Developing Brain Based Learning (BBL) Model Integrated with Whole Brain Teaching (WBT) Model on Science Learning in Junior High School in Malang

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Abstract The BBL and WBT models are two learning models based on the brain's work system with different characteristics. The integration of the two learning models produces new characteristics in the learning model. Therefore, this research aimed to develop the BBL learning model integrated with WBT learning model. The design used in this research was the Plomp model consisting of several stages (a) initial investigation, (b) design, (c) realization, (d) test, evaluation and revision stage. It produced BBL model integrated with WBT, using visual language, verbal language and body language, relaxation and self-reflection. The syntax of the learning consists of: class-yes, pre-exposure with gesture, In-aquisition Ready, elaboration with teach and mirror, incubation and memory insert, comprehension check, and celebration. The validation scores of the learning material were obtained from expert validation, product tried out in the form of teacher responses, and student learning results. The scoring results of the validation were 88%, 80% and 69.5% respectively, and the average score of the three components was 79.2 %, so the learning material of the BBL integrated with WBT learning model was valid, effective, complete, and could be used but needed small improvement.

Keywords Brain Based Learning, Whole Brain Teaching

1. Introduction

While there are many definitions of 'learning', the one that is the basis for this presentation is that learning is the process of developing sufficient surface knowledge to then move to deep or conceptual understanding. Further, there

are seven fundamental principles of learning: learning involving time, energy, deliberate teaching, and effort; the structure and relations of learning; major limitations of the mind; the student as social animal; confidence as a multiplier; the need for maintenance and feedback; and identifying the major learning strategies [1].

Teachers play an important role in the success of the learning process. 21st century teachers were required not only to teach and manage class activities effectively but also to build effective relationships with students and the school community, to use technology to support the quality of teaching, and to do reflection and improvement on their learning practices continuously [2].

The improvement of the learning practices should begin from the teacher's understanding of how the human brain learns, so that students can learn meaningfully and enjoyably. Understanding of how the brain works in learning can facilitate the teacher in designing a learning model [3]. Brain-based learning is a new revolution in learning because it combines several sciences from various fields such as neuroscience, biology, and psychology [4]. The research on combination of brain and learning shifts the education into a new and exciting era of brain-based education [5].

Some of the brain-based learning models that are developed today include Brain Based Learning (BBL) developed by Erick Jensen (2008) and Whole Brain Teaching (WBT) model developed by Chris Biffle (2013). Brain Based Learning was a learning that was based on the idea that every part of the brain had certain functions that could be optimized in the learning process [6]. The Whole Brain Teaching (WBT) model is a learning with instructional approach derived from neurolinguistics features based on the right and left brain functions [7].

The BBL and WBT models have so far been effective in

improving the success of the teaching and learning process. Based on the neuroscience findings of the BBL model in accordance with the principles of how the brain works in improving the best way of learning, improving academic achievement and providing equal opportunities to different individuals [8], Tufekcia and Demirelb reported that BBL had a positive effect on high-level learning, retention and student learning attitudes [9], stated that the BBL class had better retention [10], and stated that BBL had a positive effect in learning [11]. While the effectiveness of the WBT model was reported by several researchers: Student score of the Gilroy Prep School in California increased in amount of 11% [12], negative students behaviors decreased in amount of 50% from before and after the learning using the WBT model [13], there was an increase in motivation and mathematical communication ability by using WBT [14].

Based on the syntax of the learning model, the two learning models have some similarities and differences. The similarity of the two learning models is that they pay attention to how the brain learns, and they also consider movements to be important elements in learning. The difference is that the BBL model contains brain exercise, reflection and classical music, while the WBT model contains quick instructions or active greetings and movements or *body linguistics*.

Further research on the syntax of BBL and WBT models can provide information about the advantages and disadvantages of each learning model. The strength of the BBL model is that it has classical music that can reduce students' anxiety and can make students feel relaxed. The strength of WBT model is that it contains movements that help students understand the learning material more clearly and remember it well. The weakness of the BBL model is that it is almost similar to the discussion model commonly implemented by teachers in learning. The difference is found in gymnastics and classical music play. To complement the BBL model, more challenging techniques are needed to help students remember the learning material better. The weakness of the WBT learning model is that there are too many movements in the learning model that

can drain the teacher and students' energy in learning.

Based on the study of the strengths and the weaknesses of the BBL and WBT learning models, it is considered necessary to integrate the two models so that they can be mutually complemented. The integration of the two learning models is named as *Whole Brain Based Learning* (WBBL). The problem of this research is formulated as how is the development of BBL learning model integrated with the WBT model on science learning in Junior High Schools in Malang. Therefore, the purpose of this research is to produce a syntax and learning materials of BBL integrated with WBT model, or the WBBL model that is valid, practical and effective.

2. Method

This research was conducted in a developmental research. That details of this developmental research will be described further.

The research is included as a development research. The development model used was the Plomp model (Picture 1.) In this research, the BBL model integrated with WBT model is called WBBL model.

The design of the developmental research on BBL model integrated with WBT model was adapted from the developmental model of Plomp [15]. The developmental model of Plomp consists of five stages: (1) preliminary investigation stage; (2) design stage; (3) realization/construction stage; (4) evaluation and revision stage; and (5) implementation stage. The stages of developing the Plomp model can be seen in picture 1 [16]. This article will discuss the results of the preliminary investigation stage, the design stage, the realization or the construction stage, and the evaluation and revision stage, so that it will produce the product in the form of the combination between BBL and WBT learning models. The implementation stage will be written in the following article as an experimental research.

Picture 1. Plomp development model (1997)

The process of developing BBL learning model integrated with WBT learning model using the Plomp [15] model is summarized in Table 1 below.

Table 1. Stages of developing the BBL Model integrated with WBT Model

Stages	Activities
Stage I Preliminary investigation	Searching for the information on learning
	Providing rational reasons for the development of BBL model integrated with WBT model
	Examining the theory underlying the development of BBL integrated with WBT model
	Rationales of BBL model integrated with WBT model
Stage II Design	Designing social system
	Designing the principle of reaction
	Designing support systems
	Effects of learning
Stage III Realization or construct	Prepare the learning syntax
	Developing learning materials
Phase IV Test, Evaluation and Revision stage	Validating the learning materials
	Try out in limited class (small class)

The subject of research in the development of the BBL model integrated with the WBT model (WBBL) is 26 Junior High School Malang, Indonesia.

The data collection instruments for the material development include 6 steps: (1) questionnaire for teacher and (2) the validation sheet of the product development, (3) questionnaire for the user of the developed product, and (4) audience test, (5) the average calculation of the validation results from the three components, namely expert validation, user validation, and audience validation, (6) the

conclusion determination of the validation results which was then determined by using the criteria of the validity level.

The instruments in the research had been validated before they were. The validation included the content validity and construct validity. The content validity was related to the accuracy determine action of the instruments in terms of the concordance between content and the curriculum as well as the concept construction to be tested. The construct validity referred to the suitability between

the instruments and the skill to be measured.

The stages of the research and the instruments used at each stage are described further:

(1) Questionnaire for teachers: the questionnaires given to teachers aimed to obtain preliminary information related to teacher learning, teacher understanding of brain-based learning, and student involvement in learning.

(2) The validation sheet of the product development: the validation sheet consisted of syllabus, lesson plans, student worksheets and assessment of learning results. The validation sheets, in the development research was used to obtain validation data from biology expert validator, learning technology expert validator and senior teacher of junior high school. The results of the validation were then calculated using the following formula:

$$V_{ah} = \frac{T_{se}}{T_{sh}} \times 100$$

Formula Description:

V_{ah} = Expert validation;

T_{se} = Total empiric score achieved (based on expert assessment, user assessment, or the results of students' competency test)

T_{sh} = The total score expected

(3) Questionnaire for the user of the developed product: the questionnaire for the product development users contained indicators that could obtain information about teacher's response toward the implementation of the syntax of BBL model integrated with WBT model that had been designed. The results of the questionnaire were then calculated using the following formula:

$$V_{pg} = \frac{T_{se}}{T_{sh}} \times 100$$

Formula Description:

V_{pg} = user validation;

T_{se} = Total empiric score achieved (based on expert assessment, user assessment, or the results of students' competency test)

T_{sh} = The total score expected

(4) Audience Test: audience test in the form of learning result test is aimed to know the students' learning results after they were taught by using BBL model integrated with WBT model in the limited class. The test consisted of 20 multiple choice items and 4 essay items. Before used, the test items were validated for the content validity and the construct validity. The results of the students' learning test were calculated using the following formula.

$$V_{au} = \frac{T_{se}}{T_{sh}} \times 100$$

Formula Description:

V_{au} = Audience validation

T_{se} = Total empiric score achieved (based on expert assessment, user assessment, or the results of students' competency test)

T_{sh} = The total score expected

(5) After that, the average of the validation results from the three components, namely expert validation, user validation, and audience validation, was calculated by using the following formula:

$$V = \frac{V_{ah} + V_{pg} + V_{au}}{3} = \dots\%$$

Formula Description:

V = Validation (combination)

V_{ah} = Expert validation; V_{pg} = user validation;

V_{au} = Audience validation

T_{se} = Total empiric score achieved (based on expert assessment, user assessment, or the results of students' competency test)

T_{sh} = The total score expected

(6) The conclusion of the validation results was then determined by using the criteria of the validity level or effectiveness level in Table 2 [17].

The data obtained in this development research which included the initial information about the learning, the results of the expert validation, the validity from the user, teacher, and audience test were then analyzed descriptively.

Table 2. Criteria of Validity/Effectiveness of the Learning Model

No.	The criteria of achievement (Effectiveness)	Level of effectiveness / validity
1	81.00% - 100.00%	Very valid, very effective, very complete, can be used without improvement
2	61.00% - 80.00%	quite valid, quite effective, quite complete, can be used but need small improvement
3	41.00% - 60.00%	less valid, less effective, less complete, need major improvement, not recommended to use
4	21.00% - 40.00%	Not valid, not effective, not complete, should not be used
5	00.00% - 20.00%	Very not valid, very not effective, very not complete, must not be used

3. Result and Discussion

The results and discussion will be explained based on the steps of developing the Plomp model with 4 stages, namely: (a) preliminary investigation, (b) design phase, (c) realization / construction phase, (d) Evaluation and revision phase

(a) Preliminary investigation

Based on the results of direct observation, questionnaire (on 25 teachers) and cognitive learning result test (in 8 schools) there was some information that will be described further: 60% of all teachers used information discussion method or lecturing method during the classroom learning, the remaining 40% teachers sometimes used experiment method, cooperative learning, modeling and PBL. Related to metacognitive skills, 64% teachers were not familiar with metacognitive skill concept, so that they never taught metacognitive skills to students. While related to the retention, 80% teachers did not recognize the concept of retention, and 100% teachers stated that they never measured students' retention. Only 17.6% students reached the minimum standard score of science learning result test. The students' cooperative skill was still deemed poor, and their courage to express ideas still needed to be trained. In addition, the learning was only dominated by some students only, while the other students tended to be passive in the learning activities. The curriculum used by the science teachers in Junior High School Malang was the 2013 curriculum of 2016 revised edition.

Based on the investigation data, it is shown that the majority of teachers use lectures and discussions, which has an impact on the low student learning outcomes. This is one proof of the link between the learning process in the form of learning strategies on learning outcomes. When the learning process is not optimal, it will be followed by learning outcomes that are not optimal. The linkages between these components were strengthened by Rahman, & Phillips opinion that learning strategies have an effect on the achievement of the learning results [18], that the research results which state that the concepts of students are influenced by the learning strategies [19,20]. Similarly, the research results of Pranoto stated that the better the learning strategy implemented, the higher the students' learning results [21]. For this reason, learning strategies or models should be of concern to the teacher. Teachers need to understand and apply other learning models, so they are more varied. Less varied learning models can cause boredom in learning so that they have an impact on learning outcomes. According to Syah, when students are in a state of boredom, the reason system cannot work as expected in processing new information or experience, so it cannot show the progress of learning [22].

Developing a learning model that starts with a problem investigation will facilitate the process of developing an

appropriate learning model. Along with the development of the era, the current learning model thus progress, one of which is brain-based learning. Brain-based learning is a learning that involves the functioning of the brain with the learning process. Brain-based learning for teachers in Malang city is something new. Based on the questionnaire of needs analysis related to brain-based learning, it is known that 92% of Junior High School teachers in Malang did not know the brain-based learning, and the teacher did not know the information about the important elements that the brain needed in learning. Related to the relaxation usually used by the teachers in learning, 50% teachers stated that they usually invited the students to sing and do scout claps, while the other 50% teachers stated that they never did relaxation activities in learning. 100% of teachers stated that they had never invited the students to listen to the classical music during learning; most teachers stated that to assist the students in remembering important information, they used abbreviations and concept maps, while a few other teachers required the students to memorize it repeatedly. To attract the students' attention to refocus on the learning, the teachers did some techniques, such as: hitting the table, hitting the blackboard and doing a silent treatment or shouting.

The data shows that brain-based learning is something that teachers rarely hear and implement in the classroom, both in learning and classroom management. Concentration of students' attention in different ways, relaxation, and classical music will make students give more attention because for students it is something that is not usual. The brain will usually respond faster and leave a deep impression on something different from what is usually done. So the development of models and techniques for classroom management continue to be developed based on existing learning theories. The development of the WBBL learning model is an effort to find new learning tactics based on the learning principles that exist in the BBL and WBT models. Illustration of development can be seen in the picture.

The theories underlying the development of the model are theories related to the BBL model and the WBT model. The BBL model is based on the following theories: Brain Based Learning (BBL) derived from the cognitive theory of neuroscience. The theory arises from the study on how the brain functions by the neurosciences [23]. 12 principles of BBL that emerge from the study on how the brain functions by the neurosciences are explained further, including: (1) the brain is a parallel processor, (2) learning is influenced by physiology, (3) the search for meaning is innate, (4) the search for meaning occurs by imitation, (5) emotions greatly affect the process of imitating, (6) each brain simultaneously observes and creates the parts and overall knowledge gained, (7) learning involves focused attention and widespread perception, (8) learning always involves the conscious and unconscious process, (9) we

have at least two memory systems, (10) the brain understands and remembers best when reality and ability converge in natural spatial memory, (11) learning can thrive by challenges and hindered by threats, (12) every brain is unique [24].

The principles of BBL strategies that could improve the students' achievement in the classroom are (1) talking, (2) emotions, (3) visual, (4) chunking (5) movement, (6) shaking it up (7) the brain needing oxygen, (8) brain breaking, (9) making connections, (10) feedback, (11) music, (12) acronyms, (13) hydration, (14) time for reflection (15) energy level, (16) space, (17) location. (18) positive environment, (19) optimism, (20) choice, (21) anticipation, (22) meaningful learning [25].

The WBT model is based on the theory saying that WBT is an instructional learning derived from neurolinguistic features based on the right and the left brain function [7]. Ratey described the correlation between motoric and sensory aspects consisting of: (1) movement is very important for the existence of the brain in particular, (2) the frontal lobe of the brain specialized in organizing physical activity and mental is higher because the function the brain depends on the movements, (3) movement is essential for every brain function including recall, emotion, language and learning [26]; Movement can be an effective cognitive strategy to (1) strengthen learning, (2) improve memory and retrieval, and (3) increase motivation to learn and spirit [27].

Based on the study of the syntax of the BBL model and the WBT model, information is obtained related to the advantages and disadvantages of the BBL and WBT models. The advantages of the BBL model are students doing light exercise to balance the brain and given the opportunity to think independently calmly while listening to classical music while the drawback is the lack of active greetings for students and movements as a form of coding of important material. The strength of the WBT model is that there is an active greeting that makes students more focused in learning, that there are movements that will help students remember important material, while the drawback is that students are required to make movements that are sometimes not thought of by students, other than that with these movements students are required to remain fully concentrated so that making movement sometimes makes students tired and bored.

(b) Design Phase

At design stage some information were obtained. New characteristics resulting from the combination between BBL and WBT model, was a model implemented by using visual, verbal, and body language, relaxation and self-reflection. The system developed was a learning activity depicting an active interaction between teachers and students, students and students in class discussions, and the existence of learning instructions by teachers. The

principle of reaction that emerged was every teachers' instruction in the form of verbal language, visual language and body language would be responded by students as instructed as a form of active reaction in learning. The supporting learning system was the teacher preparing the movement or body language as an important code related to the important concepts taught, the teacher preparing classical music for self-reflection and relaxation activities and preparing materials for students to be discussed in the form of student worksheet.

Based on the design stage of integrating BBL model with WBT, it is found that the characteristics of new learning model which is followed by *Whole Brain Based Learning* (WBBL) model is learning by using visual language, verbal language and body language, relaxation and self reflection. Learning with these characteristics makes the learning process more effective, meaningful and fun. This is due to the function of the eye working optimally, in visualizing what is seen both in the form of writing, pictures, colors or movements. Al Ghraibeh and Al Zahrani, described that the eyes are controlled in a more complex way, in which each eye transfer information to both brain hemispheres. Related to gestures, it was explained that if a person was not sure about the spelling, he would rely on the gestures, and gestures depended on what was thought [26]. Any part of body that perform an activity like what is seen by the eye, heard by the ear and performed by the body will give a reaction to the work of both brain hemispheres [3].

Body linguistics in addition to acting as an encoder to clarify what is said is also a form of physical activity that affects the brain's ability to remember. Based on the findings, it is also explained that physical activity in the form of gestures atau movements in learning can support memory function because it can stimulate the liver to produce glucose to remain stable [4].

While during relaxation and reflection, classical music impacts the sense of comfort and calm that supports students to remember what they have learned by writing in the reflection book. The effects of Mozart music can improve spatial abilities and increase alpha waves that impact on positive learning ability [28]. The music could increase emotional intelligence. The students become more relaxed and focused, and it makes the conditions of the classroom comfortable, so that the students can manage their emotions better [29].

The following illustrates the syntax, similarities in differences and characteristics of the BBL and WBT models which form the basis of the WBBL model development.

c) realization/construction Phase

At construction stage, the learning syntax of WBBL was produced, as shown in Table 3. The syntax is produced

from an assessment of the learning theory of BBL and WBT models, the syntax and characteristics of the two models, as illustrated in Figure 1.

After that, based on the syntax of the learning, the learning materials were developed which consisted of syllabus, lesson plans, student worksheet and the assessment of learning results. The whole learning materials were used as a prototype 1 of the BBL learning model integrated with WBT learning model. The prototype 1 was subsequently validated by expert validators and user validators.

From the WBBL syntax can be seen that the learning activities are in accordance with the way the brain in learning. The parts of the brain that respond to the syntax are: (1) class-yes, (2) pre-exposure with gesture, (3) in-acquisition ready, (4) elaboration with teach and mirror, (5) incubation and memory insert, (6) comprehension check, and (7) celebration. The syntax is suitable with the way the brain learns. According to the syntax, the parts of the brain give responses as described further. At the class-yes stage: the part of the brain which works is the prefrontal cortex. At pre-exposure with gesture, at this stage, the part of the brain which functions is the frontal lobe. In-acquisition ready and in elaboration with teach and mirror, where the students have group discussion and share with the other groups, the part of the brain which functions

is the frontal lobes, the parietal lobes, the occipital lobe, and the limbic system. At incubation and insert memory, the part of the brain that functions is the frontal lobe, the cerebellum, the limbic system of the hypothalamus; its function is to organize the body functions, such as body temperature, so students can concentrate. At comprehension check, the part of the brain which functions is the frontal lobe, the temporal lobe, the parietal lobes [30]. At celebration stage, the part of the brain which functions is the frontal lobe and limbic system because the rewards given to the student for their efforts in learning can motivate the students to learn better.

Based on the syntax of the BBL learning model integrated with the WBT model, the learning material, called the prototype I, was developed and furthermore it was tried out to evaluate and revise whether the learning materials had been valid, practical and effective to be implemented in wide-scale learning. Moonen stated that the prototype was the initial product of the developed learning model [31]. The quality of the learning materials generally requires three criteria of validity, practicality, and effectiveness. Furthermore, it is explained that an education product not only needed to show the quality of the developed learning materials, but also showed the aspects of validity, practicality and effectiveness, so that it could be used widely [32].

Figure 1. Illustration of the Development of the WBBL Model Based on Syntax, Differences in Similarities and Characteristics of the BBL Model, and WBT.

Table 3. The Syntax of WBBL Learning Model

Learning syntax	Teachers' activity
<i>Class - Yes</i>	Teacher says " <i>class class</i> " students are answering " <i>yes-yes</i> " with the intention of making students concentrate and attracting students' attention
<i>Pre-exposure with Gesture</i>	Presenting problems in the form of facts according to everyday life. Teacher explores the students' prior knowledge Teacher invites the students to review the previous learning material Teacher states the learning objectives while using body languages
<i>In-acquisition Ready</i>	Preparing the students to do discussion or observation by saying " <i>In-Acquisition Ready</i> ", students answer " <i>Ready</i> " Dividing the students in groups Distributing the student worksheet
<i>Elaboration with Teach and mirror</i>	Teacher says " <i>teach-class</i> " as a cue to start the discussion. Note: Any student who speaks either in a group discussion or in a class discussion will talk while moving their body according to what they say Teacher says " <i>class-class</i> " which means that students have finished working in groups and are ready to share with their classmates Teacher mention the name or group to share by saying " <i>teach class</i> " (eg, group II teach class or Satria " <i>teach class</i> ") Teacher says " <i>class-class</i> " which means that students should pay attention to the teachers because the teacher will provide reinforcement, by explaining the important points with body language. Teacher says " <i>mirror</i> " which means that the students are asked to mirror what the students explain while making body movements
<i>Incubation and insert the memory</i>	Teacher says " <i>class rilex</i> " which means that the students are asked to relax for a moment with classical music playing Teacher asks the students to take a deep breath and then exhale slowly with the cue " <i>inhale</i> " and the students are asked to exhale slowly with the cue " <i>exhale</i> " Teachers say " <i>mirror</i> " which means that the students write back what they have learned as a form of self-reflection and the students remember the important material by making some body movements
<i>Compensation Check</i>	Teacher asks the students about the material being learned Teacher guides the students if any misconception occurs
<i>Celebration</i>	Teacher writes the results of the students' work on the scoreboard and gives reward for the students' success and the students celebrate it

Table 4. Recapitulation of the Validation Results by Expert Validators on the Learning Materials of WBBL Model

Learning device	Validator score results			Average
	1	2	3	
Syllabus	93.8%	91.7%	87.5%	91.0%
Lesson plan	93.2%	100.0%	77.3%	90.2%
Student worksheet	95.0%	92.5%	75.0%	87.5%
Assessment	86.4%	88.6%	75.0%	83.3%
	Average			88.0%

d). Evaluation and Revision Phase

At the evaluation and revision stage (evaluation and revision) several things were conducted: (1) validating the learning materials by expert validators, and revising the learning materials based on the results of the validation. The results of the revision were then used as the prototype II, (2) trying out the product of prototype II to obtain user responses, namely the teachers, and (3) trying out the product to obtain students' cognitive learning results as a form of audience validation. The validation activity is described as follows:

(1) Validation of the learning material by expert validators

The learning materials were validated by 3 expert validators: a Biology education expert, a learning technology expert, and a senior science teacher at Junior High School Malang. The results of the validation analysis by the validators can be seen in the following Table 4.

The results of the validation analysis by the three validators obtained the average score of 88%. The next stage was revising the prototype 1 based on the feedback from the validators. The results of the revision were then used as prototype II. The improvements to prototype II will be elaborated further.

- a) Related to the syllabus: replacing the words "teacher asks the student" to "teacher verifies the concepts learned" and adding the indicators in chapter V, namely counting the calories and heat of an object, and in chapter VI about photosynthesis.
- b) Related to the lesson plan: making one lesson plan which consisted of one chapter which had several meetings and paying attention to the implementation of the lesson plan in the classroom
- c) Related to the student worksheet: adding the taxon columns in chapter II of the classification concept, adding the number of the student worksheet in accordance with the lesson plan, adjusting the questions on the student worksheet with those in the assessment, adding the number of meetings in chapter II by adding the learning material of introduction to microscope and the classification of animals and plants.

Based on the recommendations of the validation a revision has been carried out. The results of the revision are referred as prototype 2 development products.

(2) Trying out the developed product by the teacher

The revision results based on the feedback from the validators produced the product of prototype 2, which was then tried out in the field. This try out was conducted in a limited class (small class) with the aim to know the practicality of the developed learning materials. The recapitulation of the questionnaire results of the teacher responses as users can be seen in Table 5 as follows.

(3) Try out of the product in the form of students' learning results

The product tryout was carried out in a limited scale in Junior High School 26 related to chapter 1 at the subject "Science object and Observation". The mean score of students' learning results related to that chapter was 69.5 with the percentage of effectiveness criteria of 69.5%.

This value is still not optimal, because it is still below the minimum completeness criteria for schools. The application of the WBBL model is still something new for students, so it is necessary to make it a habit. But to draw conclusions from the results of the development not only sees learning outcomes but user trials (teacher responses) and assessment of the device from the validator.

Based on the three components of the learning material validation consisting of expert validation, product tryout in the form of teacher's responses, and students' learning results, the scores of each component obtained were 88%, 80% and 69.5% respectively, and the mean score of the combination of the three components was 79.2 %. Based on these results, it can be concluded that "the learning materials of the BBL learning model integrated with WBT learning model is valid and it can be used although needing some small improvements".

From the evaluation and revision stage, it was found that "the learning materials of the BBL model integrated with WBT model had been valid, effective, complete, and could be used but needed small improvements". Therefore, the developed product of the BBL model integrated with WBT model will be used in a wider class in State Junior High Schools in Malang. This activity will be designed in the form of experimental research which will investigate the effectiveness of BBL model integrated with WBT model compared with the models of BBL and WBT as well as conventional learning toward cognitive learning results, metacognitive skills and retention of science of the Junior High School students in Malang.

Table 5. Recapitulation of Observation Results of the User

No	Indicator	Score
1	The appropriateness of the time allocation with the learning process	3
2	The capability of the learning model to achieve the learning indicators	3
3	The effectiveness of the use of learning resources by students using the developed model	3
4	The match between the learning steps in the learning model and the implementation in the classroom	4
5	The capability of the learning model in developing the students' positive habits in the learning process	3
6	The compatibility between the learning activities with the type of assessment within syllabus	3
7	The capability of the learning model in making the students creative in the learning process	3
8	The capability of the learning model in making the students active in the learning process	3
9	The capability of the learning model in involving the students to do group work	4
10	The capability of the learning model in exploring the students' knowledge	3
11	The capability of the learning model to create meaningful learning for the students' life	3
12	The capability of the learning model to make the students understand and be interested	3
13	The appropriateness of the media with the learning indicators	3
14	The capability of the learning model to engage the students in reflection activity	3
15	The capability of the learning model to create a fun learning atmosphere	4
TOTAL		48
PERCENTAGE		80.0%

4. Conclusions

From the result of research and discussion it can be concluded several things between them: (1) the syntax of BBL model integrated with WBT model consists of: (a) class-yes, (b) pre-exposure with gesture, (c) in-acquisition ready, (d) elaboration with teach and mirror, (e) incubation and memory inserts, (f) comprehension check, and (g) celebration; (2) the scores of the validation tests on the learning materials consisting of expert validation, product tryout in the form of user responses, namely teachers, and students' learning results are 88%, 80% and 69.5% respectively, and the average score of the three components is 79.2 %; (4) the validity level of the learning materials of BBL model integrated with WBT model is valid, effective, complete, and it can be used but needs small improvements".

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