Profile of Self-Regulated Learning on First-Year Students at Science Education Department in Online Learning

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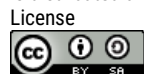
Abstract: Online learning requires students to study independently and manage lectures according to the time set. Researchers need to know the criteria for self-regulated learning of first-year students at the Physics Education Department. This paper aims to determine self-regulated learning during online learning. The study used a quantitative research approach with a survey method. The Online Self-Regulated Learning Questionnaire (OLSQ) collected the data, a 20-item scale with a 5-point Likert-type response format. The sample of this study was 131 students of physics and chemistry education study programs. Each was randomly selected to see how their respective study programs implemented independent learning activities during online learning. The results showed that each indicator of independent learning in online learning received a positive response through the OLSQ instrument that had been distributed. The disciplined behavior indicator has a higher percentage, followed by the exercise self-control indicator. Generally, the pre-service students have self-regulated learning with high criteria. This result can provide a good contribution and open for further research. The implication of this research can be a reference for lecturers to improve online and self-regulated learning quality.

INTRODUCTION

Various aspects of human life, including social life, health, economy, and education, have changed the system due to the global spread of the coronavirus disease 2019 (COVID-19) pandemic since early 2020 (Sahu, 2020). The policy in the field of education is one that the government has converted, and the current implementation of education is being transferred to an online system (Dakhi et al., 2020; Novalinda et al., 2020). Learning that can bring together students and lecturers to carry out learning interactions with the help of the internet is called online learning. The online learning process encourages students to learn independently at a distance by utilizing existing references and technology. Students can still not manage their situation and circumstances for online learning activities (Abtokhi et al., 2021). Some students prioritize activities that do not benefit their self-development compared to learning activities.

Theoretically, self-regulated learning is referred to as a process model using a cyclical structure in the phases before (forethought), during (performance), and after (self-reflection) learning to students so that they can achieve the desired results in a particular learning environment (Cai et al., 2021; Panadero, 2017; Peel, 2020). It is the ability to grasp one's learning environment and how to control it (McCombs & Williams, 2021). Self-regulated learning can also be interpreted as the extent to which individuals are metacognitive, motivated, and active participants in their learning activities (Ali et al., 2021).

Self-regulated learning can be built online learning and applied to digital simulation-based learning. Furthermore, students who learn to learn online have more opportunities to learn information, additional access to learning resources, and more significant collaboration opportunities compared to students who study in conventional classes. The ability of students to engage independently and actively in the learning

process is a success factor in the online learning process. Students in distance learning are required to be more independent because the nature of online settings results in independent learning. Therefore, online learners can control, manage, and plan their learning actions. Such regulatory processes have been referred to as self-regulated learning (Fatih et al., 2020). Learning independence is one of the important things in the learning process. Independent learning is needed for every teenager, both students and students, so that they have the responsibility to organize and discipline themselves, in addition to developing the ability to learn.

Physics is a science that studies the behavior of nature in various forms of symptoms to be able to understand what controls or determines that behavior. Based on this, learning physics cannot be separated from mastering the basic concepts of physics through understanding. Basically, physics is basic science. The theory of physics is not only readable because the theory of physics is not just rote but must be read, understood, and practiced so that students can explain the problems that exist (Abtokhi et al., 2021). The environment for students to actively participate in scientific investigation and independently acquire knowledge is created through physics education. This time has metamorphosed from a simple exchange of knowledge given and received in lectures by imitating students' experimental operations. (Cai et al., 2021). Learning physics online is the biggest challenge for educators, as they need to convey the concept of physics through existing technology. Although learning is carried out online, educators certainly expect the concept of physics to be fully understood by each individual.

The indicators of learning independence instrument developed are: (1) independence from others, (2) self-confidence, (3) behaving discipline, (4) having a sense of responsibility, (5) behaving on their initiative, and (6) exercise self-control (Hidayati & Listyani, 2010). Level independence can be measured through indicators of self-management, desire to learn, and self-control (Herliana et al., 2021). The study's results showed that the experience of student learning independence can be associated with forms of motivation given to him so that he can improve academic outcomes. In addition, students assume that the lecturer can support independence through learning courses (Syefrinando et al., 2020). Based on the above background, the study aims to examine the problem of the criteria for self-regulated learning of first-year students at the Physics and Chemistry Education Department and determine the self-regulated learning during online learning.

METHOD

This research uses a quantitative research approach with a survey method. Data were analyzed using the percentage equation (Creswell, 2016). This research was conducted at the Department of Physics and Chemistry Education of the state university in South Sumatera. The population of this research were students of the Department of Physics and Chemistry Education. The research subjects used 131 students as population research. The data were collected by the Online Self-Regulated Learning Questionnaire (OLSQ), a 20-item scale with a 5-point Likert-type response format. The questions are arranged based on the self-regulated learning indicators in Table 1.

Table 1. The amount item number of self-regulated learning

No.	Indicator	Item Number (Statement Type)
1.	Independence from others	1 (-), 4 (-), 6 (+), 16 (+)
2.	Have self-confidence	8 (+), 10 (-), 17 (+)
3.	Behave in a disciplined manner	11 (+), 12 (-), 18 (+)
4.	Have a sense of responsibility	7 (+), 13 (-), 14 (+)
5.	Behave on their initiative	2 (+), 3 (+), 5(-), 20 (+)
6.	Exercise self-control	9 (+), 15 (-), 19 (+)

Based on the instrument, each question has answer options as follows: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The instrument has been tested on different samples to obtain validity and reliability test results on the instrument. Validity testing is filled by expert judgment. This is evidenced by the confirmatory method factor analysis with the goodness of fit test producing an index of 127.398 with 85 degrees of freedom and a p-value of 0.002, so the data is multivariate and

normally distributed. The reliability coefficient of the learning independence instrument used has a score of 0.880, so it has high reliability.

The percentage of each indicator is subsequently analyzed descriptively in greater detail using the Miles & Huberman (1992) analysis technique. This technique comprises three steps: data reduction (eliminating irrelevant data), data displaying (comprehending and planning the next steps), and conclusion drawing/verification (addressing the research questions). Additionally, the study utilizes the triangulation technique, which involves referencing other data sources, such as student observations and interviews, to ensure the validity and accurate depiction of the actual conditions.
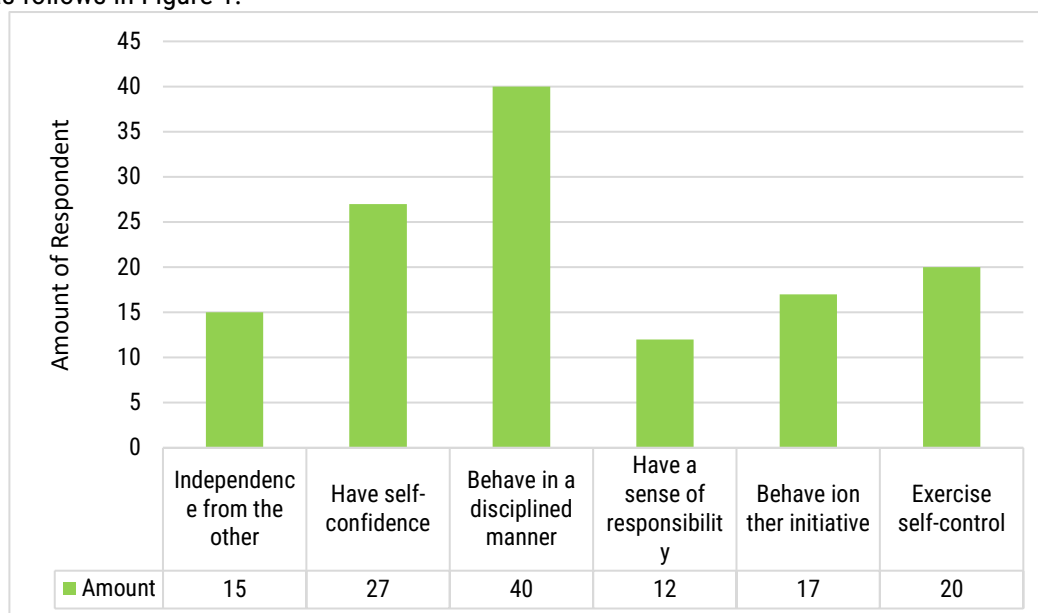
Table 1. The criteria of self-regulated learning based on the percentage (%)

No	Interval	Criteria of Self-regulated Learning
1	81% - 100%	Very High
2	61% - 80%	High
3	41% - 60%	Moderate
4	21% - 40%	Low
5	0 % - 20 %	Very Low

RESULT AND DISCUSSION

The instrument in the form of a questionnaire has been distributed online and obtained by 131 participants consisting of students of physics education at Sriwijaya University and UIN Raden Fatah Palembang from the 2020 to 2021 class. The questionnaire instrument was based on aspects of self-regulated learning proposed by Zimmerman, namely metacognition, motivation, and behavior (Zimmerman, 2013; Zimmerman & Schunk, 2001). Based on the three aspects, a questionnaire consisting of 20 items was obtained. Researchers use categories to see the picture of self-regulated learning in students; there are three categories, namely low (R), medium (S), and high (T).

Based on table 2 below, it has been described the tendency of a student to learn independence during online learning, which refers to the six indicators of learning independence, namely: 1) Independence from others, 2) self-confidence, 3) Discipline behavior, 4) Having a sense of responsibility, 5) Behave on their initiative, and 6) Exercise self-control. The score data from the calculation of indicators are as follows in Figure 1:

Amount	Independence from the other	Have self-confidence	Behave in a disciplined manner	Have a sense of responsibility	Behave ion ther initiative	Exercise self-control
Amount	15	27	40	12	17	20

Figure 1. Number of Physics and Chemistry Education Department respondents who choose SA and A answers, respectively, self-regulated learning indicator

Table 2. The criteria of self-regulated learning based on the percentage (%)

| Indicator	Percentage	Criteria of Self-regulated Learning
Independence from others	64.46 %	High
Have self-confidence	66.86 %	High
Behave in a disciplined manner	70.80 %	High
Have a sense of responsibility	68.23 %	High
Behave on their initiative	66.28 %	High
Exercise self-control	68.53 %	High

Based on the results of data analysis on the self-regulated learning scale, table 2 shows that the tendency of self-regulated learning in students who applied online learning is included in the high category. This can be seen from the analysis of each variable indicator of self-regulated learning, which shows that almost all respondents have the intensity of learning independence in the high category.

The percentage of self-regulated learning pre-service students on the first indicator is 64.46%. The results of data analysis from Table 2 can be concluded as general; the learning independence of Physics Education students in the indicator of independence from others is categorized as high. The results showed that most students who participated in online learning had high levels. The condition of self-regulated learning activities is not dependent on others; they have the will and are responsible for their learning in completing their studies. Students can also improve their learning outcomes not because of the encouragement of others but because of their own will. Students can determine their learning strategies to complete assignments given by lecturers after online learning is carried out and adjusted to the abilities possessed by individuals (Viberg et al., 2020). Self-regulated learning is self-awareness that is driven by oneself. It can also be called the ability to learn from oneself to achieve goals (Adam et al., 2017; Ellyawati et al., 2022).

The self-regulated learning percentage of pre-service students on the indicator of having self-confidence is 66.86%. The result of having self-confidence can be concluded that, in general, the learning independence of Physics Education students in the indicators of having high self-confidence is a high category. The results showed that most students who took part in online learning had high self-confidence. Confident students are characterized by having the confidence to overcome problems encountered during learning. This is also true of the observation data that more than 50% of students showed activeness in asking questions during learning, both related to learning and about the truth of the knowledge they gained. Daring to argue with ideas different from others is also a sign that students have confidence (Biwer F. et al., 2021). Someone who has positive self-confidence shows that the person has the ability or advantage that will be able to achieve his goals. A person's belief in all aspects of the advantages that that person has and this belief influences a person to feel capable of achieving various goals in life can be interpreted as self-confidence (Aurah, 2013).

Pre-service teachers' percentage of self-regulated learning on the indicators of disciplined behavior is 70.8 %. Based on Figure 1, the third indicator has the most respondents from all of the indicators. In general, self-regulated learning with an indicator of disciplined behavior is categorized as a high category. These results show that students try to be present on time during lectures through online learning. This is also proven through observations and interviews with lecturers that all students come on time during lectures.

Figure 2 shows the learning activities of pre-service students from Zoom meetings in some courses. The indicator of disciplined behavior also shows that students make plans for learning activities and collect lecture assignments on time through e-learning. The results showed that most students who took the learning with blended learning had positive discipline behavior (Toro, 2022). Discipline is related to one's self-control to follow various rules of self-awareness. As well as discipline in learning also includes the willingness to learn that is driven from within the individual (Patriot & Laksono, 2023a; Stephanou & Mpiontini, 2017).
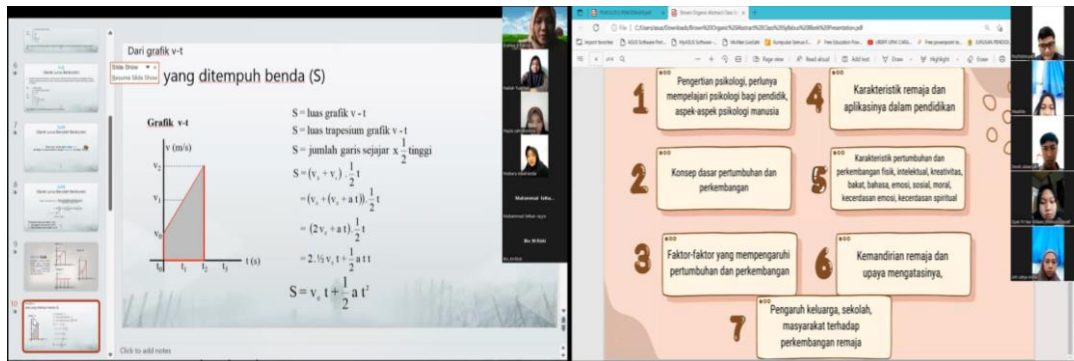
Figure 2. Learning Activities of Pre-service Students from Online Learning

The percentage of students having a sense of responsibility in physics education is 77.6%. The indicators that have a sense of responsibility are categorized as high. The results showed that most students who take part in online learning have a strong sense of high responsibility. Someone is said to be responsible if that person is highly committed to their duties and work. This shows that students encourage themselves to continue to be enthusiastic in learning. This enthusiasm is influenced by the technology used when studying. Independent students are responsible for identifying learning needs and deciding how to achieve goals with the best strategy (Nur et al., 2014). The characteristics of people who have responsibilities are: 1) have a high commitment, 2) want to be responsible, 3) energetic, 4) future-oriented, 5) ability to lead, 6) willing to learn from failure, 7) self-confidence and 8) obsession with achieving better performance (Cebesoy, 2013; Patriot & Laksono, 2023b).

The percentage of self-regulated learning of pre-service teachers on the behavior indicators based on their initiative is 66.28 %. It can be concluded that students' indicators of behaving based on their initiative are categorized as high. The results showed that most students who took part in online learning behaved in a positive initiative. These results show that students can argue consciously about their wishes. Based on the results of interviews with teachers related to learners' awareness, claiming is still considered problematic. Independent learners are the result of discovery learning; they must understand themselves and the environment. Motivation also influences this independence; motivation is essential in completing learning activities (Geng et al., 2019). If motivation is not disturbed, memory, cognition, intelligence, and reasoning will run well (Hai-Jew, 2012; Sangsawang, 2020). Good cognition makes learners act consciously of their own accord, plan their learning activities, and do practice questions even though the teacher has not assigned the task. Someone with the initiative can be told that the person can give birth to something new in the form of ideas or works that are relatively different from what existed before to solve a problem (Khairani et al., 2021; Sutarni et al., 2021).

Meanwhile, the percentage of the indicators of self-control is 68.53%. The indicators of self-control are categorized as high. The results showed that most students taking courses in the learning environment with online learning exercise self-control. According to Zimmerman (2008), self-regulated learning occurs in learners who have control over the learning process by understanding their tasks, applying appropriate strategies, learning motivation, and reinforcement in decision-making. Learning independence is closely related to students' learning motivation. Learning motivation allows learners to move and be interested in the following learning. Emerging learning motivation is a crucial driver to stimulate independent learning habits (Biwer et al., 2021) so that learners will become lifelong learners inside and outside the classroom (in the community) (Zumbrunn et al., 2015; Hamdan et al., 2021).
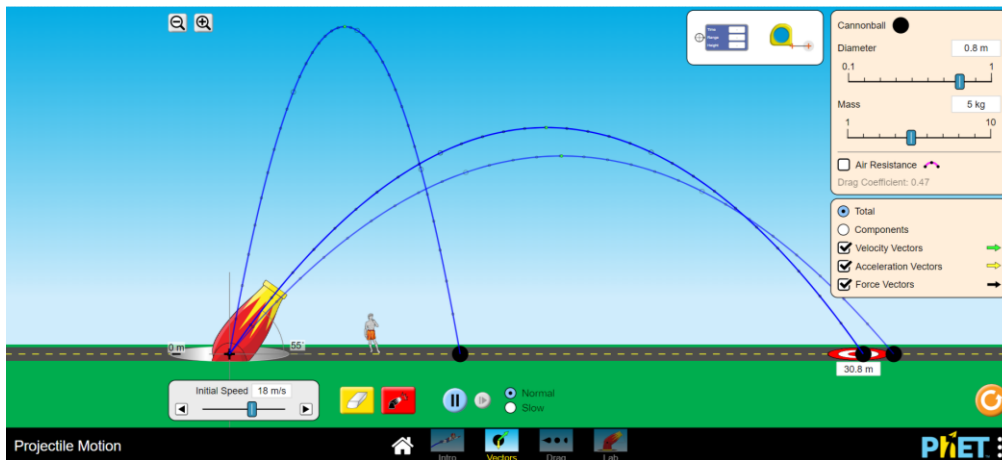
Figure 3. Interactive Media Learning Explored by Pre-service Students from Online Learning

Learning independence can be enhanced by using interactive media to help learners have high motivation because they feel interested and enjoy the learning experience (Lalitha & Sreeja, 2020). Learning independence also allows learners to control themselves and monitor themselves as a process of acquiring and validating their knowledge. Self-regulated learning can be realized if students can control themselves over everything they do, evaluate, and also plan something in the learning process. Students with positive self-control can manage information, emotions, and emotional behavior. Two points are strongly emphasized in self-regulated learning: first, it highlights how students select, organize, and create their learning environments for themselves. Second, how they plan and control the learning tasks (Sun et al., 2023; Taub et al., 2022). Based on the percentage of the results of filling out the OLSQ questionnaire for each item of self-regulated learning indicators, the researcher has conducted interviews directly with each student regarding their perceptions of increasing learning independence during online lectures. The following are the results of interviews with students as research samples.

Subject 1 (AB)
I never worry if there will be an impromptu quiz because I have studied beforehand; it's just that sometimes I worry if the results are different from what I expected. When I get the answers to the questions given by the lecturer, I can and can answer them correctly. And if the results are as expected, my hard work in studying is worthwhile because my target is a very satisfying score. During online learning, I do and complete my work without asking for help from friends. I always submit the assignments on time according to the deadline given by the lecturer.

Subject 2 (SFR)
When I am faced with questions from lecturers or tests/quizzes, I am not confident in my answers for fear of being wrong or not in line with the lecturer's expectations. But I am satisfied and happy if I can correctly answer a difficult question, like facing a challenge and succeeding. Although anxious about my answers, I was confident I could answer the questions correctly and get satisfactory results. During the online learning, I did and completed the work by occasionally asking for help from friends. I always submit the assignments on time according to the deadline given by the lecturer, but sometimes, I need to remember to submit the assignments.

Subject 3 (EFN)
When I answer a lecturer's question, I feel confident even though the answer may not necessarily be correct or completely wrong. The important thing is that I answer the question rather than stay silent. The same goes for answering quizzes or exams. But if I get a high score, that's something extraordinary, especially if I answer by myself without using the help of friends. However, in looking for answers, I was anxious about being unable to answer one of the questions, so I wondered if I could get a good score. During online learning, some things helped me to understand the lecture material. Although I mostly lacked understanding. In completing assignments, I did what I could by asking for help from friends. I

always submit the assignments on time according to the deadline given by the lecturer, but sometimes, I need to remember to submit the assignments.

Subject 4 (DAS)

In answering the lecturer's questions, I feel confident but wonder whether the answer given is correct. I answer by looking for good references from search engines, even though my answers are incorrect. If there is an impromptu test, it is undoubtedly an obstacle for me because I often need to prepare, so I ask my friends to help me answer. During online learning, many things can help me understand the lecture material. There are more things I don't understand. In completing assignments, I do what I can by asking for help from friends. I always submit the assignments on time according to the deadline given by the lecturer, but several times, I must remember to submit the assignments. Online learning makes me have to learn and ask again with friends related to the material taught by the lecturer.

Based on interviews, students have high self-confidence in their ability to do tasks. Based on the research results presented, learning independence can be fostered by providing exercises and tasks to stimulate students to solve problems (Sangsawang, T., 2020; Carter Jr R. A. et.al., 2020). In addition, learning can also be done through interactive multimedia-based learning, Blended Learning, Google Classroom, Moodle, and project-based assignments to increase students' learning independence (Hamdan, K. M., et al., 2021).

The COVID-19 outbreak has forced learning activities to be done online. The condition of students being "forced" to study from home because face-to-face learning is excluded as a form of negative impact for all levels of education, starting from schools under the Ministry of Education and Culture of the Republic of Indonesia and those under the Ministry of Religion of the Republic of Indonesia (Laxdal et al., 2020). Elevating self-regulated learning, learning without direct guidance from educators, makes students independent in seeking information about the material and assignments given to them, which is a form of the positive side of online learning. This certainly requires greater student involvement to improve observational learning behavior. This self-regulated learning can be done by reading related references, discussing in forums, and watching videos or learning content (de Barba et al., 2019). Through online learning, adolescents can freely manage self-regulated learning strategies that show students are not pressured by time in online learning because they can set their schedule and where they want to study. Online learning enables access to information and knowledge at home and anywhere (Stephen et al.,2019). In addition, online learning eliminates clumsy feelings so they can express thoughts and ask freely.

Research Limitations, advantages, and recommendations

This research certainly has limitations that could be improved, namely the target of distributing questionnaires to a much wider scope of research samples. The results obtained are intended to be represented in study programs with accreditation, scope of learning, and diverse individual learning methods in each study program in higher education. This research is a good first step in identifying how students' self-regulated learning during the online learning process is used. The results obtained help lecturers in each study program and college evaluate the methods used in lectures and contribute more to innovation in teaching methods, teaching materials, media used, and skills to be improved in prospective science teacher students. The next recommendation for this research is to apply several innovations in learning that can be used and evaluate students' abilities and skills to support the lecture process. In addition, it can also be associated with other variables such as self-efficacy, academic motivation, cognitive and metacognitive.

CONCLUSION

From the results of the research about online learning and self-regulated learning of Physics and Chemistry Education students at University, the percentage of self-regulated learning results from 6 indicators, namely: 1) independence from others is 64.46% as high category, 2) self-confidence of 66.86% as high category, 3) disciplined behavior of 70.8% as high category, 4) having a sense of responsibility 77.6% as high category, 5) behaving based on their initiative 66.28% as high category, and 6) exercising

control of self is 68.53% as high category. This result can provide a good contribution and open for further research. The implication of this research can be a reference for lecturers to improve online and self-regulated learning quality. For future improvement, results of this paper can be used for preparing and refining curriculum in the chemistry and physics education department as a reference related to self-regulated learning.

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