

## PISA Oriented Mathematics Literacy Reviewed from *Self-Efficacy* of Learners Taught by CORE Learning Model Assisted by *Scaffolding Technique*

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### Abstract

This research aims to find the PISA oriented mathematics literacy pattern of learners reviewed from the Insan Mulia JHS learners' self-efficacy with CORE learning model assisted by scaffolding technique. This research applied concurrent embedded design. The population consisted of seventh graders of Insan Mulia JHS Pati. The data were collected quantitatively and qualitatively. The findings showed that high-self-efficacy learner category had PISA oriented mathematics literacy patterns: mastering most of the indicators excellently except on representation indicator. The moderate-self-efficacy learners had three PISA oriented mathematics literacy patterns: averagely mastering the indicators of using mathematics tools, reasoning and arguing, and devising strategy to solve problems. The low-self-efficacy learners had two PISA oriented mathematics literacy patterns: averagely mastering the indicators of communicating, representing, using mathematics tools, and reasoning and arguing; or reasoning and arguing, representing, using mathematics tools, and devising strategies to solve problems.

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## INTRODUCTION

Education is a process to facilitate human in developing their potentials and skills. Akbar (2017:43) explains that education is an arena to develop a nation's quality. Thus, by improving education quality, it becomes a real effort to improve the national generation. One of the disciplines that have to be obtained by learners is - science and technology. It covers various knowledge, such as mathematics.

Mathematics is a universal science and is important in various disciplines and human mindset development. Suherman et al. (2003: 25) explain that mathematics grows and develops as other science development providers. Thus, mathematics is the main priority. Learning mathematics at school should be started by introducing contextual problems. Thus, learners will be guided to understand the mathematics concept, solve problems, re-communicate into various media, and respect the usages in life as mandated by the Ministerial Regulation of National Education Ministry Number 22, the Year 2006 Content Standard of Mathematics lesson for JHS/Islamic JHS. This research objective is in line with the notion of mathematic literacy.

Sari (2015) defines mathematics literacy as an individual's skill to effectively formulate, use, and interpret mathematics in the various problem-solving context in daily life. Stacey (2012) argues that mathematics prepares an individual to have professional roles. It includes skills to reason mathematically and use concepts, procedures, and facts as tools to describe, explain and predict a phenomenon or event (OECD, 2017). Pakpahan (2016) explains that PISA has the purpose of measuring how a country's education could prepare the learners (citizens) to engage the real world, achieve higher knowledge, socialize globally, and meet the necessities.

The mathematics literacy of Indonesia is still low. According to Wardhani & Rumiyati in Astuti et al. (2018, 69-70), one of its influential factors is lack of learners' habits to solve problems with PISA characteristics. This low mathematics literacy level is caused by a lack of mathematics-contextual, reasoning, argumentative, and creative-solution questions provided by mathematics teachers. Besides

that, most Indonesia learners lack courage and self-efficacies to believe and solve the mathematics literacy analytical questions. Many studies showed that self-efficacy influenced academic motivation, learning, and achievement (Schunk & Pajares, 2001).

Bandura in Sunaryo (2017) states that self-efficacy is a personal skill evaluation to regulate and promote various activities to reach the expected objectives and measure personal skills in promoting various actives based on the levels, generality, and strength various situation. Isfyanai et al. (2018) emphasize that learners' self-efficacy is an evaluation of their skills in regulating and promoting various academic tasks given by the teachers. Learners with strong beliefs and self-efficacies upon their skills could solve the given tasks by the teachers. They could survive, although they are engaged with various difficulties or problems.

For mathematics literacy, self-efficacy is needed by every learner to develop their skills in regulating, promote the learning, and predict the efforts needed to achieve the learning objectives and to get maximum results. Experience of learning mathematics will be obtained by learners when they are involved in the learning process. Therefore, teachers have to be more professional and creative to carry out learning practices. Junaedi (2015) also admits that qualified teachers are the absolute requirements to have qualified educational system and practice.

A qualified teacher could formulate, form, and promote active learning for learners. One such learning model is the CORE learning model (Connect, Organize, Reflect, and Extend) (Calfée, Curwen, Miller, dan Smith, 2010). Safitri et al. (2014) explain that an encouraging learning model for developing learners' creativities is CORE (Connecting, Organizing, Reflecting, and Extending), learning model.

Calfée et al. (2010) argue that CORE is an applicable learning model for all learners. Dwijayanti & Kurniasih (2014) adds that CORE demands learners to work collectively in groups and socially interact by discussing the given problems. This learning emphasizes active thinking so learners could process all information they obtain (Kursianto et al., 2016). Learning that emphasizes group cooperation, process, and evaluation of all information or personal

works with teachers' role as facilitators is recognized as student-centred learning (Kartono, 2011). It is a feature of the CORE learning model.

An effective and meaningful learning model provides wider opportunities for learners to solve problems alone. They could do it by discussing with other learners, so they develop self-efficacies. They are also trained again to work on the problems autonomously to achieve learning proficiency.

For creating learning directed and attractive, this research applied the scaffolding technique. It is assistance for learners to learn and solve problems. CORE learning model with a scaffolding technique could guide learners and support teachers. It also could obtain information from the discussion and idea-sharing activities inside of cooperative learning setting.

From the problems, the research formulation is - how the PISA oriented mathematics literacy pattern of learners reviewed from the Insan Mulia JHS learners' self-efficacy with CORE learning model assisted by scaffolding technique are.

**METHODS**

This research is mixed-method research, combining qualitative and quantitative approaches with concurrent embedded strategy. Cresswell (2014: 321) explains that concurrent embedded applies quantitative and qualitative data collection at once. Sugiono (2016:537) explains this strategy is a research method by combining quantitative and qualitative research methods simultaneously with disproportional compositions.

The research subject consisted of seventh graders of Insan Mulia JHS Pati. This research was done in Insan Mulia JHS, Pati Municipality, in the seventh grade. It was done by applying the CORE learning model assisted by scaffolding technique on integers. It was conducted in the odd semester of 2019/2020 academic year.

Qualified learning consists of serial activities to improve the learners' competencies and evaluate the learning successes (Hightower et al., 2011). On the other hand, Uno (2008) argues that learning quality is the success of learning activity done and the outcome. Danielson (2011) provides three domains to improve learning quality. They are (1) planning and

preparation, (2) classroom environment, and (3) professional responsibility.

Learner-oriented mathematics literacy was analyzed descriptively based on the test result and interview. The data validity was obtained by triangulation. The qualitative data analysis consisted of data reduction, display, and conclusion.

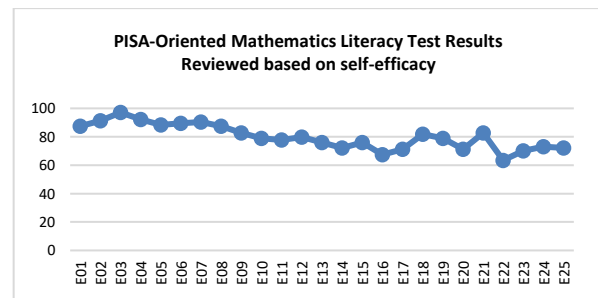
**RESULTS AND DISCUSSIONS**

Based on the self-efficacy questionnaire result analysis, validated by the experts, the learners' data are grouped in this Table.

**Table 1.** the Self-Efficacy Categories of the Seventh Graders of C-Class

Self Efficacy Categories	Numbers of Learners	Percentage
High	5	20,0%
Moderate	16	64,0%
Low	4	16,0%
<b>Total</b>	<b>25</b>	<b>100%</b>

The PISA oriented mathematics literacy test results of the subjects were reviewed based on the self-efficacy, as shown in Figure 1.



**Figure 1.** the PISA Oriented Mathematics Literacy Test Results Reviewed based on Self-Literacy

The analysis results of the PISA Oriented Mathematics Literacy Tests of the learners and the interview showed that learners had different literacy, depending on the learners' self-efficacy categories. There were several different patterns for each self-efficacy category of the learners. Each pattern had specific features of PISA oriented mathematics literacy masteries.

The high-self-efficacy typed learners, based on PISA oriented mathematics literacy, had two different patterns. The first pattern of the subjects was able to master all PISA oriented mathematics literacy indicators excellently. From the works and the interview results, they were seen excellent and confident. The second pattern showed three subjects could master all indicators. However, they were lack reasoning and argument indicators. The lack of this second pattern was seen on the subject works. They had not written the conclusion and the arguments, but they could provide the conclusions during the interview.

The PISA oriented mathematics literacy with moderate-self-efficacy category showed three different patterns. This subject's first pattern showed they mastered all indicators excellently but lacked on mathematics tool usages, such as rulers and scale. They were done it incorrectly, lack on using mathematics tool indicator. On the second pattern, the subject could master the indicators excellently but lack drawing conclusions and providing the argument (reasoning and arguing). Some subjects had not been able to write the conclusion on the worksheet, but they could provide it without entailed by arguments during the interview. The third pattern showed the subject could meet the indicators but lack the individual strategy, such as devising strategies for solving problems; and providing a conclusion and arguments.

The PISA oriented mathematics literacy on low-self-efficacy learner category had two different patterns. The subjects on the first pattern could master several indicators but lack of four indicators (poor). The subjects on this pattern performed their recognized and questioned matters on a problem orally while being interviewed. However, they were lack on communication indicator. The first pattern dealt with lack of mathematics tool usages. They were such as untidiness, problems on applying scales (using mathematics tools). They also had problems to represent figures of problems (representation). The written conclusions had not been seen in this pattern. However, the learners could deliver them well orally while being interviewed (reasoning and arguing).

The subjects on the second pattern of this category could master several PISA oriented mathematics literacy indicators. Unfortunately, four

indicators were not excellent. From all indicators, three indicators were categorized poorly. The first pattern dealt with using mathematics tools, creating representative figures, and concluding by providing the arguments (using mathematics tools, representation, and reasoning). One poor indicator in this second pattern was poorly using solution strategy (devising strategies for solving).

## CONCLUSION

Based on the analysis and the discussion, the conclusions are: The high-self-efficacy subject category had two PISA Oriented mathematics literacy patterns. The subjects could master all indicators excellently. Meanwhile, the subjects on the second pattern could master all indicators. However, some learners tended to have poor masteries on representing indicator. The moderate-*self-efficacy* learners' category had three PISA oriented mathematics literacy pattern. The subjects on the first pattern could master all indicators but lack on *using mathematics tool* indicator. The second pattern showed the learners could master all indicators but lack *reasoning and arguing* indicator. On the other hand, the third pattern subjects could master six indicators but lack of devising strategies for solving problems. They also could not meet the *reasoning and arguing* indicator. The low-self-efficacy learner category had two patterns. The first pattern subjects mastered six indicators but lack of *communication, representation, using mathematics tool, and reasoning and arguing*. On the other hand, on the second pattern, the learners averagely mastered all indicators but lack on *reasoning and arguing, representation, using mathematic tools, and devising strategies for solving problems*. Mentoring and guiding the learners with low-self-efficacy category were needed because they were less confident, confused, and lazy to work on the questions. However, during the interview, they performed better.

## SUGGESTIONS

Based on the conclusion, the researcher suggests: (1) The learners' self-efficacy difference influenced the learners' self-efficacy to solve mathematics problems, especially in dealing with

PISA oriented literacy. Thus, they needed to have different treatment. It was specifically for low and moderate self-efficacy learners categories. (2) low-self-efficacy learner category gave up easily and lazy to engage with difficult problems and due to many explanations. Therefore, teachers have to provide better mentoring for learners with low self-efficacy through mentoring and counselling both individually among teachers or with the learners. The moderate-self-efficacy learner category could understand problems, but they doubted to answer them. Thus, teachers have to motivate them more. (3) The representation aspect was found the lowest one so that further research should deal with it. (4) For any learning or further research, the implementation of the CORE learning model assisted by scaffolding continuously and sustainable should be done to improve PISA oriented mathematics literacy.

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