SAVI and DLPS learning models on mathematical problem solving

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ABSTRACT

Problem-solving ability is an skills related to mathematical characteristics which instructors need to encourage educators to be able to solve problems. This process certainly uses the right learning model to reach the target in accordance with the curriculum. This study aims to compare the influence of Somatic, Auditory, Visualization, and Intellectually (SAVI) and Double-loop Problem-solving (DLPS) methods in influencing mathematical problem solving skills. This study uses quantitative types with data analysis techniques using the T test. The results of this study are that there is an average value in the SAVI learning model of 77.7 while the average value of the DLPS learning model is 77.3. The conclusion can be drawn that the SAVI and DLPS learning models have the same effect on problem solving skills.

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INTRODUCTION

Problem-solving ability is an ability related to mathematical characteristics which instructors need to encourage educators to be able to solve problems. This process certainly uses the right learning model to reach the target in accordance with the curriculum (Amalia, Surya, & Syahputra, 2017; Jatisunda, 2017; Putra, 2017). In the previous research, problem solving skills have been tested using contextual learning based on culture, conventional learning, contextual learning, contextual learning based on Hangs on, expository learning, problem based learning, looking for relationships with Self-efficacy, looking for relationships with self-regulated learning, learning DLPS, as well as being tested with psychology education (Amalia et al., 2017; Björn, Aunola, & Nurmi, 2016; Jatisunda, 2017; Özcan, 2016; Pratama & Suherman, 2018; Putra, 2017; Samo, Darhim, & Kartasasmita, 2018; Surya, Putri, & Mukhtar, 2017).

Problem solving skills can be improved by a good learning models. This research will use two learning models of

SAVI and DLPS, from the two models we will see which ones influence the improvement of problem solving abilities. The Somatic, Auditory, Visualization, and Intellectual (SAVI) learning model basically utilizes the five senses that each student has and the intellectual ability of students to capture information. Previous researchers have tested this model for learning to write narrative essays, understanding mathematical concepts, science learning outcomes, students' mathematical connection abilities, learning Arabic, and improving student learning activities (Koderi, 2017; Nofziarni & Firman, 2019; Oricha, 2015; Puspitasari, Purnanto, & Hermahayu, 2018).

The double loop problem solving learning model (DLPS) basically emphasizes the search for causes and ways to solve problems. Previous researchers have conducted research on the understanding of concepts about the effects of environmental change (Sriyakul et al., 2019), improving cognitive learning outcomes, mathematical problem solving (Ramadhani, 2018), optimizing economic learning (Hartinah et al., 2019), and also the effect of learning outcomes on the lesson of fluid(Arum, 2017; Aryansyah, 2017; Fatmala, Dwijayanti, & Astuti, 2016; Pradipta, Mahfud, & Atmojo, 2014; Pratama & Suherman, 2018).The SAVI learning model and the DLPS learning model have been used to test some learning abilities and outcomes. Therefore, this study aims to examine the SAVI and DLPS learning models in influencing the improvement of problem solving abilities.

METHOD

The research method used a quasi-experimental study. In this study, two experimental classes will be applied to two different models. The first experimental class uses the Somatic, Auditory, visualization, and Intellectually (SAVI) learning model while the second experimental class uses the Double Loop Problem Solving (DLPS) learning model. Data collection technique is to provide a test after the application of two learning models.

SAVI learning stages   DLPS learning stages

Figure 1. Step by step learning model SAVI and DLPS
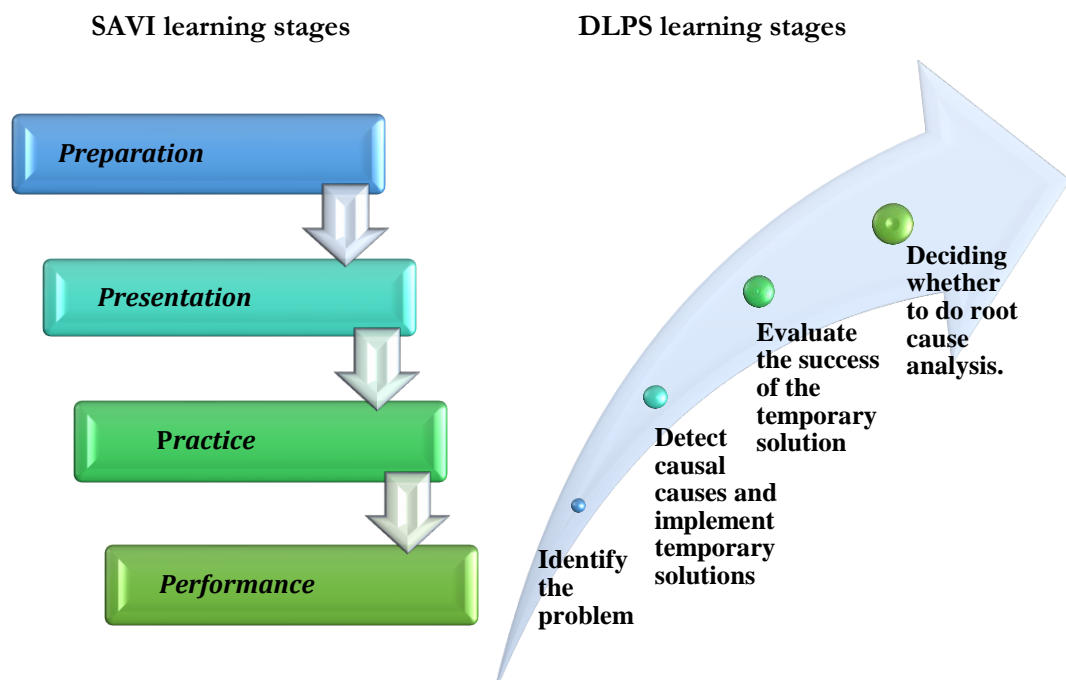
Problem solving skills through the SAVI learning model consist of4 stages of learning. The preparation phase is the stage where the teacher gives suggestions when exposure to the material to create students' curiosity. The second is presentation at this stage the teacher creates activities that trigger the five senses as a learning style facility. Third is practice, at this stage the instructor is required to help students apply, integrate material and new skills with something that triggers the students' five senses. The fourth is the display of results, at this stage students display the results of activities during learning in order to expand knowledge and skills (Isrok'tun & Rosmala, 2018).

Problem solving skills through the DLPS learning model consist of 4 stages of learning. The first is identifying problem. The second is detecting direct causes and rapidly applying temporary solutions (Abdurrahman et al., 2019), at this stage students are trained to practice finding solutions and applying them quickly. The third is evaluating the success of the temporary solution, at this stage an evaluation of the effectiveness of the temporary solution that has been applied (Ramadhani, Huda, & Umam, 2019). The fourth is to deciding if root cause analysis is need. DLPS emphasizes how information is collected, interpreted information, and used information well (Isrok'tun & Rosmala, 2018).The research design can be seen in Figure 2.

Y : problem solving skill
X_1 : SAVI learning model
X_2 : DLPS learning model
X_1Y : SAVI learning model on the problem solving skill
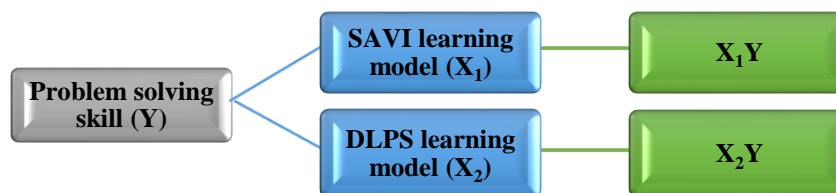X_2Y : DLPS learning model on the problem solving skill

Figure 2. Research design

RESULTS AND DISCUSSION

This study uses a T test with a quasi-experimental method. Before conducting the T test, the data is detected to find the average value, median, standard deviation, maximum value, minimum value, range, and variance. The average value used to see the comparison between SAVI and DLPS learning models. These calculations can be seen in Table 1.

Table 1. Data Description

Method	Mean	Median	Max	Min	Range	Std. deviation	Varian
SAVI	77.7000	80.000	90.00	61.60	28.40	7.85283	61.667
DLPS	77.3667	76.000	96.00	67.00	29.00	7.64958	58.516

Table 1 shows that SAVI and DLPS learning models have the same effect on problem solving skills. This can be seen from the average value of the two learning models equally large. At the maximum value, the minimum value, range, and standard deviation state that the value of DLPS is greater than SAVI, but the value of

Variant SAVI learning model is greater than DLPS. Therefore SAVI and DLPS learning models have the same effect on problem solving skills. After the prerequisite test, the next test is the T test. T test results can be seen in Table 2.

Table 2. T-Test Results for mathematical problem solving abilities

Mathematical problem-solving ability of the SAVI model and the DLPS model	Levene's Test for Equality of Variances			t-test for Equality of Means			
		Sig.		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
	174	678	167	.868	.33333	2.00152	-3.67315 – 4.33982
			167	.868	.33333	2.00152	-3.67321 – 4.33988

Table 2 shows that the $t_{count} = 0.167$. Where based on the right side of the test states the results of the $table = 2.002$ means that the $t_{count} \leq t_{table}$, where $0.167 \leq 2.002$ so that H_0 is accepted. It can be concluded that the SAVI and DLPS learning models affect the improvement of problem solving abilities. That is, these two learning models have the same characteristics that can improve problem-solving abilities.

Basically the SAVI learning model (Somatic, Auditory, visualization, and Intellectually) optimally stimulates the five senses of students to be able to capture information. Somatic is a learning process that triggers body movements to move and act to solve problems. Auditory ability triggers students to learn through listening. In the learning process, hearing is very important to capture information and then stored in the brain and then applied in real life. Visual triggers students to capture things or concepts from what students see directly in the learning process (Sagala, Umam, Thahir, Saregar, & Wardani, 2019). Intellectual is the ability to interpret, reflect, create, solve problems, and build the meaning of any information (Isrok'tun & Rosmala, 2018).
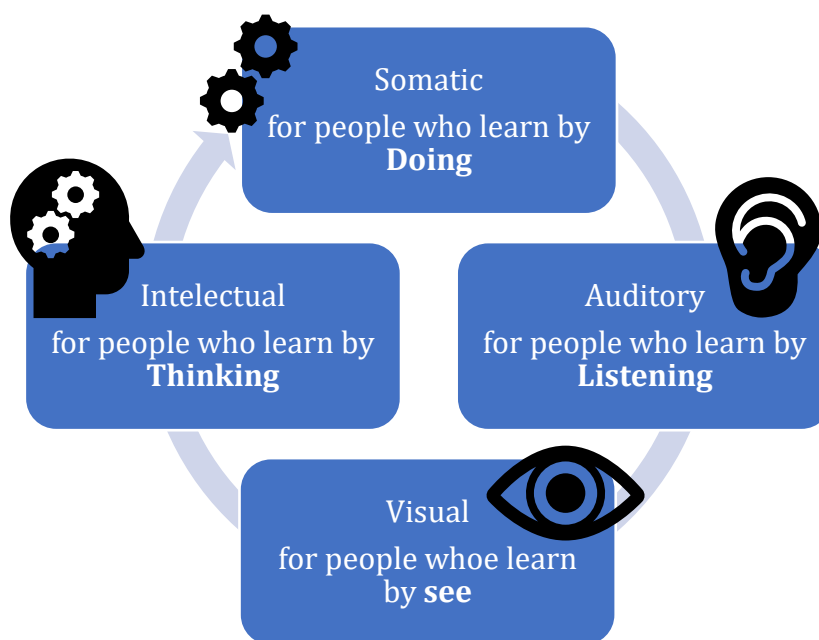

Figure 3. SAVI learning steps

Figure 3 interprets that this SAVI learning model is a learning model that combines physical and intellectual motion by utilizing the five senses in each learning (Nofziarni & Firman, 2019).
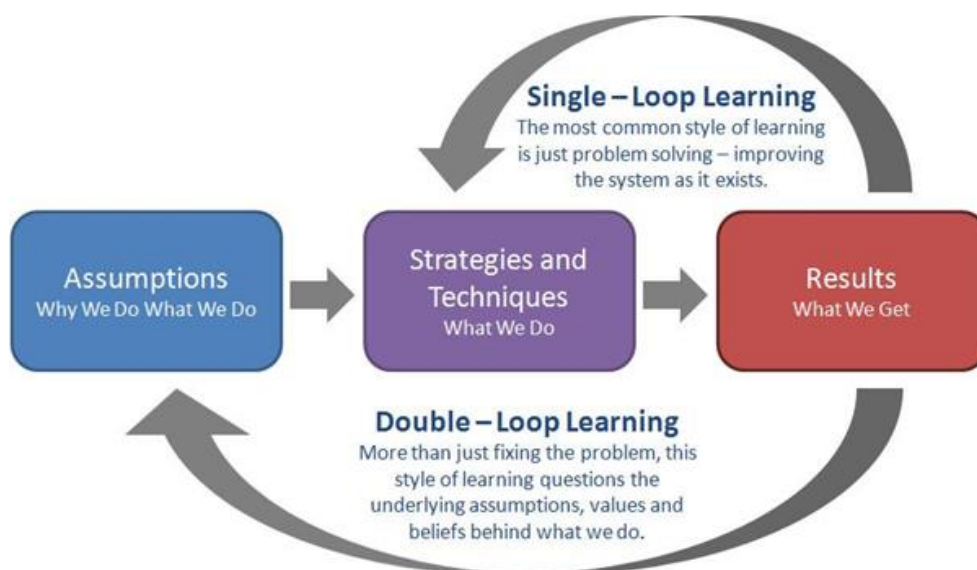

Figure 4. Step by step learning model DLPS

The DLPS (Double Loop Problem Solving) learning model emphasizes the search for causes and ways to solve problems. In this model, there are two characteristics (Andrade & Coutinho, 2016). The first solution loop means students are trained to be able to solve problems directly and get temporary solutions because each problem must be solved in a short time. Second, the second solution loop which means students are trained to find solutions from the root of the problem that trains students to take responsibility for the solution (Loch, Borland, & Sukhorukova, 2016). However, it can be concluded that the characteristics contained in DLPS emphasize the ability of problem solving (Isrok'tun & Rosmala, 2018).

Based on the explanation above, the SAVI and DLPS learning model both have an influence on the ability of problem solving. This is based on the SAVI and DLPS learning stages, where the SAVI learning phase emphasizes students to use all five senses to hear, speak, move, observe, describe and be trained to solve problems and presentations or explain (Borba et al., 2016), this is in accordance with previous research that the model SAVI learning influences the ability of problem solving (Balsa, 2019). In line with this study, there are previous studies examining the effect of SAVI learning models on narrative essay learning (America, Role, Chac, Giancarlo, & Orozco, 2019). Other studies also say that this SAVI learning model affects the ability of science learning outcomes with Hide and seek Puzzle media, understanding mathematical concepts, towards scientific-based biology learning outcomes, and towards learning Arabic (Novoa, Johann, Morillo, & Inciarte, 2019). The stages of learning from the DLPS model emphasize students to look for sources of problems and provide temporary solutions to solve existing problems (Mehta & Kulshrestha, 2014). This is consistent with previous research that DLPS affects the problem-solving ability (Huda, Syahrul, Firmansyah, Ramadhani, & Prasetiyo, 2019). Supported by other previous studies that this DLPS

learning model affects economic learning in high school, increases level 3 mathematical literacy skills, improves cognitive learning outcomes, and improves understanding of the effects of environmental change (Adams & Wieman, 2011).

CONCLUSIONS AND SUGGESTIONS

Based on the results of the elaboration above, it can be concluded that the SAVI and DLPS learning models have an equal effect on the ability to solve mathematical problems. The SAVI and DLPS learning model has an important role in problem solving. In this SAVI learning model emphasizes physical and intellectual motion that triggers students to be active and use all five senses.

The DLPS learning model presses students to analyze problems and create temporary solutions and evaluate, if enough there is no further solution, but if need be sought again solutions then students analyze from the root of the problem. Hopes for future research can be further researched for impact on other students' cognitive abilities.

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