

Virtual Class During COVID 19: A Self-Regulated Learning Study of Mathematics Pre-Service Teacher

Mohamad Gilar Jatisunda, Dede Salim Nahdi, Vici Suciawati

Universitas Majalengka, Jl. Raya K H Abdul Halim No.103, Majalengka, Jawa Barat 45418

e-mail: g.jatisunda@unma.ac.id

Abstract

The massive spread of COVID 19 has disrupted the entire system of human life, including the education system. The policy decided by the Indonesian government regarding the learning process must be based online and the university's quick response by taking the initiative to use virtual classroom-based learning. However, with virtual classroom-based learning, independence is the main keyword for the success of student learning processes. The implementation of the virtual classroom-based learning process is based on constructivism theory. Student's initial knowledge becomes important in constructivist classes in achieving learning goals. This research is pre-experimental research with one shoot case study design. Determination of the research sample by purposive sampling technique with a sample size of 33 students of mathematics teacher candidates at Majalengka University. The statistical analysis used was Anova one path. The results showed that the scale of self-regulated learning for mathematics teacher candidates differed significantly based on initial knowledge categories (high, medium, and low). This study concludes that initial knowledge is an important part of student success in virtual classroom-based learning.

Keywords: Virtual Learning, Self Regulated Learning, Prior Knowledge

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INTRODUCTION

The COVID-19 pandemic destroyed all social life, making billions of people live in their homes in global 'lock down', to reduce the spread of deadly diseases. The COVID-19 pandemic has changed the lives of students at various levels of education (Daniel, 2020). Various methods were used to decide the spread of the COVID-19 Pandemic, one of which was the Indonesian government issued a policy for each level of education to carry out the learning process at home. It is a challenge for lecturers to organize online-based learning and of course, the goals of face-to-face learning must be well achieved. Online-based learning challenges teaching strategies and techniques, to provide assessments to students who are not physically present in the classroom (Bušelić, 2012). The majority of literature that studies distance learning explains the success of students in achieving learning goals (Merchant et al., 2014; Schmid et al., 2009). Several studies have shown that technology integration can improve academic performance, inspire and encourage learning activities (Curtain, 2001; Ghavifekr & Rosdy, 2015). The mental health of students during the pandemic must be a concern of policymakers and take interventions that are appropriate to their characteristics (Liang et al., 2020). So when going to make decisions related to technology integration in the learning process lecturers must think carefully and precisely the learning material that follows the needs of students.

During this rapidly growing crisis, it is necessary to have innovative solutions and flexibility needed from students, lecturers, and learning models so that the learning process can run well (Almarzooq et al., 2020; Chick et al., 2020). Technology has quickly changed and developed the learning process in the classroom (Kumar & Bervell, 2019). Alternative learning processes during the current pandemic can be implemented based on virtual-classrooms (Ng & Peggy, 2020). The learning process during this pandemic period that lecturers need to increase their readiness from the negative effects of a pandemic by using a pedagogical strategy that aims to ensure each student is sufficiently prepared for the test (Sintema, 2020). Based on this, it gives thought to stakeholders to be able to carry out online-based learning, and of course, it can be implemented comprehensively. Virtual classroom-based learning is defined as a learning experience in a synchronous or asynchronous environment using various tools (e.g. cellphones, laptops) with Internet access (Zhu & Liu, 2020). Various platforms are used to help facilitate the learning process that serves as a medium to deliver material, assessments, or to collect assignments. These platforms include Whatsapp Group, Zoom Cloud Meeting, Google Classroom, Google Meet, Google Form, and e-mail. One thing that should be a concern when implementing the virtual classroom-based learning process is that the classroom is fully digital, requiring that each student have their own devices and this requires substantial financial outlay (Hulse, 2019).

The virtual classroom-based learning process needs a combination of learning processes intending to reduce boredom, and most importantly, of course, the lecturer knows the needs of students related to the difficulties they face in building knowledge. Different students, different needs (Daniel, 2020). The achievement of virtual classroom-based learning is very dependent on the understanding of teachers in the current education environment (Anhusadar, 2020; Leontyeva, 2018). Lecturers need to pay attention to the platform used can be operated well by students. The successful use of technology by students in education depends on the student's knowledge of managing technology efficiently and overcoming obstacles that come with integrating technology (Harrell & Bynum, 2018). The advice from the Majalengka University and has been integrated into the satu.unma.ac.id Learning Management System is to use Google Classroom. Based on these recommendations, each lecturer designed a learning process that was adapted to the platform. The virtual classroom-based learning process starts from the second meeting, along with the outbreak of the COVID 19 pandemic and recommendations from the government to carry out online learning.

During this pandemic, most have used Google Classroom as a platform used in virtual classrooms. Research findings in Australia 91.7% of students valued Google Classroom's effectiveness and 75% of students used it both in the seminar classroom and outside the classroom (Heggart & Yoo, 2018). Google Classroom is a free web service developed by Google and launched in 2014 intending to make it easier for students and teachers to create, collect, and grade assignments without the need for paper (Iftakhar, 2016). Lecturers and students can have written and oral communication using Google Classroom and there is a set of free productivity tools including Gmail, Drive, and Docs (Ratnaningsih, 2019). So that lecturers can quickly see who hasn't finished the work and provide real-time responses and provide assessments directly in Google Classroom. When students need help and have trouble understanding assignments and then want to learn more deeply from topics that have been studied, they can get input directly from their virtual classmates. Google

Classroom is a medium for socializing in online-based learning, which allows students to exchange knowledge and experience with their peers (Melisa, 2019).

The implementation of technology in the learning process serves to provide many more new things in constructing knowledge than to provide new ways to do other tasks (Lesh, 2000). Constructivism has become one of the main philosophies of mathematics education, as well as in science education and cognitive psychology (Ernest, 1993). Apart from that, the idea of constructivism according to Ernest, the process of knowledge construction involves effective construction, precise evidence, and existential statements in obtaining the meaning of knowledge. So that constructivism cannot be separated from the intuition that is *a-priori* (Lerman, 1989; Woleński, 2015; Wright, 1991). But another idea emerged about constructivism that focused on construction activities as the process by which individuals used to learn, and how that knowledge was gained (Ernest, 1994). Such mathematics, taken for granted by Piaget, is concerned not with valid or invalid mathematical statements, but with how individuals obtain that knowledge (Lerman, 1989). This is the basis for researchers carrying out the learning process, when researchers carry out the learning process by using the Google Classroom platform.

Pedagogical views also need to be a concern of researchers when implementing the learning process. Two views underlie researchers when implementing the learning process using the Google Classroom media platform. At first sight, the formation of knowledge is a dynamic process of inquiry, characterized by uncertainty and conflict that leads to an ongoing search for deep understanding (Borasi & Siegel, 1989). The second view of learning is a generative process in building the meaning of knowledge and will deepen that knowledge when social interactions occur (Harkness, 2009). Based on these views when implementing the learning process, lecturers provide support for students as they seek understanding and shaping the meaning of their mathematical knowledge. Then arrange the interaction process that occurs between lecturers and other students once in a while if needed with the help of the Zoom platform, the goal is all involved in creating mathematical knowledge for each student. Interaction between lecturers and students physically separated and of course, having their perception can influence each other so that the conclusion when building the meaning of mathematical knowledge there is a mutual agreement when they interact (Thompson, 2002).

Implement a constructivist approach to the learning process based on the virtual classroom. More attention is related to the ability of students more specifically "prior knowledge". The initial ability of "prior knowledge" expectations and students' perceptions beforehand determine what information will be selected to be considered in the constructivism learning process (Cakir, 2008). Ausubel is one that states the importance of "prior knowledge" (Dochy, 1988). Prior knowledge is very important when we try to understand knowledge effectively and in particular to assimilate what we have just learned with what we already know (Cordova et al., 2014; Fernández & Morris, 2018). Prior knowledge becomes an important part when teachers will determine learning strategies based on student understanding, that is, based on the teacher's assessment of each student (Glogger-Frey et al., 2018; Subramaniam, 2020; Williams & Lombrozo, 2013). If there is no relevant prior knowledge available, the learner has to search randomly for a solution (Ledermüller & Fallmann, 2017). Based on the hierarchical nature of mathematics that makes prior knowledge important therefore it will provide a way for students to gain broader knowledge. When students

can self-regulation prior knowledge and can be implemented into positive behavior in the learning process will facilitate students to succeed in learning.

Self-regulation is an important aspect of the learning process and the extent to which students can become independent regulators of their learning will affect their academic success (Zimmerman & Schunk, 2011). The concept of Self-regulated learning is used to describe how learners adjust their cognitive strategies, metacognition, motivation, and environment consciously. Self-regulated learning contributes to student achievement and success in online learning environments, where students are expected to be responsible for the management of their learning compared to those in traditional learning settings (Alghamdi et al., 2020). This means that the current state in which all virtual classroom-based learning processes, self-regulated learning has an important role in student success. Self-regulated learning is appropriate to control of students who take over learning to ensure their learning goals can be achieved (Aksan, 2009; Alexiou & Paraskeva, 2010; Cazan, 2012; Garcia et al., 2018). Self-regulated learning is the result of students' thoughts, feelings, and behaviors that are designed and adjusted to achieve self-determined goals based on performance feedback (Zimmerman, 1986). Self-regulated learning has a positive effect on the learning process, on the other hand, prior knowledge has a large influence on self-regulation and positive performance in learning (Moos & Azevedo, 2008; Yang et al., 2018). Teacher design related online activities with constructivism approaches and prior knowledge that shape the context for learning, such as task structure, authority structure, and evaluation practices, are expected to improve their self-regulated learning so that they have an influence on students' beliefs about themselves, their goals and expectations, and decisions they are about how to regulate their behavior in learning activities as the key to academic success. So this study aims to describe student self-regulated learning in virtual classroom learning that is designed based on a constructivist approach based on prior knowledge.

RESEARCH METHOD

The research method used is pre-experimental. The experimental design is the right balance of strength, generalization, various forms of "validity", practicality, and cost (Seltman, 2018). The research design used is the One-Shot Case Study. This design is a group that is given treatment, the dependent variable is then observed (measured) to assess the effect of the treatment (Fraenkel et al., 2011) (Campbell & Stanley, 2015). Figure 1. is a design of a study carried out during the COVID 19 pandemic.

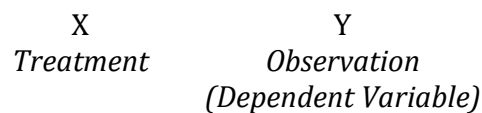


Figure 1. *One-Shot Case Study Design* (Fraenkel et al., 2011)

The sample of this is study was all pre-service mathematic teacher semester VI academic year 2019/2020 with 33 students. The sample is determined by purposive sampling to make it easier to choose representative samples according to the wishes of the researcher.

The research process begins at the first meeting by giving a prior knowledge test to find out each category of student ability that is high, medium, and low, then the implementation of research that is an intervention with problem-based learning is carried out for 7 meetings by virtual classroom-based learning and at the 8th meeting

given midterm exam and scale of Self-Regulated Learning. The results of the scale Self-regulated learning are analyzed using one-way ANOVA to get conclusions.

RESULTS AND DISCUSSION

Some factors that influence success in learning mathematics include internal factors, one of which is the prior knowledge. The research begins with an initial math proficiency test, which aims to map students' abilities. Students' prior knowledge are abilities that students have had before they take part in the learning that will be given (Lestari, 2017). Students who have good prior knowledge are very likely to easily follow the learning process and quickly understand mathematical material (Hevriansyah & Megawanti, 2017). Data from this study were obtained from the score on the scale of self-regulated learning. Self-regulated learning scale calculation is the result of the conversion of Likert scale data categories into ratio data through the conversion of the successive interval method. Based on the results of data processing on the self-regulated learning scale score, the minimum, maximum, average scores, and standard deviation scores are obtained in the following Table 1.

Table 1. Description of Test Results for Self-Regulated Learning Scale

N	Minimum	Maximum	Mean	Std. Deviation
33	44	67	56.36	6,4

Self-regulated learning scale score, the average value of 33 samples is 56.36 with a minimum value of 38 and a maximum of 67. In the next step, students are categorized based on prior knowledge test results. Prior knowledge data is presented in Table 2.

Table 2. Prior Knowledge Data

Prior Knowledge	Stat.	Score	N
High	\bar{x}	89,1	8
	s	10,7	
Medium	\bar{x}	75,1	19
	s	12,2	
Low	\bar{x}	62	6
	s	5,5	

There are 8 students in category high, the middle group category there are 19 students, and the lower group category there are 6 students. The results of the self-regulated learning scale based on prior knowledge descriptively in Table 3.

Table 3. Test Results For Self-Regulated Learning Scale Based On Prior Knowledge

Prior Knowledge	Mean	Std. Deviation	N
High	63,87	2,35	8
Medium	56,31	3,60	19
Low	46,5	2,07	6

The results of the Self-regulated learning scale categories of students with high prior knowledge get an average of 63,87, students with medium categories of 56.31

then students with low categories are 46,5. To get a more detailed picture of a self-regulated learning scale based on the student's prior knowledge category, the next one uses analysis of variance analysis. The results of data processing through one-way variant analysis are presented in the following Table 4.

Table 4. One-way ANOVA Test

SRL_SCALE	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1035,15	2	517,578	52,728	,000
Within Groups	294,48	30	9,816		
Total	1329,63	32			

Based on Table 5. the conclusion is obtained that for the Self-regulated learning scale students in the three prior knowledge categories obtained p-value (sig) of 0,000 <0.05 then H_0 is rejected so there is a significant difference Self-regulated learning scale between students based on the prior category knowledge (high, medium, and low). To see the differences in each category the differences in each prior knowledge category are continued with the Post hoc test using LSD. The results of the post hoc test calculations with LSD are presented in Table 5.

Table 5. LSD Post Hoc

Prior knowledge (i)(j)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval		
				Lower Bound	Upper Bound	
High	Medium	7,55*	1,32	,00	4,86	10,25
	Low	17,37*	1,69	,00	13,91	20,83
Medium	High	-7,55*	1,32	,00	-10,25	-4,86
	Low	9,81*	1,46	,00	6,81	12,81
Low	High	-17,37*	1,69	,00	-20,83	-13,91
	Medium	-9,81*	1,46	,00	-12,81	-6,81

*. The mean difference is significant at the 0.05 level.

Based on Table 6. Post Hoc LSD results above, for comparison between students' categories based on prior knowledge all of them, have a p-value (sig) <0.05 then H_0 is rejected. Thus the Self-regulated learning scale in each prior knowledge category is significantly different. The high categories of prior knowledge mathematics differ significantly from the medium and low categories of prior knowledge, then the categories of prior knowledge differ significantly from the high and low categories of prior knowledge, and finally, the low categories of prior knowledge differ significantly from the high and medium categories of prior knowledge.

The learning process is carried out based on the university's learning management system satu.unma.ac.id, the learning management system is integrated with google classroom. Below is Figure 2.

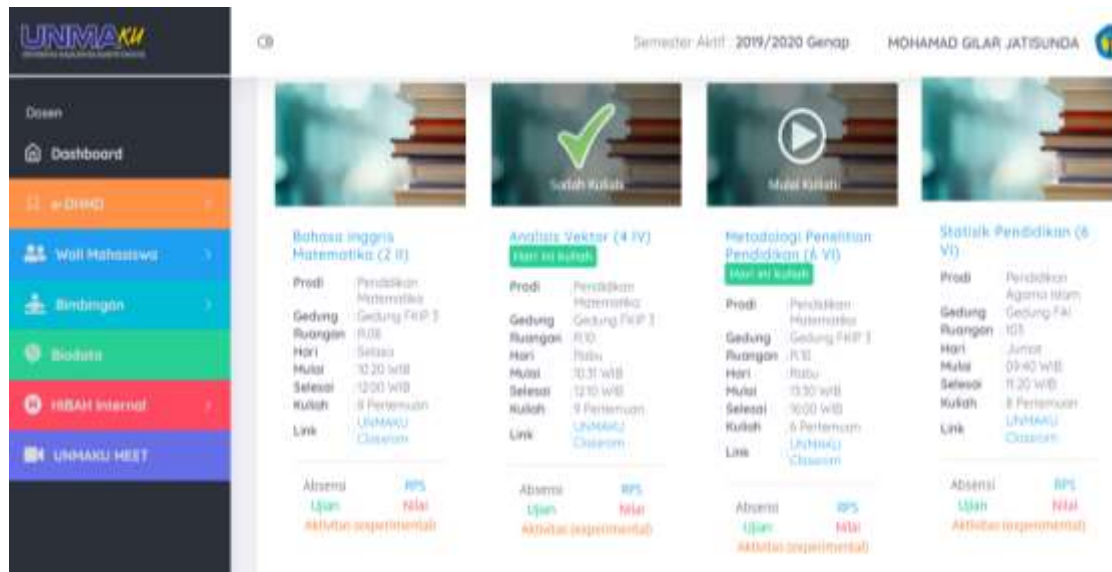


Figure 2. satu.unma.ac.id Learning Management System

Based on the announcement of the health emergency status in Indonesia, the learning process uses virtual classroom-based learning, so that the anticipation is directly carried out by the university by using virtual classroom-based learning using the Google classroom platform. Figure 3. below is an example of a learning process that is carried out based on a virtual classroom with a Google classroom platform. each time the lesson begins, the lecturer gives the book material and also an explanation in the Youtube link related to the material to be conveyed. The lecturer gives 30 minutes to read and understand the material after that begins the discussion and conducts questions and answers. Figure 4. to confirm the extent to which their understanding is related to the material being studied, the lecturer gives the final assignment of the student explaining his understanding with the video format.

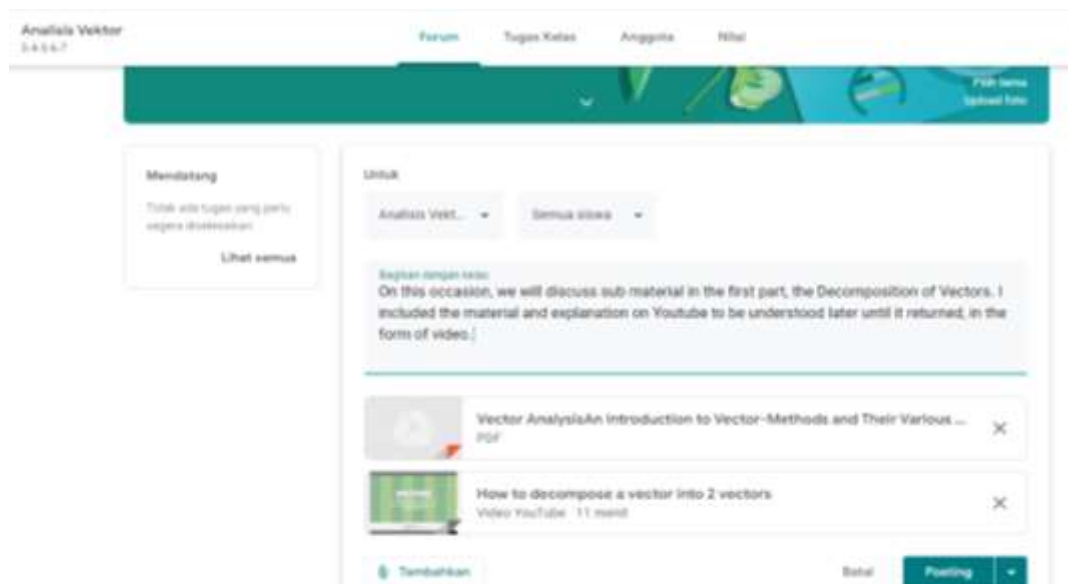


Figure 3. Google Classroom Activity

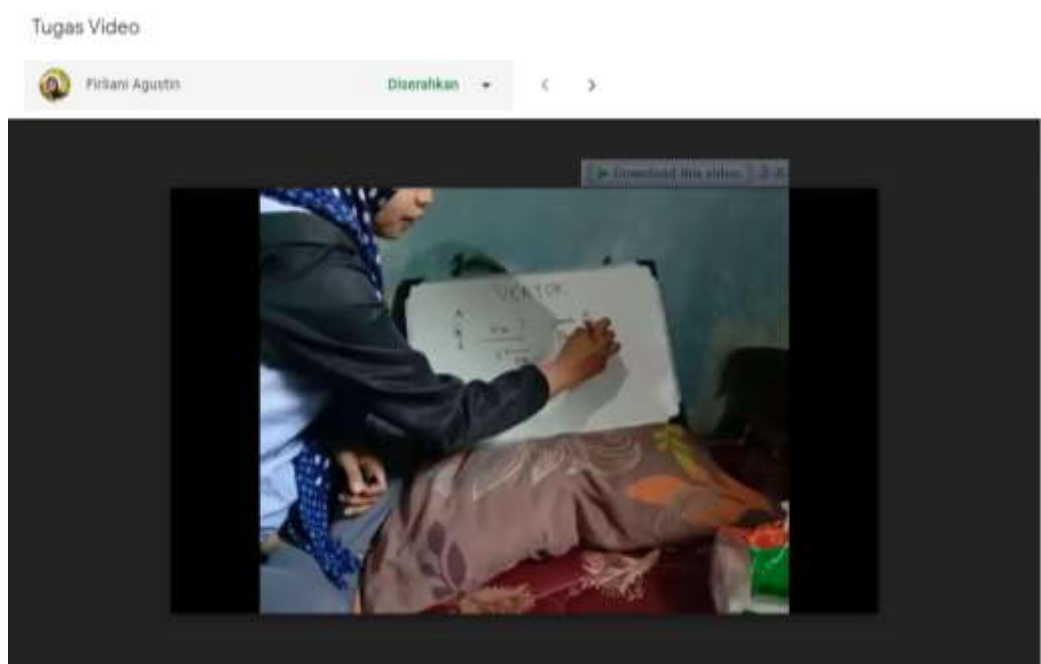


Figure 4. Students Explain Decomposition of Vectors

ICT needs to help teachers to develop better pedagogical and teaching approaches, taking account of student differences (Romero et al., 2019). The management of the environment can thus contribute to the performance of a learner with e-learning courses as previous research suggests (Sharma et al., 2007). The technology they use is more concerned with basic tasks such as search, storage, or knowledge sharing, not complemented by those who support the individual student's comprehension, supervision, or self-evaluation during the learning process (Yot-Dominguez & Marcelo, 2017). The results of the research indicate that it is necessary to recognize that different types of preliminary knowledge are different for the students and provide a more detailed representation of the previous knowledge of the students by multiple assessment methods (Hailikari & others, 2010). This means that it is not easy for Lecturers to prepare for online-based learning processes, with the background of students who are certainly different in abilities and different in culture. Lecturer expertise is very necessary to prepare didactic and pedagogic to achieve learning objectives. An autonomous on-line learning process is important so that students have a self-regulation framework (Barnard et al., 2009). Competence regulation is an element of self-regulation requiring efforts to regulate individuals' open behavior (Pintrich, 2000). In the virtual classroom-based learning process, self-regulation becomes very important, because it is a factor that controls student performance but other facts were obtained from the results of the statistical analysis above, it can be concluded that prior knowledge has a significant impact on students' self-regulated learning in virtual classroom learning. Students of modern schooling face mental and eager self-regulation difficulties (Odinokaya et al., 2019).

Whether we realize it or not, the learning process is an event of knowledge transfer between one generation to another. Thus, making the view that the knowledge transfer process is permanent for educators. so educators only become an intermediary inheriting that knowledge. the statement addressed that there were fundamental problems in the education process. If the issue is self-regulated learning, encouraging students to become independent becomes very important. The important

role of lecturers in the learning process based on the virtual classroom is very important to avoid imitative processes, lecturers need to think about how to be able to make students think process independent. If the virtual classroom-based learning process is imitative and only transfers knowledge, it can be understood that community trends will be more consumptive in many aspects of life, including knowledge. Students who have enrolled in online learning programs considered that they have stronger development than those enrolled in classrooms with metacognitive self-regulated and effort control (Quesada-Pallarès et al., 2019). Students with high prior knowledge make it easier for them to associate new knowledge with prior knowledge. The research is a prior knowledge outlook for student success (Harackiewicz et al., 2002). Prior knowledge provides a foundation of knowledge possessed by students. With a strong foundation, the process of constructing knowledge will become easier. In other words, the ability of self-regulated learning to work within virtual classroom learning. When new knowledge is added between strong prior knowledge, new knowledge will be easy to re-use. Activation of prior knowledge in virtual classroom learning can be realized by recalling material that has already been learned.

CONCLUSION

Virtual class-based learning becomes a challenge for lecturers, preparing a learning process plan is very important so that learning objectives can be achieved. Online-based learning is usually part of blended learning. But for now, virtual classroom-based learning without face to face. Student personality factors become very important, one of which is students' prior knowledge of the material to be studied has an important role in the success of their knowledge formation process. Student's initial knowledge is an important factor in the formation of self-regulated self-learning. self-regulated learning makes students have a responsibility in the learning process, able to manage their emotions into motivation to gain meaningful knowledge when following the virtual classroom-based learning process. Evidenced by the results of research that states that prior knowledge is a determinant of student success in getting a high score of independent learning scale. So, preparing for a virtual classroom-based learning process is important to keep students going to learn in a virtual classroom, intending to stay motivated to develop independent learning.

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