Journal Evaluation in Education (JEE)
Vol. 6, No. 1, January 2025, pp. 127~137
ISSN: 2716-4160, DOI: 10.37251/jee.v6i1.1255

Digital Era Dynamics: Uncovering Self-Regulation Patterns in Science Learning Among Border Region Junior High School Students

Luqmanul Hakim Abi Abdillah[1,*], Rusdiman Buhera[1], Agung Wijaya Subiantoro[1], Shafina Ade Pratiwi[2], Insih Wilujeng[1], Laifa Rahmawati[1]
[1]Department of Science Education Program, Faculty of Mathematics and Science, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia
[2]Department of Science Education, Universitas Sebelas Maret, Jawa Tengah, Indonesia

Article Info

Article history:

Received Nov 11, 2024
Revised Dec 16, 2024
Accepted Jan 04, 2025
OnlineFirst Jan 08, 2025

Keywords:

Digital Era
Junior High School
Nunukan Regency
Science Learning
Self Regulation

ABSTRACT

Purpose of the study: The research objective is to provide essential insights into students' self-regulation characteristics in border regions, which can inform strategic efforts to maintain and improve their capabilities as they navigate the challenges of the digital era.

Methodology: This study used quantitative research with descriptive data analysis involving 198 students from three junior high schools in Nunukan Regency. Data was collected using a self-regulation questionnaire with a Likert scale, which measured four indicators: forethought, volitional control, motivation, and self-reflection. The data was then analyzed using score and average calculations to assess the students' self-regulation profile.

Main Findings: The study findings reveal that the self-regulation profile of junior high school students in Nunukan Regency is generally in the high category, with an average of 77%. The motivation indicator reached the highest level at 81%, while volitional control was the lowest at 72%. Notably, differences in self-regulation levels were observed across the participating schools and grade levels.

Novelty/Originality of this study: This study provides a comprehensive understanding of the self-regulation characteristics of students in the border area of Nunukan Regency, which can serve as a basis for developing more effective learning strategies and improving the quality of education in similar contexts. The findings offer valuable insights that can inform the development of targeted interventions and support systems to cater to the specific needs of learners in border regions as they navigate the challenges of the digital era.

Corresponding Author:
Luqmanul Hakim Abi Abdillah,
Magister of Science Education Program, Faculty of Mathematics and Science, Universitas Negeri Yogyakarta, Colombo Road, Depok, Sleman, Yogyakarta, 55281, Indonesia
Email: luqmanulhakim.2023@student.uny.ac.id

1. INTRODUCTION

Realizing the golden generation of 2045 for the nation's current generation is a big challenge in the world of Indonesian education, especially in the dynamic digital era. Education is basically a conscious effort to develop the potential of human resources, especially students [1]. However, this digital era has a negative influence on the formation of children's characters, because it makes the child addicted to playing gadgets and the internet, thus interfering with children's learning and play time [2]. The development of education today requires students to be able to adapt to 21st century learning [3]. One of the key competencies needed by students to face these challenges is the ability to self-regulate. This is because self-regulation is a process used to

activate and maintain thoughts, behaviors, and emotions to achieve certain goals [4]. So, students who have better self-regulation, the better they manage themselves to reduce or eliminate distractions caused by the development of the digital era. In accordance with the words of educational psychology figure, Barry J. Zimmerman, that self-regulation is a crucial aspect in the learning process that allows students to manage their thoughts, feelings, and behaviors to achieve academic goals [5].

In an increasingly complex educational era, self-regulation skills are becoming increasingly important, especially for students in adolescence, including junior high school students who are in a critical developmental transition stage [6], [7]. Self-regulation is a crucial factor in the process of evolution, particularly in major evolutionary changes and the transition to higher levels of complexity. The role of self-regulation is especially prominent in megaevolution-the large-scale, significant evolutionary transformations that lead to the emergence of new, more complex forms of life [8]. To build the nation's independence in answering the challenges of the digital era, self-regulated learning can have a positive impact, including building student learning independence because it helps direct students to learning independence, namely setting study schedules, setting learning targets and finding the information needed independently which is able to increase awareness of the importance of productive human resources and be able to compete with other countries [9], [10].

Self-regulation in the context of Science learning is very important to increase student motivation and learning achievement. This is because self-regulation helps students to set learning strategies, maintain motivation, and face challenges in understanding scientific concepts that are often complex. In science learning, self-regulation facilitates the use of effective learning strategies, such as managing time, understanding the material in depth, and making connections between concepts, all of which contribute to higher achievement. Self-regulation includes students' ability to manage their learning process, including timing, emotional regulation, and learning strategy setting [5], [11].

Self-regulation skills are not only important for academic achievement, but they also contribute to the development of students' life skills [12], [13]. Students who can organize themselves well in an academic context tend to have better time management, problem-solving, and decision-making skills. In addition, students who have good self-regulation skills tend to have higher motivation to learn and better academic outcomes [14]. The significance of self-regulation is particularly evident in the context of online learning, especially throughout the COVID-19 pandemic. Research by Dai et al shows that students who have good self-regulation skills can be more effective in managing their learning in an online environment, which is often less structured than face-to-face learning [15].

Over the past several decades, the academic community has demonstrated growing interest and emphasis on self-regulation as a focus of research, with the popularity of this area steadily increasing. Throughout the entire timeline of self-regulation research, the number of published studies in this field has exhibited an upward trend, which can be delineated into three distinct phases: an initial embryonic stage of development from 1986 to 2002, a subsequent slow stage of development from 2003 to 2009, and most recently, a rapid stage of development from 2010 to 2022 [16].

Nunukan Regency, as one of the border areas in Indonesia, has unique characteristics that can affect the development of students' self-regulation. Border areas, especially education, have their own dynamics as areas that are directly adjacent to neighboring countries [17]. The geographical and social characteristics of this area have the potential to affect the development of self-regulation in early childhood [18]. In addition, parental involvement and peer support also affect a child's self-regulation [19]. Where many Indonesian citizens in Nunukan Regency work as palm oil workers in Malaysia or as Indonesian Workers [17]. According to Prigantari, There is a relationship between parental parenting and students' self-regulation, the better the parenting style, the higher the student's motivation in excelling [20]. This will certainly affect the self-regulation of children in Nunukan Regency. However, until now, research that specifically examines the self-regulation profile of students in border areas is still very limited.

Several previous studies have shown the importance of self-regulation in learning. According to a study conducted by Hamdiyah et al, Students with good self-regulation skills tend to have higher academic achievement [21]. Meanwhile, from the results of research conducted by Putrie, that student regulations affect learning achievement [22]. Based on research conducted by Ziadat & Sakarneh, it is known that one of the important factors in overcoming students' learning difficulties is the ability to self-regulate [23]. Self-regulation allows students to effectively plan, control their behavior, emotions, and direct their mental processes toward achievement and personal goals [24]. With good self-regulation, students can be more focused, motivated, and able to solve the learning challenges they face. This shows that strengthening self-regulation plays a significant role in helping students overcome their learning barriers.

Although various studies have examined the importance of self-regulation in learning, such as the study of Hamdiyah et al [21] which showed a positive relationship between self-regulation and academic achievement, and the study of Putrie [22] which confirmed the influence of self-regulation on learning achievement, there are still research gaps that need to be addressed. First, research on self-regulation in border areas is still very limited, even though border areas have unique characteristics that can affect the development of students' self-regulation.

Second, although the digital era presents its own challenges in the formation of students' character and self-regulation [2], there have not been many studies that specifically examine the self-regulation profile of students in border areas in the context of the digital era.

This study aims to comprehensively find out the self-regulation profile of junior high school students in Nunukan Regency in the digital era, especially in the subject of Natural Sciences. The results of the study are expected to make a significant contribution to the development of more effective learning strategies, especially in the context of education in border areas. In addition, the findings of the research can also be the basis for the formulation of a more targeted education policy in an effort to improve the quality of education in border areas.

The urgency of this research is increasingly relevant considering Indonesia's target to achieve the 2045 education vision. As stated by Nurfadhilah, a deep understanding of the characteristics and needs of students in various contexts, including border areas, is indispensable to realize Indonesia's golden generation [25]. Thus, this research not only contributes to the development of science, but also has significant practical implications for improving the quality of education in Indonesia, especially in border areas.

2. RESEARCH METHOD

This type of research is quantitative research with descriptive for data analysis, the data obtained objectively describes the self-regulation profile of students. The subjects of this study are students in grades 7, 8, and 9 of Junior High School (JHS) in Nunukan Regency. The number of samples at Junior High School 1 Nunukan is 107 students, Junior High School 1 Nunukan Selatan is 31 students, and Junior High School 1 Krayan is 60 students in the 2024-2025 school year. The sampling technique in this study uses purposive sampling with the consideration that the selected schools can represent the characteristics of different regions in Nunukan Regency.

Data collection uses a survey technique that is carried out online through google forms. The collected data were analyzed using score and average calculations to assess variable. The instrument used was a self-regulation questionnaire consisting of 16 statements on a Likert scale. The instruments used in this study have 4 indicators of self-regulation, which is adapted from 3 expert opinions, namely forethought, volitional control, motivation, and self-reflection [5], [26], [27]. The self-regulation grid can be seen in table 1 below.

Table 1. Self-Regulation Grid in Science Learning

No	Self-Regulation Indicator	Statement	+/-	Statement Number
1	Forethought	I plan my science study schedule every week I target to understand the next science material	(+)	1
		I don't think about the grades I want to achieve in studying science	(-)	2
		I study science only when there is homework or exams	(-)	3
		I set a target to understand science material even though I won't be working in the science field	(+)	4
2	Volitional Control	I was able to refrain from playing games when it was time to study science	(+)	5
		I am easily distracted by other things when I am studying science	(-)	6
		I remained focused on studying science even though there was a temptation to do other things	(+)	7
		I have a hard time managing the time between studying science and other activities	(-)	8
3	Motivation	I feel excited to learn new things in science	(+)	9
		I felt bored while studying science	(-)	10
		I try hard to understand difficult concepts in science	(+)	11
		I easily give up when faced with difficult science problems.	(-)	12
4	Self-reflection	I double-checked the results of my science work to make sure the answer was correct	(+)	13
		I don't care about my science exam results	(-)	14
		I tried to find out the cause when my science score was not satisfactory	(+)	15
		I rarely evaluate my way of learning science	(-)	16

The results of the reliability test on the research instrument showed a Cronbach's Alpha value of 0.822 > 0.6, which indicates that the instrument used has an adequate and reliable level of internal consistency to measure students' self-regulation [28], [29]. The grouping of students' self-regulation levels is classified into 5 categories [30]. The basis for categorizing students' scores or critical thinking ability scores can be seen in Table 2.

Table 2. Categories of Student Self-Regulation Assessment

Percentage Value (%)	Category
0 - 20	Very Low
21 - 40	Low
41 - 60	Moderate
61 - 80	High
81 – 100	Very High

3. RESULTS AND DICUSSION

Self-regulation data was obtained from the dissemination of self-regulation questionnaires through google forms disseminated through the Science Teacher Association in Nunukan Regency. The results of the student's self-regulation profile are summarized in the following table, the percentage (%) shows the level of student self-regulation in each indicator.

Table 3. Overall Profile Data of the Student Self-Regulation Category

Indicator	Percentage (%)	Category
Forethought	76	High
Volitional Control	72	High
Motivation	81	Very High
Self-Reflection	80	High
Average	77	High

The results of the study show that the self-regulation profile of junior high school students in Nunukan Regency is generally in the high category with an average of 77%. These findings indicate that junior high school students in Nunukan Regency have good abilities in managing their own learning process. The self-regulation of students in border areas is not always lower than that of developed areas. This is supported by the research of Zhang & Zhang, which shows that regulation in the Southwest China region is in the middle to high category [31]. This is in line with research [32] which states that students with high self-regulation tend to have better academic performance. In addition, research conducted by [22] shows that self-regulation has an effect on student achievement. To better show the self-regulation profile of students in each category, you can see the following histogram.

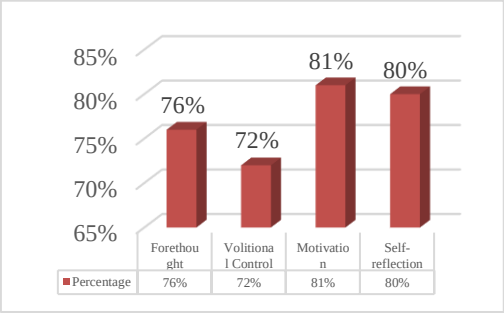

Figure 1. Histogram of Student Self-Regulation Profile Data for each indicator in Nunukan Regency

Based on the results of the data analysis shown in Table 3 and Figure 1 related to the self-regulation profile of junior high school students, each indicator in Nunukan Regency shows that the forethought indicator reaches a percentage of 76% (high category). These results show that students have good abilities in planning learning and setting learning goals. According to Panadero, High forethought abilities allow students to be better prepared for learning challenges [33]. Similar things can be seen from the research of Matitaputty & Kurniawati, which shows that good forethought can make students set goals, so that they are ready to face learning challenges [34].

The volational control indicator reaches 72% (high category), which is the indicator with the lowest percentage. This indicates that students still need to improve their ability to control their desires and maintain focus during the learning process. In line with Corno's, good volational control is very important in maintaining

learning motivation [35]. Correspondingly, Volitional control plays a crucial mediating role in the relationship between an individual's motivational fluctuations and their ability to achieve goals [36]. Meanwhile, based on research Majid et al, shows that the better a person's volational control, the more consistent a person is in learning [37]. Based on the statements of the volational control indicator, students can well withstand distractions when studying, such as playing games, social media notifications, playing mobile phones, and staying focused when these disturbances occur.

The motivation indicator reached 81% (very high category), which is the indicator with the highest percentage. These findings show that students have a very strong drive to learn and achieve their academic goals. These results are supported by research Ryan & Deci, which emphasizes the importance of motivation in learning. The control of volitional actions is primarily driven by motivational factors [38]. This motivation acts as a key catalyst, enabling individuals to intentionally regulate their behavior and cognitive processes. The strength of this motivational drive significantly influences the effectiveness of volitional control, highlighting its crucial role in goal-directed actions and decision-making [39].

Self-reflection indicators reach 80% (high category). This shows that students have good abilities in evaluating their learning processes and outcomes. Schunk & Greene, states that good self-reflection skills allow students to continuously improve their learning strategies [40]. In addition, according to Dignath & Büttner, The results of self-evaluation can affect the next phase of forward thinking [41]. According to Sloan & Frank, Self-reflection in students can make students aware of their weaknesses and strengths, so that they are more aware of their own abilities, in addition, self-reflection as a potential source used to acquire new knowledge by using the right learning strategies [42]. The self-regulation profile of students in each school in Nunukan Regency can be seen through table 4.

Table 4. Self-Regulation Profile of Students in Each School

School Name	Percentage (%)	Category
Junior High School 1 Nunukan	79	High
Junior High School 1 Krayan	76	High
Junior High School 1 South Nunukan	76	High

Based on the data shown in table 4, it can be seen that the three junior high schools in Nunukan Regency show a relatively high level of self-regulation. Junior High School 1 Nunukan is in first place with a percentage of 79%, followed by Junior High School 1 Krayan with 76%, and Junior High School 1 Nunukan Selatan which also reaches 76%. These results indicate that students in the three schools have good abilities in organizing and managing their own learning process. This difference in self-regulation profiles between schools can be influenced by various factors such as the learning environment, teaching quality, and school support for the development of students' self-regulation skills [41]. The difference in geographical location of the three different schools can also affect the self-regulation of students [18]. This difference confirms Bronfenbrenner's theory of learning ecology, in which the environmental context influences the development of self-regulation [43]. However, the relatively small gap (3%) shows the effectiveness of the education system in balancing the quality of learning in border areas. Details of the self-regulation profile of students at Junior High School 1 Nunukan can be seen through the following histogram.

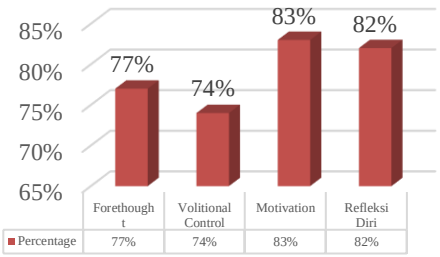

Figure 2. Histogram of Student Self-Regulation Profile Data at Junior High School 1 Nunukan in each indikator

Based on the histogram in figure 2, it can be seen that the motivation indicator shows the highest percentage of 83%, which indicates that students have a very strong drive in their learning process. The self-reflection indicator belongs to the high category with a percentage of 82%, indicating that students have good abilities in evaluating and analyzing their learning process. The forethought indicator with a percentage of 77% and the volational control indicator with a percentage of 74%, both indicators are in the lowest position, but still

in the high category. The advantages of Junior High School 1 Nunukan are in line with research Wolters & Hussain [44] who found that schools in urban centers with adequate access to learning resources tended to have students with higher self-regulation. Details of the self-regulation profile of students at Junior High School 1 Krayan can be seen through the following histogram.

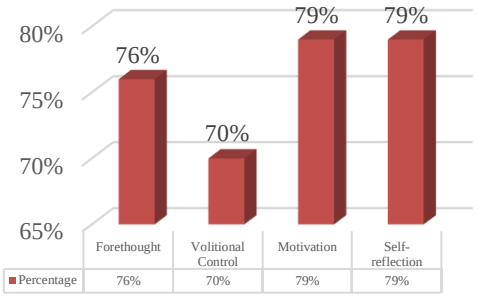

Figure 3. Histogram of Student Self-Regulation Profile Data at Junior High School 1 Krayan in each indicator

Based on the histogram, the forward thinking is at 76%, indicating that most students are able to plan for the future well. Willpower control sits at 70%, indicating that there is still room to improve consistency in maintaining focus. Motivation and self-reflection reached the highest number, which was 79%, which indicates that the majority of learners have a drive in learning and a high awareness to evaluate their actions and decisions. Self-reflection in students can make students aware of their weaknesses and strengths, so that they are more aware of their own abilities [42]. Details of the self-regulation profile of students at Junior High School 1 Nunukan Selatan can be seen through the following histogram.

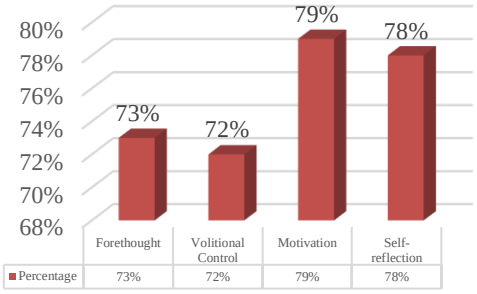

Figure 4. Histogram of Student Self-Regulation Profile Data at Junior High School 1 Nunukan Selatan in each indicator

Based on figure 4, the motivation indicator reached the highest percentage, which was 79%, indicating that students have a strong drive to achieve learning goals. Self-motivation has been proven to have an important role in the implementation of learning, which shows that it is a key factor in managing one's learning [45]. Self-reflection, which is at 78%, is also high, showing the tendency of students to self-evaluate. Meanwhile, forethought and control of the will stood at 73% and 72%, respectively, indicating that there is a fairly good ability to plan and control oneself, but can still be improved. The self-regulation profile of students at each grade level in Nunukan Regency can be seen through table 5.

Table 5. Profile of Self-Regulation of Students at Each Grade Level

Grade Level	Percentage (%)	Category
7	79	High
8	78	High
9	74	High

Based on table 5, it can be seen that grade 7 has the highest self-regulation with a percentage of 79%, while the grade 8 level is in second place with a percentage of 78% (high), in grade 9 it is at the lowest with a percentage of 74% with a high category. Although, each grade level is in the high category, but there is a decrease at each grade level. The higher the grade level, the lower the student's self-regulation. The pattern of decreasing self-regulation from grade 7 to grade 9 is interesting to study further.

According to Guo, Students' self-regulation decreases as they move up the grade, which may be related to the increased complexity of learning materials and the academic pressure faced by final grade students [46]. Details of the self-regulation profile of students in grade 7 can be seen through the following histogram.

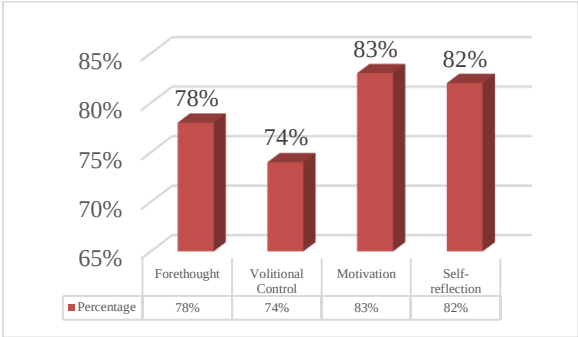

Figure 5. Histogram of Self-Regulation Profile Data Students in Grade 7 in each indicator

Based on the histogram of the data in figure 2, it can be seen that the motivation indicator shows the highest percentage of 83%, which indicates a strong drive in achieving goals. Having goals can help students develop an innovative mindset and a strong determination to achieve those goals [47]. In line with that, the self-reflection indicator also showed a high number of 82%, indicating a good awareness in evaluating oneself. Meanwhile, the forethought figure is at 78%, which reflects a fairly good future planning ability. Although the volational control showed the lowest percentage of 74%, this number still illustrates good self-control. Details of the self-regulation profile of students in grade 8 can be seen through the following histogram.

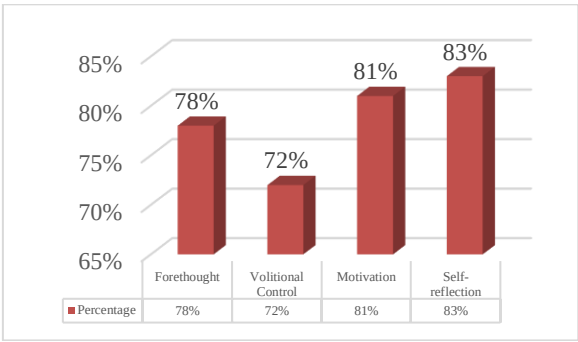

Figure 6. Histogram of Self-Regulation Profile Data Students in Grade 8 in each indicator

Self-regulation profile in grade 8 shows high results in indicators forethought (78%) and volational control (72%), and very high in motivation (81%) and self-reflection (83%). A high percentage of motivation and self-reflection indicates that 8th grade students have a strong drive to achieve goals as well as awareness in evaluating their actions. On the other hand, slightly lower volational control indicates the need for reinforcement in distraction management and consistency [48], [49]. Details of the self-regulation profile of students in grade 9 can be seen through the following histogram.

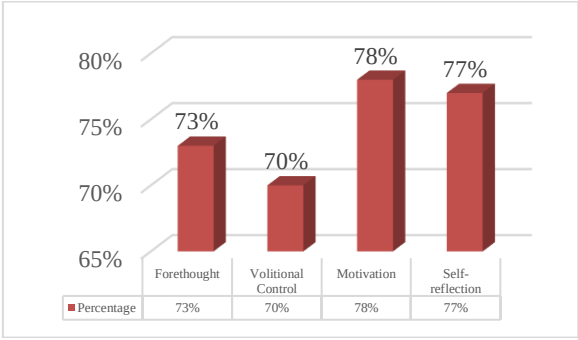

Figure 7. Histogram of Self-Regulation Profile Data Students in Grade 9 in each indicator

Based on the histogram, the self-regulation of grade 9 students shows that the forethought indicator has a percentage of 73% and the control of the will has a percentage of 70%, two indicators have a lower percentage,

indicating the need for improvement in the ability to plan and control themselves to achieve goals. Meanwhile, motivation (78%) and self-reflection (77%) showed higher results, suggesting that individuals have a strong drive and a good tendency to evaluate themselves. This reflects a fairly high level of development, especially in terms of motivation and self-reflection, which is important for personal development and continuous learning [45], [50].

This study has provided insights into the self-regulation characteristics of students in the border region of Nunukan Regency. These research findings can serve as a foundation for developing more effective learning strategies and improving educational quality in similar contexts. The results present valuable insights that can inform the development of targeted interventions and support systems to meet the specific needs of learners in border regions as they face various challenges in the digital era. For future research, it is recommended to conduct further studies over an extended period that can measure the effectiveness of student self-regulation development program implementation, as well as explore other contextual factors that may influence students' self-regulation abilities in border regions.

4. CONCLUSION

This study shows that the self-regulation profile of junior high school students in Nunukan Regency is generally in the high category with an average percentage of 77%. It can be concluded that students in Nunukan Regency can manage themselves well to face the digital era. Of the four self-regulation indicators studied, motivation indicators reached the highest level (81%), followed by self-reflection (80%), forward thinking (76%), and will control (72%). Differences in the level of self-regulation are also observed between schools, with Junior High School 1 Nunukan having the highest level of self-regulation (79%) compared to Junior High School 1 Krayan and Junior High School 1 Nunukan Selatan which each reached 76%. In addition, there was a pattern of decreasing the level of self-regulation from grade 7 to grade 9. These results provide important insights into the characteristics of self-regulation of junior high school students in the border areas of Nunukan Regency. Strategic efforts from various parties are needed to maintain and improve students' self-regulation capabilities, especially in facing the challenges of the digital era.

ACKNOWLEDGEMENTS

The author would like to express his deepest gratitude to the Science Teacher Association in Nunukan Regency for the support and cooperation given during this research process. Author also expressed his gratitude to the science teachers from Junior High School 1 Nunukan, Junior High School 1 Krayan, and Junior High School 1 Nunukan Selatan who have been willing to be part of this research, both in providing access to their students and in helping to distribute research questionnaires. The author also thanked all the students who were respondents in this study, who enthusiastically provided very meaningful data for the completion of this research.

REFERENCES

[1] N. Afrianty and F. Yolviansyah, "Analisis pengaruh sikap toleransi terhadap hasil belajar siswa fisika di kelas XII IPA SMA Negeri 2 Kota Jambi [Analysis of the influence of tolerance attitudes on physics learning outcomes of class XII IPA SMA Negeri 2 Kota Jambi]," *J. Eval. Educ.*, vol. 2, no. 4, pp. 144–147, 2021, doi: 10.37251/jee.v2i4.244.

[2] S. Sunandari, A. N. A. Sari, S. Mustainah, M. Viftar, and ..., "Pengaruh era digital pada pembentukan karakter anak di sekolah dasar [The influence of the digital era on the formation of children's character in elementary schools]," *J. ...*, vol. 05, no. 04, pp. 11644–11648, 2023.

[3] L. Kartina, N. Nurmeimana, I. Abamba, and A. J. Aswad, "Ability analysis of providing explanations and strategies in learning science," *J. Eval. Educ.*, vol. 4, no. 3, pp. 88–94, 2023, doi: 10.37251/jee.v4i3.699.

[4] N. M. Bayantari, S. H. Indonesiani, and P. I. B. Apsari, "Regulasi diri dalam belajar dan hubungannya dengan stres akademik pada mahasiswa tingkat pertama fakultas kedokteran [Self-regulation in learning and its relationship with academic stress in first year medical students]," *J. Imiah Pendidik. dan Pembelajaran*, vol. 6, no. 3, pp. 609–618, 2022, doi: 10.23887/jipp.v6i3.51175.

[5] B. J. Zimmerman, "Attaining self-regulation : A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), Handbook of self-regulation," *Handb. Self-Regulation*, pp. 13–39, 2000.

[6] L. Steinberg, "Cognitive and affective development in adolescence," *Trends Cogn. Sci.*, vol. 9, no. 2, pp. 69–74, 2005, doi: 10.1016/j.tics.2004.12.005.

[7] M. Gajda, A. Małkowska-Szkutnik, and W. Rodzeń, "Self-Regulation in adolescents: Polish adaptation and validation of the self-regulation scale," *Int. J. Environ. Res. Public Health*, vol. 19, no. 12, 2022, doi: 10.3390/ijerph19127432.

[8] A. L. Grinin, "Self-Regulation as a global evolutionary mega-trend," pp. 139–164, 2016.

[9] P. A. C. Dinata, Rahzianta, and M. Zainuddin, "Self regulated learning sebagai strategi membangun kemandirian peserta didik dalam menjawab tantangan abad 21 [Self-regulated learning as a strategy to build student independence in

responding to the challenges of the 21st century]," in *Prosiding Seminar Nasional Pendidikan Sains (SNPS)*, 2016, pp. 139–146.

[10] C. Emita and S. Lukas, "The effect of learning independence, self-regulation, and social support on learning achievement among psychology department students x university in Covid-19 pandemic era," *JTP - J. Teknol. Pendidik.*, vol. 24, no. 3, pp. 283–294, 2022, doi: 10.21009/jtp.v24i3.28814.

[11] I. G. Pratama, "Kunci sukses pembelajaran efektif: Tinjauan systematic literature review memahami hubungan [Keys to successful effective learning: A systematic literature review understanding the relationship]," *Psycho Aksara*, vol. 2, no. 1, pp. 73–79, 2024.

[12] D. D. Utami, P. Setyosari, W. Kamdi, S. Ulfa, and D. Kuswandi, "The effect of smart-pbl learning strategy and academic-self regulated learning on metacognitive & problem-solving skills in learning chemistry," *Period. Tche Quim.*, vol. 17, no. 35, pp. 960–976, 2020, doi: 10.52571/ptq.v17.n35.2020.79_utami_pgs_960_976.pdf.

[13] Y. Karlen, S. Hertel, and C. N. Hirt, "Teachers' professional competences in self-regulated learning: An approach to integrate teachers' competences as self-regulated learners and as agents of self-regulated learning in a holistic manner," *Front. Educ.*, vol. 5, no. September, pp. 1–20, 2020, doi: 10.3389/feduc.2020.00159.

[14] N. K. A. A. Nita and G. N. S. Agustika, "Efikasi diri dan regulasi diri berpengaruh terhadap motivasi belajar pada siswa [Self-efficacy and self-regulation influence students' learning motivation]," *Mimb. PGSD Undiksha*, vol. 11, no. 1, pp. 81–90, 2023, doi: 10.23887/jjpgsd.v11i1.58234.

[15] W. Dai, Z. Li, and N. Jia, "Self-regulated learning, online mathematics learning engagement, and perceived academic control among Chinese junior high school students during the COVID-19 pandemic: A latent profile analysis and mediation analysis," *Front. Psychol.*, vol. 13, no. November, pp. 1–11, 2022, doi: 10.3389/fpsyg.2022.1042843.

[16] L. Huang *et al.*, "Visualization analysis of global self-regulated learning status, hotspots, and future trends based on knowledge graph," *Sustain.*, vol. 15, no. 3, pp. 1–20, 2023, doi: 10.3390/su15032798.

[17] H. O. Ahmad, "Dinamika Pendidikan Formal di Perbatasan (Studi Kasus Sekolah Tapal Batas di Kecamatan Sebatik Tengah Kabupaten Nunukan Kalimantan Utara)," 2018.

[18] A. Ursache, R. G. Barajas-Gonzalez, and S. Dawson-McClure, "Neighborhood influences on the development of self-regulation among children of color living in historically disinvested neighborhoods: Moderators and mediating mechanisms," *Front. Psychol.*, vol. 13, no. October, pp. 1–17, 2022, doi: 10.3389/fpsyg.2022.953304.

[19] E. Latipah, H. C. A. Kistoro, and H. Putranta, "How are the parents involvement, peers and agreeableness personality of lecturers related to self-regulated learning?," *Eur. J. Educ. Res.*, vol. 10, no. 1, pp. 413–425, 2021, doi: 10.12973/EU-JER.10.1.413.

[20] C. A. Prigantari, "Hubungan pola asuh orang tua dan regulasi diri dengan motivasi berprestasi citra [The relationship between parenting patterns and self-regulation with image achievement motivation]," *Psikoborneo J. Ilm. Psikol.*, vol. 7, no. 2, pp. 234–240, 2019, doi: 10.30872/psikoborneo.v7i2.4778.

[21] R. Hamdiyah, M. Y. M. El-Yunusi, and D. Darmawan, "Pengaruh kebiasaan belajar, regulasi diri dan lingkungan sosial terhadap prestasi belajar siswa MTs Al-Ikhwan Gresik [The influence of learning habits, self-regulation and social environment on the learning achievement of students at MTs Al-Ikhwan Gresik]," *J. Educ.*, vol. 6, no. 4, pp. 21190–21210, 2024, doi: 10.31004/joe.v6i4.6036.

[22] C. A. R. Putrie, "Pengaruh regulasi diri siswa terhadap prestasi belajar siswa kelas viii pada mata pelajaran ips [The influence of student self-regulation on the learning achievement of grade VIII students in social studies subjects]," *Res. Dev. J. Educ.*, vol. 7, no. 1, p. 136, 2021, doi: 10.30998/rdje.v7i1.8105.

[23] A. H. Ziadat and M. A. Sakarneh, "Academic achievement and self-regulated learning from parent's perspective of student with learning difficulties," *Int. J. Eval. Res. Educ.*, vol. 11, no. 3, pp. 1028–1039, 2022, doi: 10.11591/ijere.v11i3.22177.

[24] E. K. Essa, "Strategies for Self-regulated learning and associated impact on academic achievement in an EFL context," *EduLine J. Educ. Learn. Innov.*, vol. 2, no. 4, pp. 533–540, 2022, doi: 10.35877/454ri.eduline1451.

[25] N. Nurfadhilah, "Analisis Pendidikan Karakter Dalam Mempersiapkan Pubertas Menuju Generasi Emas Indonesia 2045," *J. Pendidik. Dasar*, vol. 10, no. 1, pp. 85–100, 2019, doi: 10.21009/jpd.v10i1.11124.

[26] B. J. Zimmerman, "A social cognitive view of Self-Regulated academic learning," *J. Educ. Psychol.*, vol. 81, no. 3, pp. 329–339, 1989, doi: 10.1037/0022-0663.81.3.329.

[27] C. A. Wolters, P. R. Pintrich, and S. A. Karabenick, *Assessing Academic Self-Regulated Learning*, Vol 3. Boston: The Search Institute Series on Developmentally Attentive Community and Society, 2005, doi: 10.1007/0- 387-23823-9 16

[28] D. Straub, M.-C. Boudreau, D. Gefen, D. Straub, M. Boudreau, and D. Gefen, "Communications of the association for information systems validation guidelines for is positivist research validation guidelines for is positivist research validation guidelines for is positivist research," *Commun. Assoc. Inf. Syst.*, vol. 13, no. 13, pp. 380–427, 2004.

[29] H. Taherdoost, "Validity and reliability of the research instrument; How to test the validation of a questionnaire/survey in a research," *SSRN Electron. J.*, vol. 5, no. 3, pp. 28–36, 2018, doi: 10.2139/ssrn.3205040.

[30] S. Arikunto, *Prosedur Penelitian Suatu Pendekatan Praktik*. Jakarta: Rineka Cipta, 2010.

[31] J. Zhang and L. J. Zhang, "Exploring the profiles of foreign language learners' writing self-regulation: focusing on

individual differences," *Read. Writ.*, 2024, doi: 10.1007/s11145-024-10568-x.
[32] B. J. Zimmerman, *Self-Regulated Learning: Theories, Measures, and Outcomes*, Second Edi., vol. 21. Elsevier, 2015. doi: 10.1016/B978-0-08-097086-8.26060-1.
[33] E. Panadero, "A review of self-regulated learning: Six models and four directions for research," *Front. Psychol.*, vol. 8, no. APR, pp. 1–28, 2017, doi: 10.3389/fpsyg.2017.00422.[34] E. K. N. Matitaputty and F. Kurniawati, "Effectiveness of Self-Regulated learning intervention program in forethought phase of a school underachiever," *Psychol. Res. Urban Soc.*, vol. 3, no. 2, p. 109, 2020, doi: 10.7454/proust.v3i2.95.
[34] E. K. N. Matitaputty and F. Kurniawati, "Effectiveness of self-regulated learning intervention program in forethought phase of a school underachiever," *Psychol. Res. Urban Soc.*, vol. 3, no. 2, p. 109, 2020, doi: 10.7454/proust.v3i2.95.
[35] J. Husman and L. Corno, "Volitional control of learning," *Int. Encycl. Educ. Third Ed.*, pp. 724–731, 2009, doi: 10.1016/B978-0-08-044894-7.00604-7.
[36] J. Breitwieser and G. Brod, "The interplay of motivation and volitional control in predicting the achievement of learning goals: An intraindividual perspective," *J. Educ. Psychol.*, vol. 114, no. 5, pp. 1048–1061, 2022, doi: 10.1037/edu0000738.
[37] M. F. A. F. Majid, M. F. Nalva, and B. Baharuddin, "Self Control dalam meningkatkan konsistensi belajar akademik [Self Control in improving academic learning consistency]," *KONSELING J. Ilm. Penelit. dan Penerapannya*, vol. 1, no. 1, pp. 41–48, 2019, doi: 10.31960/konseling.v1i1.339.
[38] R. M. Ryan and E. L. Deci, "Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions," *Contemp. Educ. Psychol.*, vol. 61, no. xxxx, p. 101860, 2020, doi: 10.1016/j.cedpsych.2020.101860.
[39] L. Zhang *et al.*, "Neural representation and modulation of volitional motivation in response to escalating efforts," *J. Physiol.*, vol. 601, no. 3, pp. 631–645, 2023, doi: 10.1113/JP283915.
[40] D. H. Schunk and J. A. Greene, *Handbook of Self-Regulation of Learning and Performance*, Second Edi. Newyork: Routledge, 2018. doi: 10.4324/9780203839010.
[41] C. Dignath and G. Büttner, "Teachers ' direct and indirect promotion of self-regulated learning in primary and secondary school mathematics classes – insights from video-based classroom observations and teacher interviews Content courtesy of Springer Nature , terms of use apply. Ri," pp. 127–157, 2018.
[42] J. A. Sloan and T. E. Frank, "Student self-assessment data: an instrument for program assessment," *Intersect. A J. Intersect. Assess. Learn.*, vol. 4, no. 2, 2023, doi: 10.61669/001c.84511.
[43] D. Paquette and J. Ryan, "Bronfenbrenner ' s Ecological Systems Theory," pp. 1–4, 2001.
[44] C. A. Wolters and M. Hussain, "Investigating grit and its relations with college students' self-regulated learning and academic achievement," *Metacognition Learn.*, vol. 10, no. 3, pp. 293–311, 2015, doi: 10.1007/s11409-014-9128-9.
[45] M. N. Wangid, "The role of Self-Motivation in Self-Regulated learning," *PSIKOPEDAGOGIA J. Bimbing. dan Konseling*, vol. 11, no. 1, p. 14, 2022, doi: 10.12928/psikopedagogia.v11i1.14175.
[46] W. Guo, "Grade-Level differences in teacher feedback and students' Self-Regulated learning," *Front. Psychol.*, vol. 11, no. May, pp. 1–17, 2020, doi: 10.3389/fpsyg.2020.00783.
[47] S. A. Abbas, Z. N. Kusumawardani, N. F. Suprayitno, and N. Jafar, "Driving factors of motivation and its contribution to enhance performance. innovative," *J. Soc. Sci. Res.*, vol. 3, no. 2, pp. 7266–7280, 2023.
[48] M. Muraven, "Building Self-Control strength: Practicing Self-Control leads to improved Self-Control performance," *NIH Public Access*, vol. 46, no. 2, pp. 1–9, 2010, doi: 10.1016/j.jesp.2009.12.011.Building.
[49] American Psychological Association, "Strengthening Self-control," *Am. Psychol. Assoc.*, pp. 13–15, 2020.
[50] M. Ardelt and S. Grunwald, "The importance of self-reflection and awareness for human development in hard times," *Res. Hum. Dev.*, vol. 15, no. 3–4, pp. 187–199, 2018, doi: 10.1080/15427609.2018.1489098.