Experiential learning model with mind mapping on fungi: how to improve science process skills?

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ARTICLE INFO	ABSTRACT
	This research aimed to find out the effectiveness of experiential learning (EL) model with mind mapping to improve the science process skills (SPS) on fungi materials. It was quasi-experiment research by using a pre-test post-test control group design. The population of the study was all of the tenth-grade students of Kalasan State 1 Senior High School amount of 127 students in the odd semester in 2018/2019 of the school year. The sample techniques were cluster random sampling. The sample consisted of 26 students (10 students male and 16 students female) as the experiment class by implementing EL model with mind mapping and 26 students (9 students male and 17 students female) as control class by using 5M (observing, asking, collecting, associating, communicating) learning model. The used instrument was ten essay questions. The data of the research were analyzed by using t-test (independent sample t-test). Based on the result of the normalized gain score, it showed that there was an improvement of SPS about 0,85 in the experiment class which was higher than that in the control class about 0,70. Besides, it also showed a significant value (2-tailed) that was 0,000 (<0,05). It means that there was a difference in science process skills between the experiment class and control class, so the learning process through EL learning model with mind mapping proved useful to improve the students' science process skills.

Suggested Citation

INTRODUCTION

The learning is arranged for the occurrence of teaching and learning process between the teacher and students in the school (Winataputra et al., 2007). According to Isnaini et al., (2016) to achieve the appointed objectives of learning, the teacher must prepare the learning components such as syllabus, lesson plan, students' worksheet, and learning media that are suitable for the materials taught. These learning components will be implemented during teaching and learning process to make the learning be effective.

All this time, the problems found in the learning process can make the teacher realize to give the innovation both in choosing and in using the learning model based on the needs in the school. It will not create the learning that is focused on the teachers who deliver the materials monotonously, but they have to present a pleasant learning atmosphere in the class. It is done to make the students be more motivated, eager to learn and be active during learning process. It is expected to achieve the learning outcomes of the students to be more optimal (Mulyasa, 2007).

Moreover, living things and their lives can be learned through biological science as one of the lessons taught in the school. Biology is expected to enhance the students' learning experience through learning activities that are connected with the environment, technology, and society (Tanjung, 2016). Recently, many students assume that biology is a difficult lesson. It is caused by many foreign terms in this lesson, the difficulties to visualize the form from the biological objects, anatomy position from the biological objects, and the difficulties to understand the physiological process of biological objects.

Based on the observation done in the school, during the teaching and learning activities of biology lessons the students tend to receive the materials by taking notes the teacher's explanation through pointer (powerpoint) and textbooks. Then, they are given some exercises to be done. The domination of teacher's roles makes the students be passive participants during teaching and learning process. Another problem found is that students often do experiments, observations, and discussions. It is strengthened by Lubis, Hasairin & Rengkap (2017), saying that 60% of the students (74 from 124) get score above (<75). The difficulties acquired by the students are caused by the limitation of study book, learning media used by the teacher in teaching fungi materials is not suitable enough, and the facilities of the laboratory are less complete to be used in teaching and learning process.

During the learning process, the students do not only take notes or listen the information given by the teacher, but they have to involve the students' participation actively in learning activities as well. These activities involve physical and mental activities. It means that both activities must be done by the students to create the learning to be more meaningful and can improve their learning outcomes. In line with the statement of Timutiasari et al., (2016) the SPS can involve the physical, mental, and social skills that are obtained from students' experiences whereas based on Sardiman (2005) learning is doing a learning process that makes the students be more active.

Science process skills are a skill focusing on the students to be able to understand a concept, to find out independently, and to develop the facts, concepts, and values. In the activity, the teachers become a facilitator during teaching and learning process, so the students can independently build new facts, concepts and values in their daily life (Siahaan et al., 2017). The indicators of science process skill aspects used in this research are synthesized and modified by Rustaman (2005), Isnawati (2014), and Samatowa (2011) such as the aspect of observing that uses senses to collect the information, aspect of analyzing that finds out and connects the patterns in the observation to be concluded, the aspect of classifying that makes groups of objects in some categories based on their parts, aspect of making hypothesis that makes more than one temporary hypotheses to be tried out their truth, aspect of predicting that present what might happen in circumstances that have not been observed, aspect of planning experiment that decides what must be done for example work steps, and aspect of communicating that uses verbal, writing, or graphic to explain an event.

This study is done based on the results of descriptive research by using a survey method done by Apriliyani, Subali, Mariyam (2016). The research showed that the science process skill of the

students in State of Senior High School in Sleman Regency was low. The cause of the low level of science process skill is the knowledge of the students' science process skill that is limited to the concepts. The minimum of learning to train the students in order to develop their SPS causes them being difficult to do science activities, so it needs to find out the learning model that is appropriate to be analyzed in the school to improve the students' science process skill.

Based on the interview results with the biology teacher in SMA N 1 Kalasan, it shows that the increasing of SPS especially for the fungi materials has been done completely, but the experiences doing research methods are ever done through a practicum. In line with the research by Rofiqoh & Martuti (2015) stated that the fungi materials do not only learn about macroscopic fungi but they also learn microscopic fungi that need practice activity to concretize the microscopic fungi in order to make the students understand. The practice that has been done also includes a series of science activities such as observing, classifying, deciding the variable, formulating the hypothesis and communicating. They are aimed to improve the students' SPS. Based on the observation, it is found that the students' skills in doing the observation are complete yet especially in describing the objects observed, is not able to formulate the hypothesis, and still asking the teacher's help during the experiment, and they are often initiative by themselves to present their learning results done. According to Fatimah et al., (2016) the aim of SPS is to develop the scientific skills and enhance the science activities. The science process skills are very needed by the students in constructing science by themselves and implementing their experiences to the science problems found in their lives (Handayani et al., 2018). Thus, the teacher says that the students are difficult to understand the fungi materials because there are many Latin terms used. During the teaching and learning process, the students tend to be passive, especially in asking and expressing their opinions toward the materials delivered by the teacher.

The fungi materials are part of the biology materials related to human life directly. The fungi materials have some indicators of competency achievement about some topics such as the characteristics of fungi, the way of living, the classification of fungi, kinds of fungi that have the way of living by symbiotic way with another organism, and fungi's roles in life. According to the teacher's statement, the students have some difficulties to understand the fungi materials because of Latin terms, classifying the fungi correctly, and doing the simple practice only for finding out the object observed without doing detailed practice related to morphology of the fungi arrangement in microscopic and macroscopic. In other words, the fungi practice done is not complete. It is strengthened by the research Musriadi & Rubiah (2016) that showed that 65 students are difficult to understand the concepts and problems related to the fungi materials. They need innovation in learning and the suitability and organization of materials as the solution to the problem of fungi materials.

The learning model that can improve the students' science process skills is the learning model based on the experience. The experiences are very important in teaching and learning process since the students can reflect these experiences both individually and in group. Reflection is one of the steps in experiential learning (EL). The reflection will become the basic in the process of understanding the concepts from the experiences happened to the students and its estimation of applying in other situations. Thus, these concepts are internalized through the processes of strengthening, finding, and linking (Baharuddin & Wahyuni, 2007). One of the learning models based on the experiences is EL learning model. Based on Kolb & Kolb (2008) EL learning model is the forming process of knowledge from the real experience, so there is a combination between the real experience and the believed experience. The procedures of EL learning model consist of four steps that are Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation (Azrai & Ernawati, 2017). One of the learning models that can improve the students' science process skills in SMAN 1 Kalasan is EL learning model.

EL learning model can give the opportunity to the students to do the learning activities actively. It will guide them to get more experiences through their active involvement rather than reading the materials or concepts. This learning model does not only emphasize the students' cognitive aspects, but they also can involve what they learn directly as well. It will make the learning process to be more

meaningful.

One of the lack of EL learning models is the need for adequate and appropriate learning media or sources or learning techniques during teaching and learning process. The solution to strengthen the concepts of learning materials in EL learning model is combining the effective technique of taking notes in the syntax of reflection observation contained in the syntax of EL learning model. The fun note-taking technique is mind mapping which aims to arrange the information in order to make the students be easy to remember and understand the learning materials. By using mind mapping to strengthen the students' learning concepts, it is expected to be able to give an effect in increasing the science process skills. In line with Feyzioglu (2009), he stated that there is a positive correlation between the mastery of science process skills and the students' science skills. The improve of the students' learning outcome is done by developing the concepts and the science process skills as well. It shows that the better the student in making the mind map then the science process skills will improve.

Some researches state that EL learning model and mind mapping as the note-taking technique can improve the SPS. Kastawaningtyas dan Martini (2017) states that science process skill (SPS) of the students can improve after implementing EL learning model toward the environmental pollution materials. Three aspects (formulating the problem, interpreting the data and making conclusions) produce the enhancement in high category whereas two aspects (formulating the hypothesis and identifying the variable) can improve in medium category. The research done by Ardhi (2014) shows that the learning quality can be improved by using mind mapping that can be used in the microbiology subjects with the various learning methods, learning strategies, various learning media, and the ways in evaluation. Nevertheless, there is no detail information relating to the effectiveness of EL learning model to improve the science process skill in the fungi materials, and the EL learning model is not combined with the mind mapping to strengthen the concepts learned. The ideal learning model to deliver the fungi materials for the students is not done only through explanation, but it can be done by the learning process that involves the students' participation actively. So, it needs to implement EL learning model with mind mapping.

Buzan (2013), mind mapping is an effective and efficient note-taking that involves two parts of brain to sharpen the students' creativity according to what is in their minds. Besides, there are the symbols, pictures, curved lines, colors, and keywords contained in the mind mapping in order to make the students easy to get information found or learned. It means that the acquired information is easier to be understood because the students are more interested in learning rather than learning by using traditional note-taking done in the school. Besides, the implementation of EL learning model with mind mapping makes students more active in learning, foster attitude to dare to convey opinions, have critical thinking, interact with friends, and ask the things that are not well understood. Learning patterns are becoming more innovative because students can analyze directly and think critically about abstract events and only can be seen using media. The material in mind mapping will stimulate learners to think critically, giving rise to the students' science process skills in identifying problems, formulating hypotheses, concluding, conducting experiments, and communicate effectively. The learning technique facilitates the students to develop the science process skills, so the students' science process skills can be improved. In line with Muhlisin et al., (2016), he stated that the mind mapping can improve the students' critical thinking because it can decrease the learning anxiety, develop the students' way of thinking in the learning process, and participate actively to relate something to its reason, assumption, and conclusion. By combining EL learning model and mind mapping, it is expected to be one of the solutions to make the students easy to understand the fungi materials such as the characteristics of fungi (size, shape color, and body structure of fungi), the way of life and the habitat of fungi, the reproduction of fungi, the classification of fungi (Zygomycota, Ascomycota, Basidiomycota and Deuteromycota), the types of fungi that have the way of life by symbiotic way with another organism (Lichen and Mycorrhiza) and the roles of fungi in life. Besides, EL learning model focuses on the students' experiences either in daily life such as experience in consuming fungi or in learning process in the school. These matters can develop the students' science

process skills to be more active, creative, skilled in thinking and skilled in acquiring knowledge. Based on the explanation above, the objective of the research is to find out the effectiveness of experiential learning model (EL) with mind mapping to improve the Science Process Skills (SPS) on fungi materials for the tenth-grade students of SMA N 1 Kalasan.

METHODS

Research Design

This research was quasi-experiment research that uses pre-test post-test control group design (Subali, 2010). The arrangement of research patterns in quasi-experiment by Sugiyono (2012) can be seen in Table 1.

Table 1
Research Design

Classes	Pretest	Treatment	Posttest
Experiment	O_1	X_1	O_2
Control	O_3	X_2	O_4

Description:
X_1 = EL model with mind mapping O_2 = Post-test of the experimental group
X_2 = 5M model O_3 = Pre-test of the control group
O_1 = Pre-test of the experimental group O_4 = Post-test of the control group

Population and Sample

The population of the research was all of the students at the tenth grade of SMA N 1 Kalasan at odd semester in the academic year 2018/2019 that consists of 5 classes with amount of 127 students. The sample was taken by two classes based on cluster random sampling techique by assuming all homogeneous classes. The random sampling cluster technique was based on the cluster group (classes) existed previously. The sample consisted of 26 students (10 students male and 16 students female) as the experiment class by implementing EL model with mind mapping and 26 students (9 students male and 17 students female) as control class by using 5M (observing, asking, collecting, associating, communicating) learning model.

Instrument

The instrument in this research was the test of science process skills in form of essay test consisted of 10 questions. The instrument was a test done twice that was a pre-test to find out the students' science process skills before getting the treatment and post-test to find out the students' science process skills after getting the treatment. The try-out of the instrument was accomplished by validity test and reliability test. The essay test had been validated by the expert and tested to determine reliability and validity. The results of the analysis showed that the items tests fit with a Rasch model or model 1 - PL ranged from $\geq 0,77$ - $\leq 1,30$, it can be concluded that the test was valid and the value of summary of case estimate is 0, 71, which indicates that the items tests have a high reliability (Subali, 2016). The indicator of science process skills is presented in the following Table 2.

Procedure

The procedures done in the research consist of three steps (Figure 1). First step was doing pre-test in the experiment class and control class to find out the students' initial ability before getting treatment. The second step was giving the treatment of EL learning model with mind mapping in the experiment class whereas the control class did not get any treatment. The implementation of experiment class includes introducing activity (explaining the learning objectives and motivating the students), main activity or concrete experience (CE) which the students explained their experiences based on the topic given, reflective observation (RO) by using mind mapping which the students observed and reflected the experiences obtained from various aspects and created the information obtained from mind mapping, abstract conceptualization (AC) which conceptualized a theory to get

conclusion and applied the abstract theory from the experiences acquired, and active experimentation (AE) which the students did the research to prove the hypothesis made previously, so the learning process would be more useful), and closing activity (conclusion). Therefore, the learning activities in the control class contained the introducing activity (delivering the learning objectives and motivating the students), main activities (observing, asking, collecting, associating, communicating), closing activities (conclusion). Thus, the third step was doing post-test to find out the science process skills of fungi materials after getting the treatment of EL learning model with mind mapping in the experiment class and the control class by 5M learning model.
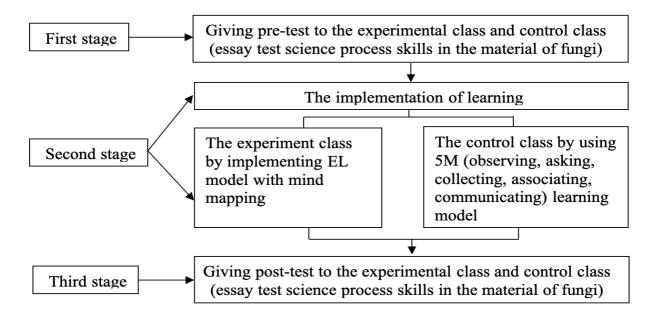
Table 2
Indicators of Science Process Skills

Aspects of Science Process Skills	Indicator Questions
Observing	Measures the observing aspect in the science process skills about using the senses in the safe and appropriate
Analysing	Make inferences observation
	Connecting the result of the observation
Planning experiment	Determining the tools/ materials/ resources to be used
	Determining what will be implemented in the form of a working step
Classifying	Finding the basis grouping
Making hypothesis	Knowing that there is more than one possible explanation from one incident
Predicting	Thinking about something that has not happened based on something of an existing trend or pattern
Communicating	Able to convey a test result or report in a clear and systematic manner
	Able to read graphs, tables, and diagrams

Data Analysis

The data were analyzed by using a pre-requirement analysis test and hypothesis test. The pre-requirement analysis tests consisted of normality and homogeneity test. The hypothesis test used t-test (independent sample t-test). The data further were analyzed by using software SPSS version 20.
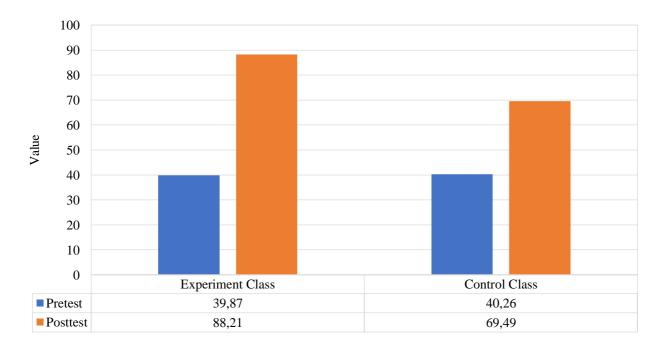

Figure 1. Research Procedure

RESULTS AND DISCUSSION

The learning process of fungi materials was done in three meetings and every meeting was done during 3 x 45 minutes. It was done orderly starting from introducing activities to closing activity. The learning activities done are based on the steps in EL learning model with mind mapping that consist of 4 steps such as CE, RO, Abstract AC and AE (Abdulwahed & Zoltan, 2009). The experiment and control classes were differentiated based on their learning steps. In the experiment class, the students did practicum and made the product of fungi fermentation result based on the indicators in the achievement of competence. The practicum of fungi was done in every meeting with the subjects such as fungal characteristics, fungal classification, and types of fungi that have a way of life that is symbiotic with other organisms. Based on the obtained data in this research, the SPS test consisted of 10 essays containing some aspects of science process skills (SPS) such as observing, analyzing, classifying, making hypothesis, predicting, planning the tryout, and communicating.

The presentation of descriptive analysis was done to present the obtained data based on the measurement result of the students' SPS that was done by using SPSS version 20. The analysis results toward the pretest of SPS getting an average of 39,87 in the experiment class and an average of 40,26 in the control class (Table 3). It shows that between the control class and the experiment class has the initial ability which is almost same as a difference of 0,39. Thus, the results toward the post-test of SPS getting an average of 88,21 in the experiment class and an average of 69,49 in the control class. It shows that between the control class and the experiment class has the science process skills which is different from a difference of 18,72. It can be concluded that the experiment class gets higher average after getting the treatment that can be seen further in Figure 2.

Table 3
The Value of Science Process Skills (*Pretest* & *Posttest*) in Control Class and Experiment Class

Test	Classes	Type			
		Mean	**Maximum Score**	**Minimum Score**	**Standard Deviation**
Pretest	Control	40,26	56,67	26,67	8,00
	Experiment	39,87	53,33	23,33	8,40
Posttest	Control	69,49	86,67	60,00	7,28
	Experiment	88,21	96,67	76,67	5,43

	Experiment Class	Control Class
■ Pretest	39,87	40,26
■ Posttest	88,21	69,49

Figure 2. The Value of Experiment Class and Control Class

Before doing the hypothesis test, it was done normality and homogeneity test toward the results of pre-test and post-test of the students' SPS. The data analysis to find out the normality of the students' SPS data in the experiment and control classes was done by using software SPSS version 20. The normality test was done to find out whether the obtained data were distributed normally or not. It used the Kolmogorov-Smirnov test with a significant value of 0,05. Based on the analysis result of normality test, the pre-test and post-test values in the experiment and control classes toward the SPS show that they are distributed normally with a significant value more than 0,05 ($p > 0,05$), so Ho is rejected (Table 4).

Table 4

The Results of Normality Test

Classes	Test	Significance	Significance Level	Description
Control	Pretest	0,200	P > 0,05	Normally
	Posttest	0,153	P > 0,05	Normally
Experiment	Pretest	0,086	P > 0,05	Normally
	Posttest	0,139	P > 0,05	Normally

Moreover, the homogeneity test done to find out whether the pre-test and post-test values in the experiment class and control class has same variant (homogeny). The homogeneity test of the students' SPS data used Levene test. Based on the analysis result of homogeneity test, the pre-test and post-test values in the experiment and control classes toward the SPS show that they have homogeny variant with the significant value more than 0,05 ($p > 0,05$), so Ho is rejected (Table 5).

Table 5

The Results of Homogenity Test

Test	Significance	Description
Pretest	0,914	Homogeneity
Posttest	0,130	Homogeneity

After the experiment class was given the treatment by giving EL learning model with mind mapping and the control class by giving 5M learning, the SPS result of the experiment class was higher than the SPS result of the control class. It is proved by t-test that has a significant value of 0,000 for the EL learning model with mind mapping toward the students' SPS (Table 6). The probability value is smaller than 0,05, and both values are really different. From t-test result, it shows that the EL learning model with mind mapping is effective to enhance the students' SPS toward fungi materials in the tenth grade.

Table 6

Value of Independent Samples T-Test

Test	Significance (*2-tailed*)	Description
Pretest	0,866	Insignificant
Posttest	0,000	Significant

Based on the analysis result of the N-gain score test, it can be known that the learning process by using EL learning model with mind mapping can improve the students' SPS with high category (Table 7).

In this research, the students are able to pass the learning steps in EL learning model with mind mapping. They are able to observe, feel, think based on their experiences, do the tasks given in students' worksheets, discuss in group well and do the practicum of fungi materials. Besides, they are able to analyze every learning material gotten through acquired experiences. It is showed with the students' ability to tell their experiences in making fermented soybean (tempeh), consuming

mushroom (*Auricularia polytricha*, *Volvariella volvacea* (straw mushroom), *Pleurotus* sp. (oyster mushroom)), and seeing liken in the stem of tree. It means that the students already do the concrete experience. In line with Suciati et al., (2017) that the experience of learning will make the students to be more active in learning process either doing the experiment or doing the tasks from the teacher. The concrete experience can develop the brain function in the cortex sensory part, so the students are always active to ask in the teaching and learning process.

Table 7
The Results of Main N-Gain Sores

Classes	Average Value		Enhancement	N-Gain Scores	Category
	Pretest	**Posttest**			
Control	40,26	69,49	29,23	0,70	Medium
Experiment	39,87	88,21	48,34	0,85	High

In the theoretical perspective, Robert (2006) stated that EL learning model is in line with the constructivism learning theory that leads the students to get the knowledge from learning experiences. Association for Experiential Education (AEE) defines the learning through experience process where the students build their knowledge, skill, and value from direct experience (Purnami & Rohayati, 2007). This learning focuses on the learning process by using the students' experiences in their daily life, so learning is more conducive and fun.

In the reflective observation step, the students are asked to give some questions then these questions are focused based on the try out activities that will be done. The try out activities will make the students easy to understand more the materials because the back integrative cortex of brain function works actively (Suciati et al., 2017). After they tell their experiences, it will be found some problems from these experiences to determine the problem arrangement. The students' skill in arranging the problems is guided by the teacher and trained through students' worksheets given. In the closing activities, the teacher gives the confirmation about how to arrange the problems correctly.

The reflective observation of EL learning model with mind mapping can enhance the students' science process skills. It is caused by mind mapping that can give wider thought about the problems, planning experiment, make the collecting data of observation easy, make the students easy to find out the solution of the problem and train the students creativity to express their ideas about the materials, so these advantages can make them remember the materials easily. Based on Muhlisin et al., (2018) mind mapping activity makes the students possible to think analytically, to arrange the information, to build the concepts found to be placed in the mind mapping. Making mind mapping can help the students to plan, observe, and to evaluate the results of mind mapping, so it can improve their cognitive skills and improve the science activities in order to achieve the objectives of learning. It is relevant to the research of Keliat & Susanti (2017) in which mind mapping can make the students more focus on the idea developed with their thought. Besides, they can connect their ideas and map their knowledge in order to get the information given easily. In line with Warseno & Kumorojati (2011), they stated that the human brain will be easier to understand the information in form of pictures, so mind mapping can be one of the alternatives to make the students remember the concepts learned easily for a long time.

Moreover, in this step, the students are guided to make mind maps based on the important concepts found in the passage. In making a mind map, they will work together with their own group well. Nevertheless, there are some students who can cooperate well because they still count on their member of groups that has the ability to draw well. In this case, the teacher has to try to guide them, so they can be responsible for making mind map and finishing it on time. According to Riswanto & Pebri (2012) stated that mind mapping can be functioned well because the students train to connect their ideas and motivated to classify certain ideas by visual framework. Besides, mind map made by the students from a group discussion will help them in collecting many ideas and creates fun learning. In line with the research by Ardhi (2014), it shows that there is an increase of science process skills of the biology education students in Madiun by using mind mapping that is implemented in

Microbiology lessons through lesson study.

In the second and third meetings, each group of the students can cooperate each other in making mind map. In the last activity of learning, each group will present their discussion results. The member from other groups can give questions or comments toward the presentation of the presenting group. Moreover, reflective observation step can help them to answer the questions relating to the aspects of observing, analyzing, classifying, and making hypothesis.

In this research, the aspects of science process skills that can be developed into mind mapping are aspects of analyzing, classifying, making a hypothesis, predicting, communicating, and planning experiments. In the aspect of observing, because of the pictures in mind mapping, they can help the students to observe the real objects in detail such as observing the structure of microscopies and macroscopies fungi. In line with the research by Muhlisin (2019), the results of observation show that the students feel happy, do not bored, and are excited during the learning process because there are various colors, symbols, pictures, and simple words in the mind map. These things make the students easily understand, memorize, and remember the learned materials. In the aspect of analyzing, the noting technique of mind mapping trains the students to summarize the concepts of materials written in the materials, so they can conclude the results correctly. Besides, the classifying aspect can be developed through mind mapping because there is curved line inside mind mapping that gives the groove or direction for classifying the fungi correctly. There is a social interaction happened in the group discussion that triggers the students to exchange their ideas or information in order to solve the problem and be able to improve the process of thinking. These matters can help the students to develop the aspects of predicting, communicating, and making hypothesis. The concepts built by using mind mapping techniques can train the students to plan an experiment.

The science process skill of the research is measured by test instrument that contains 10 essays including some aspects such as observing, analyzing, classifying, making hypothesis, predicting, planning the experiment, and communicating). Each aspect of science process skill implemented in the experiment class or control class improves. Nevertheless, experiment class gets higher average after getting the treatment that can be seen further in Figure 3. It means that the EL learning model with mind mapping can improve the science process skill. From seven aspects of science process skill measured, the aspect of planning in the experiment class has a score of 97,44 that is higher than the score of other aspects. In this activity, almost all students have no trouble. It is caused by the students who are able to plan and to do the experiment. Besides, it can make them enthusiastic and can test the theory explained directly, so it can make the students easy to answer the questions related to the planning experiment aspect. Aydogdu (2014), found that science teachers usually do the science process skill in the classroom and get the high score of the skill. The classifying aspect in the control class has a higher score about 87,18 than the score of other aspects. The lowest aspect of the KPS is communicating in the experimental class of 82,05 and the control class is 51,28. The students get the difficulty in the aspect of analyzing because they are lack of explanation and the way to conclude the existed data. Besides, the students in the control class get some trouble in communicating aspect since they are less active in the discussion activity and are not enthusiastic to present the results of observation. In line with the research done by Chabalengula (2012) stated that the result of science process skill of the students in the aspect of analyzing is very low because the students do not easily understand in analyzing the data of graphics correctly.

Thus, in the abstract conceptualization step, the students learn to arrange the hypothesis (determine the temporary answer from the questions asked). In this step, they are asked to use their thought to find out the answer to the problems arranged previously. Based on Suciati et al., (2017) by training to make hypothesis, the students will be easy to look for the solution of a problem because the frontal part of their brain can develop well. In making hypothesis, the students are trained through experiment activity. In the first meeting, they are still difficult to arrange the hypothesis and ask the teacher's help. In the next meeting, they start to understand and know by the investigation done and can give examples related to the materials learned. The hypothesis made, then, will be proved through practicum that is accomplished in the active experimentation step.
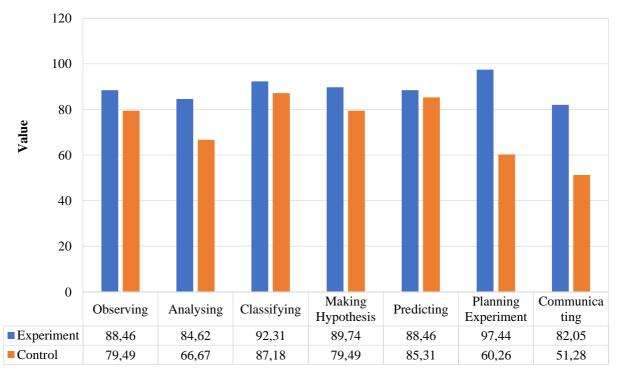
	Observing	Analysing	Classifying	Making Hypothesis	Predicting	Planning Experiment	Communicating
■ Experiment	88,46	84,62	92,31	89,74	88,46	97,44	82,05
■ Control	79,49	66,67	87,18	79,49	85,31	60,26	51,28

Figure 3. The aspect of Science Process Skills

The last step is active experimentation. In this step, the students are trained to arrange the experiment and make a conclusion. In planning the experiment, they have to decide their own steps of activities based on the experiment completed previously and write on the students' worksheet given. Almost all students do not have any problems. They are not difficult to make the conclusion based on the problem statements made previously and based on their learning experiences during learning process. It is relevant to the statement of Baharuddin &Wahyuni (2007) that knowledge will be more meaningful through experience. By science experience, the students will get the science process skills.

EL learning model with mind mapping is different from the common learning model used by the teachers because this learning model makes the learning activities fun, so the students are enthusiastic to follow the class and can cooperate well in group discussion. This learning model demands the students to participate actively during teaching and learning process. They are trained by using real experiences at the beginning of the learning activities that will be further presented. They also interact in the group discussion to find out other experiences, ideas or concepts from their mates to achieve the learning outcome optimally. In line with Kastawaningtyas & Martini (2017), they stated that EL learning model can improve the students' science process skills (SPS). Meyer (2010) also stated that EL learning model is the process to construct the knowledge that involves 4 aspects in the learning model toward the demand to understand the materials connected with the living context. The science process skills are very important for the students since these skills can help them to use scientific methods and develop their science (Bahtiar & Nurhayati, 2019). Besides, mind mapping can also improve the science process skills that make it easier for learners to learn the concepts of science. Muhlisin (2019), mind mapping can help the students to understand the science concepts well as they are more focused on organizing meaningful information and can review the obtained information. Besides, influenced by the interaction between the individual in the groups which requires the students to understand and remember the materials learned helps them to express the ideas in written form. So, there is a combination between the mind mapping and learning model of EL can improve the students' science process skills.

CONCLUSION

Based on the results of the research done, it can be concluded that normalized gain score in the experiment class improves higher than in the control class. In the research, there is a difference in science process skills between the experiment class and control class. So, the learning model of EL with mind mapping is effective to improve the students' science process skills in the tenth grade of State 1 Kalasan Senior High School toward the fungi materials. This research is expected to be the reference for the next research and the research using learning model of EL with mind mapping to improve the science process skills toward other materials needed to be done.

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