THE DEVELOPMENT OF BRAIN-BASED LEARNING MODEL BASED ON SOCIO-SCIENTIFIC ISSUES (BBL-SSI) FOR BIOLOGY LEARNING IN SENIOR HIGH SCHOOL

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Abstract

The demand for senior high school curriculum based on the 21st century requires students to have 4C skills (Communication, Collaboration, Critical Thinking, and Problem Solving, and Creativity and Innovation), *but the fact is many students who are passive in the learning process, so that learning outcomes and thinking skills critical is still low. Learning that can actively involve students can be done using the Brain-Based Learning (BBL) learning model which is modified with the Socio-Scientific Issues (SSI) approach. The purpose of this study is to produce a valid, practical, and effective BBL-SSI learning model to improve learning outcomes and critical thinking skills. The type of research is research and development. The stages of the development model in this study used the ADDIE model (Analyze, Design, Develop, Implement and Evaluate). This research was conducted at Pakusari Jember Public High School in the subject of class X students in the academic year 2019/2020. The average validation results for all products was 91.4 categorized as very valid. The effectiveness of learning outcomes based on the results of Normalized Gain analysis that was equal to 0.62 categorized as moderate and 0.71 categorized high. Psychomotor learning outcomes have increased every meeting, which was 79 and 83. Students' critical thinking skills also have increased each meeting, with a value of 65.12 which is categorized sufficiently and 71.36 whichwas categorized very well. The practicality results obtained from the teacher response questionnaire were 98 excellent categories and the student response questionnaire was 84.33 with very good categories*.

Keywords: *Biology Learning, Brain-Based Learning, Socio-Scientific Issues.*

PRELIMINARY

The demand for senior high school curriculum based on the 21st century requires students to have 4C skills (Communication, Collaboration, Critical Thinking, and Problem Solving, and Creativity and Innovation) (Makhrus et al., 2018). It becomes a challenge for teachers to develop the skills through learning at school. The data obtained from research conducted by Yusup (2018) showed that 42% of 109 biology teachers in West Java used conventional learning. This phenomenon caused by the traditional way of teaching in the classroom (Muis & Bahri, 2018). This is also supported by the result of a survey from google form, which distributed to 19 teachers of ***MGMP*** Biology in Jember regency. The teachers had several constraints in teaching activities such as limited literature, students' difficulty in remembering scientific names, and incomprehensible learning material because of the teachers' limitation in giving real-life examples.

Learning that can drill 4C skills is the one that focused on the students, group work, and related to the students' real-life (Mayasari, 2016). Social constructivism theory is a learning theory which mentions that learners create knowledge through social interaction (Wardoyo, 2013). One of the learning approaches based on the social constructivism learning theory is Socio-scientific Issues (SSI). SSI is an approach that used social issues in society to drive the students to look for information and discuss the solution of a problem (Handayani & Hastuti, 2018).

The students in the future are required to understand the concepts of science and also play a role in a scientific discussion, including analysis activities and criticizing the discussed phenomenon. Students are challenged to consider the scientific principles underlie specific issues and analyze scientific data, which inform discussion on the problems (Karisan & Zeider, 2016). The implementation of SSI learning needed to be actualized in the learning procedures, so it needed a learning model that can improve the students' learning achievement and critical thinking skills. Nowadays, critical thinking skills are required

to prepare students to process information so that they will not be easy to trust, influenced, and formatting their habit to check the truth of the information obtained (Anwar et al., 2017). Critical thinking is reasonable and reflective thinking focusing on what must be believed and done (Ennis, 2011).

One of the learning models based on the characteristics of the SSI approach is Brain-based learning (BBL). BBL is a learning model that optimized the students' brain work (Yustisia et al., 2019). BBL also creates engaging and fun learning, as well as increasing relaxation (Shabatat & Tarawneh, 2016). The learning model of BBL can create more conducive environment and improves the students' learning achievement (Sukoco, 2014). The principles of BBL closes the weaknesses of the SSI approach. During the implementation of the SSI approach, the students may involve in a situation that needs HOTS ability because social-science issues are often controversial so that it may confuse the students. Therefore, the learning model required is one that can create the conducive, fun, and pleasant situation; it is BBL.

That problem became the basis of the research to develop a Brain-based learning model for Biology subject in Senior high school. The aim was to analyze the validity of BBL-SSI learning model, analyze the practicality of the model, as well as the effectiveness of the learning model towards the students' learning achievement and critical thinking at senior high school.

RESEARCH METHOD

Research Design

The type of research used was research and development (RnD) aimed at producing a product in the form of a handbook containing the procedures of an effective BBL-SSI learning model to be used in the learning at school.

The research model used was the ADDIE development model. The stages of the ADDIE development model consist of Analyze, Design, Develop, Implement, and Evaluate (Kilbane & Milman, 2014).

The analysis stage covers problem identification, interview, needs analysis, KI and KD analysis, and task analysis. The aim of the define stage is to analyze curriculum, students' potency, school condition, and review of the literature to develop the BBL-SSI learning model, which is based on the students' needs.

The stage of design includes the formulation of learning objectives, designing the learning and research instruments, and designing the BBL-SSI learning model. Develop stage is the validation of the product and the instruments, revision of the learning model developed based on the validation result from the experts, implementation of the learning model for a small scale (try out), and revision of the product based on the weaknesses found in the tryout. The implement stage is where the BBL-SSI learning model is implemented in the classroom scale, then revising each meeting. The last stage is evaluate, this stage assessing all the result of the implementation of BBL-SSI learning model by distributing questionnaires to the teachers and students as the feedback to conduct the evaluation.

Research context and Time

This research was conducted at Biology Education Study Program and had been tried out at SMA Negeri Pakusari Jember. The research was carried out from August-November 2019 in the 2019/2020 academic year. The subjects of this research were 36 students of the X MIPA4 SMA Negeri Pakusari Jember.

Data Collection Method

The data collected from the research were obtained through a validation sheet, students' and teachers' needs analysis, students' and teachers' practicality questionnaire, pretest and posttest, assessment of LDS on critical thinking skills, interview, and documentation.

Data Analysis Technique

a. The validation of learning model product

The data analyzed in this research were the result of validation of BBL-SSI learning model design, syllabus, lesson plan, and learning achievement tests. The data were analyzed by using the following formula:

$$Validation = \frac{\sum obtained\,score}{\sum \max imum\,score} x100 \quad \ldots (1)$$

The data obtained were grouped into the following criteria:

Table 1. BBL-SSI Learning Model Validation Criteria

Atteinment Value (score)	**Validity category**	**Explanation**
84≤ x ≤ 100	Very Valid	Very ready to use in the process of learning
68≤ x < 84	Valid	Can be used but with less component added. Increments aren't very large and substansial
52≤ x < 68	Valid enough	May be used on condition to repair any less components.
36≤ x < 52	Less valid	Revision is done by careful reexamining and by searching for weakness for improvements
20 ≤ x < 36	Invalid	Revision almost the whole component

b. The practicality of learning model

The measurement of practicality on BLL-SSI learning model used practicality questionnaire/ teachers' and students' responses after conducting the learning using BBL-SSI learning model and it was described by using a 1-5 Likert scale. The results of students' questionnaire were calculated by using the following formula:

$$\text{Response Percentage} = \frac{\sum \text{data collection results score}}{\sum \text{maximum score}} x100\%$$

.....(2)

The percentage result from the teachers and students was changed into a qualitative data and analyzed by using the criteria on Table 2.

Table 2. Practicality Questionnaire/ Teachers' and Students' Responses Criteria

Percentage (%)	**Kategori**
84 ≤ x ≤ 100	Very Good
68 ≤ x < 84	Good
52 ≤ x < 68	Satisfactory
36 ≤ x < 52	Less than satisfactory
20 ≤ x < 36	Poor

c. The effectiveness of learning achievement

The results of students' learning achievement were obtained from pretest and posttest scores. The questions were in the form of essay and multiple choices. The measurement of the effectiveness of students' cognitive learning achievement was based on Normalized gain (g) with the following formula:

$$Normalized\ gain(g) = \frac{\text{posttest score} - \text{pretest score}}{100 - \text{pretest score}}$$

.....(3)

The scores used in the Normalized gain were then categorized on Table 3.

Table 3. Normalized Gain Criteria

Skor *Normalized gain*	**Kriteria *Normalized gain***
normalized gain ≥ 0,70	High
0,30 ≤ *normalized gain* < 0,70	Average
normalized gain < 0,30	Low

d. Analysis of critical thinking skills

The measurement of critical thinking ability was obtained from the students' answers on the cognitive test given and using the indicators that had been developed. The critical thinking ability was calculated with the following formula:

$$Cs = \frac{C}{N} x100$$

Note:
Cs : *Critical Thinking Score*
SC : Students's *Critical Thinking Score*
N : Total score

The categorization of the critical thinking skills was done on Table 4.

Table 4. Critical Thinking Skill Assesment Criteria

Category	Explanation
83,35≤x≤100	Very good
66,68≤x≤83,35	Good
50,01≤x≤66,68	Satisfactory
33,34≤x≤50,01	Less than satisfactory
16,67≤x≤33,34	Poor
0≤x≤16,67	Very poor

RESULT AND DISCUSION

a. Analyze stage

The initial step of analyze phase was identifying the problems aimed at finding out the issues to tackle in the research of developing the BBL-SSI learning model. The results of the analysis were obtained from 17 MGMP biology teachers of high school in Jember regency and 1 biology teacher in the school where the research was conducted, generally implemented revised-curriculum 2013 (100%). The obstacles faced in the learning process were commonly caused by passive students in expressing their opinion (44%), the lack of motivation and focus of the students (27.7%), and unable to give real-life examples for the new learning material (22.2%), only 5.7% respondents mentioned the limitation of learning media. The percentage of teachers who stated that the students' learning achievement in Biology was low of 27.7%, moderate of 55.6%, and high of 16%. The students tended to be unconfident when expressing opinion, they had unstable motivation and focus, and the learning material was not understandable because the teachers' limitation in giving real-life examples in daily life, and the limitations of the media that did not support learning activities. The students with unstable enthusiasm and focus were caused by boredom in the classroom. This boredom during the learning process was triggered by the conventional learning which emphasized the theory instead of practice. Hence, the improvement of learning quality by stimulating the students' participations and interests in learning was a must for teachers (*Zang et al.*, 2019).

The second step was conducting the interview with biology teacher at SMAN Pakusari Jember. Based on the interview result, the problems covered the students' learning achievements which were low and the limited learning media. The learning achievements were still relatively low and only 50% was able to meet the standard or *KKM* during the test. The learning achievements were strongly affected by the students' motivation and interest in learning. A way to increase their interests and motivation was by giving them an interesting learning model. Moreover, the instructional media was also possible to increase the students' motivation and understanding in learning material (Sulfemi & Kamalia, 2020). Thus, the solution done by the researchers was developing BBL-SSI learning model as an alternative in classroom learning.

The third step was about analyzing the teachers' and students' needs in order to determine the proper requirements in overcoming the problems and supporting the development of BBL-SSI model until it reached the maximum. Based on the results of needs analysis, as many as 44.4% of teachers were able to cope with the obstacles during teaching and learning activities through the replacement of learning approach and another problem which referred to the lack of students' critical thinking skills. Critical thinking skill is one of the learning objectives in the 21st century in which the students possess 4C skills (*Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation*). If they possessed critical thinking skills, they would think in more independent and disciplined ways. Critical thinking skill helped them to formulate problems quickly and clearly, obtain and assess any relevant information, draw conclusion and reasonable solutions, be more open-minded, and be able to communicate effectively with others (Paul & Elder, 2005).

The homeroom teacher had already implemented the skill of critical thinking. Unfortunately, the students still found it difficult to get a better understanding. It happened as they did not understand the questions given by the teacher. They still felt afraid to ask questions since they got mocks from the other friends. This condition made the learning became very stressful and difficult for the students to get the learning better. BBL-SSI was used to improve the students' critical thinking skills in a more attractive learning atmosphere so that they were able to understand the learning material.

The third step done was analyzing KI and KD. Based on the results of problem identification and needs analysis, the selected basic competencies were KD 3.2 and KD 4.2 on biodiversity material. Biodiversity material was taught by using BBL-SSI model with appropriate media and learning activities. The media selected by the researcher were realia (pink and orange bougenville flowers; green and red apples; *arumanis*, *golek* and *manalagi* mangos; nile tilapia and tilapia fish; and several preserved species of butterflies), video, diorama, sound speaker, and LCD. These varieties of learning media really helped the

students to understand the material; in addition, these learning media improved the teacher and student interactions (Elihami & Suparman, 2020).

The fifth step was analyzing the tasks to reinforce the student-centered active learning and the students' critical thinking skills through Student Worksheet (LKS) and Student Discussion Sheet (LDS). LKS and LDS were adjusted to BBL-SSI learning model in which the questions were based on social-science issues in surrounding environment, the material being studied was supported by the video shown during the learning process.

The presentation of environmental problems during the learning process was adjusted to BBL-SSI model. BBL provided the students with an exciting learning without having any threats, and was able to foster their relaxation. In addition, learning was also related to socio-scientific issues regarding SSI. SSI contained the complex world issues, which were used to motivate the students in identifying and doing a research on the concept, and get the principles to overcome real-world issues related to the social environment. The students worked within a small group, brought up their collective skills, communicated, and integrated the information (Duch et al., 2001).

b. Design Stage

This stage was intended to create an initial design of the product development of learning model. The first step was the learning objective formulation which was formulated in accordance with BBL-SSI model. The learning objectives must fulfil the ABCD factors (*Audience, Behavior, Condition, and Degree*). Discussion, observation, and debate referred to the activities which were carried out.

The second step was designing the learning instruments involving Syllabus, Lesson Plan (RPP), LDS and LKS, and evaluation instruments. The tests given were the tests of cognitive and critical thinking skill. Cognitive tests consisted of pre-test and post-test. Moreover, the test of critical thinking skill was done on discussion sheets (LDS) in which it was integrated with learning videos of surrounding environment, related to learning material and opened for discussion, so that it was in line with SSI approach. The discussion process based on students' worksheets developed the students' knowledge individually, and the group was able to facilitate them to collaborate, exchange ideas during the process of problem solving (Isnaeni et al., 2018). SSI-based LDS of 2013 curriculum learning process was categorized into a good category (Lukman et al., 2019).

Delivering the material was also supported by social-issues video of surrounding environment which was related to the material; thus, it corresponded with SSI characteristics. SSI was directly connected with real-world issues which optimized the higher-order thinking skills and provided the students opportunities in implementing their knowledge in problem solving (Fitriani et al., 2020).

In addition, there was a video of brain gym. Brain gym was taken to adjust BBL model which was its characteristics, it referred to a simple and fun movement and made all types of lessons easier, beneficial for academic purposes and helped many people both young and old to optimize their learning abilities through the use of whole brain (Dennison et al.., 2005). Five types of Brain Gym were used, involving Hunting Rabbit, 1551, Box, Punishment, and Ice Cream equipped by cheerful instrumental music.

The third step was designing BBL-SSI model combined from 9 syntaxes of BBL learning model and 13 characteristics of SSI approach. The design result of BBL-SSI model development is shown on Table 5 as follows:

Table 5. BBL-SSI Learning Model Design

The Characteristics of SSI Approach	Syntax of BBL Model	BBL-SSI Learning Model
Having the incomplete scientific and information basis due to the lack of scientific evidences.	**1. Pre-preparation** This stage provides the brain an overview of a new learning before being explored.	• Teacher encourages the students to care about the brain nutrition by drinking a lot of water and eating food contain lots of protein. • Teacher and students relax their muscles casually (*brain gym*) and are accompanied by cheerful music so that all parts of brain are able to control the body movements, foster the balance and conscious muscle coordination • Teacher gives time to read a book briefly while playing the alpha music.
The issues given are often reposted on the media and directed to local, national or global dimensions concerning the political and social frameworks	**2. Preparation** Teacher prepares the students by building up their curiosity and excitement	• Teacher does apperception and motivation • Teacher tells the students that there wil be a *reward* at the end of a lesson • Teacher delivers the objectives of learning
The understanding of various possibilities to occur and its risks	**3. Initiation and Acquisition** Teacher delivers the material briefly to the students and divides them within group for discussion	• Teacher explains the learning materials by using power point or videos briefly • Teacher divides the class into several groups consisting of 4-5 students and distributes LDS • Teacher divides the class into 2 big groups (pros and cons) to conduct debate on the socio-scientific issues which are taken from Student Discussion Sheet (LDS) to solve the problems of discussion topic in argumentative way
Involving opinions and making decisions on personal or social level, ethical values and development	**4. Elaboration** Teacher asks each group to present the result of discussion	• Teacher asks the representatives to share the opinions in front of the class regarding the socio-scientific issues on the biodiversity material
	5. Memory incubation and encoding This stage emphasizes the importance of downtime (free time or no activity)	• Teacher asks students to summarize the discussion result while playing alpha music • Teacher does ice-braking
Topic related to what happens in the surrounding environment	**6. Trust verification and checking** Students confirm what they have learned	• Teacher asks students about what they have learned and link it to events in the surrounding environment (HOTS question) that can be derived from the results of the discussion
	7. Celebration and integration At this stage it is very important to involve emotions and create a pleasant atmosphere	• Teacher carries out a competition or quiz related to the topic • Teacher gives rewards to student who gets the best score at the quiz • The teacher gives assignments related to social-science issues and asks students to learn the next material

c. Develop Stage

Before applying the BBL-SSI learning model, validation was done by specified validators. The validity of the product development of the BBL-SSI learning model was obtained from the validation sheet given to the validators, who were two expert lecturers in the field of development and one user, the teacher. Data obtained from the validation sheet values are presented on Table 6. The validation sheets were intended to determine the validity of the learning model product developed by experts.

Table 6. Validation Data of Product Development of the BBL-SSI Collaborative Learning Model

Instrument	Validator	Validation Result	Category
Guidebook of BBL-SSI learning model	1ST Proffesional	77	Valid
	2nd Proffesional	84	Very Valid
	Teacher	97	Very Valid
Syllabus	1ST Proffesional	78	Valid
	2nd Proffesional	90	Very Valid
	Teacher	100	Very Valid
Lesson Plan (RPP)	1ST Proffesional	74	Valid
	2nd Proffesional	75	Valid
	Teacher	96	Very Valid
Pretest and *Postest*	1ST Proffesional	70	Valid
	2nd Proffesional	73	Valid
	Teacher	100	Very Valid
Average of total score validation		77	Valid

Based on Table 6, the average validation of all products by the three validators was 77 and was included in the valid category. So the entire product development of the BBL-SSI learning model that had been prepared by researchers was valid according to experts, so it can be used in the learning process. After the product development model was valid, the product was tested on a small scale consisting of 9 students, in which 3 students were categorized to high academic level, 3 students with moderate level and 3 students with low level.

d. Implement Stage

The implementation stage was carried out on a class scale trial which resulted in some improvements to the teacher activities of the BBL-SSI syntax that improved the BBL-SSI syntax based on observer suggestions. Improvement of teacher activities in the syntax section of the BBL-SSI initiation and acquisition stages was that the formation of groups carried out before the video which based on social-science issues related to the material, so that students concentrated on analyzing the contents of the video shown. Concentration was the key to success in achieving optimal learning achievements. With concentration, students were able to relate matters relating to the material being studied (Wulandari & Dewi, 2019).

The effectiveness of the BBL-SSI learning model was seen from the measurement of the results of the pre-test and post-test using one or more classes, which was known as one group pretest posttest design. This one group pretest posttest design was a research that used a class that was measured and given treatment and then was measured again after the treatment (Susanti, 2015). Pretest and posttest calculations were analyzed using N-gain. N-gain analysis was an appropriate analysis to measure the pre-test and post-test results of many students with different levels of knowledge (Nissen et al., 2018). The cognitive learning achievements are presented on Table 7 as follows.

Table 7. Cognitive Learning Achievements of BBL-SSI and N-Gain Models on the Class Scale Test (N = 36)

Meeting	Average of *Pretest*	Average of *Postest*	*N-gain*	Category
1st Meeting	28,05± 12,88	73,33± 15,11	0,62	Average
2nd Meeting	27,63± 8,9	79,58± 8,6	0,71	High

Based on the results obtained, it was known that the effectiveness value of the BBL-SSI learning model increased. The improved learning achievements and critical thinking

skills were caused by the increasing number of learning activities carried out by students such as the brain gym activities, analyzing real problems in the surrounding environment and daily life, discussions, and observations through pictures or direct observation at the schoolyard related to the material. These activities made students' synaptic nerves more connected and made students' thinking more complex (Handayani and Corebima, 2017).

More complex thinking made the brain healthy, which was very useful for improving memory, concentration, focus, and so on. Therefore, a person's success was determined by the quality of his brain, both the right and the left brains. Brain gym was one of alternative solutions to help children overcoming the lack of concentration and stimulate the brain to receive information easily, which had simple and not tiring movements and was easy to done anytime and anywhere. (Fajriati et al., 2017). Brain gym which was held routinely at every meeting made learning fun and increased students' enthusiasm, thus students were able to absorb information faster, improve learning ability, sharpen body reflexes and coordination, sharpen memory and concentration, and balance the body and mind (Ratnaningsih et al., 2019). The impact of brain gym was that it improved various achievements including attention, memory and academic skills (Komarudin et al., 2019).

In addition, the activities that have been carried out in the learning process were maximized by supporting media of various characters of student learning styles. Visual learning style was maximized with power points and problem-based video show. Auditory learning style was maximized by the presence of sound elements in the learning process such as music and a brief explanation of the material by the teacher. The kinesthetic learning style was maximized by observations at the schoolyard, which was to identify biodiversity at the school. The maximized learning styles also improved students' learning achievements. Learning style was an important aspect of students' learning success, because it was related to the way students began to concentrate, process, internalize, and remember new academic information (Dunn and Griggs, 2000).

Besides the cognitive learning achievements, there were students' psychomotor learning achievements that can be seen on Table 8. as follows.

Table 8. Psychomotor Learning Achievments of BBL-SSI on the Class Scale Test (N=36)

Meeting	Average	Category
1st Meeting	79±5,68	Average
2nd Meeting	83±8,27	High

Besides being seen from an increase on the learning achievements, the effectiveness of the BBL-SSI model was also seen from an increase on the critical thinking skills. The results showed that the students' critical thinking skills improved at each meeting. That was because the learning process was always problem-based, starting from pre-learning activities with HOTS questions, the core activities involved in conducting LDS and worksheets based on social-science issues accompanied by video shows and discussions, so that it was in accordance with the SSI approach. Problem-oriented SSI learning activities stimulated higher-order thinking skills to find solutions to problems (Fitriani et al., 2020). SSI was used to improve problem solving skills and critical thinking, thus learning with a problem based system was considered the most appropriate teaching approach (Winarno et al., 2018). The results of students' critical thinking skills are as follows.

Table 9. Critical Thinking Achievments on the Class Scale Test (N=36)

Meeting	Average ± SD	Category
1st Meeting	65, 12 ± 5,2	Satisfactory
2nd Meeting	71, 36 ± 2,7	Good

e. Evaluate Stage

The evaluation stage occurred at the development and implementation stage of the ADDIE model in the form of revisions. The first function carried out at the evaluation stage related to improving the quality of appropriate teaching was to provide valid data, analysis and interpretation, which enabled the right idea of the state and situation of the education system and its components (Widana et al., 2018). Evaluation results were considered as valuable information for teachers because they intended to take initiatives to adapt and configure planning of learning activities by considering

students' knowledge, experiences, strengths and weaknesses, and helping teachers to organize study groups and to get better academic results in the future directly from the teaching process (Cevallos et al., 2019). The results of this evaluation stage were in the form of validity, effectiveness, and practicality of the BBL-SSI model, which were further elaborated on the points of validation, effectiveness, and practicality of the model.

The practicality of the BBL-SSI learning model was obtained through the practicality questionnaire of the teacher's response and the practicality questionnaire of the student's response. The results of the data obtained stated that the BBL-SSI model used very well, so that the BBL-SSI learning model was practical and easy for teachers to use. The results of the data obtained from the practicality questionnaire of students' responses are seen on Table 10 as follows.

Table 10. Data of Questionnaire on Students's Response after the Application of BBL-SSI Model

No.	Indicator	Percentage (%)
1.	Interest in Learning	84
2.	Function of following learning	82
3.	Interest to follow the next learning	87
Average Students's Response		84,33
Category		Very Practical

Table 10 states the very practical category related to learning interest, which means interest was very important. Interest has been valued as a major component of academic achievement for more than a century. Interest was also considered by many cognitive psychologists to be an important component of learning motivation (Rowland et al., 2019). Students' motivation in learning science increased because the SSI learning model maximized the brain (Sani et al., 2019). The teacher's response questionnaire can also be seen on Table 11.

Table 11. Data of Questionnaire on Teacher's Response after the Application of BBL-SSI Model

No	Indicator	Percentage (%)
1.	Clarity of lesson plan	95
2.	Competencies and learning goals attaintment	100
3.	Student's Response	93
4.	Diffuculty in Implementing	100
5.	Plenty of time	100
Score		98
Category		Very Practical

A learning model was said to be practical if there was already a statement from the expert and user (teacher) that the learning model could be developed and could produce a reality that showed the results in the form of positive responses from teachers and students (Jalil et al., 2016). The use of learning as mentioned above was very compatible with 21st century learning that demands to maximize the work of the brain in thinking. Entering the 21st century, there was a paradigm shift in learning towards student centered and students need to be equipped with Higher Order Thinking Skills (HOTS) (Sudarisman, 2015).

CONCLUSION

BBL-SSI learning model development is based on the results of validation by three validators of 77 which are valid categories, so the overall product development of BBL-SSI collaborative learning models that have been prepared by researchers is valid so that it can be used in the learning process. The BBL-SSI learning model can improve students' critical thinking skills from the good enough category to the good category with a value of 67.22 increasing to 71. Based on the results of the Normalized gain analysis, the value of 0.62 is moderate to 0.71 with a high category, resulting in an increase student learning outcomes after the implementation of the BBL-SSI learning model. Psychomotor learning outcomes also increased from averaging 79 with the medium category to 83 with a high category. Based on the results of the average practicality of students at 84.3 and 98 teachers included in the category of very practical so that the BBL-SSI learning model is practical to be applied to the learning process at school.

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