

Students' response to the implementation of brain-based learning (the BBL) approach in history teaching

Wawan Darmawan^{a *}, Universitas Pendidikan Indonesia, Department of History Education, Faculty of Social Science Education, Dr. Setiabudi Street. No.229, Isola, Sukasari, Bandung City, West Java 40154, Indonesia, <https://orcid.org/0000-0002-7644-4340>

Wildan Insan Fauzi^b, Universitas Pendidikan Indonesia, Department of History Education, Faculty of Social Science Education, Dr. Setiabudi Street. No.229, Isola, Sukasari, Bandung City, West Java 40154, Indonesia, <https://orcid.org/0000-0003-1535-9422>

Ayi Budi Santosa^c, Universitas Pendidikan Indonesia, Department of History Education, Faculty of Social Science Education, Dr. Setiabudi Street. No.229, Isola, Sukasari, Bandung City, West Java 40154, Indonesia, <https://orcid.org/0000-0002-4726-1991>

Jakiatin Nisa^d, UIN Syarif Hidayatullah, Social Science Education the Faculty of Tarbiyah and Teacher Training, Jalan Ir. H. Juanda No.95 Ciputat, Tangerang Selatan 15412, Indonesia, <https://orcid.org/0000-0002-6805-3948>

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Abstract

This study focuses on how students respond to brain-based learning (the BBL) in History teaching to enhance cognitive, social, reflective, emotional, and physical aspects. The study used a survey-based approach and collected data through questionnaires, interviews, and two-month observations of three participating schools. Findings indicate that the teaching-learning process using the BBL approach helps educators understand students' different characteristics and build a conducive classroom atmosphere that facilitates cooperation, historical reflection, as well as historical fact memorizing skills. However, it appears that this approach has not addressed students' emotional intelligence, historical empathy, and stress management. Findings show that the students were still anxious when facing a History test involving a vast amount of data that required them to memorize facts even though they had been provided with training on different memorizing techniques. In addition, the students were not guided to express their feelings about a particular historical phenomenon.

Keywords: brain, history, learning, memorizing, textbook.

* ADDRESS FOR CORRESPONDENCE: Wawan Darmawan, Universitas Pendidikan Indonesia, Department of History Education, Faculty of Social Science Education, Dr. Setiabudi Street. No.229, Isola, Sukasari, Bandung City, West Java 40154, Indonesia
E-mail address: wawand@upi.edu

1. Introduction

1.1. Conceptual or Theoretical Framework

It is an endless challenge for educators and policymakers to find the best method in addressing students' complex cognitive, academic, behavioral, and psychosocial needs (Walker et al., 2019). Some developments in neuroscience for a couple of recent decades have led to a bigger concept about the relationship between the human brain and behavior. Thus, it is rational that educators have made some efforts to bring all findings in neuroscience into education (Alferink & Farmer-Dougan, 2010). Lately, neuroscience and brain-based approaches have already been used in the educational world and were the reasons for a radical reformation in education, both in policy and practice ones (Kitchen, 2020).

Brain-based education is an approach used in supporting the vision and missions of education (Hairon & Chai, 2017). Rapid development in educational studies has risen all over European as well as in the United States and most studies were fully funded, including the ones in Brain-Based Learning (the BBL) (Baker, 2015; Kitchen, 2020). In the last fifteen years, teacher education in the United States and several other countries has been implementing the Brain-Based Learning. What makes it interesting is that other countries around the world, including Turkey, Chili, and England also use the Brain-Based Learning technique in their schools (Connell, 2009). In Northern Ireland, the BBL has been employed as a basis in curriculum revision since 2003, though there are still misconceptions about the BBL theoretically and pragmatically and some disputes on the scientific basis underlying the policy (Kitchen, 2020). The misconception about the BBL and its implementation in education is also found in the United States which may lead to ineffective implementation and the waste of essential resources (Van Dijk & Lane, 2018).

In Iran, the BBL is adopted as a computer system called BEBLIC (Brain Emotional Learning Based Intelligent Controller) where it is, in fact, a computational model based on the limbic system of a mammal's brain to control Engineering applications (Lucas et al., 2004). In Singapore, participants coming from public and special schools significantly improve their knowledge, skills, and personal opinions after joining a brain literacy course, though it requires further study to see its impact on the teaching process as well as on the students (Walker et al., 2019). Regarding the development of brain-based learning, Singapore has been developing MBP (Mindfulness-Based Practices) since the 1970s. However, the implementation of MBP in Singaporean schools, either formally or informally, is apparently far left behind from its partner countries like Australia, England, and the United States (Khng, 2018).

Malaysia started to implement BBL to improve the quality of English teaching in Primary School level in Malaysia (Hardman & A-Rahman, 2014). In Malaysia, Brain-Based Learning is called as Brain-Based Teaching Approach (BBTA) mostly used in handling problems in understanding science (Saleh, 2012). Thailand has also implemented the Brain-Based Learning technique since the early 2000s (Connell, 2009). The core of the program is aimed at improving the development of the youths' emotional intelligence in Thailand (Knowles, 2006). In Indonesia, there have also been studies on BBL conducted in the teaching of either science, social science, or humanities (Adiansha et al., 2018; Sani et al., 2019). However, the research only focuses on the application of BBL in certain subjects and has not been part of a structured program by the ministry that involves all fields of study.

1.2. Related Research

Brain-based learning constructs a learning design where reflective, physical, social, cognitive, and emotional aspects are driven in harmony. Studies on BBL encourage investigations on how brain works so that learning process may be more optimum (Caine & Caine, 1991). BBL is derived from studies conducted by neurologists leading to a state that BBL process is taken as "a new paradigm in learning" (Jensen, 2008).

Different studies have shown that brain development and learning directly rely on one's social-emotional experiences in a reciprocal setting since the brain is organized based on a basic principle of minimizing danger and maximizing appreciation (Bowman, 2020; Immordino-Yang, Darling-Hammond, & Krone, 2019; Santosa & Fauzi, 2017). The implementation of brain-based learning in the classroom, including the History class, comes as a response to the awareness that grows in educational research, policies, and practices that emotional and social competence may affect the learning process (Immordino-Yang, Darling-Hammond, & Krone, 2019; Santosa & Fauzi, 2017). Besides, the BBL tries to explain and understand differentiation processes concerning individual needs in a group, i.e., people may learn in different ways (Stevens-Smith, 2020). The BBL is generally used to solve different problems in learning either physical or psychological (Richards, et.al., 2018; Walker, et.al., 2019). In the future, results from brain-based learning studies will be widely used to guide any policies, studies, and decision-making in education (Walker, et.al., 2019).

1.3. Purpose of the Study

How is the implementation of BBL in history teaching? It is something challenging for practitioners in history teaching, for either teachers or lecturers. The use of an accurate strategy in teaching history can increase the critical attitude and creativity of a nation that are particularly needed to answer challenges faced recently (Wineburg, 2010). Meanwhile, the implementation of the BBL in history teaching is still challenging. The challenge of applying BBL in history learning is the teacher's weak understanding of this learning model and the dominant development of only cognitive aspects in history learning so that emotional, reflection, physical, and social aspects are neglected. History learning in schools must be managed properly because history has a strong potential to make humans do their humanity by improving students' thinking skills and historical understanding through the application of BBL (Fauzi et al., 2019; Wineburg, 2010).

This article tries to answer the problem question, "How do students respond to history learning that applies the principles of brain-based learning, namely building harmony between cognitive, emotional, reflective, physical, and social aspects? The BBL approach can be implemented in history learning and the nature of historical narratives can support the notion as historical narratives talk about one's life experience that is full of emotional memories about the past, hope, and future dreams. Stories that ignite emotions are essential for all learning aspects since they are easier to remember and to be stored in our brain (Wilson, 2002).

2. Methodology

2.1. Research Model

This study analyzed students' response on teaching learning process using brain-based learning approach. The study used survey to gain students' explorative and descriptive perceptions of the History learning process. The method used in this study is survey method. Creswell & Creswell (2017)

says that survey study aims to quantitatively describe tendency, attitude, or opinion of a certain population by studying a sample of the population. A survey study is commonly conducted to take some generalization from a superficial observation. Survey method is used to collect the primary data on respondents' experiences and opinions through questionnaires. Besides questionnaires, the data were collected through observation and interviews with students. The observation was conducted for two months during 6 meetings in each class. The interviews were conducted after the class was over to 10 students chosen from each class.

2.2. Participants

The sample of this study was taken includes the students of three schools in the regency and municipality of Bandung. Two classes from each school were chosen and the learning process was carried out through the BBL approach. The total number of students in the six classes was 250 where 67% of the students were females and the rest 33% were males. Six teachers were involved in this study, representing each school by two people.

2.3. Data Collection Tools and Process

In this survey study, information was gathered from the respondents by using questionnaires distributed after a class was over. The questionnaire asked students the elements of BBL in history teaching, i.e., cognitive, social, physical, reflective, and emotional aspects. The questionnaire used 5-point Likert type scale. Students gave the score of 1-5. The higher the score, the more positive the elements the students felt from the learning process that the students were more aware on their existence, and the smaller point the students gave, the less meaningful the elements the students felt. The scoring process for respondents' answers is carried out by making suitable classifications and categories depending on the respondent's assumptions or opinions. The criteria for the average score can be seen from Table 1:

Table 1
Criteria for Average Scores

Average Score	Criteria
1.00 – 1.80	Low
1.81 – 2.60	Fair
2.61 – 3.40	Average
3.41 – 4.20	Good
4.21 – 5.00	High

Source: Arikunto, 2006

Responses were analyzed to find out the items of which the low and high scores in the total scale showed a clear boundary. The Likert scale measures respondents' attitudes, responses, opinions, and perceptions about certain phenomena. To clarify the score analysis, the responses were analyzed to determine which items scored low and high using the standards described in table 1. The scores represent the respondents' assessment of BBL.

2.4. Data Analysis

Descriptive statistics provide an overview of students' responses to the implementation of BBL by measuring the average student assessment score for each BBL component, both in cognitive, social,

emotional, physical, and reflective aspects. The data analysis technique used is triangulation. The researcher used interviews and observation to check the validity of the data coming from questionnaire. Triangulation in this phase was taken since the data or information coming from the subjects of the study so called informants were doubtful, where there were some items measured in the study which did not appear in the observation, yet the questionnaire reflected a good score on the items. Observation and interview were employed to triangulate the data analysis to justify the interpretation of the students' responses. The data from the questionnaire are compared to the ones collected from observation and interview so that there is some depiction of the interpretation of the student's responses.

3. Results

3.1 Students' Response on the implementation of Emotional Learning System

Emotional learning system carried out by the history teachers in their classes included teaching expressively and showing their enthusiasm and spirit. The teachers showed that they used some humour, triggered students to express their feelings, used questioning strategies, as well as tell historical stories by exposing romantic and emotional elements of the historical figures. Based on the data processing results, the students' response on emotional learning system in general can be seen from their average scores as provided in Table 2:

Table 2
Students' Response on the Application of Emotional Learning System

Dimension	Average Score	Criteria
Teacher is enthusiastic in teaching	4.51	High
Class is full of Humour	4.51	High
Confidence	4.17	Good
Learning Intention	4.19	Good
Personal target	2.86	Average
Decreasing Anxiety	3.96	Good
Stress Management	2.58	Fair
Emotional Control	2.45	Fair
Spirit	4.25	High
Expressing Feelings	3.12	Average
Revealing Personal Stories	2.48	Fair

The elements found in the history classroom were as displayed in Table 2, the elements students perceived existing in the history learning process are enthusiasm, humor, confidence, learning intention, and spirit. Therefore, students believed that the teachers have already shown their enthusiasm in teaching history and the learning situation was full of humor. The atmosphere made the class so conducive that made them confident to tell their ideas, opinions, or questions openly, no matter how silly the ideas or the questions were. The interview sessions revealed that the students felt comfortable and respected the learning process and they were encouraged to increase their motivation and intention to study. In fact, as had been generally known, history learning process is generally portrayed as a boring one.

Some elements in the emotional learning system that the students did not experience in the classroom were: The teachers did not help the students achieve their personal targets, control their emotions, manage their stress, and guide them to have emotional intelligence. Although the learning process had been designed to be comfortable, full of humour, and emotionally controlled, the students' training on expressing their feelings had not been successful in prompting them to have stress management skills. The stress management element in this study refers to the student's ability in facing stress during the learning process or towards the problems they face outside the class.

3.2 *Students' Response on the Application of Social Learning System*

The teachers tried to implement this learning system by encouraging the students to work together in a small group, using a storytelling technique in telling historical figures' success story to reach the national goals, i.e. inspiring stories driven from the power of a super team not of a superman, and once in a while providing a short animation in the beginning of the class related to the power of teamwork. Based on the statistical data processing results, in general, the social learning system portrayed in the students' average scores can be seen from Table 3:

Table 3
Students' Response on the Application of Social Learning System

Dimension	Average Score	Criteria
Working together for solving problems	3.69	Good
Focus on personal strengths	2.27	Fair
Working together in a small group	4.07	Good
Appreciating diversity	2.22	Fair
Understanding the importance of cooperating	4.28	High
Historical empathy	1.88	Fair

As presented in Table 3, the social learning system elements found in the history classroom includes the understanding towards the importance of cooperation, being willing to work together in a small group, and prompting some cooperation to solve problems. The data from the table also shows that students did not feel that the learning process encouraged them to assess their personal strengths and appreciate diversity.

The aspect of empathy was almost absent and was not felt in the history learning process. It requires different strategies to train empathy in students. Empathy is a way to understand how other people feel in certain situations. Empathy in Given's (2007) perspective is related to the emotional and social learning system. Empathy can be a significant aspect in history learning as it gives students a unique opportunity to feel the connection between history and real human interaction (Abdellatif, 2020).

3.3 *Students' Response on the Application of Cognitive Learning System*

The cognitive learning system tried to be developed by the teachers through memorizing, mind mapping, Socrates questioning technique, and doing historical thinking skills. Cognitive learning system refers to a system that takes the highest portion of attention as it relates to writing,

calculating, reading, and all other academic skills development (Given, 2007). Based on the data, in general, the cognitive learning system portrayed in the students' average scores can be in Table 4:

Table 4
Students' Response on the Application of Cognitive Learning System

Dimension	Average Score	Criteria
Connection among information	3.77	Good
Connection of memory with music, real world, and physical activities	3.93	Good
Focus on problems	3.46	Good
Understanding information	4.17	Good
Facilitating an exploration for knowledge	3.77	Good
Memorizing strategy	4.18	Good
Annotating strategy	3.39	Average
Ability to get information	3.88	Good
Literacy skill	3.47	Good
The strongest opinion	3.76	Good
Invited to think	4.18	Good
Mnemonic	3.90	Good

From Table 4, it can be summarized as follows:

1. The cognitive learning system elements that were apparent in the history classroom were: understanding information, memorizing strategy and thinking process. Therefore, the dominant elements within the process are recalling and memorizing historical facts, organizing the facts, and thinking processes related to the facts as well as understanding information.
2. The cognitive learning system elements that were frequently rising in the history classroom were: the connection among information, the connection between memory and music, the natural world as well as physical activities, facilitating some exploration for knowledge, the ability to gain information, the most decisive opinion, and mnemonic.
3. The cognitive learning system elements felt to exist in the history classroom were: focusing on problems, annotating strategy, and literacy skills. Though mind mapping was rarely performed, the teachers had introduced an excellent and unique annotating strategy.

3.4 *Students' Response to the Application of Physical Learning System*

The teachers found some difficulties in implementing the physical learning system in the history class. They tried to implement the learning system by providing some challenging academic tasks that were directed to train, inspire, and support students' physically active participation during the history learning process. Besides, there was a short break in the middle of the class and the students were invited to do a brain gym or asked to take turns giving a short and simple message to their chair mates. As a result, this element was identified.

The teachers tried to discuss with the students the tasks they felt challenging. Some students suggested a historical field study to several interesting places in their neighborhood, including a study on urban legends found in their neighborhood. They suggested the idea after watching several YouTube mysteries channels in their city/regency. The teachers gave a wide opportunity to the students to take a topic interesting for them, yet it had to be still related to the historical learning

materials discussed. Based on the data results, in general, the physical learning system portrayed can be seen from Table 5:

Table 5
Students' Response on the Application of Physical Learning System

Dimension	Average Score	Criteria
Challenging task	3.36	Average
Teachers provide some inspiration	3.88	Good
Being actively involved in learning	3.72	Good

As described in Table 5, it can be concluded that the physical learning system elements often found in the learning process are the teacher providing inspiration and being actively involved in the learning process. An element of the physical learning system rarely found in the historical learning process is providing challenging (difficult) tasks for students. Whereas in the observations, it was seen that students submitted requests to be given field assignments regarding the local history of the environment around their place of residence. For them, it is challenging but helps them get to know their environment better.

3.5 *Students' Response on the Application of Reflective Learning System*

Jensen (2008) describes that the significances of reflective learning system are to develop skills in and familiarity with self-reflection, do a positive inner dialogue, learn from mistakes, and recognize strengths and weaknesses. On many occasions, teachers asked the students to philosophically ponder historical events, where they were asked to think about the way the history moved to, what the importance of learning history was, who the initiator of different historical events was, what the connection of history and the recent situation was, etc. Based on the data results, the reflective Learning System portrayed in the classroom can be seen from Table 6:

Table 6
Students' Response on the Application of Reflective Learning System

Dimension	Average	Criteria
Self-reflection skill	3.96	Good
Inner dialogue	3.55	Good
Learning from mistakes	3.51	Good
Admitting strengths and weaknesses	3.37	Average
Solving problems step-by-step	3.65	Good
Open-mindedness	3.34	Average
Experience lens	3.08	Average
Concluding a text	3.73	Good
Developing argument	3.64	Good
Thinking in pattern	3.57	Good
Considering alternative point of view	3.12	Average
Simplifying a complicated thought	3.48	Good
Recognizing rambling thoughts	2.53	Fair
Positive attitude on different thought	3.81	Good

From the table above it can be detailed that:

1. Reflective learning system elements the students felt to exist frequently in the teaching process performed by the teachers are: self-reflection skill, inner dialogue, learning from mistakes, realizing strengths and weaknesses, step-by-step problem solving, open-mindedness, alternative point of view, interpreting textbook, concluding a text, developing an argument, thinking in pattern, thinking rationally, and simplifying complicated thoughts.
2. Elements of a reflective learning system that are rarely felt by students in the learning process carried out by teachers are: providing various points of view from a particular experience, considering alternative points of view, recognizing long-winded thoughts, and being optimistic about different thoughts.

4. Discussion

The emotional aspect is expected to encourage students in acquiring some creativity, inspiration, and hope. However, in general, teachers should not pay attention too much to the content of emotional learning (Connell, 2009). Emotional aspect plays a big role in the history learning process. The basic component of BBL is our emotion that may affect our ability to learn. Our brain manages to try to make some connections between intellectuality and emotion. Emotion accelerates thinking process and allows us to recall our physical reaction to the world (Jensen, 2008). Further, emotion also gives some contributions to attention, problem solving, concept, and memory (Jensen, 2008).

Students should be in a positive and relaxed condition to have the learning process run optimally (Phillips, 2005). The teachers had tried to discuss the biographies of historical figures related to the learning materials and relate the biographies to the stories on how they studied hard, how high their learning motivation was, and funny stories related to the figures. However, a conducive atmosphere in learning process was not quite adequate to relieve the students' anxiety. From the interviews, some facts were revealed that the students had already felt that history learning was quite enjoying yet they were still nervous when they had to face a test, either a chapter test, mid-test, or final test. Nevertheless, numerous facts reveal that history still becomes a "frightening" subject for the students. Therefore, the implementation of the BBL should also be followed up with some modifications in the learning evaluation pattern. The teachers tried to decrease the students' anxiety about numerous historical facts they had to memorize by training them in a mnemonic technique. It did not make the memorizing process of historical facts something easy and fun.

Besides, a conducive and humorous atmosphere did not actually make the students feel "open" to express their feelings in the learning process. They are not used to revealing what they feel mostly when it is related to a particular historical phenomenon. The teachers stimulated students' participation to deliver their feelings through questioning strategies such as "What would you feel, if you were Soekarno when he read the proclamation text", "How did Prince Diponegoro feel when he was slyly captured by the Dutch during negotiations to end the Java War, which lasted for five years?" as well as other questions. The students did not get used to those questions and felt a little bit awkward when they had to tell their personal thought. Besides, the interviews revealed that students were not able to express their feelings on historical figures or some specific historical events due to their lack of information and knowledge on the topics.

The learning process did not address the state of understanding emotional intelligence, i.e. those related to identifying and labelling feelings, reading emotions, and other feelings, emotional

management, stimulus control, suspending for having satisfaction, expressing feelings adequately, as well as empathy. Empathy in history is more complex than simply understanding what others feel and is encouraged to help. Historical empathy is related to cognitive, reflective, and emotional aspects. Historical empathy is a learnable skill that relates to contextualization, mindfulness of one's own position, personal relationship, and historical imagination. Some efforts the teachers commonly take to build historical empathy is inviting a witness, visiting historical sites, and holding a class discussion (Bartelds et al., 2020).

The teachers tried to build empathy through questioning and story-telling techniques. The questioning technique was employed by asking students to "imagine" some emotions a historical figure would have when he faced a particular event. The story-telling technique was used by delivering some unique stories related to a historical figure as well as describing the figure to make students feel that the figure was also only a human. However, the students did not feel that the two techniques built their historical empathy. Historical empathy should be developed by learning the figure's perspectives or points of view so that the students will understand the different actions taken by the figure. Several studies found that historical empathy can be used to promote deeper conceptual knowledge and other studies claim that it may allow a deeper involvement and create a democratic citizen (Peters, 2011).

Students' difficulty in building historical empathy is something reasonable since it requires adequate historical knowledge that should also be contextually sufficient. Contextualization is required in building historical empathy. It is the ability to put the history of a phenomenon or any actions taken by historical actors in a temporal, spatial, and social context to describe, explain, compare, or evaluate (Bartelds et al., 2020). Besides contextualization, students should also do other cognitive activities like making an investigation on historical resources to cognitively understand the emotions, motives, or actions of a historical figure. Empathy can be a valuable medium to help students have a deeper understanding of historical concepts and it is also a feature that a historian in a particular field of knowledge should have (Peters, 2011).

The data shows that the students are used to working in a group, cooperating, and understanding the benefit of cooperating but they have not already comprehended about understanding others' strengths is also important to building solid cooperation. Several studies show that male students like doing physical games, group games, and risk-taking activities while females tend to care more about cooperative games and individual games with low-risk taking (Smith & Walsh, 2020).

A difficult and challenging task helps students cooperate with one another. The task to explore the local history found in their neighborhood challenged the students. The facts from observation certainly show that male students were more enthusiastic in doing the field task compared to the female ones. Male students undeniably like challenges since they grow through competitions (Smith, 2020). Challenging field observation tasks encouraged them to be physically active and train for direct social contact with resource persons to obtain information. According to a recent neuroscience study, pleasurable physical activity can increase learning motivation, improve thinking skills, and train teamwork (Burkitt, 2019; Given, 2007).

Besides, the students also did not realize that their practice for working in a group during a class session is also aimed at making them learn how to appreciate diversity in their class. In the interview sessions, students also revealed that in the history learning processes, teachers did not guide them to a contemporary and contextual problem solving. It means that the learning materials that the teachers created and discussed in the groups were not connected to contextual and social problems yet. Social

learning system both relates to the establishment of the awareness towards the importance of cooperating and promotes an active learning.

Comprehension, historical skills, and critical thinking ability are standard features that students should have in learning history (Nash & Crabtree, 1996). Cognitively, there were some efforts that the teachers made in making the students connect new information with what the students had already known, explore information from textbooks, and get some accurate information. The learning process was, to a certain extent, conducted contextually by connecting learning materials with actual information. Besides that, the teachers also prompted students' thinking aspects by using caricatures or pictures and asking them to give their opinions on them.

The interviews revealed that the teachers trained the students to connect the past and the real-time events, understand changes, make questions based on historical stories, and understand the cause-and-result concept. They see that the learning processes were mostly dominated by the process of understanding the social transformation concept in history and of understanding the historical methodology concept, namely the steps in the historical research process. history learning was still identical to recalling and memorizing since there were numerous facts students had to memorize, although they had been guided to practice an efficient memorizing technique. They had not been trained much to make some interpretation/analysis and personal opinions on a particular historical event.

There should be better efforts to develop students' ability in understanding recent events connected to the past time, in internalizing historical descriptions, and in performing a historical reflection. The interview sessions revealed that the students took history as a medium to learn about disappointment and failure so that they can be grateful for what they have now and try to do better in the future. The students see that it is important to get into one historical figure's life as it is possible for them to have a similar fate or be in a similar situation. Thus, students will be mentally ready to face any bad situations in the future. Therefore, the students believe that history is important and that reading much about history is a must.

There is an interesting finding from the class observation that the students were still not able to understand the recent political climate despite the historical knowledge they already had. One of the reasons was that most of them seemed to be "allergic" and hate political elements as well as be less responsive when the teachers connected historical learning materials to contemporary political issues. It is rational, as taken from a short interview with respondents, that they did not like politics because they felt that the national political situation was not conducive indicated by worsening conflicts. It supports the notion more than the emotional aspect tightly relates to the cognitive one.

5. Conclusion and Recommendations

The history learning process has tried to balance the emotional, cognitive, physical, social, and reflective aspects from the BBL and it shows that the BBL helps educators understand students' different characteristics. The implementation of emotional learning system made the class atmosphere so conducive that the students were confident to openly tell their ideas, opinions, and questions, no matter how silly the ideas or the questions were. However, the learning process has not already come to the state of understanding emotional intelligence and historical empathy, and it has not been able to prompt the students to have stress management skills yet.

The students were not used to telling what they felt, particularly when it was connected to a particular historical phenomenon. The students were not capable of expressing their feelings about a

figure or a historical event since they did not have adequate information and knowledge. The implementation of cognitive learning has not successfully encouraged the students to persistently increase their knowledge and understanding of history. Besides, the students were still nervous when they faced any tests.

The social learning system has not already been successful in establishing students' concepts on the importance of working together in solving problems and in prompting personal assessment as well as appreciating diversity. Students' cooperation was highly encouraged by pragmatic reasons that they got from difficult tasks given by the teachers that required them to work together in a group.

This study only uses a simple statistic to measure students' response to the implementation of brain-based teaching. This study measures a more complex variable supported with a bigger number of data where it is expected that it may lead to some new findings for future research. In the future, it is necessary to multiply practical research on applying various principles of brain-based learning, including to find a suitable model for history learning. There are still many other the BBL models that need trying and testing for their effectiveness to achieve ideal history learning objectives. This research has not been supported by the the BBL model to prove effectiveness in history learning. In addition, the students' responses have not been compared to the teacher's opinions on the students' responses so that this study can be more objective in assessing the effectiveness of the learning approach.

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