The quality of mathematical self-regulated learning of students and teachers in Indonesia

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Abstract. This paper describes how mathematical Self-Regulated Learning (SRL) owned by students and teachers in elementary education, which has been taken from a series of surveys of 379 students and 255 teachers in ten cities/regencies in Indonesia. Based on the results obtained, in some indicators, it still indicates a level of mathematical SRL that is of concern. However, both students and teachers in general have already had sufficient mathematical SRL, even though it does not show high levels. Several teachers and students still experience high level of anxiety when facing assignments or challenges, but they still feel motivated to complete the challenges by themselves.

1. Introduction

One of the issues that has never ceased to be studied in the world of education, is related to the results of research on the mathematical self-regulated learning (SRL), but often ignores the study of the teachers' mathematical SRL [1]. It is true that if students do not have sufficient SRL, both in terms of self-control, maintaining motivation, and managing their learning behavior, it will have an impact on the greater learning barriers that they feel. However, on a different perspective, if the teachers do not have enough SRL, the impact can be worse. The teachers in carrying out their role as developers of students’ SRL, cannot possibly teach well if they decide to stop learning new things better. That is why, the teachers must always build and equip themselves by always learning dynamically, always up to date, and endlessly looking for and creating innovative things.

SRL that must be possessed by students and teachers is one aspect of personality that is very important for individuals [2]. Someone in living this life is never free from trials and challenges. Individuals who have high SRL are relatively able to deal with all problems because independent individuals are not dependent on others, always try to deal with and solve existing problems. In connection with the SRL that the teachers must possess, it can be said that there has not been much research that reveals about it [1]. Besides, related to students’ SRL, research results rarely involve many students, due to students involved usually still in very limited numbers [3]. Therefore, this problem encourages an effort to reveal how much SRL is possessed by students and teachers through a study of students and teachers at the elementary level, which comes from ten cities/regencies in Indonesia.
2. Method
This study uses Cross-Sectional Survey Design, because this research study is a part of an observational research design [4,5]. The research subjects consisted of 379 students and 255 teachers from ten regions in Indonesia, represented by seven cities in Java Island, and three cities in Sumatera Island. Of the total number of students involved, 148 were male and 231 female, while from all teachers there were 54 male and 201 female.

Figure 1 is a description of the flow of Cross-Sectional Survey Design carried out in this study [5].

![Figure 1. Example of a cross-sectional study.](image)

Based on Cross-Sectional Survey Design on Figure 1, two sets of instruments to measure teachers’ and students’ self-regulated learning were created. The instruments which were used in this study consisted of two sets of mathematical SRL scale sheets, which consisted of a choice of activity frequencies (very often (VO), often (O), rarely (R), and very rarely (VR)). A set of scale sheets which was used for students, was used to measure aspects: (1) self-control (with indicators of planning goals, managing, monitoring, and evaluating learning processes and outcomes), (2) motivation (with indicators of showing interest, effort, perseverance, high self-efficacy, while studying or doing lesson assignments), and (3) management of learning behavior (with indicators of utilizing the environment and managing time to optimize learning). The scale of students SRL contains 38 items of statements Meanwhile, another set of scale sheets was used to capture teachers’ mathematical SRL data, which measures aspects: (1) intrinsic initiative and motivation to learn, (2) the ability to analyze tasks and learning needs, (3) the ability to choose and apply learning strategies, (4) the ability to monitor, to regulate, and to control the learning process, (5) the view of difficulties as challenges, (6) the ability to find and utilize learning resources, and (7) the ability to evaluate the process and results of learning.

The steps which were taken in carrying out this research briefly were as follows. The first was compiling and validate the instrument in the form of a self-assessment scale. The second was distributing the self-assessment scale which is a modification of previous studies to respondents in ten cities [6,7]. Third, collecting data based on survey results and coding. In the positive statements of VO, O, R, and VR were given a score of 4, 3, 2, and 1 respectively, while the negative statements were the opposite. Then fourth, data analysis, carried out by doing quantitative description to describe how much students’ mathematical SRL have (positive or negative).

After students’ mathematical self-regulated learning data in ten regions of Indonesia were collected and analysed, then interpretation is performed by using the guide as shown on table 1.

| Table 1. Interpretation of students’ mathematical SRL data. |
|-------------------------------------------------------------|
| Mean of self-assessment score | Interpretation |
|-------------------------------|----------------|
| 1.0 ≤ $x$ < 1.6 | SRL is very negative |
| 1.6 ≤ $x$ < 2.4 | SRL is negative negatif |
| 2.4 ≤ $x$ < 3.2 | SRL is positive |
| 3.2 ≤ $x$ < 4.0 | SRL is very positive |

In addition, quantitative descriptions were also carried out to describe the proportion of each manifest of SRL possessed by elementary school teachers, on the basis of interpretation derived from the opinion of Kuntjaraningrat [8], as shown in table 2.
Table 2. Interpretation of teachers’ mathematical SRL data.

| Percentage   | Interpretation                     |
|--------------|------------------------------------|
| 0%           | No teacher                         |
| 1% - 25%     | A small number of teachers         |
| 26% - 49%    | Nearly half the number of teachers |
| 50%          | Half of the number of teachers     |
| 51% - 75%    | Most teachers                      |
| 76% - 99%    | Almost all teachers                |
| 100%         | All teachers                       |

3. Results and discussion

3.1. Students mathematical SRL

Students’ mathematical SRL which is measured consists of aspects of self-control, self-control, motivation, and management of learning behavior. Self-control indicators include: planning goals, managing, monitoring, and evaluating learning processes and outcomes. Then in the aspect of motivation, the indicator that is used as the measurement standard is an effort that shows interest, persistence in effort, perseverance, and high self-efficacy. These indicators are carried out both during learning and in the activities of working on lesson assignments. In the aspect of managing learning behaviour, indicators that is designed in measurement consists of environmental use and time management to optimize learning activities.

The students’ SRL data which are collected after the study then grouped into five groups based on the region or location of student school. Data from the five regions can be seen in the table 3, with interpretation is performed as mentioned in table 1.

Table 3. Students’ mathematical SRL.

| Aspect          | School area | Total | Mean | Category |
|-----------------|-------------|-------|------|----------|
|                 | I           | II    | III  | IV      | V        |       |
| Self-control    | 2,798       | 2,222 | 1,678| 1,386   | 2,386    | 10,470| 2.8  | Positive |
| Motivation      | 4,030       | 3,048 | 2,376| 2,039   | 3,250    | 14,743| 2.6  | Positive |
| Learning behaviour | 3,602       | 2,862 | 2,205| 1,835   | 3,082    | 13,586| 2.8  | Positive |

Table 3 illustrates that in general the students' mathematical SRL is at a fairly good level, even though it is still in a category that is not high. The self-assessment scale related to aspects of self-control shows an average score of 2.8. Followed by an average score on the motivational aspects of 2.6, and the average score on the management aspects of learning behaviour reached 2.8. This indicates that the majority of students who are the respondents to this survey show fairly good self-control, motivation keeping, and learning behaviour management.

This finding is certainly very important to know, because it can be used as the initial foundation if future research will be carried out, or to be understood by teachers, that so far students actually already have quite good learning independence. So that, in the future, it should be sought on how to make a learning develop the attitude of SRL greater good, especially in the field of mathematics.

By having quite good SRL, it means that the students have enough provision in anticipating learning barriers that are more ontogenical (ontogenical learning obstacles). As a further impact, it will be easier for teachers to optimize learning, because the efforts to reduce learning barriers can be more focused on the didactic domain (didactical learning obstacles) [8,9].

Based on the principles of SRL stated by Antonius [2,11] and Drost [10], the self-control aspects of students who are in the positive or fairly good category indicate that: (1) students have been able to set learning targets that must be mastered, both in the form of topics and questions that must be solved, (2)
students always try to find ways or strategies to learn, so that the topics being studied is easy to understand, (3) students are getting used to marking the important parts to learn, (4) students have begun to get used to comparing their own work with the work of their friends, (5) students begin to get used to finding other ways to solve the problems when the method used failed to produce a solution, and (6) students have begun trying to analyse the whereabouts of the errors in the tests or the tasks they face. Likewise with the motivational aspects and management of learning behaviours which are included in the fairly good category, according to Robert Havighurst [11] and Basri [10], it shows that students have begun doing the habit of trying to relearn concepts that have not been well understood outside of class hours, more confident to submit questions or ideas in class discussions, more courageous to give advice to friends, and are open to receiving criticism from others.

3.2. Teachers’ mathematical SRL

The results of the recapitulation of attitude scale data which were then highlighted to find out how much the positive, neutral, and negative attitude tendencies, will be shown in Table 4 followed by the following discussion.

| No. | Aspect                                           | Positive | Neutral | Negative |
|-----|-------------------------------------------------|----------|---------|----------|
| 1   | Intrinsic initiative and learning motivation.    | 65.10%   | 3.53%   | 31.37%   |
| 2   | The ability to analyze tasks and learning needs. | 60.39%   | 16.86%  | 22.75%   |
| 3   | The ability to choose and apply learning strategies. | 60.00%   | 0.78%   | 39.22%   |
| 4   | The ability to monitor, regulate, and control the learning process. | 61.96%   | 0%      | 38.04%   |
| 5   | Views of difficulties as challenges.             | 50.20%   | 2.35%   | 47.45%   |
| 6   | The ability to find and utilize learning resources. | 65.49%   | 0%      | 34.51%   |
| 7   | The ability to evaluate the process and results of learning. | 58.62%   | 0%      | 41.38%   |

The following explanation is based on teachers’ self-regulated learning on Table 4 with interpretation category from table 2. From the analysis results of the teachers who have been respondents, the information is obtained that most teachers (65.10%) did assignments related to their teaching performance because they liked it, with initiative and motivation from within themselves. In addition, they have also become accustomed to knowing their weaknesses when learning. As many as 31.37% of teachers sometimes arrange makeshift assignments if the source is limited and do not try to find other sources.

Most teachers (60.39%) have tried to find the causes of their own failures in exams or tests. This shows that the teachers have analyzed needs or lacking in terms of understanding the materials as an improvement materials in the next exams/test. Only a small proportion of teachers (22.75%) still do makeshift learning activities without any target of learning success. Whereas, by looking at the target of learning as a direction in learning, the teachers’ learning efforts to achieve these targets will be more optimal [1,12].

Most teachers (60.00%) have often even very often tried to identify learning difficulties that they have experienced. This shows a positive attitude because by doing efforts to identify learning difficulties, the teachers will choose a learning strategies that are able to solve their problems/learning difficulties. Nearly half of the teachers (39.22%) sometimes feel frustrated when knowing the results achieved are far from the targets that must be achieved. This negative attitude indicates that the teachers have not been competent in choosing learning strategies and trying to learn optimally; so that, the results which are achieved are in accordance with the targets that must be achieved.

Most teachers (61.96%) have often even very often asked themselves about the learning efforts that they have undertaken and check the progress of learning periodically. This shows a positive attitude
because by frequent identification of learning efforts that have been carried out, they will always try to control, to monitor, and to regulate learning efforts.

Nearly half of the teachers (47.45%) have felt anxious about facing complex tasks. This anxiety shows that the teachers do not like challenges. Looking deeper, of course this is a bad 'news' for the world of education. Because teachers who do not like or tend to avoid challenges, show that they only want the 'easy' things [8]. However, most teachers (50.20%) often consider difficult tasks as opportunities to progress. This shows that teachers have seen difficulties as a challenge towards a better direction.

The results of the study indicate that teachers have been trying harder to find relevant sources, even though, it will take a lot of time. Most teachers (65.49%) often even very often compare various sources to complete assignments. Some do it by studying various sources about certain mathematical problems/contents, or by searching for sources together with their peers. From most of the teachers, they stated that working together in groups felt more comfortable and more courageous to express ideas. Thus, it can be said that the teachers have good self-efficacy. With group work there will be mutual assistance, sharing, and working together and discussing so that activities in the group increase high self-confidence [13].

Most teachers (58.62%) have often felt proud of their own work, and are brave to compete to win a competency. This pride and courage arise because they feel ready with the strong concept schemes formed in the mind [1,13], and of course the schemes formed in the mind are the result of optimal learning. However, from some respondents, there are 41.38% who have still showed negative attitudes, namely feeling anxious about competing with other teachers who are clever, and are not brave to face criticism from fellow teachers.

4. Conclusion
Observing to the results of the survey that have been conducted during this research, it can be summarized as follows. First, the students have good mathematical SRL, in terms of aspects of self-control and management of learning behaviour. This can be the basis for the teachers to develop learning process that can further enhance the students' SRL. Second, in terms of the SRL of the teachers, the intrinsic initiative and motivation of the teachers has been good enough, but, extrinsic motivation is still needed from the other side; so that, the teachers’ initiative and motivation can be better maintained. The ability of teachers to analyse assignments and learning needs is still in the low category. The development of the teachers’ ability to choose and to implement learning strategies, to monitor, to regulate, and to control the learning process, belongs to the positive category although it is not high enough. In addition, teachers already have a positive outlook on the challenges they face, which has an impact on improving their ability to find and to utilize learning resources.

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