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DEVELOPING STUDENTS' CRITICAL REASONING BASED ON INDUCTIVE THINKING LEARNING MODELS

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Abstract: Critical reasoning is one of the essential competencies crucial for enhancing the quality of human resources. However, in reality, many students still struggle to develop critical thinking skills due to inadequate learning approaches. This study aims to develop students' critical reasoning through the implementation of the inductive thinking model, which emphasizes the reasoning process from specific observations toward general understanding. This model encourages students to actively observe, analyze, draw conclusions, and build concepts based on concrete data. The research employed a qualitative approach with a library research method. Data were collected from various scientific literatures such as journals, books, and previous relevant research on inductive learning and critical reasoning. The findings show that the application of the inductive thinking model significantly improves students' critical reasoning abilities. Active student engagement in the learning process and the teacher's role as a facilitator and discussion director are key success factors. The conclusion affirms that developing critical reasoning through the inductive approach is an effective and relevant strategy for modern educational settings. The implication is the need for innovative, student-centered learning models that foster active interaction to nurture a critically minded and solution-oriented generation.

Keywords: critical reasoning; inductive thinking model; learning; students' critical reasoning

Abstrak: Penalaran kritis merupakan salah satu kompetensi utama yang sangat penting dalam meningkatkan kualitas sumber daya manusia. Namun, kenyataannya, banyak siswa masih kesulitan dalam mengembangkan kemampuan berpikir kritis karena pendekatan pembelajaran yang belum memadai. Penelitian ini bertujuan untuk mengembangkan penalaran kritis siswa melalui penerapan model berpikir induktif yang menekankan proses berpikir dari hal-hal khusus menuju pemahaman umum. Dengan model ini, siswa didorong untuk aktif mengamati, menganalisis, menyimpulkan, dan membangun konsep berdasarkan data konkret. Penelitian ini menggunakan pendekatan kualitatif dengan metode studi pustaka. Data dikumpulkan dari berbagai literatur ilmiah seperti jurnal, buku, dan hasil penelitian terdahulu yang relevan dengan topik pembelajaran berpikir induktif dan penalaran kritis. Hasil penelitian menunjukkan bahwa penerapan model berpikir induktif secara signifikan dapat meningkatkan kemampuan penalaran kritis siswa. Keterlibatan aktif siswa dalam proses pembelajaran serta peran guru sebagai fasilitator dan pengarah diskusi menjadi kunci keberhasilan. Simpulan dari penelitian ini menegaskan bahwa pengembangan penalaran kritis melalui pendekatan induktif merupakan strategi yang efektif dan relevan untuk diterapkan dalam konteks pembelajaran modern. Implikasinya, dibutuhkan inovasi pembelajaran yang berpusat pada siswa dan mendorong interaksi aktif demi mencetak generasi yang berpikir kritis dan solutif.

Kata kunci: penalaran kritis; model berpikir induktif; pembelajaran; penalaran kritis siswa

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Introduction

According to Hapsah as quoted by Imas Kurniawaty et al., explaining that the reconstruction of human reasoning in the post-truth era is actually related to the reuse of human critical reasoning to formulate the real truth. This critical thinking reasoning is formed by the ability of humans to ask themselves and assess the information circulating around them. Human critical thinking needs to be willing to "make a little effort" to verify the truth of every piece of information conveyed in order to avoid practical thinking.[1]

This opinion requires the right strategy to increase the level of critical reasoning in students. Critical reasoning is related to the ability to find a way out of a problem and is related to the level of quality of human resources that are ultimately needed to build a nation, including Indonesia with its large population and area.

Various efforts have been made by the Indonesian government in order to improve the quality of student learning outcomes and achievements. These efforts are intended to provide choices to schools, especially teachers, with the hope of being able to boost and produce superior human resources. The existence of quality human resources is an important requirement for a country that wants to compete with other countries, both regionally and internationally.[2]

Improving the quality of human resources (HR) who have good critical reasoning is an important task for a country. Developing countries and even countries that are classified as advanced and modern absolutely need quality HR to continue the wheels of government. Those who have the qualifications to run the government are thought to have a strong impact on advancing a nation. This is because quality HR knows how to run the wheels of government and of course prioritizes the interests of the wider community.

The quality of human resources has a significant influence on the competitiveness of a nation. A nation will be taken into account in the international arena when it has quality human resources. Likewise, a nation with low quality human resources is easily ostracized by other nations. A nation with a low level of human resources is considered a defeated nation, and of course it will be easily influenced so that its existence does not become a threat. In addition, a nation with a low level of human resources is easily controlled by other countries that are classified as developed. Therefore, it can be simply concluded that a country is said to be developed if the country has quality human resources.

Indonesia is a country that is included in the category of developing countries. After independence in 1945 from colonialism, Indonesia improved itself to be ready to become a developed country so that it could become part of other countries, both in terms of economy and socio-culture. Various efforts have been made by the government as implemented by schools so that graduates (output) are qualified.

Armed with a large population or often referred to as a demographic bonus, it is a great capital for the Indonesian nation to become a developed country and respected by other countries. Not all countries have a demographic bonus, there are even countries where the population growth rate is stagnating so that the government is worried about the sustainability of the country. Quality human resources are born from a long process and of course by including other supporting factors. The long process in question involves many things, policies, and of course qualified teaching human resources. All of them must be supported so that the existing elements complement each other in order to produce quality graduates. Simply put, based on this understanding, quality human resources are born from cooperation from many parties who are aware of the importance of having quality human resources.

[1] Imas Kurniawaty, "Vini Agustiani Hadian, Aiman Faiz, 'Building Critical Thinking in the Digital Age,'" *Edukatif : Jurnal Ilmu Pendidikan* 4, no. 3 (2022): 3683 - 3690.

[2] Dwi Sulisworo, "The Contribution of the Education System Quality to Improve the Nation's Competitiveness of Indonesia," *Journal of Education and Learning (EduLearn)* 10, no. 2 (2016): 127–38.

One of the characteristics of quality human resources is that they are able to think critically. Critical thinking is not interpreted as the ability to correct, or blame a situation, but critical thinking is an ability to read, analyze, and of course evaluate an event with the aim of finding alternatives that are considered capable of being a solution to the problem.

So far, the assumption of critical thinking is considered hatred or dissatisfaction with something so that motivation arises to make improvements in the wrong way. Critical thinking aims to analyze an event, so that the resulting solution can be applied. For example. A high school student beat his teacher because he did not accept being reprimanded by the teacher. As a result, the teacher suffered serious injuries so he had to be taken to hospital.[3]

The beatings carried out by students are interpreted as an alternative to solving problems. For some students, the beatings are considered appropriate to punish the teacher who has reprimanded them. Some other students have the opposite opinion, that beatings in any form are not justified. The two opinions that emerged were a reaction to the beatings that occurred. The beating incident leaves one important question that the incident that occurred cannot be separated from the underlying cause. The opinion that justifies the beating assumes that the teacher who reprimanded was at fault. The mistake was caused because the teacher did not understand the procedure for giving a reprimand, so the student hit him.

Another reason is because the psychological condition of the student who was reprimanded was not comfortable. For example, family conditions are the cause of his discomfort, so that when he is reprimanded or advised it is the same as being belittled.

The opinion that blames the beating is usually due to the high regard for teachers, so that acts of violence are not justified against teachers. Whatever the reason, if a teacher is treated inhumanely, then the action is considered negative and degrading the dignity of teachers in particular and the world of education in general. In short, teachers must be glorified because of their heavy workload, even teachers are titled as unsung heroes. Incidents of beatings or other anarchic acts did not only happen once, but happened many times and occurred in many places.

Various reasons underlie these events, so that the opinions that develop are also varied. Cases of beatings or other anarchic acts are not justified either from a legal perspective or in Islam. Humans have the same degree and dignity in the eyes of the law. Article 27 of the Constitution emphasizes that the position of humans is the same before the law, no human being is privileged. This article also strengthens the argument that all forms of violence, degrading others and even taking someone's life are actions that are not justified and are condemned. Meanwhile, in Islam, the position of humans is the same in the eyes of God. There is nothing more special than their devotion to the One God. Humans were created into the world with the aim of becoming prosperous, spreading peace and of course all in order to become servants of the Almighty.

Cases of violence that occur in schools should not happen. Schools are a place to foster, shape and give birth to the next generation needed by the nation. The presence of schools as a 'sacred' place to accelerate the birth of the next generation, so that schools are equipped with various supporting facilities both in physical and non-physical forms. One effort that can be tried is for schools to implement inductive thinking learning. Inductive thinking learning tries to combine high-level thinking skills and critical thinking skills with the ability to develop students' creativity. Thus, the ability to reason well has a correlation with the level of development of a student's creativity. This creativity functions to make it easier for a student to find solutions to a problem.

This article attempts to clarify the development of students' critical reasoning based on inductive thinking learning. Inductive thinking is thought to

[3] Jay Wijayanto, https://radarsurabaya.jawapos.com/nasional/775586922/viral-guru-di-kelas-dikeroyok-dan-dipukuli-3-siswa-sma-netizen-murka,.

be related to critical thinking, namely maximizing the role of reason to analyze a problem based on reading sources that can be accounted for. The author argues that a comprehensive explanation of this matter will be able to reduce and even break the chain of crimes that occur in educational institutions. Armed with the habit of reasoning, students learn to understand and analyze an event that occurs, so that the conclusions drawn from the event strengthen their awareness. The story of the intellectual journey of the Prophet Moses, when learning from Khidir, can be a reference that a detailed explanation accompanied by strong arguments prevented Moses from committing acts of violence against Khidir. As is known, Moses was a strong prophet, so he should have easily beaten Khidir, but he did not do it because of the clear argumentation of the dissertation.

Method

The research used in this study is included in qualitative research. Qualitative research is a type of research that produces findings that cannot be achieved using statistical procedures or other quantitative methods.[4] Qualitative research is research conducted to answer problems that require in-depth understanding in the context of time and the situation concerned, conducted naturally and fairly in accordance with objective conditions in the field without any manipulation, and the type of data collected is mainly qualitative data. The research process in question is observing people in their daily lives, interacting with them, and trying to understand their language and interpretations of the world around them.

Therefore, researchers must go into the field for a fairly long period of time.[5] Qualitative research requires researchers to conduct research activities in the field as much as possible. This will not only help researchers understand the context and perspectives of the people being studied, but also so that those being studied become more accustomed to the presence of researchers in their midst so that the "observer effect" is minimized. In qualitative research, there are triangulation activities that are carried out extensively, both method triangulation, data source triangulation and data collection triangulation. This is an effort to verify the data found.[6] In qualitative research, the researcher is a key instrument. Therefore, researchers must have a broad theoretical background and insight so that they can ask questions, analyze the objects studied to be clearer.

Results and Discussion

The Process of the Birth of Students' Critical Reasoning

Based on Hilda Taba's explanation, which emphasizes that a conclusion is drawn from an event or problem based on existing data using a method that is considered appropriate. Taba believes that the method she developed can improve students' abilities in terms of developing ideas as well as the hope that the idea is applied in life.[7]Taba's opinion emphasizes that a person's ability to formulate a conclusion requires comprehensive knowledge obtained from various sources with the same problem focus. This means that a person must read various literatures that discuss the same theme, then make a summary (resume), and the next stage is to make a conclusion. The conclusion drawn can be said to be critical reasoning because it comes from ideas found after reading or studying various literatures.[8]

Critical thinking is born from the awareness to think about reality which is driven by the

[4] Eko Murdiyanto, *Qualitative Research Methods* (Yogyakarta: UPNYK Press, 2020).

[5] Zainal Arifin, *Educational Research* (Bandung: PT. Remaja Rosdakarya, 2014).

[6] Hardani, *Qualitative and Quantitative Research Methods* (Yogyakarta: CV. Pustaka Ilmu, 2020), 225.

[7] Syah Raya Chintya Ramadhani Salsabila and Moh Faizin, "Inductive Thinking as the Basis for Critical Attitude Competence for 21st Century Millennial Generation Students," *Cendekia: Jurnal Ilmu Pengetahuan* 5, no. 1 (January 2025): 264-276.

[8] Uus Faizal Firdaussy, Sri Ningsih, and Enkin Asrawijaya, "Basic Education for Indigenous Peoples in Indonesia: Limiting Children's Cultural Alienation and Loss of Identity," *Issues in Educational Research* 34, no. 3 (2024): 995–1015.

curiosity to find the cause of the incident. Critical thinking can be an alternative to train a student to find or solve problems that occur to then be used as a basic guide (way of life) in their lives. The idea put forward by Paulo Friere indicates freedom of learning for students. Students are no longer given knowledge like a 'bank style', namely teachers only provide knowledge, but do not involve students in the learning process. The consequences of this learning system, according to him, reduce students' interest and motivation to learn. Therefore, Friere argues that student freedom such as giving them the opportunity to think critically can improve the quality of learning outcomes (output). Indirectly, Friere guarantees that involving students in learning, for example listening to opinions, or allowing students to ask and answer questions, can improve students' abilities both academically and mentally.

One of the characteristics of past education is that student involvement in learning is relatively small. Teachers dominate learning more, so that students are used as containers or objects. This concept indirectly ignores the important role of students in the learning process, indirectly this concept argues that students will not gain knowledge if the teacher does not give it. What students know is limited to what their teacher has.

Based on the explanation mentioned earlier, critical thinking is influenced by the teaching method chosen by the teacher during the teaching and learning process (KBM). Student involvement during the KBM process helps them to select words or sentences that they will convey in learning, especially learning during discussions on the problems being discussed. Teachers have an important role in developing students' reasoning skills so that they think critically in understanding a problem.[9]

Critical Reasoning Development in Teaching and Learning Activities

Humans are creatures that grow and develop. Growth in humans is seen from physical changes (their bodies), while development is clearly seen in changes in attitudes and mentality. Likewise, students experience growth and development. Development in students from an educational perspective can be seen from changes in their knowledge. Changes in student knowledge are interpreted as a number of knowledge (information) that they gain during the learning process. Hamalik emphasized that the purpose of students learning is so that they can adapt to their environment.[10]

Students' knowledge is expected to increase during the teaching and learning process. During this process, the teacher becomes the person maker who controls the transfer of knowledge, both from the teacher and from other students. The transfer of knowledge that occurs in the teaching and learning process requires students to be ready to receive the knowledge. Readiness to receive knowledge is interpreted as the awareness to understand so that students try to prepare themselves well during the knowledge transfer process. This student awareness has a fairly large role in improving student achievement and learning outcomes.[11]

Critical reasoning can develop when it is 'forced' or grown in the teaching and learning process. Teaching and learning activities are processes that involve interaction between teachers and students, so that a two-way communication pattern is formed. Through the communication process during learning activities, students have a contribution in conveying opinions on the theme being discussed in class. Therefore, the development of students' critical

[9] Ekaterina Koromyslova, Anna Sadovnikova, and Joshua Westwick, "Enhancing Student Communication Skills through Inductive Teaching," *The Journal of Research In Business Education* 65, no. 1 (2025).

See. S Ningsih and Z K Prasetyo, "Enhancing Students' Critical Thinking Skills through Inductive-Deductive Learning," *Indonesian Journal of Educational Review* 9, no. 1 (2015): 54–67.

[10] Oemar Hamalik, *Teaching and Learning Process*, 18th ed. (Jakarta: Bumi Aksara, 2016), 79.

[11] Michael J Prince and Richard M Felder, "Inductive Teaching and Learning Methods: Definitions, Comparisons, and Research Bases," *Journal of Engineering Education* 95, no. 2 (2006): 123–38.

reasoning requires cooperation with the teacher who is explaining the lesson material.[12]

The success of learning is determined by various factors. All of these factors are supported so that one with the other needs each other, so that they are able to realize an effective and efficient learning process. Effective learning indirectly motivates students to argue during the learning process. Here are some things that influence effective learning. Among them are the following:

1. Comfortable classroom atmosphere

   The classroom atmosphere is understood as the condition of the classroom during the learning process. Comfortable classroom conditions require good cooperation among the students in it. Their role is proven by the readiness to listen and carry out all the rules during discussions in the classroom. The comfort of the classroom atmosphere encourages students to actively remind each other of important learning goals in a comfortable atmosphere.

   Based on this, it can be said that the quality of school buildings contributes to determining the achievement of the learning process. According to Wati as quoted by Muhammad Muhaimin et al., the implementation of learning that does not empower the physical environment of the learning space, the student learning environment at school, both in the classroom and in the environment outside the classroom that is not well organized can have an impact on the quality of student learning outcomes. The comfort of the classroom can affect the concentration and productivity of students and teachers in learning activities.[13]

   Seeing the above, a master is also a manager in the class, should not be underestimated because as a manager must be able to organize his classroom into a conducive class. Because the success of parents and masters in conveying these values will be realized in the behavior of students who are aware and responsible which occurs because of the existence of a grip based on the values instilled in students.

   Conducive learning conditions can only be achieved if social interaction takes place well, good social interaction allows each personnel to create a pattern of relationships without anything disturbing their relationships. The cultural environment provides a condition of a pattern of life that is in accordance with the pattern of life of its citizens. "The cultural environment is interpreted as a pattern of life that is carried out.[14]

2. Students respect each other

   Another impact of a comfortable classroom atmosphere is that students respect their friends. This appreciation arises because students in the class feel the same way as other students, so that a sense of mutual respect and appreciation arises. This attitude of mutual respect is a supporting factor in the emergence of students' courage to express their opinions. Students who are less able to convey ideas will not be inferior when expressing their opinions because none of their friends bully them.

   It should be remembered that the process of bullying students in schools occurs because of the habit of not respecting. Students who have a habit of insulting, harassing will act further, committing acts of bullying, even to the point of violence. Therefore, the habit of students to respect their friends must receive attention from the school, especially teachers who are teaching in the classroom.

   The classroom is one of the first factors that influences the learning process of students in receiving a lesson, and the second factor is the master in delivering the lesson, a good classroom

[12] John W Thomas and William D Rohwer Jr, "Academic Studying: The Role of Learning Strategies," *Educational Psychologist* 21, no. 1–2 (1986): 19–41.

[13] Muhammad Muhaimin, "The Urgency of Thermal Comfort in Learning Perspective"," *Geodika: Jurnal Kajian Ilmu Dan Pendidikan Geografi* 7, no. 1 (June 2023): 23 - 32

[14] Imam Supardi, *Environment and Its Sustainability* (Bandung: PT. Alumni, 2003), 207.

is a space that can be used by students to learn something comfortably.[15]

3. Selecting of objective methods and assessments

   The learning method aims to make it easier for teachers to explain the material so that students can easily digest the material presented by their teachers. The approach in learning activities refers to the learning method. The method is a system that is directed to facilitate activities in order to achieve goals according to expectations and desires.[16]

The role of teachers in learning

The figure of a teacher as explained above is absolutely necessary. Its existence as a leader, director and of course as an innovator during the teaching and learning process. The teacher as a leader keeps the class in a conducive state. Meanwhile, as a director, the teacher provides direction, makes rules by of course being involved in the process. As an innovator, the teacher is obliged to be a creative figure who finds something new and is related to the success of the teaching and learning process. Sardiman explained that the figure of a teacher as a teacher must realize that he has an important role in the success of learning. He emphasized that the figure of a teacher must realize this by preparing himself well, especially regarding his personality as a teacher. According to the Big Indonesian Dictionary, a teacher is a person whose job is to teach. According to Thoifuri, the word teacher in Arabic is called mu'allim and in English it is known as a teacher which in a simple sense is someone whose job is to teach others. According to Annisa Anita Dewi, a teacher is an educator who is respected and imitated, in this case the teacher becomes a role model for his students.[17]

In the teaching and learning process, teachers have a very significant function to make the knowledge taught acceptable to students. In addition to functioning to teach knowledge alone, there are many responsibilities of teachers in learning activities. Now, we will discuss further the role of teachers in the teaching and learning process. The important role of teachers in improving students' critical reasoning can be seen as explained below:

1. Teacher as Facilitator

   The role of a teacher as a facilitator is to provide services so that students can easily receive and understand the learning materials. Thus, the learning process will be more effective and efficient.

2. Teacher as Guide

   Teachers can be considered as travel guides, who are based on their knowledge and experience and have a sense of responsibility for the smooth running of the journey. This journey is not only physical but also a more complex and profound mental, creative, moral, emotional and spiritual journey.

3. Teacher as Demonstrator

   Teachers have a role as demonstrator, namely having the ability to demonstrate attitudes that can inspire students to do the same things or even better.

4. Teacher as Managers

   In the process of teaching and learning activities, teachers have a role in controlling the climate in the atmosphere of the learning process. It can be likened to a teacher being a captain who holds the rudder and takes the ship on a comfortable and safe journey. A teacher must be able to create a conducive and comfortable classroom atmosphere.[18]

Inductive Thinking Based Learning Model

The meaning of the learning model is often interpreted as similar or even the same as the

[15] Syaifurahman and Tri Ujiati, *Management In Learning* (Jakarta: PT. Indeks, 2013), 105.

[16] A Anjani, G H Syapitri, and R Lutfia, "Analysis of Learning Methods in Elementary Schools"," *FONDATIA* 4, no. 1 (2020): 67-85.

[17] Annisa Anita Dewi, *Teachers Are the Spearhead of Education* (Jawa Barat: CV Jejak, 2017), 10.

[18] Dea Kiki Yestiani and Nabila Zahwa, "The Role of Teachers in Learning for Elementary School Students"," *Fondatia : Jurnal Pendidikan Dasar* 4, no. 1 (2020): 41-47.

approach, strategy, or learning method. This explanation is obtained from the purpose of choosing a learning model, namely achieving learning goals. It is clearly explained that according to Syaiful Sagala, a learning model is a conceptual framework that describes a systematic procedure in organizing students' learning experiences to achieve certain learning goals, and functions as a guideline for learning designers and teachers in planning and implementing teaching and learning activities.[19]

The inductive thinking learning model trains students to be more concentrated in learning. This concentration is because students are asked to be careful and require students to try the method they will use and in the end the student is required to draw a conclusion. Meanwhile, the conclusion is taken from the essence of various ideas that have been put forward. Quoting Wicaksono's opinion, that during this process the presence of a teacher as a companion is needed, especially in relation to directing and supervising students in each stage they will go through.[20]

According to Huda, inductive thinking-based learning is based on the opinion that explains that students are included in natural conceptualizers. This means that students always conceptualize themselves at all times, comparing and distinguishing events, objects and emotions.[21] This opinion is in line with the concept explained by Mukhtar Latif, namely that the presence of humans on this earth is equipped with knowledge given by God. God equips humans with knowledge with the aim that humans are able to fulfill their duties as the ones who prosper on this earth.[22]

Wicaksono explained as rewritten by Aisyah Raya Salsabila et al., the inductive way of thinking, namely by observing and trying certain methods which will then produce conclusions, is the basis of the inductive thinking model. To improve their thinking skills, the inductive thinking model asks students to collect, test, and process them into ideas, then process them into concepts. utilize these ideas. Although this model is more collaborative, the role of the teacher remains very important in providing direction and supervising each stage of the activity. The teacher's responsibilities in this model include determining cognitive tasks and providing appropriate instructions. In implementing the inductive thinking model, teachers also need to monitor the student's process in organizing information and building concepts, formulating supporting questions, and providing teaching aids that support students to carry out cognitive activities and learn actively and effectively.[23]

Further explanation can be explained as follows: First, the thinking process that can be built through the inductive thinking approach is based on three processes, namely: The thinking process can be learned. Teaching, for example, as applied by Taba, aims to facilitate students in spreading inductive thinking through practice. Second, the thinking process is basically an active interaction between individuals and data. This shows that students express various data related to several fields of study. Students then organize the data into a conceptual framework, connect various data points with other information, create generalizations based on the relationships they find, and conclude through hypotheses, make predictions, and explain existing phenomena. Third, the developing thinking process requires stages that are "valid based on rules." According to Taba's postulate, to understand an exclusive thinking skill, individuals must first understand other exclusive skills before proceeding to the next stage in the sequence.[24]

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[19] Syaiful Sagala, *Concept and Meaning of Learning to Help Solve Learning and Teaching Problems* (Bandung: Alfabeta,2005), 15

[20] zulfikar Boyke Wicaksono, "The Effectiveness of Show Don't Tell Technique To Teach Writing" (ISLAMIC STATE UNIVERSITY, 2021). Salsabila and Faizin, "Inductive Thinking as the Basis for Critical Attitude Competence for 21st Century Millennial Generation Students" *CENDEKIA : Jurnal Ilmu Pengetahuan* 5. no. 1, (January 2025): 264-276

[21] Miftahul Huda, *Teaching and Learning Models*, 6th ed. (Yogyakarta: Pustaka Pelajar, 2017), 78.

[22] Mukhtar Latif, *Orientation Towards Understanding the Philosophy of Science*, 4th ed. (Jakarta: Prenanda Gorup, 2016), 1.

[23] Salsabila and Faizin.

[24] Salsabila and Faizin.

Inductive learning encourages students to be actively involved in the learning process. During the process, the teacher acts as a facilitator who accompanies students in building concepts or generalizations. This method provides opportunities for students to develop skills in mathematical reasoning. Activities that follow the steps of inductive thinking can strengthen reasoning skills, including algebraic reasoning. In algebraic reasoning, students make generalizations from existing examples, develop these generalizations through arguments, and state them more formally according to their age level.[25]

Problem-Based Critical Thinking Development Exercises

Developing students' critical reasoning is one of the efforts to improve the quality of human resources. Students' critical reasoning can be improved or trained by presenting common problems in society. Common problems in question are problems that are easy to find and occur repeatedly. This aims to train students to think (think critically) as well as find the reasons why the incident occurred. Here are some examples of such incidents or events, including the following:

First, a student hit a teacher. The incident of a teacher being beaten by his students can be used as material for discussion in class. A teacher "throws" the issue for students to review in his/her class. Each student is given the opportunity to express their opinions and analyze the causes of the beating. From the various opinions that will be conveyed by students, a teacher can direct students and find the right solution to overcome the beating of teachers. During this process, teachers are not allowed to express opinions that blame students, but teachers and students together see the reasons proportionally so that the desired solution can be accepted logically.

The second problem that is used as the object of study is learning achievement. Learning achievement is the result obtained from practice, experience supported by awareness. So, learning achievement is the result of changes that occur in the learning process. In general, student learning achievement varies greatly. However, there are various obstacles to student achievement that certainly have causal factors, such as internal factors and external factors.

Students are directed to argue that the two factors that influence learning achievement need to be analyzed further. Because so far, both factors are believed to have an important role in improving student achievement and learning outcomes. However, from the opinions that will be explained by students, it is possible that there are other things that play a role in improving student achievement and learning outcomes.

Both examples of problems mentioned above are expected to encourage students to maximize the role of their reason to be used in critical thinking. The hope is that students will not easily draw conclusions if they have not read and studied a lot of literature related to teacher beatings by students and improving student achievement and learning outcomes.

Conclusion

The argument that the ability to maximize reason to think critically is closely related to the level of success in solving problems, is true. That every student who tries well to analyze the cause of an incident indirectly helps them become a solution to a problem. Because in fact, the cause that underlies a problem can be used as a basis for finding a solution to the problem. For this reason, teachers are advised to maximize learning that involves students while they are following the learning process in the classroom. This aims to make students accustomed to expressing their opinions on a problem that is a topic of discussion in the classroom.

[25] Yu A Fitrianna, N Priatna, and J A Dahlan, "Development of an Interactive E-Book Model Based on Inductive Learning to Train Junior High School Students' Algebraic Reasoning Skills"," *Jurnal Cendekia: Jurnal Pendidikan Matematika* 05, no. 02 (2021): 1562–1577; See. Yuxue Zou et al., "Promoting High-Order Thinking Skills through Problem-Based Learning: Design and Implementation," *International Journal of Academic Research in Progressive Education and Development* 13, no. 3 (2024): 737–55.

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