "social arithmetics." The achievement test thought before and after the use of media comics, and the results were compared. N-Gain score test was applied to compare the pre-test and post-test scores of the student

Table 1. Validity

Correlations

		QUESTION 1	QUESTION 2	QUESTION 3	QUESTION 4	QUESTION 5	TOTAL SCORE
QUESTION 1	Pearson Correlation	1	.210	-124	.313	.178	.483 [**]
	Sig. (2-tailed)		.275	.522	.098	.356	.008
	N	29	29	29	29	29	29
QUESTION 2	Pearson Correlation	.210	1	.014	.425 [*]	.599 [**]	.725 [**]
	Sig. (2-tailed)	.275		.942	.022	.001	.000
	N	29	29	29	29	29	29
QUESTION 3	Pearson Correlation	-124	.014	1	.256	.322	.433 [*]
	Sig. (2-tailed)	.522	.942		.180	.088	.019
	N	29	29	29	29	29	29
QUESTION 4	Pearson Correlation	.313	.425 [*]	.256	1	.517 [**]	.793 [**]
	Sig. (2-tailed)	.098	.022	.180		.004	.000
	N	29	29	29	29	29	29
QUESTION 5	Pearson Correlation	.178	.599 [**]	.322	.517 [**]	1	.788 [**]
	Sig. (2-tailed)	.356	.001	.088	.004		.000
	N	29	29	29	29	29	29
TOTAL SCORE	Pearson Correlation	.483 [**]	.725 [**]	.433 [*]	.793 [**]	.788 [**]	1
	Sig. (2-tailed)	.008	.000	.019	.000	.000	
	N	29	29	29	29	29	29

[**]. Correlation is significant at the 0.01 level (2-tailed).
[*]. Correlation is significant at the 0.05 level (2-tailed).

Table 1 The result showed validity of the achievement test, it was found that there was a validity of 5 achievement test to increase problem solving skills student from the first implementation to the last. That's found first theme, second, four and five ** correlation is significant at the 0.01 level (2-tailed) and the third theme show * correlation is significant at the 0.05 level (2-tailed). This finding shows that achievement test is validity.

Table 2. Reliability Statistics

Cronbach's Alpha	N of Items
.642	5

The results showed that reliability scores The achievement test of 5 essay question and was developed by researches and obtained by experts . With the reliability score as .642 (Cronbsch's alpha = .642). this result showed the achievement was reliable to use.

Tabel 3. Analyze The Increase The Problem Solving Skills of Students of Middle School Seventh Grade

No	Variables	Implementation I	Percentage	Implementation II	Percentage
1	Low	8	30.8%	5	17.85%
2	medium	16	61.5%	21	75%
3	High	2	7.7%	2	7.15%

The results showed that effectively of using media comic mathematics increase problem solving student skills, students problem solving skills category low 8 students, medium 16 students, and high 2 students thos result from Implementation I, and at the second Implementation students problem solving skills category low 5 students, medium 21 students, and high 2 students. Based on Table 3 above, it can be seen that the students it can be seen that there are 2 students who get N-Gain scores in the range > 0.7 or the number of students who have increased mathematical problem solving abilities with the "high" category are 2 (7.7%) students, students who have increased problem solving abilities mathematics problems scored in the range of 0.3 g 0.7 in the "medium" category there were 16 students, while students who experienced an increase in problem solving abilities in the g <0.3 range were included in the "low" category there were 8 (30, 8%) students.

In the second Implementation II students who got an N-Gain score in the range > 0.7 was 2 (7.15%) or there were students who experienced an increase in their mathematical problem solving ability in the "high" category. For students who experienced an increase in their mathematical problem solving ability, they scored in the range of 0.3 g 0.7 in the "medium" category, there were 21 (75%) students. Meanwhile, students who experienced an increase in problem-solving abilities in the range of g <0.3 were included in the "low" category, there were 5 (17.85%) students.
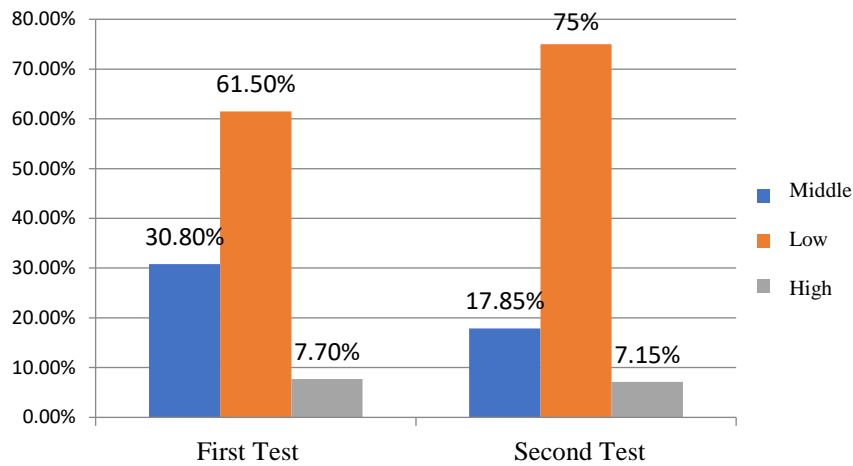
Fig. 1. Comparison First Test and Second Test

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Table 4. Findings of Media comics effectively to increase the problem solving skill of students of middle school seventh grade

No	Variables	Implementation I		Implementation II	
		Pretest	Posttest	Pretest	Posttest
1	student scores	15	20	23	27
2	Percentage	57.69%	76.92%	82.14%%	96.42%
3	Chategory	Unachieved		Achieved	

Table 4 The result show clacsicality student scores at the first Implementation is unachieved, this result percentage 85% students unreached, and the second Implementation show clacsicality students score was achieved, because the percents show 85% students reached. The value of Implemention I was not achieved to the criteria for effectiveness, this was because the results of classical mastery in Implementation I had not been achieved, namely the average value of classical mastery of students in the posttest of students in trial I had not reached 80% KKM score 75. While the posttest value of Implementation II has met the effective criteria, because the percentage of classical completeness of students reached 96.42%. This means that the criteria for the effectiveness of the mathematical comic media have been met or achieved.
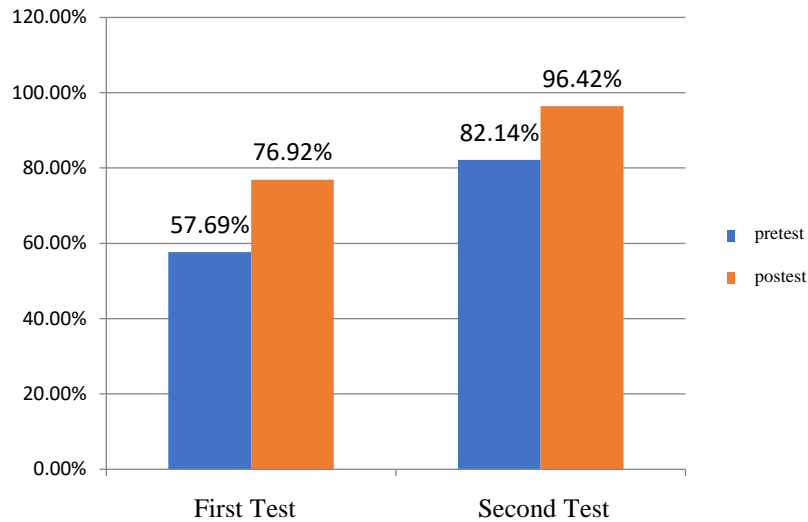
Fig 2. Comparison Pretest And Posttest

Tabel 5. Student Response To Media Comics Mathematics

N o	Variables	Implementation I	Implementation II
1	Student response	87%	90%
2	Description	Postive response	positive response

Table 5 The result shows Implementation I it can be seen that the analysis of student responses by referring to the decision making that has been described in chapter III, the results of the first trial showed a student response of 87% with a positive student response category , then in the second trial the student response was 90% with a positive response category.

Table 5 The result shows Implementation I it can be seen that the analysis of student responses by referring to the decision making that has been described in chapter III, the results of the first trial showed a student response of 87% with a positive student response category , then in the second trial the student response was 90% with a positive response category.
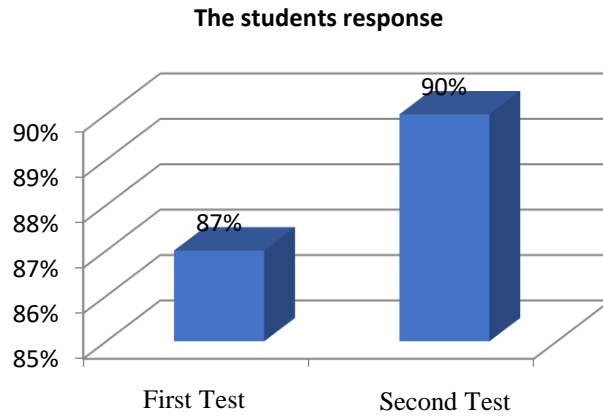
The students response

Fig. 3. Students response

Ideal of the time in the first Implementation and the second Implementation are ideal chategory , this result show the duration of the time using media comisc mathematics while a learning had the same duration with conventional learning, so the result shows the Idela of the time had funded effectively chategory.

Table 7. Achievements of the learning objectives

No	Variables	Pretest		Posttest	
		Percentage	category	Percentage	category
1	Understanding problems	95%	highly	99%	highly
2	Devising a plan	77%	medium	83%	High
3	Carrying out the plan	73%	medium	84%	High
4	Looking back	81%	high	92%	highly
	average	81.5%	achieved	89.5%	achieved

Table 7 the result shows that the average percentage of pretest on indicators of students' mathematical problem solving ability in understanding problems reaches 95.36% in the very high category, while the average percentage of indicators planning completion is 77.17% in the medium category, then the indicator of solving the problem reached 72.90% in the medium category and the indicator re-examined 80.74% in the high category.
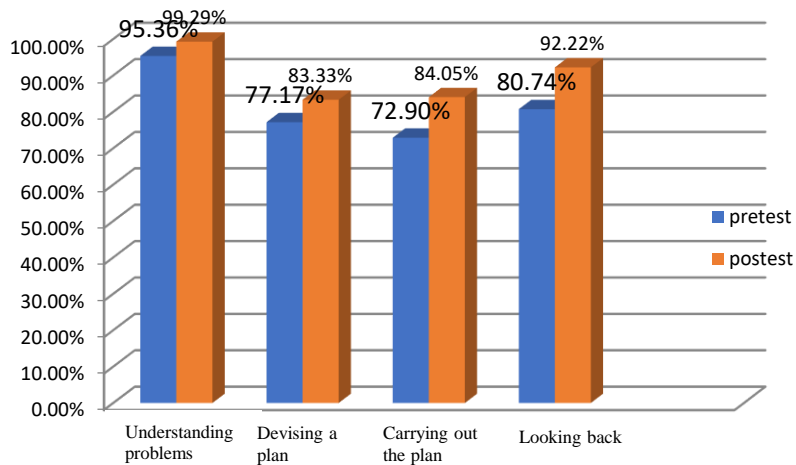
Comic media mathematics could said mean for student if the comic media mathematics the could bring up characteristics approach realistic in activity learning . Traffers (in Wijaya , 2012: 12) states that there are 5 characteristics approach realistic that is spelled out as the following : 1) the use of context (*the use of context*); 2) The use of the model (*the use of the model*); 3) Use of Student Contribution Results (*the use of student contribution*), 4) Interactivity (*interactivity*); and 5) *Intertwining* .

Table 8. Characteristics of Comic Media Mathematics based on Approach Realistic

No	Variables	Pretest		Posttest	
		Percentage	category	Percentage	category
1	Understanding problems	95%	highly	99%	highly
2	Devising a plan	77%	medium	83%	High
3	Carrying out the plan	73%	medium	84%	High
4	Looking back	81%	high	92%	highly
	average	81.5%	achieved	89.5%	achieved

Results test try eight has produce comic media mathematics based approach valid realistic and effective , then step he continued is To do Step deployment

The increasing of problem solving skills of middle school seventh grade students was obtained. When the N-Gain score result obtained from pre-test and post-test students score, and to determine the effective of use media comics obtained from 1) achievement of learning objective;2) classicity student scores;3) 80% students response ; 4) Ideal t times of students.

It was found that there was a significant increase in the scores of the media comic mathematics created by study group pretest and posttest . According to the result, it is seen that the using of media comic mathematics while learning, increased the student problem solving skills. Another

important result of the study is that there is a significant difference clasicality socres between Implementation I and Implementation II, this shows effectively media comics mathematics. And the last result founded students response in the first Implementation and the second Implementation more than 80%, so these show the students response are positive .

As the result of this research, it was concluded that media comics mathematics increase problem solving skills of the middle school seventh grade students. In this context, it is it though that students will be active learners where they can improve their academic performance

5 Conclusion

As a result of this research, it was concluded that using media comic mathematics affective to increasing problem solving skills of students. Thus, it is possible to make the following recommendations: for the teachers who are practitioners in classrooms should be trained on this subject. Using media comic can developed students problem solving skills, should be prepared on the student textbooks. Since is it though that problem solving student skills with media comic mathematics effecteive at other grade levels and lessons, it will be useful to try in various education levels and lessons. In order to increase achievement, the use of materials in education is recommended.

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