



Blended-problem based learning with integrated social media-based learning media in improving students' critical thinking skills

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ABSTRACT

SMAN 1 Tasikmalaya organizes education and learning that leads to 21st Century skills. One of the 21st Century skills developed is students' critical thinking skills. The critical thinking skills of class XI MIPA 1 student in the 2021/2022 Academic Year, especially in learning biology based on the results of interviews with biology subject teachers, still need to be improved, this is confirmed by the results of the students' critical thinking skills test with an average of 49.85 with the category still underdeveloped. The purpose of the study was to determine the role of Blended-Problem Based Learning with integrated social media-based learning media in improving critical thinking skills of class XI MIPA 1 student. This research was a Classroom Action Research based on Lesson Study. Data on critical thinking skills were obtained using a critical thinking test with essay type questions. Data on students' critical thinking skills test results were analyzed descriptively qualitatively by referring to the Illinois Critical Thinking Essay Test. The results showed that the critical thinking test results for students in cycle I and cycle II had increased by 9.83%, which means that the critical thinking skills of class XI MIPA 1 student in the 2021/2022 Academic Year had developed well in learning biology using Blended-Problem Based Learning with integrated social media-based learning media.

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INTRODUCTION

SMAN 1 Tasikmalaya West Java has a bright vision in academic and non-academic achievements based on IMTAQ and science and technology in collaborating in the era of globalization. This vision is supported by the creation of learning by teaching staff that leads to the development of life skills for students in facing the challenges of the 21st century. Critical thinking, problem solving, creativity, communication, and collaboration are part of the components of 21st century competencies (World Economic Forum, 2015). 21st century competence is a capital for students in facing the challenges of complex life.

Learning that seeks to develop 21st century competencies is created by teaching staff at SMAN 1 Tasikmalaya in various subjects, one of which is biology. Based on the results of interviews with biology subject teachers who teach in grades XI MIPA 1 to XI MIPA 3 in the 2021/2022 Academic Year on August 6, 2021, information is obtained that one of the 21st century competencies that is in the spotlight is critical thinking skills. Further observations are suggested by the biology subject teacher at XI MIPA 1. Based on the results of observations made on August 9 to 13, 2021, in class XI MIPA 1, several findings were obtained including students not assessing the credibility of information by using the teacher as the main learning resource to explain the material. Furthermore, the information provided by the teacher was also not assessed by the students either through responses or questions posed to the teacher. This is further strengthened by the situation during the Covid-19 Pandemic which forced learning to be carried out online, either synchronously or asynchronously.

Based on the results of observations of students' critical thinking skills in class XI MIPA 1, further analysis was carried out with tests of students' critical thinking skills. The Illinois Critical Thinking Essay Test scoring rubric developed by Finken & Ennis (1993) used to analyze the results of critical thinking tests. The results of students' critical thinking tests using essay questions from Basic Competency 3.3 biology class XI subjects obtained data from each critical thinking component including: focus 51.25; supporting reasons 44.87; reasoning 46.45; organizations 48.92; conventions 52.76; and integration 54.85. The average critical thinking skills of class XI MIPA 1 student is 49.85. The critical thinking component if $\leq 50\%$ each indicates the critical thinking skill indicator has not developed, on the contrary if the critical thinking component score $> 50\%$ then the critical thinking skill indicator is developing well (Triyanto et al., 2016). Based on these indicators, the average value of students' critical thinking skills in class XI MIPA 1 if analyzed based on these indicators, is included in the category of still underdeveloped.

The learning process that is less than optimal is the cause of problems related to the lack of thinking skills of Class XI MIPA 1. The use of learning resources that focus on the material provided by the teacher is an indicator of the learning process being less than optimal, especially online learning conditions during the Covid-19 pandemic seem to force learning implemented by transferring information from the teacher to the students. The dominant teacher explains the material to students in synchronous online learning using various learning support media minimizing efforts to build knowledge in students' minds by utilizing various problems as learning stimuli (Triyanto et al., 2016).

Findings regarding the condition of critical thinking skills of XI MIPA 1 students should certainly be a concern for biology teaching staff, including stakeholders at SMAN 1 Tasikmalaya. One of the important skills to be developed as a 21st century educational goal is critical thinking (Bart, 2010; Moseley et al., 2005), to be competent in the global era because it is the most important characteristic of the 21st to 30th centuries (Alotaibi, 2013; Roekel, 2015). Given the importance of critical thinking skills for students, biology teachers at SMAN 1 Tasikmalaya need to seek effective learning in pursuing students' critical thinking skills.

Learning that has not been able to overcome the less-than-optimal learning process, it is necessary to make improvements to the learning design used. Teachers in designing learning

must be in line with the goal of maximizing the learning process so that it can be said that learning is effective (Ginnis, 2008). Teachers need to strive for learning that facilitates the maximum student learning process. Blended-PBL accommodates an in-depth learning process for students because it uses a blend of Blended Learning approaches with Problem Based Learning models (Triyanto et al., 2016). Blended-PBL is closely related to online learning because it utilizes technology (Donnelly, 2008). Blended-PBL makes it easy for students to find information online to facilitate student understanding, plus there are problems that are presented as a stimulus for discussion between students (Jin et al., 2015).

Blended-PBL has the power to develop students' critical thinking skills. The characteristics of Blended-PBL are the supporters of these strengths; learning is stimulated by problems, the role of facilitator is carried out by the teacher, problems are a stimulus for learning, and there is group work (Triyanto et al., 2016). Student learning is assisted by the teacher so that they find control over the learning strategies used, such as utilizing learning media that can support student-student communication, online student-teacher communication, and are not limited by space and time (Gleadow et al., 2015; Kongchan, 2013).

Learning media that is not limited by time and can connect users online in online learning is very much needed in the era of the Covid-19 Pandemic. To support unlimited connectivity between students and teaching materials, teachers can take advantage of integrated social media. Integrated social media as online learning media comes with the hope that communication messages can be spread widely and meaningfully by using more than one social media that matches the characteristics of students. The integration between conventional media and new multimedia-based media has succeeded in conveying learning messages to be more meaningful because the weaknesses of one media can be covered by other media (Cangara, 2007; Putri, 2018). Social media that can be used is Instagram to convey information in the form of images or infographics, while information in the form of audio can be conveyed using Spotify.

The process of integrating media in learning requires a research or study. Learning can be studied using Lesson Study using peer principles and collaborating in building a learning community (Susilo, 2013). Triyanto & Prabowo (2020) saw that student learning outcomes in biology subjects could be improved using Blended-PBL based Lesson Study. Based on the condition that critical thinking skills are still underdeveloped in class XI MIPA 1 SMAN 1 Tasikmalaya in the 2021/2022 Academic Year in learning biology and seeing the potential of Blended-PBL based on Lesson Study and integrated social media-based learning media as research novelties, this research is important to do to obtain quality learning the best while developing the competence of educators.

METHODS

Research Design

This Classroom Action Research is based on Lesson Study. The Classroom Action Research used includes several cycles, where each cycle consists of planning, implementing, observing, and reflecting. The lesson study stage, namely plan, do, and see is implemented at the implementation stage of the Classroom Action Research itself (Asyari et al., 2016; Susilo, 2013). Classroom Action Research is usually one cycle for one Basic Competence of the national curriculum in Indonesia. Long cycle conditions make Classroom Action Research weak in the design process because one design is used for that time span. To improve the use of Classroom Action Research more optimally, then in each implementation activity Lesson Study activities are carried out, so that more improvements can be made to the quality of learning. Classroom Action Research is not the same as Lesson Study, although both have the same goal, namely improving the quality of learning. Classroom Action Research is research-based, while Lesson Study is not always research-based and has a wider scope than Classroom Action Research



(Sriyati, 2014). The focus of lesson study is on improving the quality of learning and the competence of educators because it provides a process for educators to develop their professionalism and pedagogical abilities (White & Lim, 2008). Figure 1 shows how lesson study-based Classroom Action Research is implemented.

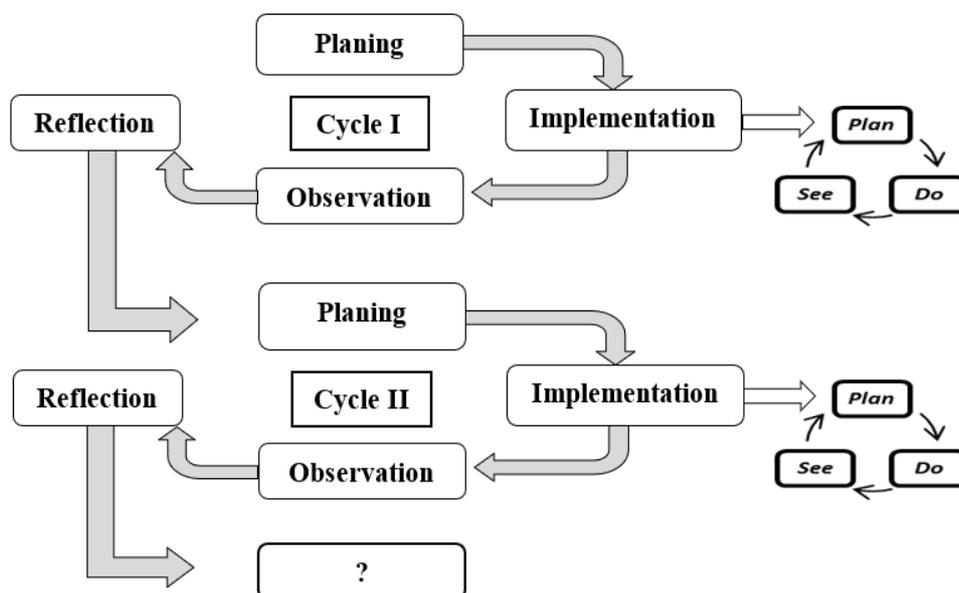


Figure 1. Integration of Classroom Action Research with Lesson Study

Population and Samples

This research was conducted at SMAN 1 Tasikmalaya City, West Java Province. The research subjects were students of class XI MIPA 1 Odd Semester for the Academic Year 2021/2022. There are 35 students, with 26 girls and 9 boys.

Instrument

Data collection techniques include test and non-test techniques. The test technique is used to measure critical thinking skills with instruments in the form of essay tests. The critical thinking instrument was developed based on the Illinois Critical Thinking Essay Test which was previously developed by Finken & Ennis (1993) including: focus, supporting reasons, reasoning, organization, conventions, and integration which is an accumulation of all previous critical thinking indicators. The number of questions in the critical thinking instrument is as many as five questions from Basic Competencies 3.4 and 4.4 high school biology subjects class XI, namely material on the relationship between cell structure in animal tissues and organ function in animals and five questions from Basic Competencies 3.5 and 4.5 high school biology subjects class XI is material on the structure of the tissues that make up organs in the motion system in relation to bioprocesses and functional disorders that can occur in the human movement system. Each question in the critical thinking instrument used is also tested for validity and reliability tests to determine the quality of the instrument.

Non-test techniques used include observation and interviews. Interviews to find out initial information about learning biology at SMAN 1 Tasikmalaya, especially in class XI MIPA 1. Observations were used to determine the implementation of Blended-PBL in biology learning and the results of lessons learned in biology learning.

Procedure

The research was carried out in two Classroom Action Research cycles with six Lesson Study activities from August to October 2021. The research procedure was started by

conducting a preliminary or pre-cycle analysis, then determining problem solutions, developing learning designs using Blended-PBL, developing chapter designs and lesson designs that includes sharing tasks and jumping tasks, developing biology learning media in the form of posters and podcasts packaged with integrated social media. All these tools were developed with the Lesson Study team.

Classroom Action Research based on Lesson Study in theory has procedures in its implementation. Triyanto & Prabowo (2020) explains several stages of lesson study-based Classroom Action Research, including: 1) Planning, namely the process of identifying learning problems and determining solutions based on problem analysis; 2) Implementation, which is a follow-up to the problem analysis that was previously carried out. The implementation of the action is also the implementation stage of the lesson study. Lesson Study practices in learning go through several stages until the desired quality is achieved, these qualities include the quality of learning, the quality of learning outcomes, and the quality of educators (Susilo, 2013). Each stage of Lesson Study to achieve the desired quality consists of Plan, Do, and See.

The Lesson Study process in Japan has three basic stages. The first stage includes activities such as problem identification, lesson planning, learning implementation, evaluation, and reflection. The results of the evaluation and reflection from the first stage are used as the basis for planning the next lesson. The second stage includes planning learning outcomes of evaluation and reflection from previous meetings, implementation of suggested learning, evaluation, and reflection. The final stage is to publish the results (Baba, 2007; Stigler & Hiebert, 2000). Educators at all stages of Lesson Study work together with Lesson Study teams to plan, design, implement, evaluate, and improve learning (White & Lim, 2008); 3) Observation: The observation phase is carried out to find out a comprehensive description of the implementation phase of the action research; 4) Reflection: The reflection stage includes process analysis activities and the impact of implementing actions, all data collected is evaluated to be used as a basis for planning for the next cycle.

The detailed procedure of the Lesson Study-based Classroom Action Research carried out is as follows:

1. Planing

The critical thinking skills of class XI MIPA 1 Academic Year 2021/2022 analyzed by the Illinois Critical Thinking Essay Test have an average score of 49.85 or fall into the category of less well developed in learning biology. Based on these conditions, Lesson Study-based Blended-PBL and integrated social media-based learning media were chosen as solutions to improve students' critical thinking skills and educator competencies.

The planning stage consists of several activities carried out together with the Lesson Study team. The Lesson Study team consists of the leadership elements of SMAN 1 Tasikmalaya Year 2021/2022, namely Anda Sujana, M.Pd. as the Principal and Yana Suryana, M.Kom. as Deputy Principal for Academic and Curriculum. The involvement of leadership elements from school institutions is important in the implementation of Lesson Study because it can be used by school leaders to carry out academic supervision of teachers in developing their competencies on an ongoing basis without having to leave school so that it has a significant impact on improving teacher performance and quality learning. The Lesson Study team here also involves a biology subject teacher, namely Dra. Nina Hartania, M.Pd., Dra. Ai Solihat, M.M., and Sutrisno, S.Pd., M.M.

The Lesson Study Team made design chapters and lesson designs for each of the two meetings in Cycle I of Classroom Action Research from Basic Competencies 3.4 and 4.4 for biology subjects in class XI high school, namely material on the relationship between cell structure in animal tissues and organ function in animals. Furthermore, the Lesson Study team also made a design chapter and a lesson design for each of the two meetings in Cycle II Classroom Action Research from Basic Competencies 3.5 and 4.5 for biology subjects in class XI



high school, namely material on the structure of tissues making up organs in the motion system in relation to bioprocesses and functional disorders that can occur in the human movement system. Each lesson design is always equipped with sharing tasks and jumping tasks to develop students' higher order thinking skills. Lesson design is also equipped with Student Worksheets to support the student-centered learning process.

The team also developed critical thinking instruments adapted to the Illinois Critical Thinking Essay Test previously developed by Finken & Ennis (1993) including: focus, supporting reasons, reasoning, organization, conventions, and integration. The critical thinking instrument consists of ten (10) essay questions with the division of five (5) questions for Basic Competencies 3.4 and 4.4 and five (5) questions for Basic Competencies 3.5 and 4.5 for high school biology class XI. Furthermore, the Lesson Study team also developed an observation sheet on the implementation of learning with the Blended-PBL model and a learning observation sheet that focuses on student learning activities.

The planning stage also prepares social media that is used to support the implementation of learning. The social media used are Instagram and Spotify. Both social media are used to upload teaching materials that students will learn later in learning. Instagram is used to convey information or teaching materials in the form of images or infographics, while Spotify is used to convey information or teaching materials in the form of audio.

2. Implementation

Research planning stages that have been carried out together with the Lesson Study team for further implementation. This action research was carried out in two cycles, where each cycle was carried out to achieve learning objectives in one Basic Competence. Basic Competencies 3.4 and 4.4 high school biology subjects' class XI for Cycle I while Basic Competencies 3.5 and 4.5 high school biology subjects' class XI for Cycle II. Each of the Basic Competencies is taken through two face-to-face or virtual meetings. Each learning activity is planned, implemented, and reflected through Lesson Study activities. So, in this action research, every cycle of action research is carried out twice Lesson Study activities.

Lesson designs that have been developed by the Lesson Study team are then implemented in learning activities for meetings one and two in Cycle I and meetings three and four in Cycle II. Lesson design implemented in learning uses the Blended-PBL learning model by utilizing integrated social media, namely Instagram and Spotify. The first meeting in Cycle I discussed the main material regarding the structure of cells in animal tissues and the function of organs in animals. Furthermore, the second meeting in Cycle I discussed the main material, namely the relationship between cell structures in animal tissues and organ functions which he compiled using data from observations and studies through textbooks and teaching materials uploaded on Instagram and audio recordings on Spotify. After the first and second meetings were completed, an assessment activity to measure students' critical thinking skills in Basic Competencies 3.4 and 4.4 in biology subjects in class XI was carried out.

Cycle II which consists of the third and fourth meetings. The third meeting discussed material on the relationship between the structure of the organ-composing tissue and bioprocesses in the human movement system. The fourth meeting discussed material regarding the relationship between the structure of the organ-composing tissue with functional disorders in the human movement system and technology to overcome disorders in the human movement system. Teaching materials in the form of images and infographics are uploaded on Instagram, while teaching materials in the form of audio are uploaded on Spotify. After the third and fourth meetings were completed, the assessment activities to measure students' critical thinking skills in Basic Competencies 3.5 and 4.5 biology subjects in class XI were carried out.

3. Observation



Observations in action research were carried out to capture the overall course of the research from Cycle I to Cycle II. To distinguish observations in action research from the see stage of Lesson Study activities, it can be seen in the focus of the observations. Observations in Lesson Study activities take more pictures of student learning activities in learning created by the teacher, while observations from action research take pictures of the general course of research. So, observations from action research can take advantage of the results of observations of student learning activities in learning created through Lesson Study activities, while observations in Lesson Study activities cannot be independently stated as results of action research observations.

Observation activities were carried out together with the Lesson Study team, which consisted of five observers. Each observer in carrying out action research observations utilizes the Blended-PBL implementation observation sheet and the student learning activity observation sheet in learning created by the teacher. One example of the focus of observation in the implementation of Blended-PBL is the successful use of authentic problems as a learning stimulus. Furthermore, the results of observation activities in action research are used as a basis for developing corrective actions after going through the analysis process at the reflection stage.

4. Reflection

The reflection stage in action research departs from the results of the analysis of the process and effects of implementing the action. The action referred to here is the application of Blended-PBL based on integrated social media in seeking critical thinking skills for class XI MIPA 1 student of SMAN 1 Tasikmalaya in the 2021/2022 Academic Year in learning biology. The results of the analysis in the form of strengths, weaknesses, or obstacles in the implementation of actions in Cycle I are used as the basis for preparing action plans at the Cycle II stage and so on until the research objectives are achieved.

Data Analysis Techniques

Critical thinking skills data consists of students' critical thinking skills scores and scores for each critical thinking component including focus, supporting reasons, reasoning, organization, conventions, and integration obtained from critical thinking skills tests. The results of the critical thinking test are then scored using the critical thinking rubric of the Illinois Critical Thinking Essay Test developed by Finken & Ennis (1993).

Scoring procedures, namely: 1) the maximum score ranges from 6 to 36; 2) a score of 1-3 indicates that the critical thinking component that is assessed is not visible or at a stage that is still underdeveloped and a score of 4-6 indicates that the critical thinking component is developing very well; 3) each component is assessed separately except for the integration component.

There are five critical thinking questions from each cycle. Each critical thinking question is assessed with a critical thinking rubric covering focus, supporting reasons, reasoning, organization, and conventions, while the score for integration is obtained from the average of the scores of the other components. The value of students' critical thinking skills is obtained from the sum of all scores obtained from each component divided by the maximum score. The maximum score for critical thinking is 180 if there are 5 item questions, obtained from 6 times 30. A score of 30 is obtained from the maximum score for the critical thinking rubric multiplied by 5 item questions. The increase in critical thinking value is obtained from the average value of critical thinking in Cycle II minus the average value of critical thinking in Cycle I divided by the average value of critical thinking in Cycle I multiplied by 100%.

The value of each critical thinking component is obtained from the total score of each critical thinking component of 5 item questions multiplied by 35 students divided by the

maximum score of each critical thinking component, which is 1050. The maximum score for critical thinking is obtained from the maximum score of each aspect multiplied by 5 item questions multiplied again with 35 students.

The results both the value of students' critical thinking skills and the value of each critical thinking component are categorized into two categories, namely "still less developed" if the value is 50 and "has developed well" if the value is >50 (Triyanto et al., 2016).

RESULTS AND DISCUSSION

Instrument Validity and Reliability Test Results

The research data were obtained using instruments that had previously been tested for validity and reliability. The test was carried out on the Basic Competency Test instrument in cycle I and cycle II. Instruments of critical thinking skills in the form of essay questions, 10 items of essay questions based on content and construction validity tests stated that all items were valid. Reliability test is used to measure the level of consistency of respondents' answers to the item questions. The results of the calculation of the reliability coefficient stated that each item of the question for the critical thinking test in biology learning gave fixed or reliable results. The results of the critical thinking instrument test for the first cycle questions obtained a Cronbach Alpha value of 0.954 while for the second cycle questions it was 0.976. The item items were declared reliable because Cronbach's Alpha value was > r-table (0.349) at the 5% significance level.

Student's Critical Thinking Skills

Data on critical thinking skills were obtained through critical thinking tests. Critical thinking skills test was conducted at the end of Cycle I and Cycle II. The analysis was carried out by calculating the critical thinking component scores obtained by each class XI MIPA 1 student, then the data was used to determine the scores of each student's critical thinking component classically. The value of critical thinking in class XI MIPA 1 is classically obtained from the sum of all values of the critical thinking component. The value of the critical thinking components of class XI MIPA 1 student from Cycle I and Cycle II can be seen in [Table 1](#).

Table 1

The Value of Students' Critical Thinking Components Cycle I and Cycle II

No	Critical Thinking Component	Value		Enhancement (%)
		Cycle I	Cycle II	
1.	Focus	56.75	62.22	9.64
2.	Supporting reasons	48.28	52.96	9.69
3.	Reasoning	49.35	53.45	8.31
4.	Organization	53.82	58.45	8.60
5.	Conventions	56.53	62.54	10.63
6.	Integration	58.72	65.64	11.78

Based on [Table 1](#), all the critical thinking component scores of students of class XI MIPA 1 in cycle I for the Supporting reasons and Reasoning components are in the category of not developing well, while the Focus, Organization, Conventions, and Integration components are already in the well-developed category. All components of critical thinking in cycle II are included in the well-developed category. The highest increase in the value of critical thinking components was owned by integration 11.78%, conventions 10.63%, supporting reasons 9.69%, focus 9.64%, organization 8.60%, and reasoning 8.31%.

The value of critical thinking in class XI MIPA 1 classically increased from cycle I to cycle II. The average value of critical thinking skills for students of class XI MIPA 1 in the first cycle is



53.91 which means that the average critical thinking skills of students in class XI MIPA 1 have developed well and in the second cycle of 59.21 which means the average critical thinking skills of students in class XI MIPA 1 have developed well. good. The percentage increase in critical thinking skills of class XI MIPA 1 student reached 9.83% as shown in [Table 2](#).

Table 2
Critical Thinking Value of Class XI MIPA 1

No	Descriptions	Value		Enhancement (%)
		Cycle I	Cycle II	
1.	The Average Value of Critical Thinking Skills for Class XI MIPA 1	53.91	59.21	9.83

Critical thinking skills data were analyzed using the Illinois Critical Thinking Essay Test and Guidelines for Scoring Illinois Critical Thinking Essay Test by Finken & Ennis (1993). The value of critical thinking skills of class XI MIPA 1 student has increased after learning with Blended-PBL based on Lesson Study. The value of critical thinking skills of class XI MIPA 1 student has increased from Cycle I to Cycle II.

Students' critical thinking skills can be improved through the application of Lesson Study-based Blended-PBL in learning. These results are in accordance with research conducted by Sendag & Odabas (2009) that online-PBL has a significant effect in improving critical thinking skills. Critical thinking is included in High Order Thinking Skills (Page & Mukherjee, 2006; Sendag & Odabasi, 2009). Alias & Saleh (2007) and Ibrahim et al., (2015) stated that Blended-PBL is effective in developing High Order Thinking Skills (HOTS), including critical thinking.

The application of Blended-PBL based on Lesson Study improves students' critical thinking skills classically from Cycle I to Cycle II, covering components of focus, supporting reasons, reasons, organizations, convention, and integration. The focus component shows the level of truth and clarity of the main ideas that students have (Finken & Ennis, 1993), when solving a problem or task. Blended-PBL uses PBL as the main pedagogical model (Donnelly, 2006), where PBL has a syntax that directs students to analyze problems, describe systematic explanations of problem analysis, and formulate learning objectives based on problem analysis (Schmidt, 1983; Wood, 2003; Yu et al., 2015) so that the focus component can be developed. Problems in learning require students to use their critical thinking skills (Sendag & Odabasi, 2009).

The supporting reasons component of critical thinking skills has also increased through the implementation of Blended-PBL. Supporting reasons indicate the level of truth, clarity, trustworthiness, credibility, of the supporting reasons or reference sources (Finken & Ennis, 1993) in solving problems or tasks. The level of truth, clarity, trustworthiness, and credibility of the problem-solving results can be tested by students in the learning process. Blended-PBL provides a learning environment that facilitates these activities, at the stage where students gather information in groups and test the results of group discussions in class discussion forums. (Lukitasari et al., 2019; Schmidt, 1983; Wood, 2003; Yu et al., 2015).

The reasoning component of critical thinking skills also improved through the application of Blended-PBL. Reasoning shows the level of truth and clarity of conclusions supported by reasons or evidence, alternative solutions, and arguments (Finken & Ennis, 1993) of the problem or task. Blended-PBL provides a learning environment for students to develop a reasoning component through the stages of concluding and seeking additional information, as evidence or alternative solutions to the problems at hand. Students can transfer the concepts they learn through online discussions into actual discussions in class to solve problems (Sendag & Odabasi, 2009), via Blended-PBL.

The organizational component of critical thinking skills has also improved through the application of Blended-PBL. Organization, showing the level of clarity and linkage between answers that are related to each other logically (Finken & Ennis, 1993) of the problem or task being completed. Problem-based learning in online PBL or Blended-PBL encourages students to think more deeply (Sendag & Odabasi, 2009) so that the problem or task being solved is clear and logically interrelated.

The conventions and integrations components of critical thinking skills have been improved through the application of Blended-PBL. Conventions show the use of grammar, while integration shows a general evaluation of the clarity of problem solving that has been done (Finken & Ennis, 1993). Students in Blended-PBL are trained to use good and correct grammar by providing learning steps that facilitate students to present in class discussion forums, ask questions, and give opinions. Blended-PBL or online-PBL facilitates students to think reflectively (Sendag & Odabasi, 2009) through concluding activities.

The average value of critical thinking skills for students of class XI MIPA 1 generally increased from Cycle I to Cycle II with the application of Blended-PBL. The application of Blended-PBL can train students to develop their critical thinking skills (Lukitasari et al., 2019). One of the improvements that occurred was influenced by the teacher's role as a facilitator in learning. Teachers in PBL online learning act as facilitators (Donnelly, 2006). Teachers who provide discussion guides encourage students to think more deeply, discuss more, think further, and do more research so that students critical thinking skills can develop (Sendag & Odabasi, 2009).

Blended-PBL supports flexible learning. Blended-PBL facilitates students learn to use media that is not limited by online (Gleadow et al., 2015; Kongchan, 2013). Learning media packaged with integrated social media is one definition of unlimited media use. Utilizing social media by uploading or posting on social media is an effective way to provoke students' critical thinking skills (Pattanapichet & Wichadee, 2015). The use of integrated social media in the delivery of learning materials using various social media in the form of uploading images, sounds, or even videos aim to improve the quality of meaning from the communication that exists between students and teaching materials, students and students, and even students and teachers. The use of technology and the use of social media in learning is a positive way to encourage students to think critically and reflectively (Bailey, 2014).

The teacher as a facilitator in learning together with the Lesson Study team reflects on the implementation of learning for each meeting in Cycle I and Cycle II to improve students' critical thinking skills. Reflection activities in Lesson Study are carried out to identify problems that occur in learning (Baba, 2007). An example of the results of problem identification that was successfully implemented and improved the quality of the learning process is the use of learning media that is not limited to PowerPoint but also involves videos and flash animations in learning through Blended-PBL. The combination of PBL and technology in learning improves the quality of student experience in learning (Lukitasari et al., 2019).

One of the results of the see stage in Lesson Study is to provide opportunities and encourage students to ask questions in learning. Opportunities and encouragement given by teachers to students are the result of Lesson Study. Lesson Study is a meaningful way to reflect and ask critical questions about learning (Trapero, 2013). The results of the Lesson Study activities encourage students to have the characteristics of critical thinking. Students who think critically have several characteristics, including asking the right questions to clarify understanding and trying to be knowledgeable (Ennis, 1993).

CONCLUSION

Based on the results of the critical thinking test of students in cycle I and cycle II, there was an increase of 9.83%, which means that the critical thinking skills of class XI MIPA 1 student



had developed well in learning biology using Blended-PBL with integrated social media-based learning media. Lesson Study-based Blended-PBL plays a role in improving students' critical thinking skills by utilizing learning media packaged through integrated social media because the communication formed is more meaningful.

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