



# SELF-REGULATED LEARNING DESIGN AS AN APPLICATION OF STUDENT'S SELF-ASSESSMENT IN MATHEMATICS LEARNING

Nabila Nurhaliza Ali<sup>1\*</sup>

<sup>1</sup>STAI Putra Galuh Ciamis

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## ABSTRACT

Self-regulated learning is one of the important factors in learning to control oneself in thinking and acting. The purpose of this research is to analyze how much students have achieved their independence in learning. Student learning independence includes all matters of student learning independently without the help of others, student learning motivation or things that affect student independence in learning, especially in learning mathematics. This analysis study will be continued as an effort to improve self-regulated learning. The scope of self-regulated learning was analyzed by descriptive quantitative method through data collection techniques in the form of questionnaires on the object of research taken from a population of 25 students. Data collection was carried out with a questionnaire consisting of 20 statements from indicators of students' self-regulated learning ability. In learning mathematics, students who have initiative and intrinsic learning motivation, apply learning targets, and set a learning schedule in the percentage of almost half of the students do according to these indicators of independence. Almost all students diagnose learning needs, view difficulties as challenges, utilize and seek relevant sources. However, a small proportion of students lack self-efficacy or confidence in their abilities and are still low in evaluating the learning process and results. So that as an educator this needs to be considered to be able to improve students' self-regulated learning abilities (learning independence) in order to improve student achievement.

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## Corresponding Author:

Nabila Nurhaliza Ali

STAI Putra Galuh Ciamis

Email: [nabilanurhaliza97@gmail.com](mailto:nabilanurhaliza97@gmail.com)

Phone Number: 082216329353

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## 1. INTRODUCTION

Mathematics is an important science because it can be used to facilitate everyday life (Maass, K., Geiger, V., Ariza, M. R., & Goos, 2019; Zanthy, 2016). In teaching mathematics,

it is expected that each individual is able to process the ability to think logically, systematically, analytically and critically. Referring to the objectives of national education, students are expected to have an attitude of respect for life, have curiosity, attention and interest in learning mathematics, as well as a tenacious and confident attitude in problem solving. Therefore, mathematics will always be found in the school environment as well as in everyday life (Dewi, N., 2020; Yeh & Otis, 2019). According to (Sari, N. K., & Hasibuan, 2019) mathematics is a science that is always related to everyday life, this is because every activity, way of thinking and human activity will always develop mathematics itself. Some definitions about mathematics, it can be concluded that mathematics is an absolute science or an exact science that will always be related to life, ways of thinking and human activities and will always develop along with these activities.

Education refers to a system that is planned with the aim of creating a learning environment and learning or training experiences that can help students to actively develop their abilities, both spiritually, emotionally, skills, personality, intelligence, good morals, and also the skills needed for themselves and society. According to Poerwadarminta, education also includes efforts to maintain and train people, as well as change their attitudes and behavior so that they become more mature and developed through teaching and training.

The success of an education cannot be assessed only from the side of the teacher, but it needs to be reviewed from the students. As educators must have the knowledge and ability to provide education to students in accordance with their fields. In addition, educators have the obligation to guide students to learn independently, in this case students must be trained in the learning process in order to achieve self-regulated learning (learning independence) according to their learning experience.

The 2013 curriculum also states that learning mathematical hard skills and mathematical soft skills are included in cultural and character education values that need to be developed simultaneously and in a balanced manner. Self-regulated learning is one of the mathematical soft skills. Self-regulated learning is considered to be one of the factors that influence the cognitive process of students (Anggraeni & Sundayana, 2021). Self-regulated learning is the ability to control oneself in thinking and acting (Addawiyah & Basuki, 2022).

In other words, learning independence is an awareness within a person to learn independently, obtain learning resources independently, design a learning schedule independently and conduct self-evaluation and learning improvement independently. The definition of learning independence is divided into 7 (Fitriatien, S. R., & Mutianingsih, 2020), is (1) a sense of student responsibility in making decisions in a problem, (2) a trait that sticks to each individual when learning, (3) not a separator between oneself and others, (4) applying and implementing understanding in all situations, (5) implementing positive activities such as independent reading and group discussions, (6) carrying out various kinds of activities, such as conversations and looking for references, and (7) increasing independent learning abilities. Self-regulated learning is an activity of students to increase their capacity in the learning process, the desire to change the reality of learning mathematics into something fun, and efforts to manage students' time and learning environment (Nurhikmayati, I., & Sunendar, 2020).

However, what happens in the field, student learning independence is still low, not all students in the class have a positive perception of mathematics and teacher skills in teaching. There are students who feel comfortable with the learning that has been applied, but there are also those who feel normal. This needs to be explored more deeply so that teachers get a deeper and more detailed view of student perceptions during the learning process. The uniqueness of SMK compared to SMA, even between majors or expertise in SMK itself, will also differ from the learning objectives. According to (Efendi, 2017), mathematics curriculum development in SMK adheres to the principle of supply driven, not

integrated with the objectives of its expertise program, so that it overlaps with teaching materials. So that it has an impact on the development of teaching materials that are not focused on the material needed, learning becomes not contextual, not interesting and less meaningful so that students' understanding of mathematics is less than optimal.

As a new contribution to this field, this research not only describes the level of students' learning independence, but also offers a solution by developing a more contextual and interactive learning approach. This approach is expected to increase students' positive perception of mathematics and encourage students to be more active in managing and evaluating their learning process.

Learning independence is one of the most important factors in learning mathematics (Hakiki, S. N., & Sundayana, 2022). In other words, the teacher as an educator is only a facilitator, while students are encouraged to look for learning resources from anywhere (Damianti, D., & Afriansyah, 2022). Based on the above background, this study was conducted to describe learning independence in 100 high school / vocational high school students in Ciamis and Tasikmalaya. This, the researcher aims to analyze the extent of student learning independence in mathematics learning activities.

This study aims to determine the extent to which the level of mathematics learning independence of SMA / SMK students and analyze the factors that influence it. The importance of this research lies in the effort to understand more deeply the needs of students in learning independently, as well as providing solutions for educators to create a conducive and enjoyable learning environment. The expected benefits of this research are that the results can be used as a reference in efforts to increase student learning independence in schools and help develop teaching methods that support students' self-regulated learning skills.

## **2. METHOD**

This study uses a quantitative descriptive method research method, with the research subjects being high school/vocational high school students in Ciamis and Tasikmalaya as many as 100 students. Collection techniques through questionnaires distributed with the help of google form. The questionnaire has been designed so that it can measure students' learning independence abilities tailored to their indicators and arranged in such a way as to make it easier for respondents to choose answers that match their respective characters. The questionnaire distributed to students had previously been validated by a validator with the results that could be used with minor revisions. This research was conducted on December 20, 2022.

The self-regulated learning indicators used in this study were adapted from the article (Juwita, D. P., Kusuma, I., & Umeng, 2022). There are nine indicators with 20 questions developed by the researcher. The indicators in question are initiative, motivation, discipline, self-confidence, evaluation of the learning process, applying learning strategies, applying learning targets, diagnosing learning needs and responsibility and responsibility (Juwita, D. P., Kusuma, I., & Umeng, 2022). Independence of learning as freedom for students in processing the learning process by utilizing various learning resources.

This study used a questionnaire instrument containing 20 statement items with a Likert scale on each item. The instrument was developed by the researcher. Likert scale is a scale containing points 1-5 with rules ranging from strongly disagree to strongly agree which can be adjusted to the needs of the research. Details of question item numbers and indicators of students' self-regulated learning in Table 1.

**Table 1.** Student Self-Regulated Learning Indicator

No	Indicator	Statement Item
1.	Initiative and intrinsic learning motivation	1, 2, 3, 4, 5, 6, 7, 10
2.	Diagnose learning needs	8, 9
3.	Implementing learning objectives/targets	13
4.	Choosing to apply learning strategies	12
5.	Monitor organize and control learning	11
6.	View difficulties as challenges	14, 15
7.	Utilize and search for relevant resources	17, 18
8.	Evaluate the learning process and outcomes	19, 20
9.	Self-efficacy/self-concept/self-ability	16

Analysis of questionnaire data is carried out by determining the percentage of student response answers which then each statement item in the questionnaire will be analyzed descriptively by transforming the data obtained into attitudes, such as Thurstone, Guttman and Likert scales, which then the data will be analyzed quantitatively (Lestari, 2015). The determination of the percentage of student answers for each statement item is carried out by the formula below:

$$P = \frac{f}{n} \times 100\%$$

Description:

$P$  = Percentage

$f$  = Frequency of each questionnaire answer

$n$  = Number of ideal

100 = Fixed number

The percentage of the results of the answers per statement item that has been averaged will be interpreted in accordance with the criteria stated by (Lestari, K. E., & Yudhanegara, 2018):

**Table 2.** Interpretation of Percentage of Statement Answers

Criteria	Interpretation
$P = 0\%$	No one
$0\% < P < 25\%$	A small portion
$25\% < P < 50\%$	Almost Half
$P = 50\%$	Half
$50\% < P < 75\%$	Most
$75\% < P < 100\%$	Almost all
$P = 100\%$	All

The questionnaire data will be summarized to be classified based on the phases of student learning independence. In student independence there are three phases in its implementation, namely: designing learning activities, monitoring and controlling learning activities and evaluating the learning outcomes that have been carried out (Sunawan, S., Sugiharto, D. Y. P., & Anni, 2012). The activities in each phase are as follows (1) designing learning activities include: analyzing the tasks given, applying learning objectives, selecting and applying learning strategies and utilizing and finding relevant sources; (2) controlling the course of the learning implementation process includes: monitoring regulating and controlling learning, utilizing relevant sources, designing learning strategies to achieve learning goals and viewing difficulties as challenges; and (3) evaluating learning outcomes include: evaluating the process and learning outcomes. Thus, it can be concluded that the phases of student learning independence are (1) learning planning; (2) learning implementation; (3) learning evaluation.

### 3. RESULTS AND DISCUSSION

#### 3.1 Results

Before the questionnaire was given to respondents, the researcher prepared several things that needed to be needed in this research activity, namely by making 20 questions that represented indicators of students' self-regulated learning (learning independence) that had been validated by experts. The questionnaire sheet distributed to students becomes supporting data on student learning independence by analyzing the questionnaire data obtained. The research was conducted on 100 high school / vocational high school students in Ciamis and Tasikmalaya. Data collection was done via Goggle form distributed on December 20, 2022. Questionnaire data collection with questions in the form of a Likert scale with information SS (Strongly Agree), S (Agree), N (Neutral), TS (Disagree), and STS (Strongly Disagree). Based on the analysis of self-regulated learning in SMA/SMK in Ciamis and Tasikmalaya.

**Table 3.** Percentage Analysis Results of Self-Regulated Learning Questionnaire

No	Indicator	P	Interpretation
1.	Initiative and intrinsic learning motivation	81,52%	Almost All
2.	Diagnose learning needs	84,8%	Almost All
3.	Implementing learning objectives/targets	80%	Almost All
4.	Choosing to apply learning strategies	62,2%	Mostly
5.	Monitor organize and control learning	73%	Mostly
6.	View difficulties as challenges	82,3%	Almost All
7.	Utilize and search for relevant resources	73,6%	Mostly
8.	Evaluate the learning process and outcomes	85,9%	Almost All
9.	Self-efficacy/self-concept/self-ability	67%	Mostly
	<b>Cumulative</b>	<b>76,70%</b>	<b>Mostly</b>

Based on table 3, it can be seen that the results of the percentage analysis of the students' self-regulated learning questionnaire show that most high school / vocational high school students in Ciamis and Tasikmalaya have learning independence with a percentage of 76.70% with the interpretation that most students have learning independence in accordance with the indicators.

### 3.2 Discussion

In this study obtained the results per indicator of learning independence that almost all of the students had initiatives in learning and almost all of them could diagnose learning needs and not only that, almost all students agreed to the statement "Evaluating the learning process and results" which means that in the process of learning mathematics students can evaluate the process and results of learning. This is because students have the desire to re-learn material that is not understood during learning, by repeating learning at home to strengthen the material that has been delivered at school. This can also be explained that when the teacher delivers material in class through several lecture methods then the teacher gives assignments to students to strengthen students' understanding of the material that has been delivered at school (Nuryadin, A., Muharram, M. R. W., & Guntara, 2021).

As for the result of "Implementing learning goals/targets" almost all students have this. By allocating time for learning activities that support goal achievement, students indirectly have an effectively structured time schedule to carry out learning activities aimed at achieving their targets. Thus, students will be able to avoid delays in doing school assignments and postpone or complete existing assignments on time (Savira, F. , & Suharsono, 2013). Some students have good time management skills, but there are still some students who have not fully maximized time management because they feel overwhelmed in managing between school activities and organizational activities.

Then for the statement "Choosing to apply study strategies" most students agreed with the statement. In the statement "Monitor organize and control learning" it can be seen that most students can manage their own study schedule. This can be explained that when students cannot utilize time well, often delaying completing tasks will result in potential failure or hindrance to a student's success (Savira, F. , & Suharsono, 2013).

In organizing study schedules, students generally have more concentration and focus when studying in the morning because they are still fresh so they have more enthusiasm for learning. While studying in the afternoon, many students are already tired because of their activities in the morning so they are no longer interested in learning (Lestari, 2015).

Students feel that the difficulties faced in learning mathematics are a challenge, so that in the statement "View difficulties as a challenge" almost all students agree. These students tend to study anywhere without regard to comfort or focus. They face difficulties in organizing the physical environment to make learning easier.

It can also be explained that someone who has knowledge and understanding of how and when to use this knowledge will be able to organize themselves and the learning environment effectively (Hudaifah, 2020).

In the statement "Utilize and search for relevant sources" it can be seen that most students can utilize and search for various sources that are relevant to the material being studied. And for the statement "self-efficacy / self-concept / self-ability" most students have good self-confidence, self-concept, and self-ability.

When a student shows a high level of perseverance in learning, where they are always eager in the learning process. This can be seen from students' regularity in doing assignments, active involvement in learning, punctuality, and discipline in carrying out other tasks. In this case, it can be explained that when the expected results of a task have meaning

for students, then the value of a task is very important and students will try persistently to complete the task (Sunawan, S., Sugiharto, D. Y. P., & Anni, 2012).

The implementation procedure of the self-regulated learning technique can be illustrated in several stages of self-regulated learning. There are four stages which are explained as follows: Self-regulated learning begins with planning, which involves a series of important activities such as applying the desired goal or specific objectives required after the task.

Such students have developed high self-awareness and are able to monitor their progress regularly. They are able to identify areas that need improvement and implement effective strategies to improve their skills. They are also able to utilize available resources such as guidance and teaching materials to support their learning.

(Meilani, D., Cakrawati, D., & Sugiarti, 2017) stated that self-regulated learning can help students overcome learning difficulties in following the learning process. A student who can evaluate the learning process and learning outcomes can be seen from the effort to improve unsatisfactory grades and be serious in completing tasks this can be an independent individual in learning and achieving their goals.

In an educational setting, such students can motivate themselves and influence their classmates to develop their self-awareness in learning. This can bring benefits to the whole group, as it can increase learning effectiveness and the achievement of shared learning goals.

This is supported by attribution theory which suggests that learning motivation is influenced by how students interpret the causes of success or failure in learning. If students judge that success or failure is caused by internal factors such as their own abilities or efforts, then they will be more motivated to learn. In indicator 9, namely Self-efficacy / self-concept / self-ability, it is supported by Albert Bandura's Self-efficacy theory, which states that self-efficacy or belief in one's own abilities greatly affects the level of motivation, effort, and goal achievement. Students who have low self-efficacy tend to feel unable to complete the tasks or challenges faced, so they are less motivated and tend to feel hopeless.

#### **4. CONCLUSION**

Based on the research results, the majority of high school/vocational school students in Ciamis and Tasikmalaya have a high level of self-regulated learning, with a percentage of 76.70%. Students show good learning initiatives, the ability to diagnose learning needs, and are able to evaluate the learning process and results, especially in learning mathematics. Students tend to repeat material that has not been understood at home to strengthen understanding. In the aspect of time management, most students have implemented structured study goals, although some still experience difficulties in maximizing time management due to involvement in school and organizational activities. Students also generally have good study habits in the morning, when their energy is still optimal. This research also shows that students see learning difficulties as a challenge, which encourages them to continue learning despite less than ideal conditions. The ability to find relevant learning resources and a good level of self-efficacy in most students support their independence and perseverance in learning.

The ability of students in self-regulated learning in high school / vocational high school students in Ciamis and Tasikmalaya in learning mathematics is almost entirely students can evaluate the learning process and learning outcomes, can diagnose learning needs, view difficulties as challenges, have initiative and intrinsic learning motivation, can apply learning goals / targets, and most students can utilize and search for relevant sources, can monitor regulate and control learning, have self-efficacy / self-concept and can choose to apply learning strategies.



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