Student’s critical thinking ability with higher order thinking skills (HOTS) question based on self-efficacy

TJ Syarifah¹, B Usodo², Riyadi³
¹²³Primary School Teacher Education, Sebelas Maret University, Indonesia

Corresponding author: trianamath@gmail.com

Abstract. Critical thinking is one of the thinking abilities that must be given in 21st-century education, because by having it, the student can think reasonably, reflectively and systematically that carried out on all information or problems to make the right decisions. There are many factors that affect students’ critical thinking ability, such as self-efficacy which has meaning self-confidence, curiosity, and willingness to accept opinions, openness, independence, and decision making. This qualitative study aimed to describe students’ critical thinking abilities based on levels of self-efficacy by using the question of Higher Order Thinking Skills (HOTS). Purposive sampling technique has been used with 58 subjects with different levels of self-efficacy. Data collection was done using documentation, testing, and interview method. Shown student’s critical thinking ability on high self-efficacy is students can internalize the basic abilities of deep thinking, moderate self-efficacy students thinking ability are still systematic, and low self-efficacy student has limited insight. These results indicate that differences in self-efficacy will also make a difference in students’ critical thinking abilities.

1. Introduction

The 21st century is a time when the spread of information and access to technology brings ease to people all over the world. This process raises a new social and economic system that describes changes in structural transformation, technological development, and competition in the labor market [1]. The various fields of complex work that require expert thinking and communication in dealing with information technology, we expect to be able to internalize them to our future education. Thus individuals can go along with the existing developments [2]. Critical thinking as one of the educational framework of the 21st century in which the Indonesian government has set standards-based education [3].

Critical thinking as a medium and an essential way of active processes, which allows individuals to think deeply, ask lots of questions, find relevant information through contemplation, seek out for relevant information, instead of just taking various things for granted [4]. Critical thinking plays a significant role as an activity of mental discipline which includes thinking in a reflective, rational and evaluating arguments or propositions to decide what to do [5]. Critical thinking also is known generally identical to the ability of individuals in analyzing for facts, generalizing and organizing ideas, defending opinions, making comparisons, drawing conclusions, examining the arguments as well as solving for problems [6]. The reasons why critical thinking skills are needed; (1) students do not need to memorize knowledge at the beginning of their generation; (2) students should recognize the problem in a different context and time as well. (3) Complex work requires critical thinking ability [7].
Higher-Order Thinking Skills (HOTS) question is a complex thought process in describing the material, concluding, building representations, analyzing and building relationships by involving the most basic mental activities that can be used to improve students' critical thinking ability [8]. Current education should ideally refer to the transition to the dominance of traditional non-algorithmic teaching emphasizing low-level thinking (LOTS) towards learning to emphasize high-level thinking skills (HOTS) [9]. The individuals’ competence of high-level thinking is an approach to learning from which students are taught to think critically, logically, reflective, metacognitive, and creative [8]. The basic concept of Higher Order Thinking Skills (HOTS) refers to Bloom's taxonomy which has been revised by Anderson & Krathwohl, where the cognitive process is divided into two dimensions, namely; first, Low Order Thinking (LOT) is summarized in C1 (Memorizing), C2 (Understanding), C3 (Applying); the second is Higher Order Thinking (HOT) as summarized in C4 (Analyzing), C5 (Evaluating), and C6 (Creating) [10]. By the set-questions designed with HOTS, it should make students’ mathematics learning at schools not only focused on traditional activities such as memorizing or knowing factual knowledge sourced from textbooks, however, but students are also being helped to be able to train and see their critical thinking ability phases.

In essence, in the world of education, students' critical thinking ability are still far from the expectations and goals of education. In 2015, Indonesia had previously participated in the Trends of the International Mathematics and Science Study (TIMSS) for fourth-grade elementary school students. Indonesia was ranked 6th from the bottom or 43th out of 49 countries participating with scores 397 which is far below the TIMSS Scale Point which is 500 [11]. The cognitive standard used by TIMSS is knowing 35%, applying 40%, and reasoning 25% [12]. Given the sub-indicators are part of the cognitive stages of Higher Order Thinking Skills (HOTS). Also, the 397 scores obtained by Indonesia concluded that students' high thinking skills were still below the average.

The result of National Examination Mathematics in elementary schools in Indonesia has decreased, especially in the National Examination in 2018 where the government began implementing a High Order Thinking Skill (HOTS) based curriculum [13]. The application of HOTS-based questions is a government effort to improve the quality of Indonesian education. However students are still not accustomed to solving HOTS problems that use critical thinking skills. The results of research conducted by a researcher at the State Elementary School of Munggung 1 in Surakarta revealed that the students' thinking tends to imitate the examples given by the teacher. They have not been able to interpret, analyze, evaluate, and take decisions to resolve the problems. Most students were only able to formulate the problem issues without being able to provide for self-logical reasons. Likewise, the students were found not being able to understand the true concept stipulated in the questions. This leads them to have difficulty in articulating ideas to solve problems in a variety of ways.

Self-efficacy as environmental factors and different people influence the development of students' critical thinking. The characteristics of personal beliefs are manifested in thought patterns and actions based on curiosity, honest to accept opinions, independence of openness and decision making at the time of learning. Self-efficacy is known as the main component of behaviour, especially those of behaviour change that effectively predict critical thinking skills [14]. Self-efficacy as a motivational factor mainly influences critical thinking, and lack of sufficient motivation is an obstacle to the development of critical thinking [15]. Other research studies show that self-efficacy acts as a determinant between critical thinking [16]. A study found that students’ critical thinking and positive self-efficacy and significant correlation [15]. This means that the increase in students’ self-efficacy, the higher their critical thinking ability.

The statement above can be interpreted that students who have a high degree of self-efficacy will carry out certain roles or tasks regardless of the degree of those complexities. Students with unrealistically low self-efficacy will not undertake challenges [17]. Individuals who have high self-efficacy will feel challenged to complete difficult tasks [18]. Even basically individuals with low self-efficacy consider themselves unable to do everything around them [19]. In difficult situations, people with low self-efficacy tend to give up, while those with high thinking ability try harder to overcome
challenges [20]. Self-efficacy as a positive and significant impact on critical thinking ability refers to the level of self-efficacy of each student that has a strong influence on their critical thinking ability[21].

This study aims to describe students' critical thinking ability based on their different levels of self-efficacy (high, medium, low) with Higher Order Thinking Skills (HOTS) question based on self-efficacy. The novelty of this study lies in using questions of the Higher Order Thinking Skills (HOTS)-based for the measuring test. Having understood the characteristics of the critical thinking ability on self-efficacy, each teacher is believed to be able to determine the appropriate learning model or strategy for the students.

2. Method
This research is qualitative research, because data analyzed in the form of qualitative data. The subjects were selected by using purposive sampling method, from which 58 of the 5th-grade students that were selected from high, moderate and low self-efficacy. This research used 3 instruments, namely self-efficacy questionnaire, critical thinking ability question, and interview guidelines. All of them have been validated by experts in content, construction and language.

This questionnaire consisted of 30 questions were tested to 33 students in the fifth grade students of Bibis Kalang Elementary School which had been validated by the expert. Calculation of KMO obtained 0.647. Anti image obtained item number 17 and 18 have score 0.361 and 0.420. Found 2 item invalid so it must be discarded. The questions that are valid and can be used are 28 questions. The result of the cronbach alpha coefficient is 0.88 which means that the reliability is high. The questionnaire used bandura guide for constructing self-efficacy scale. Bandura's the strength of their efficacy beliefs on a 100-point scale, ranging in 10-unit intervals from 0 ("Cannot do"); through intermediate degrees of assurance, 50 ("Moderately certain can do"); to complete assurance, 100 ("Highly certain can do") [23]. A simpler response format retains the same scale structure and descriptors but uses single unit intervals ranging from 0 to 10.

The questionnaire result was was found that 14 students had high self efficacy, 26 students had moderate self efficacy and 18 students had low self efficacy. After students are classified by their level of self-efficacy, students are given Higher Order Thinking Skill (HOTS) questions. Questions were given to 58 of 5th-grade students in Munggung 1 elementary school as follows:

![Figure 1. Higher Order Thinking Skill (HOTS) Questions](image)

| Questions                                                                 |
|--------------------------------------------------------------------------|
| a. Write what is known and asked of the above problems according to your own abilities! |
| b. Write a description of the steps in solving the problem!               |
| c. Write down the solution to the problem!                               |
| d. Prove that the results of the settlement in point (c) are truly appropriate! |
| e. If the height of the transparent beam is added to 1 unit cube, what is the number of unit cubes to fill the beam |

The Question are made by indicator from Ennis called FRISCO (focus, reason, conclusion, situation, clarity and overview) [6]. Then the researcher conducted an analysis with a percentage that aimed to determine the student's ability to fulfil the indicators as illustrated in Table 1.
Table 1. The Conversion of the Students' Achievement of Indicators.

| Percentage Interval (%) | Category   |
|-------------------------|------------|
| 80 ≤ x ≤ 100            | Very good  |
| 60 ≤ x < 80             | Good       |
| 40 ≤ x < 60             | Enough     |
| 20 ≤ x < 40             | Less       |
| 0 ≤ x < 20              | Very Less  |

3. Results and Discussions

3.1. Critical Thinking Ability of The High Self-Efficacy Student

After students with high self-efficacy categories are given a question, the results are then configured into the percentage presented in the following table:

Table 2. The Result of High Self-Efficacy’s Answer

| Ennis's Stage of Critical Thinking Process | Indicators for Critical Thinking Ability | Percentage |
|------------------------------------------|----------------------------------------|-------------|
| Focus                                    | The subjects were able to write down what was known and what was asked in the question | 100%        |
| Reason                                   | The subjects were able to decide on an accomplishing strategy based on the problems and provide accurate evidence based on the strategies used | 93%        |
| Inference                                | The subjects were able to draw a recent conclusion based on the presented arguments and reasons. | 86%        |
| Situation                                | The conclusions obtained are oriented to being able to answer the initial problem | 79%        |
| Clarity                                  | The subjects were able to cope with other problems related to the initial one correctly | 71%        |
| Overview                                 | The subjects were able to review what had been taught related to the argument, reason, and also evidence. | 71%        |

From the 14 students who had high self-efficacy, overall 100% were able to fulfil the focus indicator, 13 students or 93% achieved indicators of reason, 12 students or 86% fulfilled indicators of inference, 11 students or 79% fulfilled indicators of the situation, 10 students or 71% achieve indicators of clarity and overview. It can be said that students with high self-efficacy are very good at the focus, reason and inference indicators. Whereas for situation, clarity and overview indicators are categorized as good. For example, the following is given a description of the results of the work subject with the initials AZ. Taken by AZ subjects for high self-efficacy with a score of 90. The choice of subject AZ is based on their ability to communicate and provide information to researchers. The discussion to analyze critical thinking ability from high self-efficacy using High Order Thinking Skills (HOTS) based on the Ennis Indicator is presented as follows:

Figure 2. Focus Indicator by AZ’s Answer

Figure 3. Reason Indicator by AZ’s Answer

Figure 4. Inference Indicator by AZ’s Answer

The subject AZ with high self-efficacy was able to fulfill all indicators of critical thinking ability based on Ennis's theory. This can be seen in Figure 2, 3, and 4. The student able to write down what information is known and asked correctly. In a reason indicator, the AZ subject has also been able to provide appropriate and coherent strategies. AZ revealed that the first step is to calculate the existing
unit cube and reduce it by the volume of the beam. Whereas in the inference indicator, the subject AZ can correctly determine the number of existing unit cubes as many as 22. In determining the unit cube critical thinking skills are needed, this is due to the information presented implicitly. The elementary students’ stage of thinking remains in the concrete operational phase [22]. AZ stated that he was able to determine the length of the beam by 6 unit cubes, the width of the beam was 5 unit cubes and the height of the beam was 4 unit cubes. The volume obtained correctly is 120 unit cubes. In line with the results of the interview, AZ stated that in order to determine the size of the beam, he must determine many unit cubes that are not visible in the image.

Based on the initial conclusions obtained, it enables AZ to step into the situation (figure 5) stage, which in this case is considered capable of literally answering the initial problem. AZ wrote the number of cubes needed to fulfill the transparent beam is 120-22 = 98 unit cubes. This shows that the steps taken are relevant to concepts or ideas in the form of definitions, concepts, theorems, principles, and procedures that are clear, precise, and relevant. We can see at figure 6, the clarity indicator on AZ indicates his ability to solve problems related to the initial problem. Transparent beam height which is initially 4 unit cubes plus 1 unit cube into 5 unit cubes, thus the total volume of blocks is 150 unit cubes. As for the question, the number of unit cubes needed is 150-22=128 unit cubes. In the overview indicator (figure 7), AZ was able to provide evidence based on the correct perspective. AZ was able to prove that the cube unit needed was 98. AZ was argued that the maximum capacity of unit cubes was 120 with many unit cubes being 22. Thus, according to AZ’s view, it is not acceptable if the unit blocks needed are less than 98 unit cubes.

Students with high self-efficacy ability were proven to provide information analysis either related to or not to their assignments. Their answers showed a comprehensive understanding of all the existing problems. Additionally, they were able to suggest alternative approaches and creative solutions for further steps in clarifying the situation. They were also able to consider the overall consequences of the suggested solutions. Shortly, they justified their responses using reliably and valid evidence in a way to avoid problematic biases and decisions [23]. Students who have high self-efficacy can manage their academic performance and thought processes [21]. High self-efficacy shows ability and effort in solving problems [24]. So his critical thinking ability are also high in finding various alternative solutions, synthesizing problems and providing reasonable conclusions [25]. In addition, referring to the characteristics of high self-efficacy, AZ strives harder to overcome the existing challenges. He pursues his best abilities, determines the purpose of resolving correctly, and is committed to solving them. They also increase efforts to prevent failures that may arise [19]. Self-confidence because high self-efficacy makes individuals solve the problem critically.

3.2. Critical Thinking Ability of The Moderate Self-Efficacy
After students with moderate self-efficacy categories are given a question, the results are then configured into the percentage presented in the following table:
Given 26 students had moderate self-efficacy. As many as 26 students or 100% fulfill indicators focus, 23 students or 88% reach indicator reason, 22 or 85% reach indicator inferences, 20 students or 77% meet indicator situation, 18 students or 69% reach indicator clarity, lastly for indicator overview reached 10 students or 38% of the total subjects. From these results it can be concluded that students are very good at the indicator of focus, reason and inference. While the indicator of situation and clarity of students is in the good category. As for the indicator overview, students with moderate self-efficacy are in the less category. As an example of student’s answer descriptions, taken JS subjects with a self-efficacy score of 60 points. Subject JS’s answer was given a test presented as follow.

| Ennis’s Stage of Critical Thinking Process | Indicators for Critical Thinking Ability | Percentage |
|------------------------------------------|-----------------------------------------|-------------|
| Focus                                    | The subjects were able to write down what was asked in the question | 100%        |
|                                          | The subjects were able to decide on an accomplishing strategy based on the problems and provide accurate evidence based on the strategies used | 88%         |
| Reason                                   | The subjects were able to draw a recent conclusion based on the presented arguments and reasons. | 85%         |
| Inference                                | The conclusions obtained are oriented to being able to answer the initial problem | 77%         |
| Situation                                | The subjects were able to cope with other problems related to the initial one correctly | 69%         |
| Clarity                                  | The subjects were able to review what had been taught related to the argument, reason, and also evidence. | 38%         |
| Overview                                 |                                                                                      |             |

The subject of JS was able to provide information on what was known and asked in the question correctly (figure 8). This indicates that JS was able to meet the focus indicator. Then for the reason indicator, the information obtained by the subject along with the steps or strategies used in solving the problem can be resolved properly (figure 9). JS argued that the first step should determine many unit cubes. Secondly unit cubes are subtracted by the volume of transparent beams. At the Inference stage, JS determined that there were 22 unit cubes. JS were able to determine the length, width and height of the beam with minimal information from the problem. Given the volume of beam were 120 unit of cubes (figure 10).

Then at the situation stage, JS was able to solve the initial problem through reducing the volume of transparent beams with the numbers of unit cubes, which is 120 - 22 = 98 unit of cubes (figure 11).
Furthermore, at the clarity stage, JS was found to be able to solve other occurring problems along with the initial problem. This can be seen from JS’ result of exercise, that at the time he determined the new height of beam, which is \(4 + 1 = 5\) unit cubes and determined the volume of 150. Therefore, the number of unit cubes needed is \(150 - 22 = 128\) unit of cubes (figure 12). However, at the stage of overview, the subject was unable to prove his answer (figure 13). He said that his answers were actually true. The subject only explains that the calculation is in accordance with the completion step. This can be indicated that JS's viewpoint is still limited. Subjects cannot work with other methods or strategies to solve problems.

Students with moderate self-efficacy primarily focus on separate documents and facts presented to them without linking each other. Students basically understood the subject matter and explain what is needs to be expressed through their own words. However, they did not synthesize overall information in a way that mutually integrated. Students have proven to be less creative in providing alternative solutions. As a result, at the overview stage, they were not able to review the decisions that have been taken [23]. Students also cannot provide reasons to solve problems related to aspects of assumptions or ideas [26]. In line with the characteristics of moderate self-efficacy, subjects are able to deal with the problems they face effectively, be confident in facing problems or obstacles, persevere in their efforts to solve problems, believe in their abilities, but do not quickly rise from the failures they face [19]. This can be seen when students cannot review their work, they also do not want to try again even though the researcher has tried to help him during the interview.

3.3. Critical Thinking Ability of The Low Self-Efficacy

After students with low self-efficacy categories are given a question, the results are then configured into the percentage presented in the following table:

| Ennis’s Stage of Critical Thinking Process | Indicators for Critical Thinking Ability | Percentage |
|------------------------------------------|-----------------------------------------|-------------|
| Focus                                    | The subjects were able to write down what was known and what was asked in the question | 89%         |
| Reason                                   | The subjects were able to decide on an accomplishing strategy based on the problems and provide accurate evidence based on the strategies used | 56%         |
| Inference                                | The subjects were able to draw a recent conclusion based on the presented arguments and reasons. | 33%         |
| Situation                                | The conclusions obtained are oriented to being able to answer the initial problem | 22%         |
| Clarity                                  | The subjects were able to cope with other problems related to the initial one correctly | 17%         |
| Overview                                 | The subjects were able to review what had been taught related to the argument, reason, and also evidence. | 11%         |

The results of the questionnaire found that 18 students had low self-efficacy. 16 students or 89% students fulfilled the focus indicator, 10 students or 56% fulfilled the reason indicator, 6 students namely 33% reached the inference indicator, 4 students namely 22% achieved the indicator situation, 3 students or 17% were able to reach the indicator of clarity, and for the indicator of the overview achieved by 2 students namely 11%. It can be concluded that students with low self-efficacy is very good in focus, good category for reason indicator, and low category for inference and situation indicators. Finally for the clarity and overview indicators students are in the very less category. For example, given AE subjects who have low self-efficacy with a total score of 30 point. The discussion to analyze critical thinking ability of moderate self-efficacy using Higher Order Thinking Skills (HOTS) question based on Ennis’s Indicator presented as follow.
For the focus stage as the first indicator, the subject with an initial AE was able to write what was known and asked (figure 14). This shows that AE understood what was being asked and what was known from the questions. At the reason stage, AE only counted a lot of cubes and calculated the volume of transparent beams (figure 15). In this case, AE did not provide further explanation about the strategy given, which concludes that AE did not provide a clear resolution. At the inference stage, AE allowed himself to determine many unit of cubes, namely 22 along with the length, width, and height of the transparent beam of 6, 5 and 4 unit cubes. AE also determines the volume of the beam by 120 unit cubes (figure 16).

Based on this stage, AE cannot answer the problem. The question required a lot of unit cubes needed, but AE gives the volume of the beam. According to the strategy provided it is still unclear, so the answer is also unclear (figure 17). Subject AE is only able to determine the new beam volume. As well as the stages of reason, inference, and situation that are not able to be fulfilled, so at the stage of clarity, which is resolving other problems that have relation with initial problems also can’t be done (figure 18). However, due to the strategy provided was not right, certainly, the stages of situation, clarity and overview were not fulfilled properly. It can be seen that the AE’s answer baseless and does not connect with the problem (figure 19).

Overall, AE employed data or facts that were unclear, inaccurate, and irrelevant. The subject used the concept or ideas in obscure definitions, concepts, theorems, principles, and procedures. The subject was able to solve mathematical problems using a fuzzy and limited perspective. In line with Heidi's research, students with low self-efficacy characteristics only focus on existing information, not interested in delving into more detail. The solutions offered are in the form of pieces without analyzing and combining perspectives. Based on qualitative analysis, it was found that in arguing students tended to generalize, explain instantly and superficial reasoning without thorough elaboration [23]. Low self-efficacy cannot motivate students and inhibit their critical thinking ability [21]. They do not have the desire to develop and seek deeper information. They also tend to rely on memorization so that they become low in decision making during the problem solving process [26]. This can be seen during the interview phase, the subject chose to give up easily and did not want to try to improve the answer. It is indicated that having low self-efficacy, students do not try harder and analyze it first. In line with the results of interview, the subject argued that he only experimented without fully aware whether the answer was correct or not. In accordance with the characteristics of low self-efficacy, the subject doubted his ability to stay away from difficult tasks since the task was seen as a threat to him [19]. The subjects were found slow in correcting or regaining their efficacy on being unable to answer the given questions. In performing various tasks, those who have low self-efficacy cannot solve the problem no matter how good their true abilities are. Confidence increases the desire for achievement, while doubts reduce it.
3.4. Strategies for Critical Thinking Ability Based on Self-Efficacy

Given the importance of critical thinking ability in learning, those who are responsible for education should always improve learning strategies. With regard to the learning objectives in encouraging students' critical thinking processes, the basic principles in learning should optimally guide teachers by focusing on student-centered classes [27]. There are several applicable strategies, among others: (1) question strategies, stimulating and investigating students' minds and developing into something more clear. (2) Stimulation of thinking, formulating various strategies such as comparing elements, sorting items, explaining causes and effects, summarizing, and solving problems [28]. (3) Teachers need to provide support to students at the beginning of learning and then gradually transfer responsibility to them to work on their own [29]. In addition, self-efficacy as a factor that influences critical thinking skills must also be improved. Personal self-efficacy is obtained, developed or obtained from a combination of the following four sources: Experience of mastery, social modeling, social persuasion, physical and emotional state [30].

4. Conclusions

Subjects who have high self-efficacy are able to fulfil all indicators of critical thinking ability, including focus, reason, conclusion, situation, clarity, and overview. The details are subjects very good in focus, reason and inference indicators. While for situation, clarity and overview are good category. These subjects should not only be able to solve problems with critical thinking but they are also required to be able to review what has been said related to arguments, reasons, in addition to evidence. Additionally, the subjects are believed to have deep knowledge related to information and concepts that they can use in solving the mathematical problems. The subjects who have moderate self-efficacy are those who are able to assess the quality of their thinking so they can sort out whether the reason used is applicable or not. They start thinking systematically, making excuses in overcoming other problems and resolving them correctly, unfortunately among the students have not yet been able to review whether the answers are actually true or not. As result moderate self-efficacy just fulfil indicator of critical thinking including focus, reason, conclusion, situation, and clarity. The details are subjects very good in focus, reason and inference indicators. For situation and clarity indicators are good category. While for overview indicator, subject having less category. Furthermore, while the subjects with low self-efficacy used inaccurate and non-systematic strategies, in addition to the perspective used remains unclear, and illogical. This is means low self-efficacy just fulfil indicator focus and reason. The details are subjects very good in focus, good category for reason category, low category for inference and situation indicators. Lastly, the low self-efficacy are very less category for clarity and overview indicators. Bearing in such a result, both teachers and researcher should be able to realize learning innovations in improving students' critical thinking ability and be able to adapt to the students' self-efficacy. This shows that the students’ level of self-efficacy determines their critical thinking abilities. There are many ways to improve student self-efficacy, one of which can be realized through a number of approaches such as mastering students’ experience, social modelling, social persuasion, and physical and emotional conditions. In such a way, the quality of education will be significantly improved.

5. Acknowledgments

The authors thank to Bibis Kalang and Munggung 1 Elementary School Surakarta for giving research permission.

6. References

[1] Tuan Soh T M, Arsada N M and Osman K 2010 The relationship of 21st century skills on students’ attitude and perception towards physics Procedia - Social and Behavioral Sciences
[2] Moss P 2009 The New Division of Labor: How Computers are Creating the Next Job Market Contemp. Sociol. A J. Rev.
[3] Partnership for 21st Century Learning Skills 2011 Framework for 21st Century Learning P21 Framew. Defin.
[4] Fisher A 1989 *Critical Thinking: An Introduction*

[5] Çimer A, Timuçoğlu M and Kokoc M 2006 Critical Thinking Level of Biology Classroom Survey: Clobics *Online J. New Horizons Educ.* 3 15–24

[6] Ennis R H 2011 *The Nature of Critical Thinking: An Outline of Critical Thinking Dispositions Sixth International Conference on Thinking at MIT*

[7] Warren W J, Memory D M and Bolinger K 2008 Improving Critical Thinking Skills in the United States Survey Course: An Activity for Teaching the Vietnam War *Hist. Teacher*

[8] Afandi and Sajidan 2018 *Stimulasi Keterampilan Berpihak Tingkat Tinggi* ed Gunarhadi and Sumawati (Surakarta: UNS Press)

[9] Miri B, David B C and Uri Z 2007 Purposely teaching for the promotion of higher-order thinking skills: A case of critical thinking *Res. Sci. Educ.* 37 353–69

[10] Anderson L W and Krathwohl D R 2001 A Taxonomy for Learning , Teaching , and Assessing: A Revision of Bloom’s Taxonomy of Educational Objectives *Spring*

[11] Nizam 2016 *Ringkasan Hasil-asasmen Belajar Dari Hasil UN, PISA, TIMSS, INAP Semin. Puspendik 2016*

[12] Sari D C 2015 *Karakteristik Soal TIMSS* *Semin. Nas. Mat. Dan Pendidik. Mat. Uny 5*

[13] Yohana Artha Uly 2018 *Nilai Rata-Rata Ujian Nasional 2018 Turun news.okezone.com*

[14] Sang G, Valcke M, Braak J van and Tondeur J 2010 Student teachers’ thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology *Comput. Educ.*

[15] Dehgani M, Sani H J, Pakmehr H and Malekzadeh A 2011 Relationship between students’ critical thinking and self-efficacy beliefs in Ferdowsi University of Mashhad, Iran *Procedia - Soc. Behav. Sci.* 15 2952–5

[16] Uzuntiryaki-Kondakci E and Capa-Aydin Y 2013 Predicting Critical Thinking Skills of University Students through Metacognitive Self-Regulation Skills and Chemistry Self-Efficacy *Educ. Sci. Theory Pract.* 13 666–70

[17] Katz S 2015 Enhancing Self-efficacy of Elementary School Students to Learn Mathematics *J. Curric. Teach.* 4 42–55

[18] Bandura A 1987 *Social Foundations of Thought and Action: A Social-Cognitive View. Acad. Manag. Rev.*

[19] Padmomartono S and Windrawanto Y 2016 *Teori Kepribadian* (Penerbit Ombak)

[20] Ghuftron M N and Risnawati R S 2014 *Teori Psikologi*

[21] Putri Dwi Sundari, Parno and Kusairi S 2016 Kemampuan Berpikir Kritis Siswa Dalam Model Pembelajaran Terintegrasi *Pros. Semin. Nas. Pendidik. IPA Pascasarj. UM* 1 11

[22] Suparno 2001 *Teori Perkembangan Kognitif* (Yogyakarta: Kanisius)

[23] Hyytinen H, Toom A and Postareff L 2018 Unraveling the complex relationship in critical thinking, approaches to learning and self-efficacy beliefs among first-year educational science students *Learn. Individ. Differ.* 67 132–42

[24] Pajares F 2005 *Self-Efficacy During Childhood and Adolescence*

[25] Marzano R J 1988 *Dimensions of Thinking: A Framework for Curriculum and Instruction* (Virginia: ACCOSiation for Supervision and Curriculum Development)

[26] Taubah R 2018 Student Critical Thinking Viewed from Mathematical Self-efficacy in Means Ends Analysis Learning with the Realistic Mathematics Education Approach *Unnes J. Math. Educ. Res.* 7 189–95

[27] King F, Goodson L and Rohani F 2000 *Higher Order Thinking Skills*

[28] Merrill Harmin and Toth M 2006 *Inspiring Active Learning: A Complete Handbook for Today’s Teachers* (Expanded Second Edition) (USA)

[29] Slavin R E 2006 *Educational Psychology: Theory and Practice* (8ndEdition) *Pearson Educ. Inc*

[30] Bandura A 1999 Social cognitive theory of personality *Handbook of personality: Theory and research 2nd ed.*