

Development of Learning Tools to Improve Students Self-Efficacy

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Article Info	ABSTRACT
Article History Received : 19 Mei 2022 Accepted : 23 Juni 2022 Published : 30 Juni 2022	This research is included into development research type. This research uses a 4-D model (define, design, develop, and disseminate) Thiagarajan (1974). This research is organized by learning media and instruments, namely: the student's handbook, the teacher's handbook, lesson plan, the student's exercise sheet, the student's mathematical problem-solving ability test and self-efficacy questionnaires. Tests conducted on grade X as many as 26 people in Madrasah Aliyah Muhammadiyah (MAM) 1 Medan. The results of this research indicate that: Improvement of students' self efficacy after learning produces an average value of 84.5.
Keywords: Development of Learning Instrument, Students Self-efficacy.	

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INTRODUCTION

According to Bandura (1997) suggests that *self-efficacy* is a major determinant of choice for individual development, persistence in using various difficulties, and patterns of thought and emotional reactions experienced.

This means that *self-efficacy* is the confidence that students must have. With students having high *self-efficacy*, it makes students have motivation in solving problems related to problem solving. In the learning process, the teacher should provide opportunities for students to see and think about the ideas given. *Self efficacy* is beliefs and expectations about students' abilities to deal with their tasks. Various studies show that *self-efficacy* affects tenacity in facing the difficulties of a task, and learning achievement. Students who have *self-efficacy* feel they do not have confidence that they can complete the task, so they try to avoid the task. *self-efficacy* is not only experienced by individuals who do not have the ability to learn, but it is also possible for gifted individuals to experience it. Therefore, confidence in completing tasks or math problems requires *self-efficacy* to achieve the expected results. According to Simanungkalit (2015) says that *self-efficacy* is a psychological aspect that has a significant influence on student success in completing assignments and problem-solving questions well. This explains that the ability to assess himself accurately is very important in doing assignments and the questions asked by the teacher, with self-confidence or self-confidence can make it easier for students in these assignments, even more so that they can improve their achievements. In relation to problem solving, *self efficacy* has a function as a tool to assess student success in solving problem solving problems.

Individuals with high self-efficacy will choose to make a bigger effort and be more unyielding. Self-efficacy has an important role in regulating one's motivation which can affect students' mathematics learning outcomes and is reinforced by Kanginan & Terzalgi (2013) in working on math problems, especially trigonometry, we must have confidence if the questions we do are appropriate. with a guide and we are sure that the questions we are working on are correct. In addition, we must also be confident to appear working on questions on the blackboard if the teacher offers to do it.

According to Marlina, Ikhsan & Yusrizal. (2014) in his research the success and failure experienced by students can be seen as a learning experience. Learning experiences will produce *self-efficacy* in solving problems so that their learning abilities will increase, *self-efficacy* is needed in learning so that students can achieve their learning goals and achieve maximum learning achievement. Bandura (2009) states that the measurement of a *self-efficacy* refers to three dimensions, namely *level, strength, and generality*.

Based on the results of researchers' observations of MAM 1 Medan students, they stated that their *self-efficacy* were low. This is in accordance with the data that has been obtained from giving a *self-efficacy* questionnaire in the form of a closed questionnaire scale containing 24 statement items with answer choices of strongly agree (SS), agree (S), disagree (TS), and strongly disagree (STS) to students. class X MAM 1 Medan, totaling 25 people. From the results of the *self-efficacy* given by researchers to 25 students, the average score obtained by students is 48%, this makes the *self-efficacy* of MAM 1 Medan students still low. In accordance with the classification of *self efficacy* which can be seen in Table 1. below.

Table 1. *self-efficacy* Student

Percentage (%)	Criteria
76 – 100	High
51 – 75	Medium
0 - 50	Low

Source: Bandura (2006)

This all shows that *self-efficacy* are low, because many students feel unsure of their abilities in math subjects, so when they face math problems they don't try to solve them well and when the researcher asks some students in class X MAM 1 Medan on when learning takes place students still feel less confident to express their opinions and in general will only answer questions when appointed by the teacher. When given a question, students are generally still passive by waiting for an answer from their friends or from the teacher.

The low *self-efficacy* of Madrasah Aliyah students is an important problem in mathematics education. Students tend to be less interested in mathematics, they admit that they only study mathematics when they are in class and only do the questions given by the teacher without repeating them at home. Allegedly due to the factors of the devices and learning media used are less attractive and do not involve students in their learning.

Based on observations made at MAM 1 Medan, the facts show that the mathematics learning process still adheres to a monotonous way that requires students to just swallow whatever the teacher or parents tell them, so it is difficult for us to expect students to become individuals who are able to put forward their own thoughts, let alone those who unique. They tend to appear as individuals who automatically do things they normally do. The learning process is still dominated by teachers and does not provide access for students to develop independently through learning activities that prioritize problem solving. Students tend to only

memorize a number of materials and problem-solving steps that have been done by the teacher or those in the textbook. As a result, students are passive in learning in class.

From all the cases that have been described above, it shows that the problem-solving ability and *self-efficacy* of students towards the questions given are still low, causing student achievement to decline. This possibility is caused by several things, including the learning that has taken place so far is not related to the daily experiences of students, and the learning pattern that does not emphasize the problem solving ability and *self-efficacy* mathematical

The success of students can be influenced, one of which is the success of their learning. While the success of a learning, is influenced by many factors, including learning models, learning strategies, learning media, and also teaching materials or learning materials. The selection of appropriate learning strategies and approaches can support the success of that learning as well. The 2013 curriculum emphasizes the current learning process referring to a scientific approach which consists of observing, asking, trying, reasoning, association, concluding, and communicating in all subjects as well as mathematics subjects.

RESEARCH METHOD

Development model is used *four-D*. According to Thiagarajan (1974) the 4D research and development model consists of 4 main stages, namely *define, design, develop, and disseminate*. According to Trianto (2013), the 4D development model can be adapted into 4Ps, namely: definition, design, development and deployment. The application of the main steps in the study is not only based on the original version but also adapted to the characteristics of the subject and the *examinee's place of origin*.

The 4D model was chosen because it is systematic and suitable for developing problem-based learning tools assisted by *Rubu' Al-Mujayyab media*, but in this study the researchers modified the 4D model. Modifications were made with the consideration that this model is used for all normal students and it is not possible to carry out all stages of the 4D model in detail due to limitations. The modified 4D model in this study is intended for normal students.

This research is divided into two stages. The first stage is the development of learning tools. The development of learning devices includes the design of learning devices. The second stage in this research is to test the learning tools in class X Madrasah Aliyah Muhammadiyah 1 Medan in the 2017/2018 academic year.

RESULTS AND DISCUSSION

Questionnaire Validity *Self-Efficacy*,

In calculating the validity of student self-efficacy questionnaire items it is done using manual, *excel*, and SPSS 22. Summary The results of the validity of the *self-efficacy* are in Table 2. below:

Table 2. Questionnaire Item Validity *Self Efficacy* Student

No. Question	rx _y	tarithmetic	ttable	Interpretation
1	0.60	4.64	2.02	Valid
2	0.86	10.17	2.02	Valid
3	0.62	4.93	2.02	Valid

4	0.64	5.14	2.02	Valid
5	0.63	5.06	2.02	Valid
6	0.62	4.93	2.02	Valid
7	0.53	3.9	2.02	Valid
8	0.53	5.23	2.02	Valid
19	0.64	5.15	2.02	Valid
10	0.62	4.84	2.02	Valid
11	0.39	2.57	2.02	Valid
12	0.75	6.89	2.02	Valid
13	0.62	4.9	2,02	Valid
14	0.53	3.9	2.02	Valid
15	0.46	3.49	2.02	Valid
16	0.67	5.63	2.02	Valid
17	0.79	7.8	2.02	Valid
18	0.53	3.48	2.02	Valid
19	0.50	3.6	2.02	Valid
20	0.35	2.32	2,02	Valid
21	0.66	5.6	2.02	Valid
22	0.55	4	2.02	Valid
23	0.55	6.2	2.02	Valid
24	0.71	6.5	2.02	Valid
25	0.52	3.8	2.02	Valid
26	0.61	5.5	2.02	Valid
27	0.45	3.14	2.02	Valid
28	0.53	3.8	2.02	Valid
29	0.53	3.9	2.02	Valid
30	0.40	2.66	2.02	Valid

Based on the data in the table. 2. The interpretation of each item of the *Self Efficacy* is in the Valid category. Thus, all the items of the *Self Efficacy* student's

Questionnaire *Self-Efficacy* Student

Based on the results of calculations using the *alpha-Cronbach* reliability for *self-efficacy* was 0.93. This means that the reliability *self-efficacy* is in the very high category. Thus, *self-efficacy* can be said to be reliable for measuring student *self-efficacy* .

***Self-efficacy* Using Learning Tools That Have Been Developed In Trial I**

questionnaire data *self-efficacy* were collected and analyzed to determine *self-efficacy* before learning treatment. The answer choices for the *self-efficacy* scale *Linkert*. The type of data obtained from the answers to the questionnaire is an ordinal scale. Calculations with the Successive Interval Method were performed using the *Ms. software. Excel 2007*. Overall analysis results can be seen in the attachment. The results of the descriptive analysis of *self-efficacy* after using learning tools are presented in Table 3. below:

Table 3. Description of *Efficacy* After Using Learning Tools In Trial I

Group	Statistical Data	<i>Self-efficacy</i> After Using Devices
High	N	6
	Average	95.83
	Standard Deviation	0.7
Medium	N	15
	Average	71.86
	Standard Deviation	10.7
Low	N	5
	Average	55
	Standard Deviation	1.87
Overall	N	26
	Average	74.15
	Standard Deviation	15.9

Descriptively it can be concluded that *self-efficacy* after using problem-based learning tools that have been developed based on the KAM category (High, medium and low) produces students who have *self-efficacy* in the high group, there are 6 people, in the medium group there are 15 students and in the middle group

there are 15 students. the low group there are 5 students. The average *self-efficacy* are 95.83, 71.86 and 55, respectively. The results *self-efficacy* each indicator are shown in the table. 4. as follows:

Table 4. Self- Each Indicator in Trial I

Variable	Indicator	Average
Self Efficacy Student	Level of Task Difficulty (<i>Level</i>) a. Expected efficacy on the level of task difficulty b. Analysis of behavioral choices to be tried (feeling capable of doing) c. Avoid situations and behavior beyond the limits of ability	2.48
	Degree of stability, belief or hope (<i>strength</i>) a. Weak expectations, unfavorable experiences b. Steady hope persists in his endeavors.	2.60
	Area of behavior (<i>generality</i>) a. Expectations only in specific areas of behavior b. Expectations that spread across various areas of behavior	2.61

From Table 4. above, it can be seen that the highest average score is 2.61, which is an indicator of Generality. While the lowest average score is 2.48, namely the Difficulty of Tasks (Level).

Self-Efficacy After Using Learning Tools That Have Been Developed In Trial II

questionnaire data *self-efficacy* were collected and analyzed to determine the *self-efficacy* before learning treatment. The answer choices for the *self-efficacy* scale *Linkert*. The type of data obtained from the answers to the questionnaire is an ordinal scale. Calculations with the Successive Interval Method were performed using the *Ms. software. Excel 2007*. Overall analysis results can be seen in the attachment. The results of the descriptive analysis of *self-efficacy* after using learning tools in the second trial are presented in Table 5. below:

Table 5. Description of Efficacy after Using Learning Devices in Trial II

Group	Statistical Data	Self-efficacy After Using the Tool
High	N	6
	Average	103
	Standard Deviation	1.1
Medium	N	15
	Average	84.4
	Standard Deviation	9.7

Low	N	5
	Average	62.8
	Standard Deviation	2.4
Overall	N	26
	Mean	84.5
	Standard Deviation	15.2

Descriptively it can be concluded that *self-efficacy* after using problem-based learning tools that have been developed based on the KAM category (High, medium and low) produces students who have *self-efficacy* in the high group, there are 6 people, in the medium group there are 15 students and in the middle group there are 15 students. the low group there are 5 students.' average *self-efficacy* are 103, 84.4 and 62.8, respectively.

From the data obtained, it shows that the number of students who experienced an increase in *self-efficacy* in each category of KAM (high, medium and low) there was no difference. In trial I the number of students in the high group was 6 students as well as after trial II. In the first trial the number of students in the medium group was 15 students as well as after the second trial and in the first trial the number of students in the low group was 5 students as well as after the second trial. This means that the increase is only seen in the average *self-efficacy* of students from trial I to trial II, there is no visible increase in the number of students based on the KAM category (High, medium and low).The results *self-efficacy* each indicator are shown in the table. 6. as follows

Table 6. *Self-efficacy* Each Indicator in Trial II

Variable	Indicator	Number Item
<i>Self Efficacy</i>	Level of Task Difficulty (<i>Level</i>) a. Expected efficacy on the level of task difficulty b. Analysis of behavioral choices to be tried (feeling capable of doing) c. Avoid situations and behavior beyond the limits of ability	2.82
	Degree of stability, belief or hope (<i>strength</i>) a. Weak expectations, unfavorable experiences b. Steady hope persists in his endeavors.	2.95
	Area of behavior (<i>generality</i>) a. Expectations only in specific areas of behavior b. Expectations that spread across various areas of behavior	3.06

From Table 6. above, it can be seen that the highest average score is 3.06, which is an indicator of Generality. While the lowest average score is 2.82, namely the Difficulty of Tasks (Level).

Self-Efficacy Student

The average *self-efficacy* in the first trial was 74.15 while the average *self-efficacy* in the second trial was 84.5. Based on these data, the overall *self-efficacy* of students in trial II is better than trial I. If these results are related to the conclusions of Bandura's (1997) opinion which states that *self-efficacy* refers to belief in one's ability to organize and implement tasks than the students in the *math* first trial and trial II based on the division of high, medium and low groups can be seen in Table 7.

Data Efficacy Using Learning Devices in Trial I and Trial II

Group Self Efficacy	Trial I	Trial II
High	95.83	103
Medium	71.86	84.4
Low	55	62.8
Overall	74.15	84.5

From the data obtained, it shows that the number of students who experienced an increase in *self-efficacy* in each category of KAM (high, medium and low) there was no difference. In trial I the number of students in the high group was 6 students as well as after trial II. In the first trial the number of students in the medium group was 15 students as well as after the second trial and in the first trial the number of students in the low group was 5 students as well as after the second trial. This means that the increase is only seen in the average *self-efficacy* of students from trial I to trial II, there is no visible increase in the number of students based on the KAM category (High, medium and low). To see '*self-efficacy* in the first and second trials, we can see the diagram in Fig. 1. below.

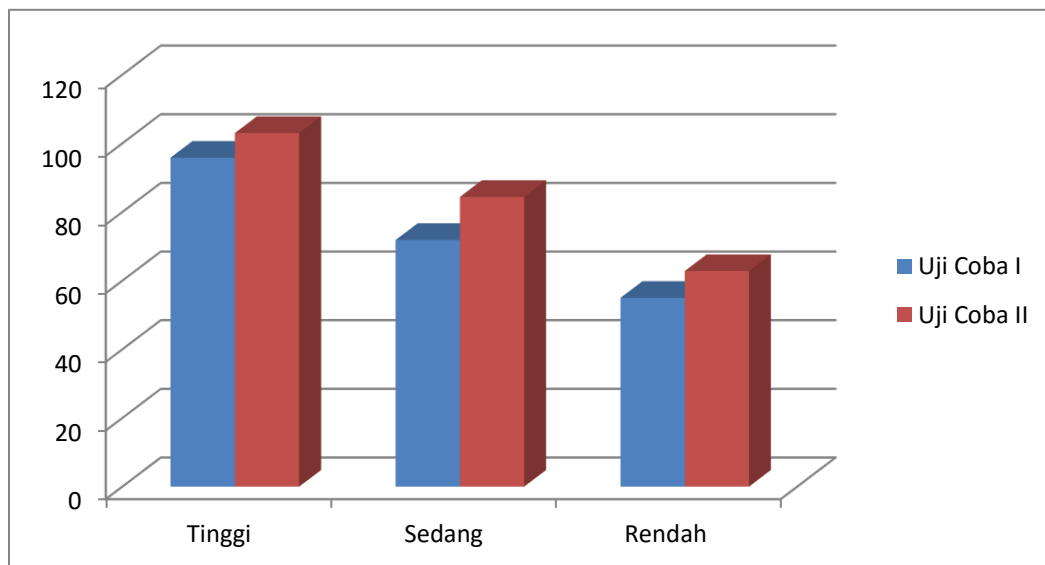


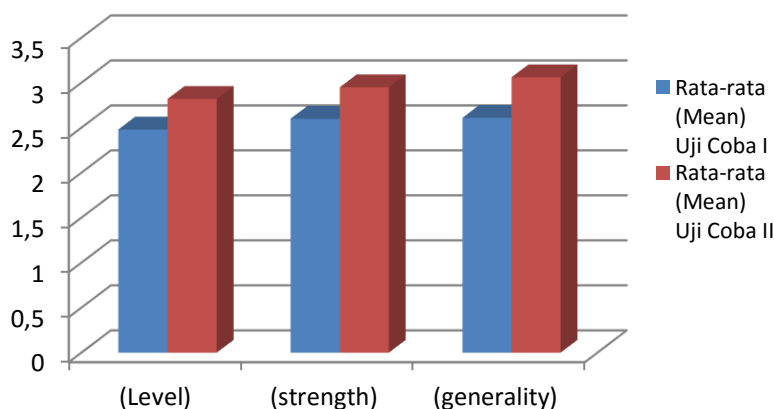
Figure 1. Self Efficacy Using Learning Devices in Trial I and Trial II.

From Figure 1. it can be concluded that regarding the picture *self-efficacy* that can be revealed, that is, from the average score of each indicator there is an increase from trial I to trial II. If it is seen from the results of the *Self Efficacy* students use learning tools in the first trial and second trial in each aspect, it can be seen in Table 8. Below

Questionnaire Results *Self-efficacy* Each Indicator in Trial I and Trial II

<i>Aspects of Self Efficacy</i>	Average (Mean)	
	Trial I	Trial II
Level of Task Difficulty (<i>Level</i>)	2.48	2.82
Degree of stability, belief or expectation (<i>strength</i>)	2.60	2.95
Area of behavior (<i>generality</i>)	2, 61	3.06
Overall aspect	23.2	29.2

To see '*self-efficacy* in the first and second trials, we can see the diagram in Fig. 2. below.



Picture.2. Results *Self-Efficacy* Each Indicator in Trial I and Trial II

From Figure 2. it can be concluded that regarding the picture *self-efficacy* that can be revealed, from the average score of each indicator there is an increase from trial I to test. try II.

This is in line with the research conducted by Moma (2014) which resulted in the *self-efficacy* of students who received generative learning better than students who received conventional learning because students in generative learning were more confident and diligent in doing math tasks than learning. conventional.

CONCLUSION

Increasing *self-efficacy* after learning using learning tools that have been developed based on the KAM category has increased from trial I to trial II, in the high group by 95% it increases to 103%, in the medium group by 71% it increases to 84%. In the low group, 55% increased to 62%. Judging from the average achievement *self-efficacy* in the first trial of 74.15% increase to 84.5% in trial II.

REFERENCES

- Bandura, A. 2006. *Guide for Constructing Self-Efficacy Scales*. Information Age Publishing.
- Bandura, A. 2009. *Self-efficacy in changing societies*. Cambridge, UK: Cambridge University Press.
- Bandura, A. 1997. Self-Efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological Review*. Vol. 84 No. 2, 191-215
- Kanginan, M. & Terzalgi, Y. 2013. *Matematika untuk SMA-MA/SMK Kelas X*. Bandung : Srikandi Empat Widya Utama.
- Marlina, M., Ikhsan. & Yusrizal. 2014. Peningkatan Kemampuan Komunikasi dan Self-Efficacy Siswa SMP dengan Menggunakan Pendekatan Diskursif. *Jurnal Didaktik Matematika*. Vol.1, No.1. Page 35-45.
- Hidayat, M. 2020. Pengembangan Media Ruhu' Al-Mujayyab (Instrumen Astronomi Klasik) Dalam Pembelajaran matematika. Yogyakarta : Bildung
- Moma, La. 2014. Peningkatan Self Efficacy Matematis Siswa SMP Melalui Pembelajaran Generatif. Fakultas Keguruan dan Ilmu Pengetahuan Universitas Pattimura
- Simanungkalit, R. H. 2015. *Pengembangan Perangkat Pembelajaran untuk meningkatkan Kemampuan Pemecahan Masalah dan Self Efficacy Siswa SMP Negeri 12 Pematangsiantar*. Tesis PPs UNIMED.
- Thiagarajan, S., Semmel, Ds., Semmel, M. 1974. *Intruactional Development For Training Teachers Of Exceptional Children*. A Source Book Blomingtn, Central For Innovation On Tesching The Handicapped.
- Trianto. 2013. *Mendesain Model Pembelajaran Inovatif-Progresif : Konsep, Landasan dan Implementasinya Pada Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Jakarta : Jakarta : PT. Kencana Prenada Media Grup.