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Knowledge, skills, and attitudes of teachers in training critical thinking of elementary school students

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ABSTRACT

Knowledge, skills, and attitudes of teachers in developing critical thinking skills are very much needed to train students' basic thinking skills. This descriptive quantitative study described the knowledge, skills, and attitudes of teachers in developing critical thinking skills in elementary school students. The data collection employed a questionnaire with a Likert scale. The questionnaire was distributed online using Google Form during teacher professional development training. Respondents in this study were 366 elementary school teachers spread across 23 provinces in Indonesia. The data obtained were analyzed descriptively and quantitatively. The results of this study indicated the knowledge, skills, and attitudes of teachers in developing critical thinking in elementary school students are a good category. Description knowledge, skills, and attitudes of a good teacher impact the designed learning process. However, this study only described teachers' knowledge, skills, and attitudes in developing critical thinking skills, which the basis for implementing learning in elementary schools. The application of critical thinking learning by elementary school teachers can be used for further research.

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1. INTRODUCTION

During the industrial revolution 4.0, students must adapt to the challenges of 21st century life. Assessment and teaching of 21st century skills (ATC21S) categorize 21st century skills into four categories: i) A way of thinking; ii) Working; iii) Tools for working; and iv) Skills for living in the world [1]. In the way of thinking category, one of them includes (creativity, innovation, critical thinking, problem-solving, decision making).

In this high-speed era, students need to have thinking skills that can help them make the right decisions to acquire new knowledge quickly. Critical thinking is the ability to think rationally and reflectively to decide what to do or believe [2]. Critical thinking is not a skill that individuals are born with, but practice is needed to develop these skills [3]. Critical thinking skills are valuable life skills [4]. All students should possess critical thinking skills, for that student need to be familiarized and trained to think critically from an early age, especially at the elementary school level [5]. Critical thinking skills are accustomed in schools to think logically and profoundly and evaluate a material [6]. For this reason, teachers need to carry out learning that can train elementary school students' critical thinking skills.

Although critical thinking skills are essential, learning in elementary schools has not yet fully implemented what learning critical thinking looks like and how to train students' critical thinking skills. The research results by Aida *et al*. showed that the critical thinking skills of elementary school students were low and needed to exercise using specific learning models [7]. In addition, the findings in universities that students' critical thinking skills are still in the medium category [8] students' critical thinking skills are still lacking, especially in the evaluation and creation stages [9]. The achievement of Indonesian students' learning outcomes internationally has not been encouraging. The results of students' abilities internationally, program for international student assessment (PISA), and trends in international mathematics and science study (TIMMS) results from year to year are low. The latest data from PISA 2018 shows Indonesia ranks 74th, sixth from the bottom. Indonesia received a science score of 396, far below the organisation for economic co-operation and development (OECD) average score of 489. While the Mathematics score was ranked 7th from the bottom with a score of 379 (OECD average 489) [10].

Research on critical thinking: i) There are more studies on students' critical thinking; ii) But not many have investigated teachers' knowledge; iii) Skills; and iv) Attitudes in developing critical thinking skills. To improve students' critical thinking skills, it is also necessary to know the knowledge and skills of teachers in teaching the critical thinking skills of elementary school students. This study examines whether teachers' knowledge, skills, and attitudes about critical thinking are by the theory of critical thinking.

This paper aims to reveal teachers' knowledge, skills, and attitudes in developing the critical thinking skills of elementary school students. Researchers seek to solve this problem by departing from the teacher as an educator in elementary schools. This study provides a comprehensive description of teachers' knowledge, skills, and attitudes in developing critical thinking for elementary school students. In addition, there are findings of practical ways for teachers to teach and develop the critical thinking skills of elementary school students.

According to Pellegrino and Hilton [11] life skills that need to be important in the 21st century include three competencies, namely cognitive competencies including: i) Thinking processability (critical thinking, problem-solving, argumentation, interpretation, and decision making); ii) Knowledge (using information and communication technologies, having literacy skills, and having communication skills); and iii) Creativity. In addition, Triling and Fadel in the 21st century, everyone must have three life skills: i) Learning skills and innovating critical thinking skills; ii) Problem-solving; iii) Collaboration; iv) Communication; v) Creativity; and vi) Innovation [12]. Another opinion, according to Wagner, is that there are seven types of life skills needed in the 21st century, including the ability to think critically and solve problems. Based on the opinion of several experts that critical thinking is one of the crucial elements of essential life skills in the 21st century [1], [11]–[14].

Students' critical thinking skills are a demand for the 2013 curriculum. As stated in the 2016 by the Minister of Education and Culture Regulation (Permendikbud) Number 20 explains that elementary school graduates must be able to think and act critically and creatively [15]. According to Usmaedi [16] higher order thinking skills, which he claims contain critical thinking, should have been taught and trained as early as possible. higher order thinking skills is a thinking ability that adjusts one's cognitive level. Teachers in conducting learning that develop critical thinking can be by observing and selecting lesson content by making the learning process the main focus, involving students directly in learning contained in the selection of appropriate learning strategies, applying assessment techniques that allow students to increase intellectually [17].

Teachers play a crucial role in teaching students critical thinking skills in elementary schools. Teachers are the key. They are the pearl of agents of change, agents of change to produce Indonesian people who are religious, intelligent, productive, reliable, and comprehensive through excellent learning services for their students [18]. Knowledge, teachers' skills, and teachers' attitudes in developing the critical thinking skills of elementary school students become essential. However, there are still teachers who are not familiar with critical thinking methodologies [19]. Primary and secondary school teachers know they will teach students and receive training in teaching methods. However, little training is devoted to teaching students critical thinking skills. In addition, some teaching materials have not provided content to develop critical thinking skills [20]. Teachers and students have preconceived notions of knowledge that can hinder their ability to think critically.

2. RESEARCH METHOD

This study described teachers' knowledge, skills, and attitudes in learning to develop critical thinking skills of elementary school students. Hence, this was descriptive research. Descriptive research provides knowledge about the status quo, often the first step in improving educational practice [21]. The subjects in the study were elementary school teachers from grade one to grade six who volunteered to fill out

the questionnaire. Research subjects are not limited to gender, seniority, education level, geographic location of assignments, and school status. Respondents in this study were 366 elementary school teachers spread across 23 provinces in Indonesia.

The instrument used is a questionnaire. The questionnaire used to measure the knowledge, skills and attitudes of teachers to develop critical thinking. Before being used the instrument was validated in terms of content, construction, language, and readability. The questionnaire to measure aspects of teacher knowledge and skills in developing students' critical thinking refers to the critical thinking indicators of Ennis [2] which include aspects of: i) Explaining (elementary clarification); ii) Building basic skills (essential support); iii) Conclusion (inference); iv) Make further explanations (advanced clarification); v) Strategy and tactics (strategy and tactics). While the questionnaire to measure attitudes refers to attitude indicators, according to Azwar, covers aspects of direction, intensity, breadth, and consistency [22]. Based on these indicators, a Linkert scale questionnaire was compiled with a range of 1-4, with the provisions of the value; 1=strongly disagree, 2=disagree, 3=agree, and 4=strongly agree. The questionnaire consisted of 15 statements of critical thinking knowledge, 15 statements of critical thinking skills, and 15 questions about teacher attitudes in developing critical thinking. The questionnaire was distributed to respondents online by using a google form. Before using the instrument, the researcher validated the construct by referring to the opinions of experts and colleagues who did similar research. The data obtained were analyzed descriptively by calculating the average and percentage of each statement item. They are obtaining data in the form of scores that describe teachers' knowledge, skills, and attitudes in developing the critical thinking skills of elementary school students.

3. RESULTS AND DISCUSSION

The research results obtained data on teachers' knowledge, skills, and attitudes in developing the critical thinking skills of elementary school students. This data was collected using a questionnaire via a Google form. The questionnaire was distributed to participants in the mentoring activity to develop critical and creative thinking skills using the read-answer-discuss-explain-create (RADEC) learning model held on September 12, 2020 online and offline by the Universitas Pendidikan Indonesia (UPI) primary education lecturer team in community service activities.

3.1. Teacher profile as respondent

The number of respondents in the study was 336 elementary school teachers who teach in grades one to six spread over 23 provinces in Indonesia. Complete information about the respondents is in Table 1. Based on the table, there are more women (80.06%) than men with bachelor/S1 (97.32%) and postgraduate/S2 education. Respondents who became the research sample had met the minimum criteria for teaching with a minimum degree of S1. The data on the distribution of teaching teachers is more in the high grades, namely grades four, five, and six, with varying teaching experience, with most of them being civil servants (94.6%).

Table 1. Research respondent data

Respondent data		f	%
Gender	Man	67	19.94
	Woman	269	80.06
Last education	S1	323	97.32
	S2	9	2.66
Classroom teacher	Class 1	43	12.8
	Grade 2	27	8.0
	Grade 3	32	9.5
	4th grade	54	16.1
	Grade 5	70	20.8
	Grade 6	110	32.7
Long teaching	Under ten years old	179	53.3
	10-20 years	117	34.8
	Over 20 years old	40	11.9
Employment status	Civil servant	318	94.6
	Non-PNS(Civil servant)	18	5.4

3.2. Knowledge, skills, and attitudes of teachers in developing critical thinking skills of elementary school students

Knowledge, skills, and attitudes of teachers in developing students' critical thinking were measured using a questionnaire with a Linkert scale with conditions 1=strongly disagree, 2=disagree, 3=agree, and 4=strongly agree. This study indicates that the average value of knowledge and skills and attitudes are in the same category, namely sound, with an average value of knowledge of 3.4 skills of 3.3 and attitudes of 3.2. The results of the knowledge and skills questionnaire are presented in Table 2.

Table 2. Knowledge and skills of teachers in developing critical thinking skills based on critical thinking indicators

No	Indicator	Average	
		Knowledge	Skills
1	Provide an explanation (elementary clarification)	3.42	3.17
2	Building fundamental skills (essential support)	3.42	3.29
3	Conclusion (inference)	3.37	3.29
4	Make further explanation (an advanced clarification)	3.40	3.30
5	Strategy and tactics (strategy and tactics)	3.44	3.23
Total	3.4	3.3	

Knowledge is very influential with the teacher's skills regarding critical thinking. Based on Table 2, teachers' knowledge of critical thinking is good, with an average value of 3.4 and 3.3. From the results of this questionnaire, the knowledge and skills of teachers based on each critical thinking indicator have almost the same value. Elementary school teacher knowledge data about critical thinking is in Table 3.

Table 3. Teacher knowledge in developing critical thinking skills

Indicator	Items	Item content	Average
Provide an explanation (elementary clarification)	1	Critical thinking is the ability of students to be able to ask questions in the learning process	3.41
	2	Another student can answer a question posed by a student	3.35
	3	It is necessary to create a learning climate that makes students free to express their opinions, and there is a discussion between students	3.49
	4	Discussions can go well if students can give feedback from other friends' opinions	3.44
Building fundamental skills (essential support)	5	Students' critical thinking skills can be developed by searching for literature sources that the teacher has suggested	3.31
	6	In learning, students can add other sources other than the sources that have been provided	3.51
	7	Learning involves observation activities to be able to develop critical thinking	3.45
	8	The results of observations need to be discussed by students in groups	3.39
Conclusion (inference)	9	Students' critical thinking skills can be developed through a conclusion from observations made by students	3.37
	10	Alternative conclusions from the results of group discussions are needed to develop students' critical thinking	3.36
Make further explanation (an advanced clarification)	11	Student learning that aims to train logical, rational, and reflective thinking can train students' argumentation skills.	3.39
	12	Learning involves students "to think logically, rationally and reflectively, one of which is discussion and question and answer activities."	3.41
	13	A student will be more critical if they have learned the basic concepts.	3.39
Strategy and tactics (strategy and tactics)	14	Learning that involves students to solve problems can develop students' ability to develop ideas/strategies	3.44
	15	Learning that involves students "to solve problems can develop students' ability to decide on the ideas/strategies developed."	3.43

In Table 3, elementary school teachers' knowledge regarding critical thinking is summarized. The teacher has the highest opinion that "in learning, students can add other sources other than the sources that have been provided." This situation is by the characteristics of the 2013 curriculum learning. The learning carried out in schools is student center, meaning that it is centered on students who do more activities and the teacher acts as a facilitator.

Based on Table 4, the skills of teachers in developing critical thinking of elementary school students are in the excellent category with an average of 3.3. The particular skill is that the teacher stimulates students to think in the learning process (3.41). From the results of the questionnaire, the lowest response by the teacher was in assigning students to answer questions from their friends (3.01).

Table 4. Skills of teachers in developing critical thinking of elementary school students

Indicator	Items	Item content	Average
Explain (elementary clarification)	1	I always assign students to make questions	3.06
	2	I tend to assign students to answer their friends' questions	3.01
	3	I always stimulate students to think	3.41
	4	I ask students to analyze their friends' opinions and compare one opinion with another	3.21
Building fundamental skills (essential support)	5	I always direct students to seek information from various relevant sources	3.44
	6	I tend to direct students to agree on the sources/literature used to find information in group discussions	3.16
	7	I tend to direct students to evaluate the information they get whether it is appropriate and by what is needed	3.29
	8	I always assign students to observe and confirm the results of student observations	3.26
	9	I ask students to relate the experimental results to everyday life	3.32
Conclusion (inference)	10	I direct students to conclude from the results of group discussions	3.34
	11	I try to direct students to make alternative conclusions from the results of group discussions	3.24
Make further explanation (an advanced clarification)	12	I ask students to respond to the results of their friends' discussions if they agree with the results of their friends' discussions	3.29
	13	I ask students to give responses from the results of their friends' discussions if they disagree with the results of their friends' discussions	3.3
Strategy and tactics (strategy and tactics)	14	I ask students to think of other alternative ideas/solutions apart from the results of the discussion	3.26
	15	I ask students to agree on other alternative ideas/solutions apart from the results of the discussion	3.19

Based on Table 5, the teacher's attitude in developing critical thinking skills is good, with an average value of 3.2. The highest score obtained is the teacher's attitude that "Students can use their critical thinking skills to understand the lesson" (3.45) better. These results still show the importance of understanding the lesson (achievement of student learning outcomes).

Table 5. Attitudes of teachers in developing critical thinking of elementary school students

Indicator	Items	Item content	Average	
Direction	1	Critical thinking is a vital skill possessed by students.	3.36	
	2	Students can use their critical thinking skills to understand the lesson better.	3.45	3.42
	3	Students' critical thinking skills can be trained in Learning.	3.43	
	4	Students' critical thinking skills can be developed and improved	3.44	
Intensity	5	Students who think critically can help other students engage with their Learning.	3.36	
	6	Class discussion will be productive when students use their critical thinking skills	3.38	3.35
	7	It is challenging to think critically without a deep understanding of a topic.	3.32	
Breadth	8	Students' thinking skills can be measured.	3.15	
	9	Class assessment should measure critical thinking skills.	3.11	3.09
	10	Critical thinking skills cannot be tested.	2.79	
	11	A student will be better able to critically thinking if they have learned the basic concepts.	3.31	
Consistency	12	School climate can have an impact on students' critical thinking skills.	3.33	
	13	More critical students tend to demand more attention or be distracting.	2.9	2.99
	14	One must have experience with the subject area to think critically in it.	3.2	
	15	Critical students tend to be unpopular.	2.52	

3.3. The relationship between the knowledge, skills, and attitudes of teachers in developing critical thinking of elementary school students

The research hypothesis is a correlation between knowledge, skills, and attitudes. The statistical hypothesis is written as (1) and (2).

$$H0^{r_{12}}\ Y = 0 \quad (1)$$

$$H1^{r_{12}}\ Y \neq 0 \quad (2)$$

To test the hypothesis in this study, statistical product and service solutions (SPSS) software version 20 was used, which was related to the multiple correlation test, and the output is shown in Table 6.

Table 6. Significance test analysis of variance (ANOVA)

	Model	Sum of squares	df	Mean square	F	Sig.
1	Regression	.041	2	0.020	,248	,784 [b]
	Residual	,990	12	,082		
	Total	1.031	14			

a. Dependent variable: attitude; b. Predictors: (constant), skills, knowledge

From the output in Table 6, the value of Sig.=0.784>±(0.05) then H_0 is accepted, H_1 is rejected. Based on these results, there is no significant difference between knowledge, skills, and attitudes. There is no significant difference between knowledge, skills, and attitudes. These results indicate no simultaneous effect of knowledge and skills on teacher attitudes in developing critical thinking. The relationship between knowledge and skills on teacher attitudes in developing critical thinking is shown in the Table 7. Based on the table, the value of R=0.040. This value indicates a low correlation between knowledge skills and attitudes. This value shows that only 4% of the variability of teacher attitudes by knowledge (X1) and teacher skills (X2) in developing critical thinking skills of elementary school students.

Table 7. Model summary correlation

Model	R	R square	Adjusted R square	Std. Error of the estimate
1	,199 a	0.040	-,120	,28723

a. Predictors: (constant), skills, knowledge

4. DISCUSSION

The findings of this study indicate that the knowledge, skills, and attitudes of teachers regarding critical thinking are good, with an average score of 3.3. The results of this study mean that elementary school teachers have knowledge, skills, and attitudes that follow the characteristics of critical thinking. According to Ennis, critical thinking can be measured by referring to critical thinking indicators, namely: i) Explaining (elementary clarification); ii) Building basic skills (essential support); ii) Conclusion (inference); iv) Make a further explanation (an advanced clarification); and v) Strategy and tactics (strategy and tactics) [2]. The teacher has the expected knowledge and skills based on critical thinking indicators, namely excellent. This knowledge, skills, and attitudes follow the demands of the 2013 curriculum as stated in the 2016 Minister of Education and Culture Regulation No. 20 that elementary school students need to practice critical and creative thinking skills in learning [15].

The results of previous research by Aida *et al*. stated that the critical thinking skills of elementary school students were still low and needed to practice using specific learning models [7]. This result contradicts the findings in learning in primary schools. In addition Surya *et al*. revealed that teachers find it difficult to teach critical thinking to elementary school students [23]. This situation shows that teachers' knowledge, skills, and attitudes regarding critical thinking align with implementing them in learning.

Teachers still have difficulties in implementing Learning that can develop critical thinking. According to Rapih and Sutaryadi, the application of higher-order thinking skill-based learning is to planning (100%), implementation (62%), and very few apply it in assessment (28%) [24]. Similar to what was found by Fauziah, elementary school teachers were only limited to planning in the form of lesson plans and very lacking in learning implementation [25]. This finding shows a gap between the teacher's knowledge, skills, and attitudes and the teacher's ability to implement critical thinking learning.

The gap between what is known by elementary school teachers and the implementation and evaluation of critical thinking learning in elementary schools needs to be addressed. Elementary school teachers only receive training in the knowledge aspect. Teachers have not received assistance in implementation in the field. According to Nursalim, training is one way to improve the professionalism of elementary school teachers [26]. A similar study was conducted by Laelasari, there is an influence between training and teacher competence, but it is still necessary to increase training intensity (duration) [27]. The discovery of a teacher training model that can train and assist teachers in the planning, implementation, and evaluation of Learning becomes essential.

After performing a linear regression test using IBM SPSS software version 20, which is related to the multiple correlation test, the value of Sig.=0.784>±(0.05) then H_0 is accepted, H_1 is rejected. Regression test means no simultaneous effect of knowledge and skills on teacher attitudes in developing critical thinking. This value indicates a low correlation between knowledge, skills, and attitudes. This value indicates a low correlation between knowledge, skills, and attitudes. Based on these findings, only 4% of the variability of teacher attitudes in developing critical thinking skills of elementary school students. These results indicate

that other factors influence the teacher's attitude or tendency to act. Other factors include frequency of participation in training, duration of training, training model, level of education, educational background: teaching motivation, and personality factors.

The limitation of this research is the instrument used. The researcher only uses the Linkert scale so that the data displayed is only in the form of questionnaire results. There were no further interviews and follow-ups related to the teacher's ability to develop the critical thinking skills of elementary school students.

5. CONCLUSION

Teachers' knowledge, skills, and attitudes in developing the critical thinking of elementary school students are in a good category. Teachers' knowledge, skills, and attitudes in developing good critical thinking are the basis for elementary school students learning to develop critical thinking. Teachers as professionals should have a good understanding of the critical thinking demands demanded by the 2013 curriculum. This knowledge, skills, and attitudes still need to be explored again regarding their application in the learning process. This study only describes teachers' knowledge, skills, and attitudes in developing critical thinking skills, which will be the basis for implementing learning in elementary schools. The application of critical thinking learning by elementary school teachers can be used for further research.

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