Self-regulated learning through Contextual Teaching and Learning (CTL) approach

C T Merawan¹, Hajidin² and M Duskri³

¹ Mathematics Education Department, Universitas Syiah Kuala, Aceh, Indonesia
² Physical Education, Universitas Syiah Kuala, Banda Aceh, Indonesia
³ Mathematics Education Department, UIN Ar-Raniry, Banda Aceh, Indonesia

Email: m.duskri@ar-raniry.ac.id

Abstract. Self-regulated learning is essential and must be a concern for teachers in the learning process. Self-regulated learning is one of the affective aspects that play a vital role in achieving mathematics learning outcomes. Students' self-regulated learning is generally still relatively low. This study aims to determine students' self-regulated learning through the Contextual Teaching and Learning (CTL) approach. The research sample was eighth-grade students in one of the junior high schools in Banda Aceh. The research instrument was a students' self-regulated learning questionnaire. Data were analyzed using descriptive statistics. The results showed that most students (55%) had good self-regulated learning after learning with the CTL approach. Besides, 42% of students had sufficient category, and only 3% were in a low category. Overall, students gave a positive response to learning with the CTL approach.

1. Introduction

Self-regulated learning is one of the factors that must get attention in the learning process. Self-regulated learning is an affective aspect that plays a role in mathematics learning outcomes [1, 2]. Students accustomed to being self-regulated in learning when facing a problem will tend to be calm while working on tasks because they have high self-confidence and do not quickly give up when facing issues. It is important to note that solutions exist because of a problem. Therefore, when facing a problem, it is hoped that we can try to find a solution. Self-regulated learning occurs when individuals plan, implement and evaluate the learning system [3]. Students who have self-regulated learning can analyze difficult problems, work individually or collaborate with groups, and dare to develop ideas. Many factors cause a low level of students' self-regulated learning. These factors include teachers, students, and learning media. The teacher's inappropriate teaching method is one of the factors that can affect students' self-regulated learning. No matter how good the established mathematics teaching materials are, they do not guarantee educational goals. One of the essential factors to achieve the goal is the learning process emphasizing optimal student involvement.

The learning model concerns not only the teacher's teaching activities but also student learning activities. The teacher actively provides explanations, helps students face difficulties in learning, and guides discussions to help them make correct conclusions. It is expected that the learning carried out can foster the nation's noble values, such as creativity (emergence of ideas), honesty, self-confidence, help, mutual respect, independence, and others [4]. Self-regulated learning is a learning skill in which individual learning is encouraged, controlled, and assessed by himself [3, 5-7]. Thus, students manage
their learning by activating their cognitive, affective, and behavioral ones to achieve the desired learning goals.

Several study findings also support the need for developing self-regulated learning in individuals who study mathematics. The individuals who have high self-regulated learning tend to learn better, monitor, evaluate, organize their learning effectively, save time in completing assignments, manage their study and time efficiently, and score higher in science lessons. If students have good self-regulated learning, they will more quickly receive the lesson so that students' character will be better [1, 8]. Self-regulated learning is significant and needs to be developed in students as learners. Self-regulated learning applied by students can bring positive changes to intellectuality [6]. To measure self-regulated learning, the indicators of self-regulated learning used are (1) dependence on others, (2) having self-confidence, (3) behaving in discipline, (4) having a sense of responsibility, (5) behaving on own initiative, and (6) exercising self-control [9, 10].

In fact, in mathematics learning, self-regulated learning is generally still relatively low [3, 10]. So far, the learning process is more often defined as the teacher explaining the lesson and students listening passively [11]. The quality of learning will increase if, in the learning process, students have ample opportunity to ask questions, discuss, and actively use the new knowledge they have acquired. Self-regulated learning is essential to get attention in every learning process.

The implementation of education based on the curriculum of 2013 applied in schools requires teachers to apply learning models to construct concepts, laws, or principles. The approach needed is an approach that supports students' ability to think contextually, where the context of mathematics is related to students' real-life. Students also should find concepts by themselves from the lesson being studied to embed a good understanding of the concepts during the learning. Self-regulated learning is one of the objectives of learning mathematics that students must possess to develop a relevant learning approach. One such learning approach is contextual learning (CTL) [3, 6, 12].

The Contextual Teaching and Learning (CTL) approach is a learning approach in which students are directly involved in the learning process related to students' real-world situations. The CTL approach involves seven principal components, namely (1) constructivism, (2) questioning, (3) inquiry, (4) learning community, (5) modeling, (6) reflection, and (7) authentic assessment [14]. Each of the CTL approaches' main components has basic principles that must be considered when applying them in learning. The CTL approach is a teaching system that is compatible with the brain because it generates meanings that connect academic content with the context of students' daily lives [13-15]. The first step that the teacher takes in applying the CTL approach in the classroom is to develop students' thinking through more meaningful learning by working independently, discovering themselves, and constructing their new knowledge and skills. It encourages students to have self-regulated learning, not to choose suitable strategies to solve these problems. Another reason is that through learning with the CTL approach, students also learn to be responsible, not only being passive recipients of information but also actively seeking the information needed according to their capacity. Students must be skilled at asking questions and expressing opinions, finding relevant information from various sources, looking for alternative ways to get solutions, and determining the most effective way to solve problems. Based on this, the issue raised in this study is how self-regulated learning is after learning through the Contextual Teaching and Learning (CTL) approach?

2. Methods
The type of research used in this study is descriptive quantitative. The participants in this study were 29 eighth-grade students of Islamic Junior High School 4 Banda Aceh. The instrument used in this study was a student self-regulated learning questionnaire, which was based on six indicators and consisted of 20 statements [11]. This questionnaire was used to determine students' self-regulated learning. The statements related to students' self-regulated learning, containing several positive and negative statements, were analyzed statistically descriptive. The questionnaire was given to students at the final meeting after learning. The student self-regulated learning questionnaire used a five-point Likert scale, namely SA (strongly agree), A (agree), D (doubt/do not know), DS (disagree), and SDS (strongly
disagree). Each item was scored by weighting the responses where 1=strongly disagree, and 5=strongly agree for positive statements, and the scoring was reversed for negative statements. We determined the percentage of student answers to each item and then analyzed the data descriptively. The percentage of student answers for each item was determined using the following formula [16]:

\[ P = \frac{f}{n} \times 100\% \]

Remark:
\( P \) = Percentage of student answers
\( f \) = Frequency of answer
\( n \) = The number of students

The percentage obtained for each item was then interpreted based on the following criteria:

| No. | Criteria | Interpretation |
|-----|----------|----------------|
| 1.  | \( P = 0\% \) | No one |
| 2.  | \( 0\% < P < 25\% \) | Fraction |
| 3.  | \( 25\% < P < 50\% \) | Almost half |
| 4.  | \( P = 50\% \) | Half |
| 5.  | \( 50\% < P < 75\% \) | Most of them |
| 6.  | \( 75\% < P < 100\% \) | Almost all of it |
| 7.  | \( P = 100\% \) | All of it |

Based on the students' responses to the questionnaire, strongly agree (SA) and agree (A) are classified as good self-regulated learning. Doubt (D) refers to sufficient self-regulated learning. Disagree (DS) and strongly disagree (SDS) are regarded as less self-regulated learning.

3. Result and Discussion

Students' self-regulated learning through the contextual teaching and learning (CTL) approach are described based on self-regulated learning questionnaire results. The questionnaire used in this study contained six indicators: dependence on others, self-confidence, behaving in discipline, having a sense of responsibility, behaving on self-initiative, and exercising self-control. It consisted of 20 items embedding the six indicators [11]. To find a description of self-regulated learning through the CTL learning approach, we used indicators as follows.

| Table 1. Criteria for interpretation of the percentage of questionnaire answers. |
|---------------------------------------------|
| **No.** | **Criteria** | **Interpretation** |
| --- | --- | --- |
| 1. | \( P = 0\% \) | No one |
| 2. | \( 0\% < P < 25\% \) | Fraction |
| 3. | \( 25\% < P < 50\% \) | Almost half |
| 4. | \( P = 50\% \) | Half |
| 5. | \( 50\% < P < 75\% \) | Most of them |
| 6. | \( 75\% < P < 100\% \) | Almost all of it |
| 7. | \( P = 100\% \) | All of it |

**Table 2. The percentage average of student self-regulated learning in each indicator after learning through the CTL approach.**

| Indicators | Response | SS | S | R | TS | STS |
|-----------|---------|----|---|---|----|----|
| Dependence on others | 2 | 14 | 12 | 2 | 0 |
| Average (percent) | 16 (54%) | 12 (40%) | 2 (6%) |
| Having self-confidence | 2 | 12 | 13 | 2 | 0 |
| Average (percent) | 14 (48%) | 13 (44%) | 2 (8%) |
| Behaving in discipline | 3 | 13 | 10 | 3 | 0 |
| Average (percent) | 18 (55%) | 10 (34%) | 3 (10%) |
| Having a sense of responsibility | 5 | 13 | 11 | 0 | 0 |
| Average (percent) | 18 (62%) | 11 (38%) | 0 (0%) |
| Behaving on self-initiative | 2 | 13 | 14 | 1 | 0 |
| Average (percent) | 15 (50%) | 14 (47%) | 1 (3%) |
| Exercising self-control | 3 | 15 | 10 | 1 | 0 |
| Average (percent) | 18 (62%) | 10 (34%) | 1 (4%) |
| **Total number** | 17 | 80 | 70 | 9 | 0 |
| **Average (percent)** | 55% | 42% | 3% |
Regarding the six indicators of student self-regulated learning, the analysis revealed several findings: most of the students (54%) met the indicator of dependence on others; nearly half of the students (48%) reached the indicator of having self-confidence; most of the students (55%) met the disciplined behavior indicator in learning; most of the students (62%) had a sense of responsibility in learning; 50% of students met the initiative's indicator; and most of the students (62%) completed the indicator of exercising self-control. Thus, it can be concluded that most of the students (55%) have good self-regulated learning. Meanwhile, 42% of students have sufficient self-regulated learning. Only 3% still lack self-regulated learning after participating in the CTL approach.

In this research, the first step that the teacher takes in the classroom is to develop students' thinking through meaningful learning by working alone, discovering themselves, and constructing their new knowledge and skills [4,17]. When students can relate the lesson to their own experiences, they will find the lesson meaningful and give them reasons to learn. It encourages students to have self-regulated learning, not to choose suitable strategies to solve these problems [11, 13, 18].

Data analysis results showed that mathematics learning with a contextual approach encourages students to connect their knowledge to application in everyday life. Students learn from their experiences, and such learning can increase students' learning motivation, enjoyment of learning, independent thinking, and decision-making. Mathematics learning with the CTL approach takes place actively and interactively. In a group, students work on problems given in the worksheets and explain and justify the answers they make, then the other groups respond. Such activities raise students' belief and confidence in their responses, understand other students' answers, agree with their friends' answers, express disagreement, look for other alternative solutions, and reflect on each step taken. Students who construct their knowledge without waiting for orders from the teacher make self-regulated learning higher. Students actively control whatever they do, evaluate and plan more in-depth in their learning, and are active in the process [17, 19].

Applying a suitable approach, such as the CTL approach, in the learning process will make students more interested in mathematics and responsible for solving mathematical problems. It was following the observations of researchers when the learning process took place with the CTL approach. Most students looked enthusiastic when solving problems provided in the student worksheets, although some seemed only to accept what their friends did.

In general, students who receive learning with the CTL approach have a positive tendency towards self-regulated learning. For example, a strong determination to complete mathematics assignments in a group, interest and desire to find something new, not depending on the teacher, and discussing with friends when solving and evaluating problems in student worksheets. Overall, students' self-regulated learning has increased after learning with the CTL approach [3, 17, 20].

4. Conclusion
Students' self-regulated learning through the Contextual Teaching and Learning (CTL) approach was assessed based on six indicators of student self-regulated learning: dependence on others, having self-confidence, behaving in discipline, and having a sense of responsibility, behaving on self-initiative, and exercising self-control. The results found that most students (55%) have good self-regulated learning. Almost half of the students (42%) have sufficient self-regulated learning, and a small number of students (3%) have less self-regulated learning. Students could construct their knowledge without instructions from the teacher. Students also completed the tasks together in their groups, shared opinions, and did an evaluation. Students who have high self-regulated learning will try to complete assignments with their abilities, indirectly affecting learning quality. In general, students who receive learning with the CTL approach have a positive tendency towards self-regulated learning.

References
[1] Bungsu T K, Vilardi M, Akbar P and Bernard M 2019 Pengaruh Kemandirian Belajar Terhadap Hasil Belajar Matematika di SMKN 1 Cihampelas J. Educ. 1 382-9
[2] Wang C H, Shannon D M and Ross M E 2013 Students’ characteristics, self-regulated learning, technology self-efficacy, and course outcomes in online learning Distance Educ. 34 302-23

[3] Nuridawani N, Munzir S and Saiman S 2015 Peningkatan kemampuan penalaran matematis dan kemandirian belajar siswa Madrasah Tsanawiyah (MTs) melalui pendekatan Contextual Teaching and Learning (CTL) J. Didakt. Mat. 2

[4] Surya E 2012 Visual thinking dalam memaksimalkan pembelajaran matematika siswa dapat membangun karakter bangsa J. Penelit. dan Pembelajaran Mat. 5 41-50

[5] Lee S W Y and Tsai C C 2011 Students’ perceptions of collaboration, self-regulated learning, and information seeking in the context of Internet-based learning and traditional learning Comput. Human Behav. 27 905-14

[6] Lilik S, Djannah W and Wagimin 2013 Tingkat penguasaan Self-Regulated Learning Skills ditinjau dari segi prestasi belajar dan lama studi pada mahasiswa FKIP UNS J. Conselium 1

[7] Suhendri H 2015 Pengaruh metode pembelajaran Problem Solving terhadap hasil belajar matematika ditinjau dari kemandirian belajar Form. J. Ilm. Pendidik. MIPA 3

[8] Alexander P A, Dinsmore D L, Parkinson M M and Winters F I 2011 Self-regulated learning in academic domains Handbook of self-regulation of learning and performance pp 393-407

[9] Sardiman A M 2008 Interaksi dan Motivasi Belajar Mengajar (Jakarta: Raja Grafindo Persada)

[10] Soemarmo U 2006 Kemandirian Belajar: Apa, Mengapa dan Bagaimana dikembangkan pada Peserta Didik (Makalah disajikan pada seminar Pendidikan Matematika UNY tahun 2006 dan dilengkapi untuk bahan ajar Perkuliah Isu Global dan Kajian Pendidikan Matematika di PPs UPI, Februari 2011)

[11] Burais L 2016 Peningkatan Kemampuan Penalaran Matematis dan Kemandirian Belajar Siswa Madrasah Tsanawiyah melalui Model Discovery Learning (ETD Unsyiah)

[12] Ambarjaya B S 2012 Psikologi pendidikan dan pengajaran teori dan praktik (Jakarta: CAPS)

[13] Ben-Eliyahu A and Bernacki M L 2015 Addressing complexities in self-regulated learning: a focus on contextual factors, contingencies, and dynamic relations Metacognition Learn. 10 1-13

[14] Järvenoja H, Järvelä S and Malmberg J 2015 Understanding regulated learning in situative and contextual frameworks Educ. Psychol. 50 204-19

[15] Riyanto Y 2012 Paradigma Baru Pembelajaran (Jakarta: Kencana)

[16] Arikunto S 2006 Metode Penelitian Kualitatif (Jakarta: Bumi Aksara)

[17] Surya E and Putri F A 2017 Improving mathematical problem-solving ability and self-regulated learning of high school students through contextual learning model J. Math. Educ. 8 85-94

[18] Lombaerts K, Engels N and Braak J V 2009 Determinants of teachers’ recognitions of self-regulated learning practices in elementary education J. Educ. Res. 102 163-74

[19] Wan Z, Compeau D and Haggerty N 2012 The effects of self-regulated learning processes on e-learning outcomes in organizational settings J. Manag. Inf. Syst. 29 307-34

[20] Darma Y, Firdaus M and Haryadi R 2016 Hubungan kemandirian belajar terhadap kemampuan pemecahan masalah matematis mahasiswa calon guru matematika Edukasi J. Pendidik. 14 169-78