



The Influence of SAVI Problem Based and Mathematical Disposition on the Student Achievement of SMK Dinamika Tegal City

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Abstract. Research of problem based SAVI (Somatic, Auditory, Visual and Intellectually) on mathematical creative thinking skills, mathematical problem solving abilities, and mathematical dispositions. The study was conducted from June to October 2021. The results of this study showed that students who followed learning with problem-based SAVI had better mathematical creative thinking skills than students who followed conventional learning. The results of learning device development are as follows: (1) learning devices developed valid according to validators, with an average validation score of 3.25 with the highest score of 4; (2) the device is said to be practical because the positive student response with a score of 83.92 and the expertise in learning process management with a score 4.41 is very high; (3) use of SAVI model learning devices Mathematical Disposition-based is effective, characterized by the achievement: (a) students achieve completion individually and classical, (b) the expertise to complete mathematical difficulties on classroom that uses the SAVI model based on Mathematical Disposition is better than expertise to complete difficulty in the field of mathematics classroom compared to conventional classes methods, (c) Have an together - the character on problem-solving ability and ability at the level of independence skills to the problem. Mathematical problem solving ability by 80.7%.

Keywords: SAVI · Mathematical problem-solving skills · Mathematical disposition · Learning achievement

1 Introduction

Mathematics has special characteristics, namely the entire object of abstract study Yeni [1] stating that mathematical characteristics are deductive, logical, as a formal system of number symbols, abstract structures, symbolism, and is a collection of human reason propositions, or basic science and thinking activities. Learning mathematics is a high mental activity, with regard to abstract ideas and must be carried out continuously in a logical order. According to Murni [2], character is a pattern, be it thoughts, attitudes, or actions that are attached to a person very strongly and difficult to eliminate. Character has

the definition of a person who has a good oral attitude and personality various Kindness can be used as basis to way of view, be able to think, be able to behave and acting [3]. Character conscious is an attempt to develop one's personality and is It can be used as a means to basic act, behave, and think. And in this study contains the affective aspect of independence which is one of the 18 characters used in the 2013 curriculum.

This research provides an understanding that it needs attention related to cognitive and independence so that it affects knowledge without any related interactions and including gender differences that affect the improvement of cognitive abilities and independence. Next on the research from Stanovich and West [4]. In the advanced research process, the researchers must still show as it is well known that there is a tendency to avoid multiple interpretations related to rational thinking, in particular the tendency to display denominators abandonment, probability. The results of subsequent studies are [5] the results of this study provide an explanation that independence has a positive choleration with the success of the English language test, in the independence section, it correlates more specifically by filling in the task completion questions. Matching questions compared to cognitive styles of field independence and cognitive style field dependence, however, correlate more significantly with multiple choice. Then the next review is the result of research [6] which provides quite interesting research results, namely on the use of e-learning systems containing technological content by considering the factors that make up independence. Experiments conducted at 3 Ukrainian universities, this has given an understanding that the learning process is very closely related to technological developments models makes it possible to improve on independent student work using the e-learning environment has a significant effect on academic performance and to be able to reduce the frequency of boredom. And the next one is to provide a related view of quantitative research results where analysis of the principle component.

According to Phua and Tan [7] that aspects used in using cognitive learning outcomes contain 6 levels: remembering, understanding, applying, analyzing, assessing and creating. Then the percentage results for the cognitive domain contained in student book problems can provide provisions to train and encourage the level of learning development. So from some definitions and problems it is very interesting to take the common thread related to cognitive aspects, independence, and mathematical learning. Problems that often arise in learning, especially linear program materials, include: (1) the teaching methods used are still more with the lecture method in the lecture process; (2) The media and learning resources used are still very limited. Therefore, students tend to have difficulty understanding linear program material so that the student success rate for this material is relatively very low. The basis that the facts, then looking at the data on the average daily replay of linear program material in the last three years in class XI SMK Tegal City Dynamics did not increase based on the experience of teachers during teaching class XI Automotive, with the analysis of daily repeat values conducted on students of class XII Automotive Year 2021/2022 student success in achieving completion is 54% much lower than the previous year in the previous year in the 2021/2022 school year. Which reached 62.5%, and currently KKM mathematics in SMK Dynamics of Tegal City in the 2021/2022 school year is 78 which is still the same as the previous year and 2 years ago in the 2012/2013 study year KKM mathematics is 75. Based on the observations and information above, in an effort to improve students' problem-solving

skills. SAVI learning is learning that uses all the senses, namely emotions, the whole body, while respecting the learning styles of other individuals by realizing that everyone has different abilities. Because the use of the 2013 curriculum prioritizes attitude or character education, one of which is independence and all learning is also directed at modern learning methods so that the savi learning model is appropriate when used mathematical disposition approach that emphasizes and relates learning to everyday life.

Meier in Fauzan and Yerizon [8], states that learning does not automatically increase by telling students to do activities. However, collaborating physical movement with intellectual activity and the use of all the senses can have a big effect. This learning model is called the SAVI Model. The elements that are easy to remember are: (1) Moving and doing, (2) Learning by talking and listening, (3) Observing and describing, (4) Solving problems and reflection. SAVI learning can be planned with groups/individuals in four stages: (1) Preparatory stage, (2) Delivery Stage, (3) Training Stage, (4) Performance stage of results.

Problem solving as a learning approach. Meanwhile, according to Polya [9] there are two problems, namely: 1. The problem to find, can be theoretical or practical, abstract or concrete which has the main part of a problem as follows: a) What is he looking for? b) How is the data known?; c) What are the conditions?; These three main parts are the basis for solving this type of problem, 2. The problem of proof is showing that a question is right, wrong or both. So it is necessary to do further research related to learning mathematical problem solving skills, mathematical disposition and learning achievement.

2 Research Methods

This research is classified in the type of development research, namely the development of mathematical learning devices. The devices developed are syllabus, Learning Implementation Plan, student book (SB), Student Worksheet (SW), and Problem Solving Ability Test (PSAT).

The Four-D model was proposed by Siyasailam Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel. This model consists of 4 stages of development, namely Define, Design, Develop, and Disseminate or adapted into a 4D model, namely define, design, development, and deployment in *bustang*. Modifications are included 3 steps/stages, namely defining (define), design (design), development (develop), while the stage of dissemination (disseminate) is not done. The stages that are done are: This research is classified in the type of development research, namely development mathematical learning devices. One of the learning tools developed is the syllabus, Learning Implementation Plan, student book (BS), Student Worksheet, and Problem Solving Ability Test Problem Solving Ability Test (PSAT). Before carrying out an experiment, it is necessary to know the initial condition of the control class with the experimental class. The data needed to determine this condition uses pre-test scores. The data calculated the normality test, the homogeneity test and the average similarity test.

After the design of the learning device is made, the learning device is requested by an expert validator consisting of 5 validators. The practicality of learning devices can be determined from the student response indicators, namely student responses about the

implementation process learning using SAVI model learning devices. Learning tools are said to be practical if the average of respondents gives a minimal assessment of the “agree” [10] category. Learning is said to be effective if after experiencing the learning process with a device developed using the SAVI model if (1) students complete classical the experimental class gave the results that more than 75% students scored more than or equal to 78 with an average of more than or equal to 78; (2) Problem solving skills and independence during the learning process have an influence on the Problem Solving Ability Test (PSAT); (3) The results of the problem-solving ability test (PSAT) in the experimental class are better than the control class. So to measure the effectiveness of learning outcomes, statistical completeness tests, influence tests, and comparative tests were carried out on research variables.

3 Results and Discussions

The research was conducted from June 2021 to October 2021, starting from the preparation of proposals to the preparation of a full report. In its implementation took the research object of class XI Automotive at SMK Dynamics of Tegal City. After validating the instrument of the Mathematical Problem Solving Capability Test, the researcher conducted a test instrument test of problem-solving ability, then analyzed the problem solving ability test (PSAT) problem item through a test of validity, reliability, difficulty level and different power of the problem instrument. Based on the analysis of problem solving ability test (PSAT) instrument trial data. For validation results from validators on device development, syllabus, learning implementation plan, student books, student worksheet, and Math Problem Solving Ability Tests problem solving ability test (PSAT) are presented on the recapitulation table of validator values against device development such as Table 1.

Based on the results of device validation by experts show that the developed device is valid so that learning devices that have been developed can be used in learning with little revision. Student response to Learning in the trial class was carried out as many as 5 meetings with 1 meeting of 2 h of lessons. Before learning in experimental class with first in learning in the trial class and in the test class students and teacher observers were given a questionnaire to provide an assessment of the learning activities carried out and

Table 1. Learning device validations results

No	Recapitulation	Validator					Average	Criterion
		V1	V2	V3	V4	V5		
1	Syllabus	3.40	3.00	3.50	3.60	3.50	3.40	Highly Valid
2	Learning implementation plan	3.43	3.00	3.21	3.21	3.43	3.26	Highly Valid
3	Student book	3.20	3.00	3.53	3.53	3.26	3.30	Highly Valid
4	Student worksheet	3.20	3.00	3.00	3.05	3.21	3.09	Valid
5	Test of problem solving skills	3.47	3.00	3.00	3.07	3.53	3.21	Valid

the learning tools developed. Incoming responses are used to assess the practicality of the device to be developed.

Research results data are used to determine the effectiveness of using SAVI-based learning devices and models of Mathematical Disposition in the learning process. The level of effectiveness is measured through statistical tests: (1) tests of completion of mathematical problem-solving skills, (2) average differences tests (appeals), (3) influence tests, and (4) improvement tests. The great influence of character independence and problem-solving skills on mathematical problem-solving abilities is described in Table 2.

With a close eye on Table 2 obtained the value of R Square = 0.807 = 80.7%. This means that 80.7% of student’s math problem-solving abilities are influenced by the character of independence and math problem solving skills in solving problem solving ability test (PSAT) problems (together), while 19.3% are influenced by other factors. The magnitude of the influence of independence character on the ability to solve mathematical problems is 33%. While the significance value for problem solving skills sig = 0.00 = 0% < 5%, so accept H1, meaning problem solving skills affect mathematical problem solving skills.

The test results provide an understanding that can improve the ability to solve mathematical problems to find out the improvement in students’ mathematical problem solving abilities on the test class of devices and control classes based on the values at the beginning and end of learning can be done with the following hypothesis formulation. Because $t_{count} = 9.16 > 1,658 = t_{tabel} H_0$ was rejected in other words H1 was accepted, so the average difference in post-test scores and pre-test scores of students’ mathematical problem-solving abilities in class with the SAVI learning tools and models based on mathematical disposition are more than the difference between the average post-test scores and pre-test scores of students’ mathematical problem-solving abilities in class with conventional learning, then to find out the increase using the gain test. By using the gain test obtained an average score of 0.7 shows an increase in students in the experimental class is relatively high and in the control class using a gain test obtained an average score of 0.6 indicates the increase in students in the control class is relatively very low.

The development of mathematics learning tools developed as described previously, namely Syllabus, Lesson Plans, Worksheets, Student Books, and Problem Solving Skills Tests. During the trial, revisions were made according to input from experts related to the trial process so that the final prototype was obtained. The results of the development

Table 2. Influence of mathematical disposition and problem solving skills on math problem-solving abilities

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.895 ^a	.807	.790	2.63958	1.703

a. Predictors: (Constant): Mathematical Disposition and Independence

b. Dependent Variable: Problem Solving Ability

of the SAVI model learning device based on Mathematical Disposition, before being tested directly in the class that was given treatment first, was a limited class trial.

From the results of the analysis of the data obtained, it shows the ability of the teacher to manage the class well and the student's response to positive learning. This shows that the learning tools developed can be directly tested in the trial class. The good and positive results obtained from the observation of the teacher's ability and student response questionnaires indicate that the learning device can be said to have met the practicum criteria. Discussion of the effectiveness test before the effectiveness test was conducted, a prerequisite test was conducted to test whether the class that received the treatment and the class that did not receive the treatment was normal and homogeneous or not. Based on the calculation results from the data obtained from the previous problem-solving ability test (PSAT) scores. Learning, it can be concluded that the data comes from a population that is normally distributed and the variances of the two classes are homogeneous.

The influence test was carried out with the help of SPSS, namely the regression test. The results of the simple regression test of the character of independence on problem solving ability indicate that the character of independence affects the ability of problem solving. The next simple regression test also showed that problem solving ability had an effect on students' problem solving ability. The multiple regression test conducted shows that the character of independence and problem solving skills both affect students' problem solving abilities. This shows that the character of independence and problem solving skills have a good (positive) influence on students' problem solving abilities.

The process of developing learning tools in this study has gone through validation, revision, field trials on students, until finally the final design of a valid learning device is obtained. Furthermore, the trial of learning tools has also given results, namely: (1) the student's KPM variable achieves mastery classically and individually, (2) there is a positive influence on the independent character variable and problem solving skills together on student problem solving ability, (3) the average class that received treatment was better than the average class that did not receive treatment (4) there was an increase in students' ability to solve lazy students. Based on the ability of the four criteria, it means that the trial of the SAVI model of learning models based on Mathematical Disposition has resulted in an effective learning process.

4 Conclusion

Based on the discussion that has been described, the following conclusions are obtained: (1) Using a 3-D development model produced by mathematics learning tools with the SAVI model based on Automotive Mathematics Disposition, CLASS XI linear program material consisting of syllabus, learning implementation plans, BS, LKS, and problem solving ability test (PSAT). Because the learning tools developed have gone through a validation process and were declared valid by people who are experts in their fields, the learning tools developed in this study are valid. (2) The use of SAVI based learning tools on Mathematical Dispositions charged with character education is expressed practical, (3) Linear program material learning using SAVI model learning devices based on Mathematical Disposition is declared effective, namely: (a) The ability to solve mathematical problems achieves completeness both individually and classically, in other words,

students who are given the KKM 78 treatment complete individually. Then based on classical completeness calculations, it was concluded that students complete classically or the percentage of students who achieve KKM scores of more than 75%, (b) The ability to solve mathematical problems of students by learning the SAVI model based on Mathematical Disposition is higher than the ability to solve mathematical problems of students by conventional learning.

References

1. Kurniawan, R. Y., Prakoso, A. F., Hakim, L., Dewi, R. M., & Widayanti, I. (2017). Pemberian Pelatihan Analisis Butir Soal Bagi Guru di Kabupaten Jombang: Efektif? *Jurnal Pemberdayaan Masyarakat Madani (JPMM)*, 1(2), 179–193.
2. Fauzan, A., & Yerizon, Y. (2013). Pengaruh Pendekatan Disposisi Matematis dan Kemandirian Belajar Terhadap Kemampuan Matematis Siswa. *Prosiding SEMIRATA*, 1(1), 2013.
3. Utama, S. (2019). Pengembangan kurikulum matematika: Penilaian pembelajaran matematika berorientasi program for international student assessment di sekolah menengah pertama. *Seminar Nasional Pendidikan Sultan Agung*, 1(1).
4. Khodadady, E., & Zeynali, S. (2012). Field-dependence/independence cognitive style and performance on the IELTS listening comprehension. *International Journal of Linguistics*, 4(3), 622–635.
5. Lavrov, E., Logvinenko, V., Siryk, O., & Kyzenko, V. (2021). Method for assessing the information content of factors forming the cognitive independence of students. *Journal of Physics: Conference Series*, 1840(1), 012066.
6. Lysaker, P. H., Gumley, A., Luedtke, B., Buck, K. D., Ringer, J. M., Olesek, K., & Dimaggio, G. (2013). Social cognition and metacognition in schizophrenia: Evidence of their independence and linkage with outcomes. *Acta Psychiatrica Scandinavica*, 127(3), 239–247.
7. Murni, M. (2021). Manajemen Pendidikan Karakter. *Intelektualita*, 6(02).
8. Hyde, J. S. (2014). Gender similarities and differences. *Annual Review of Psychology*, 65, 373–398.
9. Phua, D. H., & Tan, N. C. (2013). Cognitive aspect of diagnostic errors. *Annals of the Academy of Medicine, Singapore*, 42(1), 33–41.
10. Ramadhani, R. (2016). Pengembangan Perangkat pembelajaran matematika yang berorientasi pada model Problem Based Learning. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 7(2), 116–122.

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