Journal of Education and Learning (EduLearn)
Vol. 13, No. 4, November 2019, pp. 559~566
ISSN: 2089-9823 DOI: 10.11591/edulearn.v13i4.13232

Developing instruments of teacher's perception of critical thinking in elementary school

Eni Rahmawati[1], Harun[2]
[1]Educational Research and Evaluation, Yogyakarta State University, Indonesia
[2]Early Childhood Education, Yogyakarta State University, Indonesia

Article Info

Article history:

Received Jun 27, 2019
Revised Aug 25, 2019
Accepted Oct 6, 2019

Keywords:

Critical thinking
Elementary school teacher
Instrument development
Perception

ABSTRACT

This study aims to develop the teacher's perceptions of critical thinking in science learning in elementary schools. The samples in this study were 50 elementary school teachers in Central Java. Selection of samples employed convenience sampling. The instruments in this study used a modified Likert Scale. The validity tests used in this research were content validity and construct validity. Content validity was measured using CVR (Content Validity Ratio) and construct validity was measured using EFA (Exploratory Factor Analysis). By using SPSS, reliability estimation was obtained with the Cronbach Alpha formula 0.83 and it can be stated that the instruments for evaluating teacher perceptions of critical thinking in science learning are reliable.

Corresponding Author:

Eni Rahamwati,
Eduational Research and Evaluation,
Yogyakarta State University,
Colombo Road, No 1, Yogyakarta, Indonesia.
Email: enirahmawati1818.2017@student.uny.ac.id

1. INTRODUCTION

The 21st century is known as the age of globalization that creates more fundamental changes than that in the previous age. This century develops rapidly and dynamically throughout the world. The dynamism of this century affects the upcoming development [1]. One of the most pivotal thing in the 21st century is critical thinking skills [2]. This opinion is supported by Nugroho's statement [3] that there are things in the 21st century that underlie the area of education which are 4Cs (critical thinking and problem solving, collaboration, communication, creativity). Critical thinking is included in one of the thinking skills that must be possessed by the students. The facts in the field show that critical thinking at the basic education level is not an easy thing [4].

Critical thinking is the center of human intelligence [5]. Critical thinking skills are not possessed by other living things. Critical thinking skills develop along as the time goes [6]. Critical thinking is active and organized in mental processes. This skill is able to solve problems using logic [7]. Critical thinking helps humans in making meaningful decisions [8]. This critical thinking ability is included in the humans' high level of cognitive abilities [9].It has a long history from The Plethora of Educational Philosophy Movements from Socrates. In 1950, critical thinking skill began to be taught in schools and incorporated into school curricula [10].

Critical thinking skill is a center of cognitive skills that form the basis of the learning process [11]. Components in critical thinking that are still currently used as a standard for students nowadays are behaviors that reflect the way of thinking, knowledge built based on curiosity, and some skills for applying logic methods. Critical thinking is one way to solve problems based on logic, opinions, and provide cause and

effect reasons [12]. Critical thinking can be developed – one of them is through habits [13]. Some perspectives state that critical thinking includes behavior and skills [14].

Critical thinking is an organized skill to analyze and evaluate information, formulate problems clearly, collect and use relevant information, think openly, and communicate effectively with others. Critical thinking as the ability to draw conclusions based on observations and provided information [15]. The ability to think critically includes collecting relevant information, making connections between logic, and checking the truth of information. Wulandari [16] adds an example of critical thinking skills which is a good ability to provide explanations, draw conclusions, and be expert in making tactics and strategies. In Bloom's taxonomy, indicators of critical skill can be seen at the level of analysis, synthesis, and evaluation. It is supported by Maiorana [17] and Kowalczyk et al [18] who define critical thinking as a process of evaluating knowledge in making the right and effective decisions. It is essential for critical thinking to be instilled since the primary school [19].

One of the learnings that uses critical thinking skill is science learning. Science is a part of science that increases the ability to explore [20]. This makes science to be a lesson that should exist in elementary schools [21]. Science education teaches about logic and critical thinking [22]. Science learning in these schools is correlated with critical thinking skills [23]. Science learning has a role in the application and development of student skills [24]. The results showed that critical thinking skills are important skills that can be developed in the classroom [25]. Research [23] shows that students do not use critical thinking skills in making decisions in learning science.

Science learning requires the students not only for reading and remembering but also for using skills about understanding and critical thinking. Science learning becomes one of the important lessons in everyday life. Natural processes such as natural events, growth and development of living things can be observed in daily life.

Bailin [26] in his article on Critical thinking and Science Education, states that critical thinking is connected with learning processes and science learning. This approach emphasizes the importance of the description of the concept. The results of field observations in five elementary schools in Central Java Province showed that teachers experienced misconceptions about critical thinking. In addition, students often experience difficulties in critical thinking which results in unsatisfactory science scores. It shows that the students' critical thinking skills are low. Thus, this study focused on teacher perceptions of critical thinking.

This research refers to a previous study conducted by Santos [24] entitled "The role of critical thinking in science education". This research shows that there is a strong relationship between critical thinking and science learning. The problem occurs when the teachers implemented critical thinking, yet they experienced critical thinking misconceptions. One of the strategies used is by dialoguing between teachers and students as well as between students and the pairs. The similarity with this current research is that both discussing the critical thinking skill. Meanwhile, the difference between this research and Santos' research [24] is that Santos conducted the study at the university, andwe condicted this study at the elementary school level.

The renewal in this research is the teacher's perception of critical thinking skills. Misconceptions about critical thinking skills must be fixed because skill to think critically in the 21st century is a foremost ability. Critical thinking makes the students able to compete globally. The teacher's perception of critical thinking is very important because the teacher is an actor in the class.

2. RESEARCH METHOD

The type of research was Research and Development (R & D) design. The R & D method will produce certain products and can also be used to generate products as well as test the effectiveness of a product [27]. The population in this research were all teachers at the Elementary School level in Central Java Province. The samples in this research were 50 elementary school teachers in Central Java. Samples were selected using convenience sampling. In using this sampling technique, researchers chose the samples because they want and are willing to be studied [28].

An instrument is stated to be good if it meets the requirements of validity and reliability. A instrument is valid if it can measure what should be measured and provide accurate and reliable results, and it is reliable if it has consistency of measurement results even though it has been repeatedly tested [29]. The validity test used in this research was content validity. The formula employed to calculate content validity was the Aiken's V coefficient which was calculated using numbers 1-5 with the numbers of raterswere 3 people. The reliability test in this researchused the Cronbach Alpha formula using SPSS. Data analysis techniques used qualitative analysis with the categorization by Azwar.

3. RESULTS AND ANALYSIS

3.1. Results

Validity refers to the accuracy and precision of a measuring instrument (test) [30]. Content validity contains the suitability between what would be measured and the existing instrument. Content validity shows a process that determines the extent to which a set of test is relevant and represents each domain in which the test score interpretation will be made [31]. The formula used in calculating content validity was Aiken's V coefficient which was calculated by giving numbers 1 to 5 (not representative to very representative). Below is Aiken's V formula:

$V = \sum \frac{s}{n\,(c-1)}$ [32]

Description:
s : r-lo
n : Number of assessment
lo : Number of assessment of the lowes validity
c : Number of the highest assessment

Categorization of content validity is explained as follows in Table 1. Assessment result of content validity is displayed in Table 2

Table 1. Categorization of content validity

Category description	Explanation
< 0.40	Low
0.4-0.8	Moderate
> 0.80	High

Table 2. Content validity assessment

Number	V	Category	Number	V	Category	Number	V	Category
1	1	Moderate	11	0,78	Moderate	21	1	High
2	1	Moderate	12	0,89	High	22	1	High
3	1	High	13	0,89	High	23	1	High
4	0,89	High	14	0,89	High	24	1	High
5	0,89	High	15	0,89	High	25	1	High
6	1	High	16	1	High	26	1	High
7	1	High	17	1	High	27	1	High
8	1	High	18	1	High	28	1	High
9	1	High	19	1	High	29	1	High
10	0,78	Moderate	20	0,89	High	30	1	High

Based on the results of the content validity calculation, there are no items that fall down because 30 items had moderate and high category.

Reliable instruments indicate a consistency. If a test has the ability to produce steady measurements, it does not change if it is used repeatedly on the same target, the same measuring instruments, and the same procedure; therefore, it can be said that the test is reliable [33]. Reliability test using Alpha Cronbach formula. In reliability, categorization was done the Kappa value. Kappa values are divided into three categories according to [34], including in the Table 3.

Table 3. Reliability category

Score category	Description
Kappa < 0,4	Poor
Kappa 0,4 - 0,75	Fair
Kappa > 0,75	Excellent

Based on the results of the research that used SPSS, the questionnaire instrument had a reliability of 0.83 and belonged to the special category.

Questionnaires contained 30 statements with 4 categories which were SS (Strongly Agree), S (Agree), TS (Disagree), STS (Strongly Disagree). Positive statements had scores from the highest to the

lowest which were 4 to 1, while the negative statements were in the opposite. The results of questionnaires are presented in the Table 4.

Table 4. Teacher's perception of critical thinking

No	Statement	Answer				Standard deviation
		SS	S	TS	STS	
1	Critical thinking is a higher-level thinking	100%	-	-	-	0
2	Critical thinking makes someone like new thing	20%	40%	40%	-	0,836
3	People thinking critically has the great curiosity	40%	60%	-	-	0,547
4	People thinking critically demand the clear and concrete reasons in answering questions	100%	-	-	-	0
5	People thinking critically are interested at listening to the other people	-	60%	40%	-	0,547
6	People thinking critically like the questions that need a consideration than the memorization	40%	40%	20%	-	0,836

Table 4 illustrates the teacher's perception of critical thinking consisting of 6 statements. Table 5 shows the effect of science learning on critical thinking skills. Table 6 shows whether the students become one of the inhibiting factors in instilling critical thinking skills. Table 7 shows the effect of teacher's teaching style on critical thinking skills. This component consists of 6 statements. Table 8 shows external factors in critical thinking skills.

Table 5. Effect of science learning on critical thinking

No	Statement	Answer				Standard deviation
		SS	S	TS	STS	
1	Practicum activities instill critical thinking attitude of the students	-	80%	20%	-	0,447
2	Science learning helps the students to train their critical thinking	80%	20%	-	-	0,447
3	Critical thinking skill helps the students to be more aware of nature signs	-	60%	40%	-	0,547
4	Science learning does not influence critical thinking skill	-	-	40%	60%	0,547
5	Scientific attitude is one of the characteristics of prople thinking critically	20%	40%	40%	-	0,836
6	Critical thinking skill eases the students to draw the conclusion towards something	60%	20%	20%	-	0,894

Table 6. Students inhibit critical thinking

No	Statement	Answer				Standard deviation
		SS	S	TS	STS	
1	Diligent students usually have better critical thinking skill	-	-	20%	80%	0,447
2	Students having higher science score tend to have critical thinking skill	-	60%	40%	-	0,547
3	Students having high critical thinking skill like practicum activities	-	60%	40%	-	0,547
4	Intelligent students are those who are able to think critically	100%	-	-	-	0
5	Critical thinking skill depends on the age of students	40%	40%	20%	-	0,836
6	Each student has different critical thinking skill	-	100%	-	-	0

Table 7. Effect of teaching style on critical thinking skill

No	Statement	Answer				Standard deviation
		SS	S	TS	STS	
1	Learning through practicum helps the students practice their critical thinking skill	-	60%	40%	-	0,547
2	Teacher's teaching style does not influence students' critical thinking	-	-	40%	60%	0,547
3	Assigning independent tasks helps the students practice their critical thinking	40%	40%	20%	-	0,836
4	Disussion helps the students practice their critical thinking	40%	60%	-	-	0,547
5	Using media helps the students practice their critical thinking	40%	60%	-	-	0,547
6	Student-centered learning helps the students practice their critical thinking	-	100%	-	-	0

Table 8. External factors in critical tinking skill

No	Statement	Answer				Standard deviation
		SS	S	TS	STS	
1	Complete school facilities support critical thinking skill	-	60%	40%	-	0,547
2	Parents' attention will help the students practice critical thinking skill	80%	20%	-	-	0,447
3	Students with critical thinking skill will influence other friends	-	40%	20%	40%	0,836
4	School environment influences critical thinking skill	20%	40%	40%	-	0,707
5	The longer the students are at school, the more increase their critical thinking	-	-	40%	60%	0,547
6	Technology-based learning helps the students in critical thinking	20%	60%	20%	-	0,707

3.2. Analysis

The instrument developed in this research was in the form of a critical thinking skill assessment rubric for elementary school students. The results of instrument development are carried out in three stages below:

a. Define stage

The initial analysis was carried out through interviews with elementary school teachers. Based on the results of the interview, information was obtained that there were still misconceptions of critical thinking among elementary school teachers.

b. Design stage

Preparation of the initial prototype of the instrument to be developed was carried out at this stage. This statement was subsequently referred to as the basis for arranging an assessment rubric that uses a scale of 4, which are Strongly Agree with a value of 4, Agree to with a value of 3, Disagree with a value of 2, and Strongly Disagree with a value of 1.

c. Develop stage

At the stage of developing the instrument design, the statement items were then validated by the instrument expert and the results of the validation were analyzed using the Aiken formula.

The number of statements were 30 items and contents were alidated using a rater. Rater used in this study was students who are competent in their fields. Raters in this research were as many as 3 people. The results obtained were then analyzed using construct validity using EFA and reliability using the Cronbach Alpha formula. After being analyzed using SPSS 17, the results of the analysis are as follows:

The first are KMO and Bartlett Test. The results of the factor analysis of the adequacy of the sample showed that the chi square value of the Bartlet test was 1489,353 with degrees of freedom (df) 435. The results showed that the sample size was sufficient to be seen from Kaiser-Meyer-Olkin (KMO) by which measure of sampling adequacy was 0.616 that was higher than 0.5. The value of 0,616 shows that the samples used in this research are complete The complete results can be seen in Table 9.

Table 9. KMO and bartlett's tes

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.616
Bartlett's Test of Sphericity	Approx. Chi-Square	1489.353
	df	435
	Sig.	.000

The second was Anti Image. There is variable analyzed based one anti image table. If observed in Anti Image Correlation, there appears a number having sign "a". That sign shows the amount of MSA (Measures of Sampling Adequacy) of a variable.

Table 10. Anti image correlation

Item	Value of anti image correlation	Item	Value of anti image correlation	Item	Value of anti image correlation	Item	Value of anti image correlation	Item	Value of anti image correlation
1	0,543	7	0,737	13	0,643	19	0,584	25	0,617
2	0,537	8	0,660	14	0,744	20	0,529	26	0,663
3	0,732	9	0,613	15	0,479	21	0,684	27	0,713
4	0,366	10	0,716	16	0,564	22	0,543	28	0,625
5	0,547	11	0,579	17	0,685	23	0,377	29	0,565
6	0,844	12	0,699	18	0,310	24	0,372	30	0,779

Based on Table 10, it was concluded that out of the 30 items, 5 items are failed. The MSA score of the dropped variable has a value <0.5 so that it was not analyzed. These points are items 4, 15, 18, 23, 24 hence the remaining 25 items were processed further.

The third are Communalities. Communalities are values that indicate the contribution of those variables or items to the formed factors, and they can also be interpreted as the amount of variance (in percentage) of a variable that can be explained by the formed factors. For instance, Item 1 contributes 62.6% to the factors formed. Item 1 contributed 62.6% to the factors formed. The greater the communalities of a variable, the more closely related to the factors formed. The values of communalities can be seen in Table 11.

Table 11. Communalities

Item	Initial	Extraction	Item	Initial	Extraction	Item	Initial	Extraction
Item 00001	1.000	.626	Item 00010	1.000	.671	Item 00019	1.000	.803
Item 00002	1.000	.881	Item 00011	1.000	.940	Item 00020	1.000	.787
Item 00003	1.000	.598	Item 00012	1.000	.920	Item 00021	1.000	.956
Item 00004	1.000	.698	Item 00013	1.000	.836	Item 00022	1.000	.754
Item 00005	1.000	.830	Item 00014	1.000	.772	Item 00023	1.000	.543
Item 00006	1.000	.858	Item 00015	1.000	.811	Item 00024	1.000	.732
Item 00007	1.000	.737	Item 00016	1.000	.714	Item 00025	1.000	.684
Item 00008	1.000	.546	Item 00017	1.000	.901			
Item 00009	1.000	.727	Item 00018	1.000	.798			

The fourth is Total Variance Expalined. Total Variance Explained shows the number of factors formed from the items that were analyzed. The total variance if 25 items were extracted into 7 factors was 82.889%. The amount of variance that can be explained by the factors formed was 82.889%, while the remaining 17.102% was explained by other factors that were not examined.

Table 12. Total variance explained

Component	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.599	27.851	27.851	2.599	27.851	27.851	2.070	22.178	22.178
2	1.848	19.806	47.657	1.848	19.806	47.657	1.776	19.029	41.207
3	1.117	11.973	59.630	1.117	11.973	59.630	1.042	11.160	52.367
4	.831	8.899	68.529	.831	8.899	68.529	.874	9.364	61.731
5	.615	6.589	75.118	.615	6.589	75.118	.593	6.358	68.089
6	.403	4.320	79.438	.403	4.320	79.438	.920	9.853	77.942
7	.323	3.460	82.898	.323	3.460	82.898	.462	4.955	82.898

The fifth is Scree Plot. The number of factors contained in the instrument can be seen from the scree plot. The number of factors is characterized by the drastic graph of eigen values. Factor analysis always attempts to produce factors that are fewer than the number of variables processed. The approach used to determine the number of factors obtained in this research was based on eigenvalues, percentage variances, and scree plots. Scree plot is a plot of eigenvalues for the number of factors extracted. The point where the scree starts to occur shows the number of the right factors. This point occurs when the scree starts to look flat. Screeplot pictures explain the relationship between the numbers of factors formed with eigenvalue in graphical form. The Figure 1. shows 7 factors that are formed: item 1, item 3, item 6, item 7, item 8, item 9, item 10.

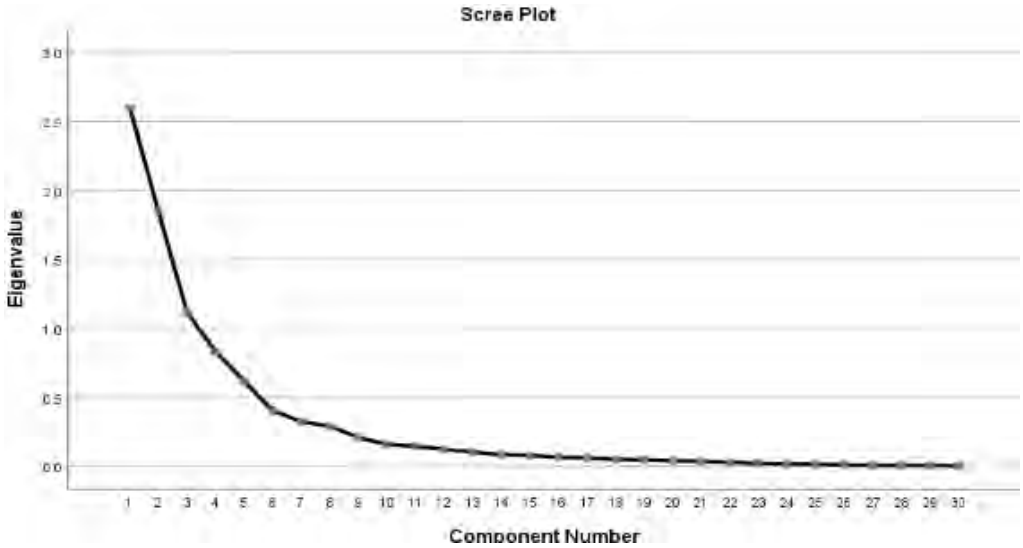

Figure 1. Scree plot

Based on the results of the analysis above, it can be concluded that the instrument can be used to assess critical thinking skills in science learning in elementary schools with 25 positive and negative items.

4. CONCLUSION

The results of the instrument analysis of teachers' perceptions of critical thinking indicate that there are several indicators and statements that are corrected based on the raters' suggestions. Of the 7 components derived based on operational definitions, the writer can develop it into 30 statements and it becomes 25 statements after being analyzed. The results of the quantitative analysis show that Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.616 or 61.6% which means that the representation of the sample in the analysis has met because 0.616> 0.50. Bartlett's Test of Sphericity also shows sig. 0.000 which shows a significance at 0.05, so it can be concluded that the instruments meet the valid requirements. After factor analysis was conducted, there are 7 components analyzed. By using SPSS, reliability estimation was obtained using Cronbach Alpha formula 0.83 and it can be comcluded that the instruments for evaluating teacher's perceptions of critical thinking are reliable.

The development of instruments for teachers' perceptions of critical thinking that the authors carried out remains having any weaknesses. It is expected that the readers will follow the steps in developing the instrument well. The readers are also expected to pay attention to the compatibility between statements made with indicators to minimize the statements that are not in accordance with the indicators.

ACKNOWLEDGEMENTS

Acknowledgment of the authors to the beloved almamater of Yogyakarta State University that provides an opportunity to make this research run well.

REFERENCES

[1] Ikman and Hasnawati, "Effect of problem based learning models of critical thinking ability students on the early mathematics ability," *International Journal of Education and Research,* vol. 4, pp. 361-374, 2016.
[2] Demir, S., "Perspective of science teacher candidates regarding scientific creativity and critical thinking," *Journal of Education and Practice,* vol. 6, pp. 157-159, 2015.
[3] Nugroho, "Chapter 1- Pendidikan Abad 21," in *HOTS (High-Level Thinking Ability, Concept, Learning, Assessment, Question Preparation based on HOTS) (in Bahasa),* Ed: Gramedia Widiasarana Indoensia, pp.1, 2016.
[4] Munawaroh, S. and Riyadi, "Teacher's perceptions of innovative learning model toward critical thinking ability," *International Journal of Educational Methodology,* vol. 4, pp.153-160, 2018.
[5] Klein, G., "Theoretical issues in ergonomics science," *Cognitive Salution Division*, vol.12, pp.210-224, 2014.
[6] Grohs, J. and Knight, D., "Assessing systems thinking: a tool to measure complex reasoning through ill-structured problems," *Thinking Skill and Creativity Journal*, vol. 28, pp.110-130, 2018.
[7] Gotoh. Yasushi, "Development of critical thinking with metacognitive regulation," *International Conference of Cognition and Exploratory Learning in Digital Age,* pp.353-356, 2016.
[8] Howie, "Chapter 2 - critical thinking in education," in *Teaching student thinking skill and strategies: a framework from cognitive education in inclusive setting*, Ed: Jessica Kingsley, pp.48, 2011.
[9] Alwadai, "Islamic teacher's perceptions of improving critical thinking skills in saudi arabian elementary schools," *Journal of Education and Learning,* vol. 3, pp. 37-48, 2014.
[10] Bataineh and Alazzi, "Perceptions of Jordanian secondary schools teachers towards critical thinking," *Journal of International Education,* vol. 3, pp. 56-72, 2009.
[11] Uyar, R. and Yasar, M., "Prospective preschool teachers' academic achievements depending on their goal orientations, critical thinking dispositions and self regulation skills," *European Journal of Educational Reseacrh,* vol. 7, pp. 601-613, 2018.
[12] Florea, N., and Hurjui, E., "Critical thinking in elementary school children," *Social and Behavioral Sciences Journal,* pp. 565-572, 2015.
[13] Sahin, S. and Yilmaz, K., "Relationship between professional values and critical thinking disposition of science technology and mathematics teachers," *Eurasia Journal of Matematics, Science, & Technology Education,* vol. 12, pp. 25-40, 2016.
[14] Moreira, A. and Watts, M., "So much more than just a list: Exploring the nature of critical questioning in undergraduate sciences," *Research in Science & Technological Education*, vol. 32, pp.115-134, 2014.
[15] Haberlin, S., "Problematizing notions of critical thinking with preservice teachers: A self-study imparting critical thinking strategies to preservice teachers: A self study," *Action in Teacher Education,* pp. 1-14, 2018.
[16] Wulandari, "Student's critical thinking improvement through PDEODE and STAD combination in the nutrition and health lecture," *International Journal of Elementary Education,* vol. 6, pp. 110-116, 2017.
[17] Maiorana, "Chapter 1 – definition of critical thinking," in *Critical thinking across the curriculum: Building the analytical classroom,* ed: Bloomington, pp.7, 1992.

[18] Kowalcyk, H. and Case, "Perception of the use of critical thinking methods," *Radiologic Technology,* vol. 3, pp.226-237, 2012.
[19] Pebriana and Disman, "Effect of problem based learning to critical thinking skills elementary school students in social studies," *Journal of Elementary Education,* vol. 1, pp. 109-118, 2017.
[20] Fitria, Y. and Gistituati, N., "Critical thinking skills of prospective elementary school teachers in integrated science-mathematics lectures," *Journal of Education and Learning (EduLearn),* vol. 12, no. 4, pp. 597-603, 2018.
[21] Duran, M. and Dokme, H., "The effect of the inquiry based learning approach on students cricital thinking skills," *Eurasia Journal of Mathematics, Science, & Technology Education,* vol. 12, pp. 2887-2908, 2016.
[22] Vieira, R., "Critical thinking: conceptual clarification and its importance in science education," *Science Education International,* vol.22, pp. 43-54, 2011.
[23] Yocubian, H., "A framework for guiding future citizens to think critically about nature of science and socioscientific issues," *Canadian Journal of Science, Mathematics, and Technology Education,* vol. 15, pp. 248-260, 2015.
[24] Santos, F., "The role of critical thinking in science education," *Journal of Education and Practice,* vol. 8, pp.159-173, 2017.
[25] Hand, B. and Therrien, W., "Improving critical thinking growth for disadvantaged groups within elementary school science: A randomized controlled trial using the science writing heuristic approach," *Science Education,* pp. 1-18, 2018.
[26] Bailin, "Critical thinking and science education," *Science & Education,* vol. 11, pp. 361-375, 2002.
[27] Sugiyono, "Chapter 3 – Research and development," in *Quantitative, Qualitative, and R&D Methods* (in Bahasa), Bandung: Alfabeta, pp. 35, 2017.
[28] Creswell, "Chapter 1 – Research Planning (in Bahasa)," in *Educational Research: Planning, Implementing, and Evaluating Qualitative & Quantitative Research* (in Bahasa), Yogyakarta: Pustaka Pelajar, pp. 17, 2015.
[29] Mardapi, "Chapter 2 – The Concept of Reliability (in Bahasa)," in *Educational Measurement, Assessment and Evaluation* (in Bahasa), ed: Parama Publishing, pp. 20-21, 2016.
[30] Azwar, "Chapter 3 – Evaluation Criteria (in Bahasa)," in *Validity & Reliability* (in Bahasa), Yogyakarta: Pustaka Pelajar, 2017, pp. 43.
[31] Gronlund and Robert, "Chapter 4 – Validity," in *Measurement and Evaluation in Teaching,* 6th ed., New York: Macmillan, pp. 56, 1990
[32] Retnawati, "Chapter 2 – Content validity (in Bahasa)," in *Validity & Reliability* (in Bahasa), ed: Parama Publishing, pp. 25, 2016.
[33] Mahrens and Lehman, "Chapter 3 – Evaluation," in *Measurement and Evaluation in Education and Psychology,* New York: Holt, Rinehart, and Winston, pp.212, 1973
[34] Gwet, "Chapter 3 – Reliability," in *Handbook of Inter Rater Reliability,* Gaithersburg: MD Advanced Analytics, pp. 93, 2012

BIOGRAPHIES OF AUTHORS

Eni Rahmawati is a Educational Research and Evaluation student in Yogyakarta State Univeristy, Indonesia.

Dr. Harun, M.Pd is Early Childhood Education Lecturer in Yogyakarta State Univeristy, Indonesia.