

# Systematic Literature Review: Students' Self-Regulated Learning at Different Levels of Education in Indonesia

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**Abstract.** Self-regulated learning (SRL) is an important skill for students. Students who have SRL can regulate and control themselves in the learning process, especially when dealing with school assignments. The purpose of this study was to review the literature on students' SRL at different levels of education in Indonesia. This study is qualitative and uses the systematic literature review method. The data collection technique used in this study was a literature study and documentation sourced from articles using the keywords "self-regulated learning", "mathematics", and "students". Articles were screened using Publish or Perish software with Google Scholar, Crossref, and Semantic Scholar databases. A total of 2993 works of literature were screened and analyzed using Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) so that 9 articles were obtained representing each level of education. The study results showed differences in students' SRL levels at each level of education. Elementary school students have relatively low SRL. High school students have SRL levels varying between moderate and low.

**Keywords:** educational level, self-regulated learning, students.

## INTRODUCTION

Technological advances pose a major challenge for everyone, including school students, to face and adapt. Teachers play an important role in preparing students to be adaptive and able to face technological growth. Educators in the 21<sup>st</sup> century are not only teachers but also creators of democratic learning conditions and provide integrated challenges in learning current technological developments [1]. In this 21<sup>st</sup> century, qualified human resources are needed to help students develop their potential.

Mathematics is a fundamental discipline that plays a crucial role in advancing science and technology. It is taught to all students, from elementary school through high school and into college [2]. Mathematics learning plays an important role in preparing individuals in society to anticipate changes in circumstances in everyday life. One important thing to develop in students is the ability to manage themselves, especially in the learning process. Self-regulation in the learning process is related to students' ability to solve problems through deep thinking, making decisions, taking initiative in addressing challenges, having responsibility for their tasks, and being accountable for their actions.

One of the several aspects that influence the cognitive process in learning is the individual's condition, which includes aspects such as interests, talents, motivation, enthusiasm, and learning styles, as well as learning independence, or what is known as self-regulated learning (SRL) [3]. SRL is a process where someone takes the initiative to learn, either independently or with assistance, by assessing their learning needs, setting learning goals, identifying available learning, selecting and applying learning strategies, and evaluating their own progress [4]. For students, SRL represents the ability to manage their learning process, particularly when completing school assignments. Students with good SRL can effectively manage their learning experiences in various ways, leading to optimal outcomes.

The ability to regulate oneself in learning mathematics plays a role in improving the quality and quantity of one's learning [5]. In learning activities, SRL needs to be possessed by students to mobilize their potential to learn

learning objects without any pressure or foreign influences outside themselves [6]. Students with high SRL tend to learn better, as they are capable of effectively monitoring, evaluating, and organizing their learning, so they can save time in completing their tasks, and managing both their learning and time efficiently [7]. Students with good SRL will organize themselves in learning, help them manage the material they are studying, apply plans, and find solutions to solving mathematical problems [8]. Thus, SRL will have a significant influence on students' academic achievement. Based on the description above, it is necessary to trace the research results showing students' SRL at various levels of education and its impact on students' academic achievement.

## RESEARCH METHOD

The type of research used in this study is qualitative research with the Systematic Literature Review method. Systematic Literature Review refers to a research methodology carried out to collect and evaluate research related to a particular topic to produce conclusions and recommendations related to the problem being studied [9]. The data analysis technique in this study uses meta-synthesis, which integrates data to obtain new theories or concepts or a deeper and more comprehensive level of understanding [10]. The subject of the study is an article about self-regulated learning (SRL) among students at various levels of education in Indonesia. The research procedure includes several steps, namely identifying research questions, developing research protocols, determining the location of the search area results database, determining selection criteria, selecting relevant research results, data extraction, coding, and presenting results. The identification of research questions is made based on the needs of the selected topic. In this study, identification used the questions "Does the article discuss SRL in mathematics learning in Indonesia?" (RQ1) and "Are there other factors associated with SRL in mathematics learning in Indonesia?" (RQ2). Research protocol development using the keywords "self-regulated learning", "mathematics", and "students". The location of the research database was selected using the Publish or Perish software, with the databases used being Google Scholar, Crossref, and Semantic Scholar. The articles that were collected were selected using inclusion and exclusion selection criteria. The inclusion criteria were publication years 2019-2023, and the research subjects were students at elementary school/equivalent, junior high school/equivalent, or high school/equivalent. The exclusion criteria were articles that used the literature review research method and used college students as research subjects. Furthermore, the data was analyzed using the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) [11]. The results of PRISMA are shown in Figure 1.

Based on the search results using Publish or Perish 8 software with the specified keywords, 2993 kinds of literature were found, consisting of 993 from Google Scholar, 1000 from Crossref, and 1000 from Semantic Scholar. After screening using inclusion and exclusion criteria, 9 articles remained which were then coded and studied intensively.

## FINDINGS AND DISCUSSION

The findings from the articles examined in this study suggest that students' self-regulated learning (SRL) is impacted by various factors, such as the learning strategies or models and the instructional media employed by teachers in the classroom. Students' SRL has different influences on the process and results of students' mathematics learning at each level of education. The following describes the influence of SRL on mathematics learning at different levels of education.

### a. SRL of Elementary School Students

At the elementary school level, SRL has not received enough attention. The study results show that elementary school students' SRL remains relatively low. Elementary school students are still unable to control themselves, including learning. Students cannot independently find, recognize, and formulate questions. In addition to self-factors, the environment influences elementary school students' SRL abilities. They have not been given enough freedom to regulate themselves to learn. The process of self-management is still shaped by the supervision and control of teachers and parents who monitor students' learning development.

Pransisca and Gazali's [12] research on elementary school students' problem-solving and SRL abilities shows that learning strategies that integrate knowledge, skills, and creative thinking are needed and emphasize students' experiences and active involvement in solving mathematical problems. Pransisca and Gazali's [12] found that parenting learning strategies can improve elementary school students' abilities in independent learning and managing their learning process effectively.

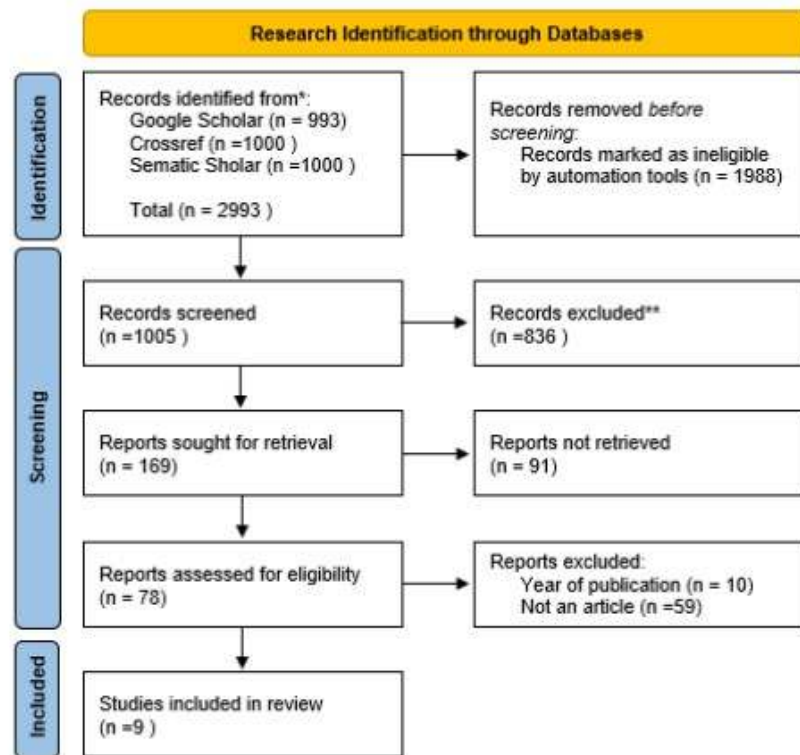


FIGURE 1. PRISMA 2020 Flowchart

#### b. SRL of Junior High School Students

Unlike elementary school students, junior high school students have begun to be able to regulate themselves so that they can develop SRL. Students begin to enter puberty and learn new things that can affect their development process, including in lessons. SRL is the ability of students to organize, manage, and control their own learning process, including understanding problems, planning solution strategies, implementing the plan, and evaluating the results. SRL plays an important role in mathematics learning. Students with high SRL tend to learn better, monitor, evaluate, and organize their learning carefully, save time completing assignments, and manage time in learning [13]. SRL is related to learning independence. Learning independence affects students' problem-solving abilities [14].

SRL is influenced not only by internal factors within students but also by external factors such as learning strategies, models, or media that offer a more independent and personalized learning experience. Kamelia and Pujiastuti [6] stated that mathematics learning needs to be supported by appropriate methods and strategies according to students' intellectual development. Learning strategies or models that can influence the SRL of junior high school students include metacognitive-scaffolding learning strategies [6], the 7E Learning Cycle Model [5], the Inside Outside Circle (IOC) learning model with the Metaphorical Thinking Approach [15], the Missouri Mathematics Project (MMP) learning model [16], the Problem-Based Learning model [17].

Musliha and Revita [17] found differences in the ability to solve mathematical problems among students with different SRL levels. Students with high SRL levels tend to have better abilities in learning mathematics because they are able to manage their thoughts, behaviors, and emotions more effectively to direct or control their learning experiences. Students with moderate and low SRL levels can understand problems, develop solution plans, and implement plans, but have not yet reached the ability to direct and control their learning experiences. SRL makes students more independent in the learning process and able to overcome obstacles that may arise when solving mathematical problems. Students tend to have high learning initiatives and the ability to solve complex problems. Thus, educators are expected to continue to work with parents to develop students' SRL and get them used to solving problems based on problem-solving [18].

#### c. SRL of Senior High School Students

Senior high school students have entered adolescence. At that age, normal students have a mature mindset and self-regulation skills that can affect their learning success. Azizah et al. [19] found a significant impact of SRL on the mathematics learning abilities of students at Islamic senior high schools. In addition to the maturity factor of senior high school students, the use of learning models also affects students' SRL. One of the learning models

that can improve students' SRL is the 7E Learning Cycle Model [20]. Applying the 7E Learning Cycle Model can foster meaningful student learning independence related to their SRL.

The use of learning media also plays a role in students' SRL. Learning media assistance can provide students with an independent and more personal learning experience. Narawidia et al. [21] found that applying the multimedia-assisted SRL learning model significantly affected senior high school students' learning motivation and mathematical problem-solving abilities. Yusuf et al. [22] developed learning media using an articulated storyline to help train senior high school students' mathematical problem-solving and SRL abilities.

The literature review revealed variations in students' SRL abilities across different education levels. This SRL was also found to be closely related to students' mathematical problem-solving abilities. Therefore, SRL needs to be practiced and made a habit. Teachers can use learning models or learning media that encourage students' learning independence so that they have SRL.

## CONCLUSION

Students' self-regulated learning (SRL) varies at each level of education. Students' SRL at elementary school is still relatively low, because teachers and parents still influence their self-management process. Junior high school students' SRL varies at high and moderate, and some are still low. This difference has an impact on their problem-solving ability. Senior high school students, having reached a level of maturity, possess self-regulation skills that enhance their SRL performance. The application of certain learning models and media can provide students with independent and more personal learning experiences, so that they can improve their SRL. Thus, teachers play an important role in choosing learning models and media.

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