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Brainstorming as an Effective Learning Strategy to Promote Students' Critical Thinking Skills

Ida Ayu Made Sri Widiastuti¹, Ni Made Wersi Murtini¹, Ruli Anto²

¹English Language Education Study Program, Universitas Mahasaraswati Denpasar, Indonesia

²Department of History Education, Universitas Mahasaraswati Denpasar, Indonesia

*Corresponding email: idaayuwidia@unmas.ac.id

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Abstract: Brainstorming as an Effective Learning Strategy to Promote Students' Critical Thinking Skills. Objectives: This study investigates the brainstorming strategy employed by teachers in the classroom to enhance students' critical thinking skills. **Methods:** This study employed a qualitative research approach conducted in a senior high school consisting of 30 teachers and 4 teachers were selected as the research participants. The data were collected by conducting semi-structured interviews and classroom observations. The data were analyzed descriptively to establish valid and reliable findings. **Findings:** This study found that teachers intensively used the brainstorming method in enhancing students' critical thinking skills by asking various challenging questions to arouse students' critical skills. **Conclusions:** the Findings of this study revealed the importance of conducting brainstorming strategies during the learning activities. Moreover, this study implies teachers should utilize the brainstorming method more intensively to develop students' critical thinking skills.

Keywords: brainstorming, learning strategy, critical thinking skills.

Abstrak: Brainstorming sebagai strategi pembelajaran efektif untuk meningkatkan keterampilan berpikir kritis. Tujuan: Penelitian ini mengkaji strategi brainstorming yang digunakan oleh guru di kelas untuk meningkatkan keterampilan berpikir kritis siswa. **Metode:** Penelitian ini menggunakan pendekatan penelitian kualitatif yang dilakukan di sebuah sekolah menengah atas yang terdiri dari 30 guru dan 4 guru terpilih sebagai partisipan penelitian. Pengumpulan data dilakukan dengan wawancara semi terstruktur dan observasi kelas. Data dianalisis secara deskriptif untuk menetapkan temuan yang valid dan reliabel. **Temuan:** Penelitian ini menemukan bahwa guru secara intensif menggunakan metode brainstorming dalam meningkatkan keterampilan berpikir kritis siswa dengan mengajukan berbagai pertanyaan yang menantang untuk meningkatkan keterampilan kritis siswa. **Kesimpulan:** Temuan penelitian ini mengungkap pentingnya melakukan metode brainstorming selama kegiatan pembelajaran. Selain itu, penelitian ini menyiratkan guru harus memanfaatkan metode brainstorming lebih intensif untuk mengembangkan keterampilan berpikir kritis siswa.

Kata kunci: brainstorming, strategi pembelajaran, keterampilan berpikir kritis.

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■ INTRODUCTION

One of the life skills that need to be developed through the educational process is thinking skills. The success of students in learning and their life is much determined by many factors, one of them is critical thinking skills, especially to solve the life problems he faces. Critical thinking is a systematic process that allows students to formulate and evaluate beliefs and opinions held by students themselves. Thinking skills can be divided into critical and creative thinking (Fitria et al., 2018). These two types of thinking are also referred to as higher-order thinking skills. Critical thinking skills are now no longer a new thing in the world of education as it has become a very popular term.

Critical thinking is one of the most important high-level skills taught to students besides creative thinking skills. Critical thinking is one of the important high skills taught to students in the 21st century, where information and technology must be filtered intelligently and critically (Arend, 2019). Therefore, human resources must be equipped with flexible intellectual skills, able to analyze and integrate various information to solve problems encountered with the skills to provide decisions using logical and scientific reasons (Aswan et al., 2018).

Critical thinking skills can be obtained through the learning process (Saptuti Susiani et al., 2018). Students can be said to have critical thinking skills if these students have the following characteristics: (1) character, students have critical thinking skills have behaviour that is not easy to believe, open to friends, honest and responds to opinions; (2) criteria, critical thinking has criteria and standards; (3) arguments, statements based on data, arguments used to accept or reject an opinion; (4) consideration, is to summarize the conclusions from various assumptions; (5) point of view to analyze something and which will

determine the construction of meaning; (6) application procedure criterion. The procedure includes formulating the problem, determining the decisions to be taken, and identifying assumptions or estimates (Jailani et al., 2017).

Critical thinking is a rational, open way of thinking, based on existing evidence and facts. Critical thinking is also a mature attitude to respond to a problem or opinion, but not everyone can think critically and many people can't always think critically, for that it takes an interest to continue learning in order to think critically (Atamtajani & Putri, 2020). Every day humans are faced with problems, but not all of these problems affect humans themselves. To be able to solve this problem requires careful and wise preparation. Critical thinking is one of the things that humans have. Critical thinking does not only apply in academic activities (school environment) but also applies to daily activities. Often the environment does not support a person to think critically. Critical thinking is the process of identifying problems, observing, analyzing, evaluating, reflecting, and giving opinions (Akramova, 2021). To improve critical thinking, students must be happy to find information and be able to make decisions.

Critical thinking is reasonable and reflective thinking focused on deciding what to believe or do. Critical thinking skills are developed, a person will tend to seek the truth, think openly, be tolerant of new ideas, can analyze problems well, think systematically, be full of curiosity, and mature in thinking (Prayogi et al., 2018). It can be said that critical thinking skills lead to thinking activities to analyze an idea systematically, specifically, carefully, and thoroughly, using logic and evidence so critical thinking skills are important things that must be developed. Those who think critically are expected to be able to use a way of reasoning (thinking logically, critically, systematically, and

objectively) that can be used in solving problems, both problems in everyday life and in studying science (Rustam et al., 2017).

Critical thinking is a clear and directed process that is used in mental activities such as problem-solving activities, making decisions, analyzing assumptions, and scientific research. Critical thinking is a way of expressing opinions in an organized way. Critical thinking is the embodiment of learning behaviour that is closely related to the problem-solving process (Ermayeni et al., 2020). In this case, students are required to use certain appropriate cognitive strategies to solve problems and overcome errors or deficiencies. Critical thinking indicators are: analyzing arguments, conducting deductions and assessing the results of deductions, conducting inductions, connecting causes and effects, considering and making decisions, identifying assumptions and deciding an action. **Someone who has the ability to think critically** needs some process to think before reaching critical thinking skills to develop creativity (Syahrin et al., 2019).

A learning process can be said to be good if in the teaching and learning process students are active in an effort to improve their learning experience (Syaiful Romadhon et al., 2019). In addition, if students show positive changes and produce higher learning achievements, the learning process can also be said to be good. To obtain a good quality of the learning process, one of the efforts to overcome problems in the learning process is to improve learning patterns and to make children take an active role in the learning process (Widiastuti et al., 2021).

The learning method used should be able to provide good, efficient, and effective results, therefore **teachers are required to be able to use learning methods** (Maba & Mantra, 2018). One of the places for humans as learning beings is the world of education. Because basically education is a process that aims to help humans develop themselves so that they are able to face all changes

and problems with an open attitude, and think logically, and critically. Education is one of the important factors that can be used to channel the talents that humans are born with so that humans have skills that can be used for their welfare (Mantra et al., 2019).

Creative teachers must be skilled at designing diverse activities and allowing students to be fully involved in learning activities. Students tend to be bored if teaching methods do not vary. On the other hand, students will not feel bored if the methods used are varied (Kong, 2017). Teachers must also conduct a needs analysis to determine the learning styles of students. Creative teachers must be skilled at communicating attention to the progress of students in critical, original, and creative thinking (Mutakinati et al., 2018). Teachers must provide constructive feedback to develop students' creativity and critical thinking in learning to enhance their learning outcomes (Widiastuti et al., 2020).

One of the learning methods that can be used to develop students' critical thinking skills is Brainstorming. The brainstorming approach can make students express ideas because the teacher collects as many ideas as possible that differ from one student to another (Yuliani et al., 2019). The brainstorming method is effective in training students' critical thinking skills. This method trains students' activeness in asking and processing questions so as to encourage students to participate in the learning process (Chaijum, 2020).

Brainstorming is very needed to identify and analyze problems in problem-based learning. Problem-based learning requires efforts to solve problems that are presented in an unstructured manner (Anazifa & Djukri, 2017). The brainstorming learning method was implemented to encourage students to think creatively in finding a solution to the problem in the company by way of discussion, where every employee is free to express his opinion (Hanipah et al., 2018). The

brainstorming method is a way to gather ideas or the opinion of every student who learns about a problem. In line with this opinion, Brainstorming is a technique for generating ideas to solve all obstacles and problems (Hidayanti et al., 2018).

The application of the brainstorming method begins with the teacher explaining the problem that he wants to be a topic of conversation at that time and how students can participate in learning using this method. The next step is for the teacher to re-explain the problem and for the students to formulate the questions they want to ask. From the formulation of the problem, students can develop unique and innovative ideas. The final step is for the teacher and students to collect ideas and evaluate them. After being evaluated, all can be concluded neatly (Al Masri, 2019).

Previous studies have been conducted by the researchers (e.g.: Chaijum, 2020; Malkawi & Smadi, 2018; Viegas et al., 2020). Those previous studies have mainly investigated the implementation of brainstorming methods to arouse students' attention to the lesson and engage students to participate in solving problems, however, this study was conducted to mainly determine the extent to which the brainstorming method was carried out by teachers in the classroom and the impact of brainstorming method on students' critical thinking skills in solving problems in the English classrooms. Furthermore, specifically, this study aims to determine the role of the brainstorming method in improving students' critical thinking skills and also to reveal the importance of brainstorming activities in learning, as well as the problems faced by teachers in improving students' critical thinking skills through brainstorming method.

■ METHODS

This research begins with a theoretical framework that examines the application of critical thinking learning theory using the

brainstorming method. This study used a qualitative research design with descriptive analysis. The study was conducted in a senior high school in Bali consisting of 30 teachers, and 4 teachers were selected as the participants of this study.

The data were collected by carrying out semi-structured interviews, and classroom observations. Semi-structured interviews were conducted before and after the teaching-learning process and the classroom observation was conducted during the learning activities covering the pre-activity, main-activity, and post-activity. These were carried out to gather the real existing data concerning the brainstorming method being implemented during the learning activities in the classroom to enhance the critical thinking skills of the students.

The research instruments were in the form of an interview guide and classroom observation blank sheets. The interview guide was listed with 5 main questions related to the stages of implementing the brainstorming, namely: (1) information and motivation stage, (2) identification (analysis) stage, (3) classification (Synthesis) Stage, (4) verification Stage, and (5) conclusion (agreement) Stage. Meanwhile, the observation blank sheet was listed with three main headings covering pre-activity, main-activity, and post-learning activity to collect the data related to the implementation of the brainstorming method to promote students' critical thinking skills.

Data obtained from observations, interviews, and classroom observations were critically categorized based on the right headings. Both data from the interviews and the observation were matched and triangulated, namely checking the truth of data from data sources with other data sources so that the data presented were tested for their validity level before the data were analyzed qualitatively. The results of data analysis obtained from the interviews and observations and interviews were discussed argumentatively

1 to establish valid and reliable findings and then all the findings were presented descriptively to provide appropriate information related to the implementation of the brainstorming method to promote the critical thinking skills of the students.

■ RESULTS AND DISCUSSION

Teacher's understanding of the application of brainstorming in learning

Based on the results of the data analysis of interviews conducted with the teacher, it was found that the participants in this study had a fairly good understanding of the brainstorming method. All the teachers in this study had a poor understanding of brainstorming in classroom learning. When asked about brainstorming, teacher A did not understand the term brainstorming well, but he stated that he always used the term discussion stimulus in learning. However, Teacher A stated that the stimulus/ brainstorming activity is a method used to give students the opportunity to remember the material they have learned and bring students to new material to be taught, conduct discussions in group learning, and develop students' ideas. According to him, the brainstorming method is designed to encourage groups to express various ideas and build critical thinking. Through these activities, the teacher can open students' insight regarding the material to be taught. Furthermore, teacher A's understanding of the brainstorming method can be seen in the following interview transcript,

"I know what brainstorming is because when I was in college, I often heard my lecturers talk about the method when I started learning. Yes, for me the discussion stimulus activity is an important method of learning. Teachers can stimulate students to be ready to learn to follow the subject matter to be taught.

According to teacher A, brainstorming is very important in the classroom. This has an impact on students' readiness to receive lessons.

Opening student responses to follow the lessons given, as well as conducting joint discussion activities. This is in line with Abedianpour & Omidvari (2018) who revealed that brainstorming is a highly effective learning method to enhance students' skills. Teacher B also has a good understanding of the brainstorming method. Based on the analysis of the results of the interviews conducted, teacher B has a good understanding of the brainstorming method. According to him, brainstorming is a teaching method that is carried out in the classroom to activate students' learning. Through this activity, students can convey their ideas and then present them in class. At this stage, the teacher becomes a facilitator in learning, where the teacher can invite students to discuss together so that they can be actively involved in learning. Similarly, ALRababah & Rababah (2019) found that teachers had a highly positive attitude towards the implementation of brainstorming methods to improve students' learning participation. According to him, brainstorming is an important stage to actively involve students in learning. The following is an excerpt from an interview with teacher B.

"I used to do brainstorming. I do this so that students can learn by collaborating with their friends. Students can actively participate and participate in joint discussions so that students thinking skills can be improved.

Furthermore, according to him, the use of brainstorming can activate students in discussion activities, especially in conveying ideas and solutions without being limited and monitoring by educators in the teaching and learning process. The teacher continues to monitor when the discussion is carried out so that students can discuss in a structured manner. Similarly, Ivanov et al (2020) discovered that the implementation of brainstorming may develop students' active participation in discussing their ideas to solve problems and activate and stimulate their cognitive interest in mastering the necessary competencies.

¹ Based on the results of the interview data analysis conducted, teachers with less teaching experience did not understand the term brainstorming well, but they implemented the method in the class.

From the results of observations made in class, teachers with less experience can carry out brainstorming methods in class well. They apply these learning steps quite well. Even though they could not explain the meaning of brainstorming well, it was implemented quite well in class. Teachers can carry out the stages in the *brainstorming* properly, namely the stages of providing information and motivation (Orientation), Identification (Analysis), classification (Synthesis), verification, and conclusion (Agreement). In learning, all students focus on generating ideas for the best solution to every problem offered by the presenter group, and also in this method all ideas are well-received by all, so students feel motivated to develop their ideas and ideas. Based on these observations, it is known that the two inexperienced teachers can implement the brainstorming method well in the classroom.

Teacher A's inability to convey his understanding of brainstorming was due to the fact that he was not familiar with the term before, but he understood that such activities were very well used in learning. This is the reason teacher A cannot explain the brainstorming method but understands the characteristics of the activity and can carry it out in class. In contrast to teacher A, teacher B has a fairly good understanding of the brainstorming method. This understanding is also implemented in the learning carried out in the classroom. This understanding gave teacher B the ability to implement the brainstorming method well in the classroom.

The next analysis and discussion are the data from interviews with teachers C and D as teachers with more than five years of teaching experience who in this study were categorized

as experienced teachers. Based on the results of the interviews conducted, Teachers C and D have a good understanding of the brainstorming method. Teacher C stated that brainstorming is a teaching method that can facilitate students to be the ability to discussion groups. Group discussions are conducted to provide opportunities for students to discuss and exchange ideas and thoughts. According to him, brainstorming can increase students' creativity and students' ability to discuss and solve the problems they face. At this stage, students have the opportunity to improve their critical thinking skills.

This is in line with Abedianpour & Omidvari, (2018) who revealed that brainstorming is a form of creative thinking so that considerations provide a way for creative initiatives. In brainstorming, students are encouraged to pour out all the ideas that arise from their minds within a certain period of time regarding several problems and are not asked to evaluate them during the opinion activity. Assessment will be carried out in the next period where all ideas are selected, evaluated, and possibly implemented (Zarei & Feizollahi, 2018). Thus it can be concluded that the Brainstorming method is a form of discussion in which participants are encouraged to express ideas, opinions, information, knowledge, experiences, and ideas about a problem without any judgment from other participants (Mantra et al., 2018).

In addition to teacher C, teacher D is also a teacher with more than five years of teaching experience. He has good skills in brainstorming methods. This method is applied when the teacher wants to invite students to play an active role in learning. Discuss the problems given together, then discuss these problems by conveying the ideas that each student in the group has. The brainstorming method is applied to activate students in learning by conveying their ideas. This is in accordance with Abedianpour & Omidvari,

(2018) who found that brainstorming is a form of discussion in order to gather ideas, opinions, information, knowledge, and experiences, from all participants. In contrast to discussions, where one person's ideas can be responded to (supported, supplemented, reduced, or not agreed upon) by other participants, the use of the Brainstorming method does not allow other people's opinions to be responded to. This method is based on the opinion that a group of people can propose more than their respective members.

Brainstorming in Developing Students' Critical Thinking

Ability Students' critical thinking ability is one thing that is currently needed in learning. This ability is done by inviting students to participate in learning in class. Many learning methods and strategies are applied to improve students' critical thinking skills. One of the methods applied by teachers to improve the students' critical thinking skills is the brainstorming method. In this study, interviews and observations were made regarding the brainstorming method that was understood and implemented by the teacher in the classroom. Based on the results of interviews conducted with teachers in this study, it is known some information related to the implementation of the brainstorming method to develop students' critical thinking skills.

Based on the results of interviews conducted, it is known that the brainstorming method can develop students' critical thinking skills. According to teacher A, the stimulus activities he carried out were aimed at increasing student activity in learning. These activities are also carried out to stimulate students' ability to cooperate and think critically. Critical thinking skills are needed so that students can express innovative ideas and ideas about what they are learning. Students' critical thinking skills are

needed because students are not only expected to be able to understand the material being studied but are able to produce an idea or creativity about the things they learn. This is in accordance with Syahrin et al (2019) who describe that the purpose of using the Brainstorming method is to exhaust everything that is thought by students in responding to the problems given to them by the teacher. In this case, the method applied by the teacher aims to develop and improve students' critical thinking skills.

The results of the analysis of interviews and observations conducted on teacher B related to brainstorming abilities in developing students' critical thinking skills also gave the same results. Teacher B applies the brainstorming method in classroom learning with the aim of inviting students to actively participate in learning. The method is applied by providing several topics that can be discussed with the group. Discussions were conducted to give students the opportunity to explore the information they know, stimulate their creativity and activeness in learning, and to be able to increase learning independence so that students' critical thinking skills can be developed. Based on the results of interviews conducted with teacher B, the brainstorming method implemented in the classroom can develop students' critical thinking skills. This can be seen from the results of the interview transcripts conducted with teacher B.

"Yes...you see, ma'am...I apply the brainstorming method in the class. I often give this method to students. I made small groups and then I gave the topics to be discussed. So, from that topic, my students will convey their ideas and opinions. It also aims to make students active and stimulate their critical thinking skills."

"I think brainstorming can develop my students' critical thinking skills. I say this because, through the application of the brainstorming method, students become more active in

conveying their ideas and are more critical in responding to ideas conveyed by other friends”.

Based on the results of the analysis of interviews with teacher B, it is found that the brainstorming method can develop students' critical thinking skills so that students' higher-order thinking skills can be improved. This finding was supported by Itmeizeh & Hassan (2020) who revealed that brainstorming can be one of the learning approaches to improve students' critical thinking and creative skills. From the analysis of the results of interviews with teachers A and B, it is known that the brainstorming method can develop students' critical thinking skills. The application of this method provides opportunities for students to actively participate in learning to improve their learning achievement (Naima, 2022). Additionally, Mantra et al (2022) found that brainstorming can be used to stimulate students to be active in problem-solving throughout the learning process by sharing ideas to solve the problems given by the teachers.

Data analysis from interviews and subsequent observations was carried out on teachers C and D. They were experienced teachers. Based on the results of interviews conducted by teachers C and D stated that the brainstorming method applied in the classroom was able to develop students' critical thinking skills. This method is very good for increasing student participation in learning. According to teacher C, the implementation of the brainstorming method has several stages that must be considered in order to develop students' critical thinking skills. This is in line with Sripradith, (2019) who found that to achieve these abilities and implement learning efficiently, there are several stages of implementing the brainstorming, namely: (1) Information and motivation (Orientation) stage, (2). Phase Identification (Analysis), (3). Classification (Synthesis) Stage, (4) Verification Stage, and (5) Conclusion (Agreement) Stage.

Moreover, the teacher's teaching experience had an effect on differences in teaching methods. This means that more experienced teachers will be better able to carry out variations in the learning process (Assistant et al., 2012). In addition, it was found that there were differences in the teaching methods of teachers who had studied a language other than English compared to those who had never studied another language. So, this study found that experience had a contribution to the learning process carried out by the teacher. The following is a transcript of the interview with teacher C.

“I apply the brainstorming method in the class. Yes, there are several steps that I do so that this method runs efficiently. Among them are the stage of providing information and motivation (orientation), identification (analysis), classification (synthesis), verification stage, and conclusion stage (agreement).

Teacher D also stated the same thing. The brainstorming method implemented in the classroom can improve students' critical thinking skills. The teacher divides the class into several discussion groups. At the discussion stage, the activeness and participation of students can be increased. The brainstorming method implemented stimulates students' ability to continue to be active in conveying their ideas.

Based on the results of the analysis of interviews and observations made on the two experienced teachers. Obtained information related to the brainstorming method in improving students' critical thinking skills. The application of these methods can make students more active and creative in conveying their ideas and ideas. Teaching experience provides the opportunity for teachers to be able to carry out learning better. Educational background and teaching experience have a major contribution to teacher pedagogical knowledge (McDonough, 2004). This study demonstrates the importance of individual

abilities, especially teaching experience and previous education in understanding heterogeneity at the onset of live teaching practice in the classroom.

This is also found in this study teachers with longer teaching experience have a better understanding of brainstorming methods and are able to apply them in the classroom better. It is, however, based on the data analysis conducted on the participants in this study, it was found that less experienced teachers and experienced teachers have a fairly good understanding of brainstorming, although teacher A mentions the term as a stimulus in the discussion, they are able to apply the brainstorming method well in class. This is due to the fact that the brainstorming method certainly develops students' critical thinking skills.

Based on the classroom observation, it was found that teachers implemented the brainstorming method in several phases of learning. Firstly, teachers gave students a problem that must be solved. Next is the identification process from brainstorming, each student in the group must state their opinion in turn. All opinions and ideas were recorded by the minutes that have been determined previously by each group. All opinions that have been classified are reviewed together by the group. Each brainstorming is tested for its relevance to the problems discussed. Many students ask questions and argue so that group activities become alive because of student activity. This student activity indicates that they understand what they are learning and know good solutions to the problems given. Additionally, based on the observation, it was found that through the brainstorming method students were more active in expressing their opinions or comments on the problem and thinking critically in response to the problems that the teacher posed to the class.

■ CONCLUSIONS

The learning process is said to be successful if all students can be actively involved in learning, whether physically, mentally or socially. Based on this, the teachers' efforts in developing learning activities for the students become very important to enable students to enhance their competence and develop their creativity and critical skills. Brainstorming has better advantages than other learning methods in terms of developing students' critical thinking skills. Brainstorming method becomes an essential learning method for the teachers to understand comprehensively and able to implement it in the classroom appropriately. The brainstorming method makes students able to express their ideas or thoughts and actively engage in solving problems posed by the teachers.

This study revealed that teachers implemented brainstorming methods in learning activities intensively. It is, however, that teachers' ability in carrying out the brainstorming method was varied due to their educational background and teaching experiences. Moreover, it was found that the brainstorming method can improve students' critical thinking skills, and additionally brainstorming methods can provide an interesting and fun learning atmosphere that can increase student motivation. Therefore, this study suggests that brainstorming should be utilized more intensively in the classroom to develop students' creativity and critical thinking skills and to make the learning activities become more meaningful.

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