



Implementation e-learning through physics education study program learning on Self-Regulated Learning (SRL)

Evelina Astra Patriot^{1*}, Pandu Jati Laksono²

¹Department of Physics Education, Universitas Sriwijaya, Indonesia

²Department of Chemistry Education, Universitas Islam Negeri Raden Fatah Palembang, Indonesia

**E-mail: evelinaastrapatriot@fkip.unsri.ac.id*

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ABSTRACT

The Covid-19 pandemic in Indonesia has caused various learning changes that initially used the direct learning process to become distance learning. In this research, the researcher aims to implement e-learning through introductory physics lectures in the physics education study program for prospective science teachers. The type of research used is experimental research with a one-shot case study research design. The sample in the research is a candidate for science teacher in semester 1 (one) in the physics education study program as many as 40 students. This study uses an instrument in the form of a self-regulated learning instrument with 19 questions. The results of this study indicate that the SRL indicator is independence from others as much as 73%, 70% of students in the indicator of self-confidence, 68% behave in a disciplined manner, 68% have a sense of responsibility, the ability to control themselves is 77%, and the percentage is 79 % behave on their initiative. The application of e-learning can provide opportunities for prospective science teacher students to develop and improve Self-Regulated Learning (SRL) in the basic physics lecture process. This research implies an alternative choice of learning that can be applied in basic physics lectures to support student learning independence.

Keywords: E-Learning, physics education, Self-Regulated Learning (SRL)

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INTRODUCTION

Challenges are being faced by primary, secondary, and higher education in Indonesia. This is due to the Covid-19 pandemic in Indonesia, causing a change from face-to-face learning to distance learning. The problems faced during the pandemic are distance, time, and location. COVID-19 urges the implementation of distance learning which has never been done simultaneously before for all elements of education. Higher education, especially at the

University level, has also transformed face-to-face learning into distance learning.

Basic physics is one of the compulsory subjects in the physics education study program at one of the State Universities in Palembang, which first-semester students take. The expected achievement after attending this lecture is to have good knowledge and understanding of various methods and techniques contained in basic physics and to be able to use physics as a method of problem-solving processes in everyday life. This course discusses the matter of mechanics, matter and energy, fluids and temperature, and heat. The content of this course is presented interactively through a lecture process, group discussion, and giving practice questions. This basic physics learning process is implemented through distance learning, namely using e-learning due to the Covid-19 pandemic conditions in the South Sumatra area, especially Palembang city.

E-learning is a form of information technology in education as a virtual world. E-learning is more appropriately intended to transform the existing learning process in schools or colleges into a digital form bridged by internet technology (Wahyuni, A.D., 2021). According to Thompson, quoted by Petretto, D. R., et.al. (2021), E-learning is instructional content or learning experiences delivered or enabled by electronic technology. E-learning also has the advantage that students can share information and access learning materials at any time and repeatedly to strengthen their mastery of learning materials. The use of web-based learning resources is more profitable because of their interactivity and accessibility and can increase students' active learning independence.

E-learning can also be a solution in offering various social networking possibilities so that, in this way, teachers can keep records of different educational interactions. Based on the results of research conducted by Shahzad, A., et.al. (2021) that e-learning in optical wave courses can improve students' conceptual understanding. Other research results show that the e-learning learning process using online physics teaching materials can also develop students' independence and interest in learning on heat. The distance learning process carried out by researchers using zoom meetings and also e-learning has been developed (Turnbull, D., et.al., 2021; Maatuk, A. M., et.al., 2022; Coman, C., Țîru, L. G., et.al., 2020).

The independent word means not depending on others, being free, and being able to do it yourself (Shao, M., et.al., 2020); Maulana, A. W., et.al., 2019). Learning independence is defined as the nature and ability of students to carry out active learning activities, which are driven by a motive to master a competency, and are built with the knowledge or competencies they already have (Susanti, N., et.al., 2020). Learning independence is an attitude that must be carried out by students when learning independently; students have the initiative according to the needs of the students themselves. Independence always helps the learning process by activating knowledge, strengthening and securing what has been learned, as well as providing motivation in connection with a willingness to learn (Holstein, 1986; Utomo, K. D., et.al., 2020)

In line with the opinion conveyed by Dimiyati as quoted by Syarif (2012), learning independence can be interpreted as a learning activity, and the ongoing process is more driven by their own will, their own choices, and their responsibility from the student. Students are said to have been able to learn independently if they have carried out learning tasks without dependence on others. A self-regulating (SRL) student actively participates in their learning rather than simply receiving it. The three cyclical phases of learning, Forethought, Performance, and Self-Reflection, enable SRL in accordance with Zimmerman's Social Cognitive Theory

(Zimmerman, 2013). Students employ various monitoring and management techniques during each of these phases. The planning and goal-setting phases of the forethought phase involve the student outlining their objectives for finishing a task and their plan for doing so. Students' motivations frequently impact these choices (e.g., achievement goals). Students use cognitive learning techniques (such as reading the material and taking notes) and metacognitive monitoring processes (like time management) to complete tasks during the performance phase (Zimmerman, 2015). Based on the description above, the researcher aims to implementation of e-learning through introductory physics lectures in the physics education study program for prospective science teachers and to know Self-regulated Learning (SRL) from each student.

RESEARCH METHODS

The researcher uses research method is quantitative research. The researcher collects facts about students' independent learning attitudes using a learning independence questionnaire in basic physics lectures. The researcher uses total sampling because the researcher wants the research results to apply to the population, namely the first-year physics education students, as an experimental class consisting of 40 students.

In this design, the test was carried out once after experimental treatment. The questionnaire developed is a closed questionnaire in the form of an attitude questionnaire for students' independence in learning physics. This attitude questionnaire was Hidayati & Listyani (2010). The questionnaire consists of 19 positive and negative statements about students' self-regulated learning (SRL) in basic physics lectures. This Likert scale assessment uses four scale indicators, namely strongly agree (SS), agree (S), disagree (TS), and strongly disagree (STS). For positive (+) statements, the measurement starts from values 4, 3, 2, and 1. On the scale, strongly agree (SS) has a score of 4, agree (S) has a score of 3, disagree (TS) has a score of 2, and strongly disagree (STS) has a score of 1. While on the contrary, for negative (-) statements, the measurement starts from values 4, 3, 2, and 1 on the strongly disagree (STS) scale. The assessment strongly disagrees (STS) has a score of 4, disagree (TS) has a score of 3, agree (S) has a score of 2, and strongly agree (SS) has a score of 1.

Table 1. The points of Self-regulated Learning (SRL) instruments

Indicators	Item Numbers	Total
Independence from others	1(+), 4(-), 6(+), 16(+)	4
Confidence	8(+), 10(-), 17(+)	3
Discipline	11(+), 12(-), 18(+)	3
Responsible	7(+), 13(-), 14(+)	3
Own initiative	2(+), 3(+), 5(-)	3
Doing self control	9(+), 15(-), 19(+)	3
Total		19

RESULTS AND DISCUSSION

The implementation of the online learning process has been applied to first-semester

students taking basic physics courses. After going through 16 meetings, students are given a self-regulated learning questionnaire to get percentage results based on each indicator of the student's assessment during the online learning process. The bar chart below shows the average score of student learning independence who has received the lecture process through e-learning or the distance learning process (PJJ).

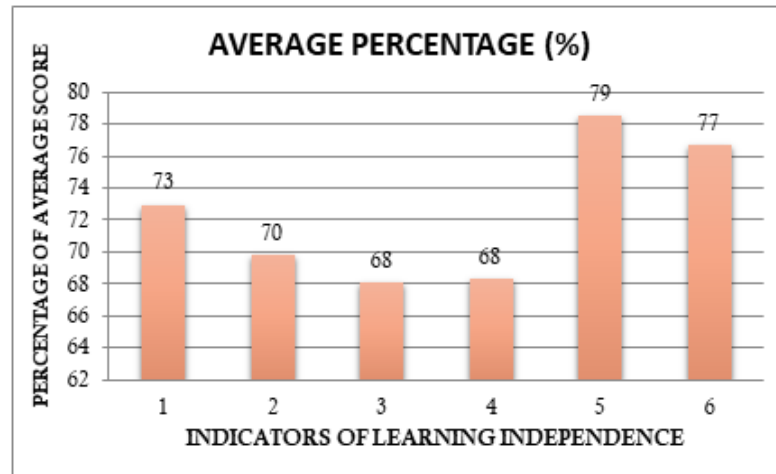


Figure 1. Bar chart of the average score of independent learning score

Caption:

1. Independence from others,
2. Have self-confidence,
3. Behave discipline,
4. Have a sense of responsibility,
5. Behave on your own initiative,
6. Doing self-control

Based on the table and figure above, it can be seen that the percentage of the average score of the largest learning independence of all participants is on indicator 5, namely self-initiative behavior of 79%. While the percentage of the average score on indicators 3 and 4, namely disciplined behavior and having a sense of responsibility, has the lowest category compared to the percentage of other indicators, which is 68%. The process of applying Basic Physics lectures was carried out two times for static fluid material and dynamic fluid material. The e-learning lectures are implemented through the university's e-learning portal and zoom meeting facility.

Virtual simulations are also used to support the lecture process through discussions between students using Phet Simulation from Colorado University. Students can independently use the virtual simulation that has been given and can repeat the lecture videos that have been recorded and uploaded. On the other hand, it shows that learning with the scaffolding approach assisted by PhET simulation is effective in improving students learning independence (Eveline, E., et.al., 2019)

The other result stated that students with high independence participating in distance learning will always compete to show the best results. This will lead to optimal learning achievement. Individuals who have high learning independence tend to learn better, can monitor, evaluate, and manage their learning effectively; devote time to completing work,

manage study and time efficiently, and obtain higher scores in science lessons (Tsaniyah, S. F., Ayu, H. D., & Pratiwi, H. Y., 2019).

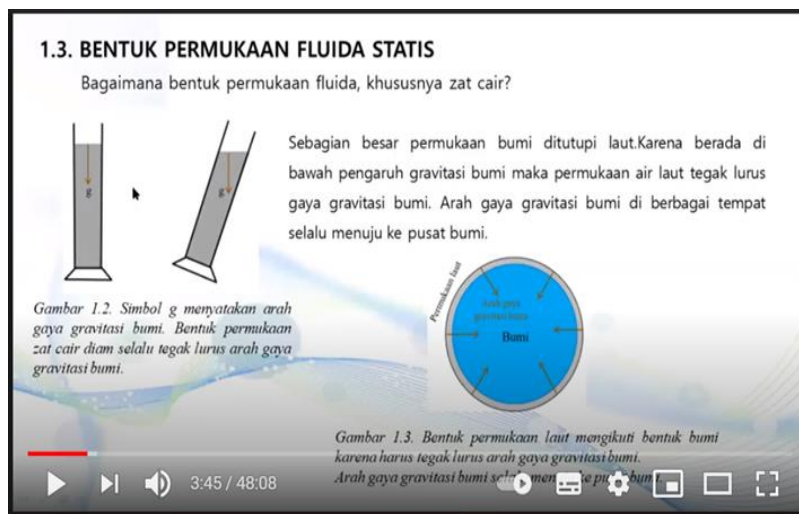


Figure 2. Static and dynamic fluid learning videos

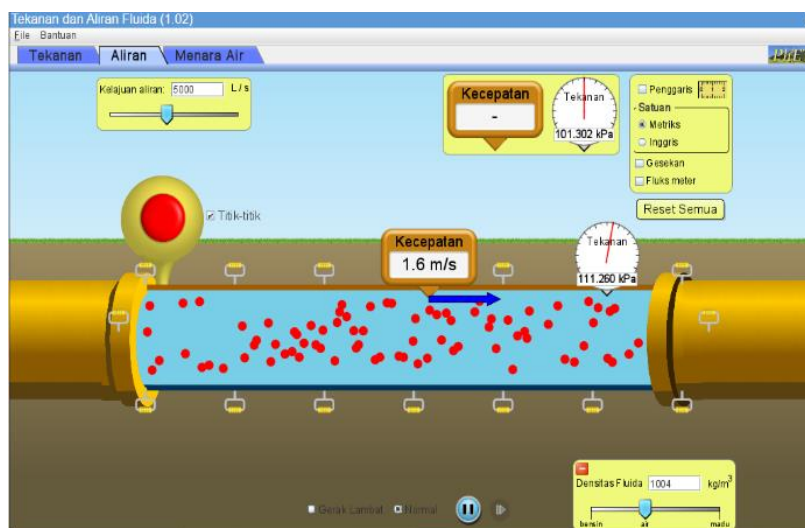


Figure 3. Phet simulation of static and dynamic fluids

The COVID-19 outbreak has forced learning activities to be carried out online. According to Purwanto, et al. (2020) all levels of education, from elementary/ibtidaiyah schools to universities (universities) both under the Ministry of Education and Culture of the Republic of Indonesia and those under the Ministry of Religion of the Republic of Indonesia, all have a negative impact because students, students, and students are "forced" to study from home because face-to-face learning is abolished. According to Firman and Rahman (2020), online learning has several positive sides: growing independent learning. Learning without direct guidance from educators makes students independently seek information about the material and assignments given to them. It will require. Greater student involvement to improve observational learning behavior. This behavior can be done by reading, interpreting discussion posts, and discussing videos or learning content (Herliandry, Nurhasanah, Suban, and Kuswanto, 2020).

In line with other research indicate that COVID-19-related distance learning had such an

impact on how students finished or intended to finish each module, encouraging more students to adopt goals and strategies that decreased the time and effort needed to pass each module. On the other hand, public involvement, student performance, and self-reflective processes were either minimally affected or not impacted at all (Zhang, T., Taub, M., & Chen, Z., 2021).

Research on independent learning in online students has relevance to several previous studies. Based on research conducted by Hartley (2001), virtual class in e-Learning is a type of teaching and learning that allows the delivery of teaching materials to students using the Internet, Intranet, or other computer network media. The activities carried out by the lecturers are learning through virtual classes, namely:

- 1) Opening the class, here the lecturer gives instructions to students to be absent;
- 2) Class closure;
- 3) Presentation with streaming video;
- 4) Upload and download lecture materials to be given;
- 5) Make exam questions, the question model is fully submitted to the teaching lecturer;
- 6) Check the number of students who attend or take part in this virtual class;
- 7) Provide answers to questions posed by students using a microphone or via chat;
- 8) Provide tasks that support the material presented;
- 9) Discussion through the forum (optional).

On the other hand, the activities carried out by students are 1) absent online using the provided e-learning portal; 2) evaluation in an online form; 3) interaction with lecturers in audio-visual and or use of chat facilities; 4) discussion through the forum (optional). Activities carried out by students in learning with virtual classes allow students to get used to being independent in following the stages of learning activities. Independent learning is important in determining student success in the lecture process. In the lecture process, students are required to be responsible for making decisions related to their learning process and have the ability to carry out their decisions. The positive effect of the SRL intervention leads to the practical implication that implementing SRL instruction benefits learners in open online education. An SRL intervention improves learners' course completion and likely supports learners' SRL activity during learning in the MOOC (Jansen, R. S., et.al., 2020; Hong, J. C., et.al., 2021).

Through online learning, students can freely set their learning strategies; research conducted by Firman and Rahman (2020) shows that students are not pressured by time in online learning because they can set their schedule and place to attend lectures. Online learning allows access to information and knowledge at home and anywhere at students' convenience. Herliandry, Nurhasanah, Suban, and Kuswanto (2020). In addition, online learning eliminates awkward feelings so they can freely express their thoughts and ask questions. Implementation of e-learning through physics education impacts their self-regulated learning, especially indicators that behave on their initiative to respond and give an answer to the lecturer's question, analyze the problem using physics concepts, and self-control to manage their self in physics learning.

CONCLUSION

The conclusion of this study shows that students still have enough confidence and responsibility to study online through e-learning courses. The self-regulated learning (SRL)

analysis showed that the percentage of the average score of all participants' most significant learning independence is on indicator 5, namely self-initiative behavior of 79%. While the percentage of the average score on indicators 3 and 4, namely disciplined behavior and having a sense of responsibility, has the lowest category compared to the percentage of other indicators, which is 68%. This research implies an alternative choice of learning that can be applied in basic physics lectures to support student learning independence. Suggestions for further research are using a larger and broader sample of subjects. Analysis of student learning independence can be identified in depth through a questionnaire accompanied by interviews.

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