THE EFFECT OF ONLINE LEARNING BASED ON SOCIO SCIENTIFIC ISSUES (SSI) ON IMPROVING LEARNING INDEPENDENCE AND CRITICAL THINKING STUDENTS FACULTY OF EDUCATION AND EDUCATION SCIENCE UNIVERSITAS MUHAMMADIYAH SUMATERA UTARA IN THE PANDEMIC COVID-19

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Abstract

This study aims to see the results of how much the effectiveness of students in the online-based learning process based on the results of the data above, the independence of online-based learning in learning the Indonesian democracy system is strong response with a percentage of 63%, while some other students respond strongly to the percentage of 31%, responding quite 5% and respond weakly 1%. The average result of student response questionnaire is 99%. Thus it can be concluded that the response of students to learning independence in learning the Indonesian democratic system is strong. This type of research uses quantitative research in which researchers decide to determine what will be studied, ask narrow specific questions, collect quantitative data (can be calculated) from participants, analysis using statistical figures and conducting investigations in an impartial or objective way Creswell, (2008: 46). That is, research using a quantitative approach has advantages in a measurable research process with more objective results. Based on the above explanation it can be concluded that the quasi experimental design is a type of research design that has a control group and the experimental group is not randomly selected. Researchers use quasi experimental design because in this study there are variables from outside that cannot be controlled by the researcher.

Keyword: *On Line, Learning, Covid-19*

1. INTRODUCTION

Today at the peak of the digital face electronic learning activities on line is a learning concept that is carried out through electronic media networks, the development of technology that is very advanced in the modern era and globalization as it is now allows various activities carried out quickly and efficiently, (Rapanta,2020). The development of technology has a lot of influence on our way of life, ways of life and activities that are instantaneous, for example one of them is in the field of education by using network in learning activities in schools, colleges, places of course even online communities have started using concepts like this, (Goa,2020). Along with the development of information technology and the demands of the globalization of education and distance learning, various concepts have been developed to replace traditional learning methods, one of which is an online concept that can be used as an alternative to problems in the field of education, both as an addition, supplementation or substitute for learning activities which has existed, (Mishra,2020)

Then later it cannot be denied that the digital era has a positive impact on the world of education, for example emerging alternatives for learning resources and learning media, (Funes,2020). Learning that used to only be done in the classroom, has now begun to be replaced by online means, (Hussin,2018). Online learning is the implementation of teaching and learning which is fully carried out with the help of internet technology and does not require any face to face activities in this learning, students can learn from anywhere and can be done synchronously (directly) or asynchronously (indirectly), (Azlan,2020).

In various aspects and activities of the world today, especially in the aspect of education, we are challenged to be able to create an education system that can produce thinkers who are able to build a knowledge-conscious social and economic order like world citizens in the 21st Century, (Chevallard,2020). Of course in looking ahead and devising steps we must never turn away from the reality that binds us to the realities of life as well as students especially students must be able to grasp the various issues that develop at this time, (Armstrong,2016). One of the prominent features of the 21st century is the increasingly interlocking world of science and technology, so that synergies between them become faster and faster, (Dhillon,2017). Related to the use of information and communication technology (ICT) in the world of education, has resulted in the increasingly fused dimension of "space and time" which has been a determining factor for the speed and success of human mastery of science and technology, (Jannah,2019).

Especially in a situation like now with the outbreak of Covid-19 where the international world is hampered in a number of activities of human life especially in the educational aspect also being the impact of the plague, this becomes difficult and very influential in the order of daily life, in other aspects for example, anxiety faced by students in situations like this is too many tasks given by lecturers or supervisors in the university environment so that students or students are required to be independent of the students in carrying out learning activities at home, their independent attitude also continues to hone their abilities students in raising a learning topic that is associated with a current issue and utilizing a network that is currently a necessity for student participants so that an independent attitude appears, (Elfrianto,2020). In addition there are also obstacles faced by students or students who live in the area sometimes it is difficult to get a signal so that it is less effective in the process of learning as a group and independently through discussions online to discuss the latest issues around issues that are national or international, (Irfan, 2020). Based on the background, this study will conduct a study to measure the effect of online learning based on SSI (Socio Scientific Issue) on Increasing Learning Independence and Critical Thinking of Teaching and Education Faculty Students of North Sumatra Muhammadiyah University during the Covid-19 Pandemic Period.

2. RESEARCH METHODS

This type of research uses quantitative research in which the researcher decides to determine what will be studied, asks narrow specific questions, collects quantitative data (can be calculated) from participants, analyzes using statistical figures and conducts investigations in a way that is impartial or objectively, (Biedenweg,2020). That is, research using a quantitative approach has advantages in a measurable research process with more objective results. Based on the above explanation it can be concluded that the quasi experimental design is a type of research design that has a control group and the experimental group is not randomly selected. Researchers use quasi experimental design because in this study there are variables from outside that cannot be controlled by the researcher.

3. Results and Discussion

Student Learning Activities in the Control and Experiment Class

Learning is a process of activity that has a clear measurement. In the process of measuring student learning activities used observation techniques that involve observers with instruments in the form of observation sheets. This observation was carried out with the aim of knowing the differences in student learning activities between the experimental class and those who were learning to apply on line based with the control class which in the learning process used two-dimensional media.

Based on research data it is known that at the first meeting at the first meeting there was no difference in student learning activities between the control class and the experimental class. While at the second meeting learning activities in the experimental class increased higher than in the control class. The following graph shows the average percentage of student learning activities in the control and experimental classes.

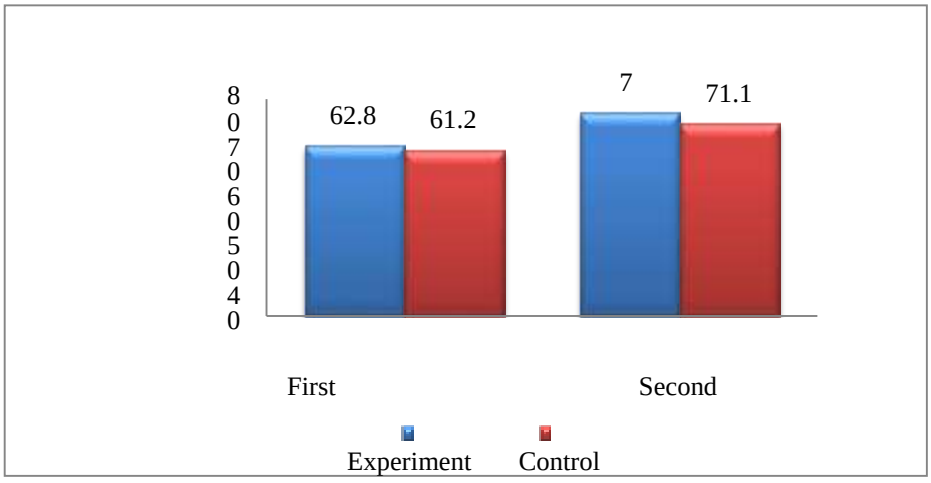

Figure.4.1 Graph of Percentage of Average Activity of Control Classes and Experimental Class Students at First and Second Meetings

The data (figure 4.1) shows a graph of the average percentage between the control and experimental classes at the first and second meetings. The results obtained from observations at the first meeting showed that the control class and the experimental class did not have significant differences in learning activities. The difference in the percentage of student activity is only 1% difference between the two. The control class was 61.22% while the experimental class was 62.81%. but at the second meeting there was an increase in the percentage of students' learning independence activities in both classes, namely the control class 71.15% and the experimental class 75.00%. based on these data it can be concluded that the experimental class has increased student learning activities on line that are greater than the control class.

Student Learning Independence Activity in the Control Class and Experiment Class Based on Each Indicator of Learning Activity

Observation of student learning independence activities carried out includes 5 indicators, namely Identifying elements in the case being thought, especially the reasons and conclusions, clarifying and interpreting statements and ideas, evaluating arguments of various types, interesting inferences, produce arguments. Each observer in this study observed students from each class observed. Data obtained from the first meeting can be seen in the following graph.

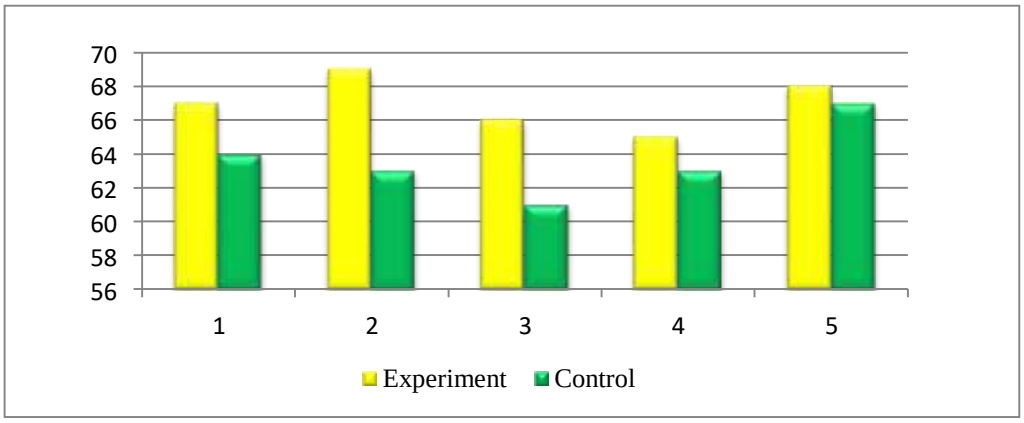

Figure 4.2 Graph of Student Activities at the Meeting First for each indicator

Indicator : Utilizing books and internet facilities
Indicators : Students are able to identify current issues
Indicator : Students are able to find the concept of current issues
Indicator : Analyze material digitally
Indicator : Carry out interactions online

Based on data from the graphs of student activities at the first meeting (figure 4.2) the achievement of the first indicator is seen from identifying elements of learning independence. This indicator is achieved by the control class with an average percentage of 64% and the experimental class 67%. Achievement of the control class on the 1st indicator has sufficient criteria, as well as the achievement of the experimental class on the 1st indicator has weak criteria, but the experimental class has higher achievement when compared to the control class. In the second indicator which includes students interpreting statements and ideas about the function of respiratory system organs, the experimental class had higher achievement compared to the control class, 69% with sufficient criteria and the control class only gained 63% with sufficient criteria.

Furthermore, the achievement of the 3rd indicator by the control class 61% and the experimental class 66%. Achievement on the 4th indicator by the control class 63% and the experimental class 65%. Then, the achievement of the 5th indicator by the control class 67%, while the experimental class 68%. The second meeting obtained different results from the first meeting. The average achievement of the indicators of the two classes increased compared to the first meeting. The results of observations of student learning independence activities at the second meeting can be seen in the graph below.

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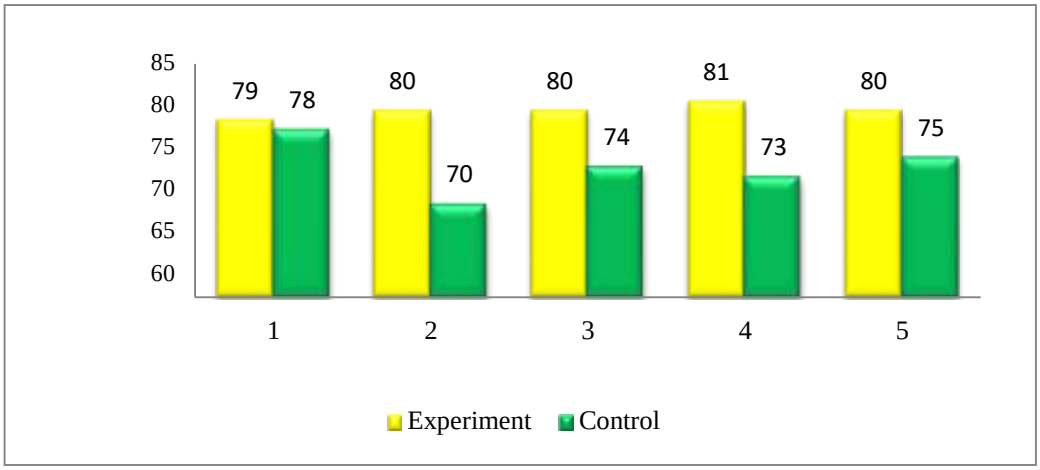

Figure 4.3 Student Activities at the Second Meeting for Each Indicator

Indicator : Utilizing books and internet facilities
Indicators : Students are able to identify current issues
Indicator : Students are able to find the concept of current issues
Indicator : Analyze material digitally
Indicator : Carry out interactions online

Based on the graph of student learning activities at the second meeting (figure 4.3) the achievement of the first indicator of the control class reached 78% with good criteria, while the experimental class reached 79% with good criteria. In the 2nd student activity indicator, the control class gained 70% while the 80% achievement in the experimental class showed good criteria. Furthermore, the achievement of the 3rd indicator by the control class was 74% and the experimental class was 80%. The fourth indicator of the control class only slightly increased to 73% while the experimental class gained 81%. Student activities in the control and experimental classes tended to increase. This increase can be seen in the following graph.

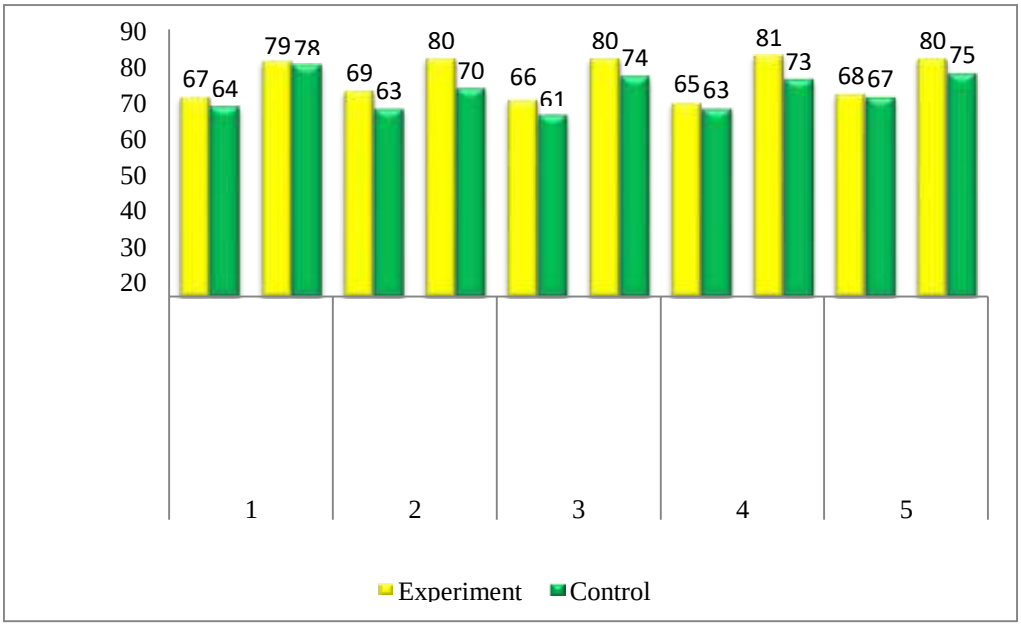

Figure 4.4 Recapitulation of Student Independence Activities at the Meeting First and Second Meeting for Each Indicator

Indicator	: Utilizing books and internet facilities
Indicators	: Students are able to identify current issues
Indicator	: Students are able to find the concept of current issues
Indicator	: Analyze material digitally
Indicator	: Carry out interactions online

Based on the graph of student learning activities (figure 4.4) at the first meeting the experimental class had the highest percentage of 79%, in the second indicator the control class gained 70% less than the experimental class gained 80%. At the 3rd meeting the experimental class had the highest percentage with a value of 81%. Overall the student activity chart shows an increase in student learning activities at the second meeting. The experimental class experienced a higher increase compared to the control class.

Difference in Increased Student Learning Independence Between the Control Class and the Experimental Class The application of different learning between the control class and the experimental class allows for differences in the achievement of learning outcomes obtained by each class. In this study the control class implemented independent learning with printed textbooks. Whereas in the experimental class e-learning assisted learning media was applied in learning the Basic Concepts of Civics with each student being able to operate e-learning in the form of a web LMS (Learning Management System) as the media and learning resources.

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Increased Student Learning Independence in the Control Class and Experiment Class

The difference in the increased independence of the students studied has a reference to the indicators of learning independence revealed by Alec Fisher. In this study there are 5 indicators used, namely 1) Identifying the elements in the case being thought, especially the reasons and conclusions 2) Clarifying and interpreting statements and ideas 3) Evaluating arguments of various types 4) Attracting inferences 5) Generate arguments. Data on the average value of students' critical thinking skills obtained from the pretest and posttest in the control class and the experimental class can be seen on the graph

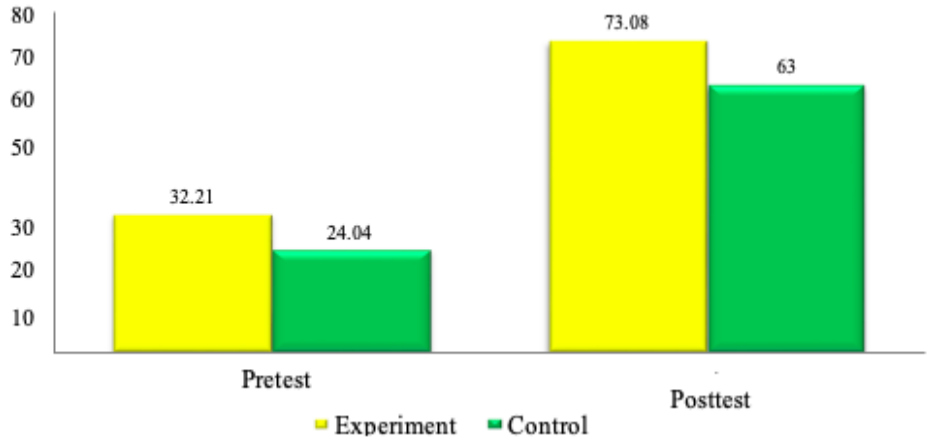

Figure 4.5 Graphic Average Value of Student Independence in the Control Class and Experiment Class

Based on the graph the average value of the ability of the control class and experimental class students (Figure 4.5) obtained from the initial knowledge test is not much different. While in the posttest process the average value of student learning independence in the control class and the experimental class has increased. The increase obtained by the experimental class is higher than the control class with an average value of class 73, while the control class has increased with an average value of 63.

The difference in the average value of student learning independence between the control class and the experimental class can be described and observed in more detail through the pretest-posttest average value graph of each KB indicator.

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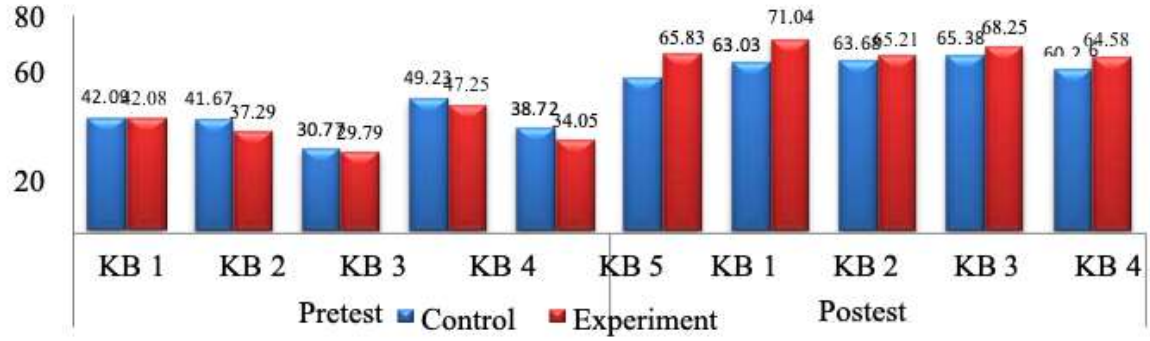

Figure 4.6 Graph of Pretest-Posttest Average Value of each KB Indicator (Learning Independence) in the Control Class and Experiment

Indicator : Utilizing books and internet facilities
Indicators : Students are able to identify current issues
Indicator : Students are able to find the concept of current issues
Indicator : Analyze material digitally
Indicator : Carry out interactions online

The average value of the posttest in the control class and the experimental class has increased compared with the average value of the pretest. Based on the results of the pretest the control class obtained higher scores on all KB indicators namely KB indicator 1, KB indicator 2, KB indicator 3, KB indicator 4 and KB indicator 5. In contrast to the control class, in the experimental class the average pretest score was lower than with the control class on the KB indicator 1, KB indicator 2, KB indicator 3, KB indicator 4 and KB indicator 5. Based on the graph of the pretest-posttest value of the control class and the experimental class for each KB indicator (Figure 4.6), it can be seen that the posttest mean value of the control class and the experimental class has increased. The highest average posttest value for the control class lies in the KB 4 indicator, while the lowest average posttest value occurs in KB 1 indicator. This result is different from the experimental class who obtained the highest posttest average value on the KB 2 indicator and the average value average lowest posttest on KB indicator 5.

The difference in increasing students' critical thinking skills between the control class and the experimental class can be seen from the value of the gain (N-gain). In this study, the N gain used has been normalized so that the N gain obtained does not exceed the score 1. In general, the N gain in the control class and the experimental class can be seen in the following graph.

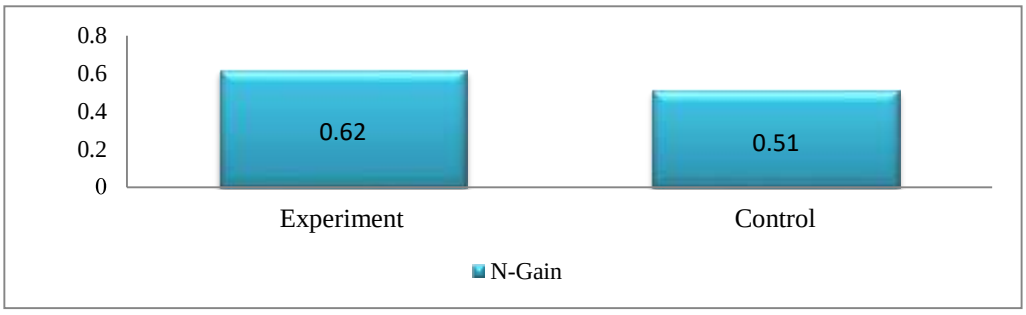

Figure 4.7 Graph of N-gain Control Class and Experiment Class

Based on the N-gain graph (figure 4.7) it is known that the experimental class has increased higher critical thinking skills compared to the control class. The experimental class gained N-gain of 0.62 while the N-gain of the control class was only 0.51. The comparison of the two N-gains is the average N-gain of each class. In more detail the improvement in students' critical thinking skills achieved by the control class and the experimental class for each KB indicator can be seen in Figure 4.8.

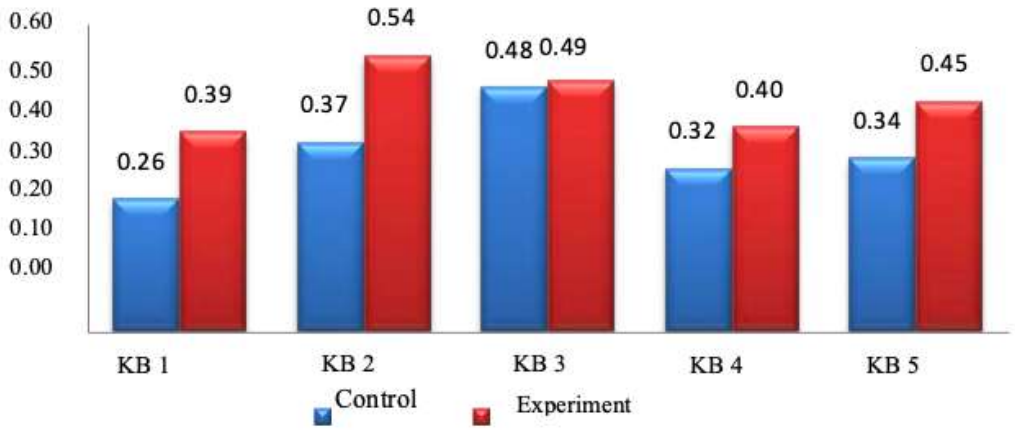

Figure 4.8 N-gain for each KB indicator in the control class and experimental class

The N-gain graph above shows the comparison of N-gain achieved by each class on each indicator of critical thinking skills (KB). In the KB 1 indicator which includes identifying elements in the case in mind, specifically the reasons and conclusions of the N-gain score of the control class 0.26 while the experimental class 0.39. Next indicator 2 with the scope of clarifying and interpreting the statements and ideas of the N-gain score of the control class 0.37 while the experimental class 0.54. Then KB indicator 3 which includes evaluating arguments of various types the N-gain score of the control class is 0.48 while the experimental class is 0.49. Next indicator 4 includes interesting inference scores of N-gain control class 0.32 while the experimental class 0.40. As for the KB 5 indicator which is an indicator of producing N-gain score arguments for the control class 0.34 and the experimental class 0.45.

4. CONCLUSIONS

In the midst of the covid-19 Pandemic the research conducted was experimentally based, in order to see the effectiveness of each class in carrying out the learning process independently carried out in their respective homes. Of the two different classes there are slightly significant differences, for the implementation of independent learning. Therefore, these two different classes must be further improved by a number of methods that will be given later to two and more classes later, so that the implementation of independent learning itself is carried out well.

REFERENCE

Azlan, C. A., Wong, J. H. D., Tan, L. K., Huri, M. S. N. A., Ung, N. M., Pallath, V., ... & Ng, K. H. (2020). Teaching and learning of postgraduate medical physics using Internet-based e-learning during the COVID-19 pandemic–A case study from Malaysia. *Physica Medica*, *80*, 10-16.

Armstrong, T. (2016). *The power of the adolescent brain: Strategies for teaching middle and high school students*. ASCD.

Biedenweg, K., Trimbach, D., Delie, J., & Schwarz, B. (2020). Using cognitive mapping to understand conservation planning. *Conservation Biology*, *34*(6), 1364-1372.

Chevallard, Y., & Bosch, M. (2020). Didactic transposition in mathematics education. *Encyclopedia of mathematics education*, 214-218.

Dhillon, S. S., Vitiello, M. S., Linfield, E. H., Davies, A. G., Hoffmann, M. C., Booske, J., ... & Castro-Camus, E. (2017). The 2017 terahertz science and technology roadmap. *Journal of Physics D: Applied Physics*, *50*(4), 043001.

Dahnial, I., Dwiningrum, S. I. A., & Wuryandani, W. (2021). The Mind

of SM Amin Medan City Nationalism Figure during Independence. *Psychology and Education Journal*, *58*(2), 3818-3825.

Elfrianto, E., Dahnial, I., & Tanjung, B. N. (2020). The Competency Analysis Of Principal Against Teachers In Conducting Distance Learning In Covid-19 Pandemic. *Jurnal Tarbiyah*, *27*(1).

Elfrianto, E. (2020). [Turnitin] The Antecedents of School Medical Room Management System in Preventing the Presence of COVID-19 in Indonesia To Improve the Health Quality of Students A Systematic Review. *Kumpulan Penelitian dan Pengabdian Dosen*.

Funes, M., & Mackness, J. (2018). When inclusion excludes: a counter narrative of open online education. *Learning, Media and Technology*, *43*(2), 119-138.

Gao, L. X., & Zhang, L. J. (2020). Teacher learning in difficult times: Examining foreign language teachers' cognitions about online teaching to tide over COVID-19. *Frontiers in Psychology*, *11*, 2396.

Hussin, A. A. (2018). Education 4.0 made simple: Ideas for teaching. *International Journal of Education and Literacy Studies*, *6*(3), 92-98.

Jannah, M., Mu'ammar, A., & Fahyuni, E. F. (2019). ASSTECH APPLICATION BASED E-LEARNING SYSTEM TO IMPROVE THE QUALITY OF 21st CENTURY INCLUSIVE EDUCATION. *Studia Religia: Jurnal Pemikiran dan Pendidikan Islam*, *3*(2).

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of Covid-19 pandemic. *International Journal of Educational Research Open*, 100012.

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the Covid-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education*, *2*(3), 923-945.

Tisdell, C. A. (2020). Economic, social and political issues raised by the COVID-19 pandemic. *Economic analysis and policy*, *68*, 17-28.