



Critical thinking among fourth grade elementary school students: A gender perspective

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ABSTRACT

While student intelligence, in general, is not distinguished by gender, some results of cognitive ability tests found differences in males and females. The purpose of this study, hence, was to identify the critical thinking skills of fourth-grade elementary school students based on gender. The critical thinking indicator employed refers to the Cornell Critical Thinking Test Level X. The participants were selected through convenience sampling in which consent was obtained from the principal, parents, and students of Elementary School SDN Giwangan in Yogyakarta, Indonesia. They consisted of 28 males and 17 females (N= 45). Data were analyzed using percentages, mean, standard deviation, range, and t-test. The findings uncover statistically significant differences in the mean of critical thinking scores between males and females, and this implies that elementary school teachers can develop critical thinking skills by providing different learning experiences for both groups. To follow up, the scope of the subject matter, the sequence of skills that are trained on students, and various choices of learning activities that develop critical thinking skills can be purposely personalized by gender.

Keywords: critical thinking, gender, fourth-grade elementary school student

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INTRODUCTION

The new vision of quality education emphasizes the life skills essential for success in the 21st century. Critical thinking is one of the targeted skills prioritized in education systems around the world. This intellectual intelligence needs to be possessed by school students in the era of the industrial revolution 4.0. Critical thinking as the main learning skill in the 21st century (Irwanto et al, 2018) is characterized by the ability to recognize and identify problems (Russell III, Waters, & Turner, 2017). School students are trained and educated to become successful critical young citizens of tomorrow. They practice generating initial ideas into more complex ideas through experience and the learning process (Iswinarti & Suminar, 2019). Children's natural skills to solve daily problems can be noticed and elevated through involvement in various cognitive involvements to demonstrate their critical thinking skills (Huang et al, 2017; Setiawan, et al, 2021).

So far, several previous research studies in critical thinking probably focused on higher levels, ranging from junior high school to university students. Rosidin, Kadaritna, & Hasnunidah (2019), as an example, examined the critical thinking skills of junior and senior high school students using two research designs. The research subjects were treated with the Argument-Driven Inquiry (ADI) learning model, then the effect of the model was measured based on differences in academic ability, gender, and personality type. This study suggests that the ADI model had a greater influence on high school students and could accommodate various personality types in both male and female students.

Likewise, Narmaditya, Wulandari, & Rosnita (2018) measured the effect of problem-based learning on the critical thinking skills of high school students by applying a lesson study approach. The Structure Observed Learning Outcome taxonomy covering five levels was chosen as the basis for measuring critical thinking skills. The treatment given was proven to be able to improve problem-solving skills and make conclusions through critical thinking processes as noticed in their ability in asking questions, discussing problems, and making problem solutions. Similar to this, Marzuki & Basariah (2017) described the effect of problem-based learning and project citizen models on critical thinking skills and disciplinary characteristics of vocational school students, and suggested three important findings, i.e. there is a significant effect of the problem-based learning model and project citizen in Civics learning on (1) critical thinking skills, (2) the character of student discipline, and 3) critical thinking skills and disciplined character of vocational students.

While in higher education level, improvement of students' critical thinking was also investigated by the use of the TPS method through a non-equivalent control group pretest and posttest design (Kurjum, Muhid, & Thohir, 2020). Significant differences were found in the critical thinking skills of students who learned to use the TPS method compared to those utilizing conventional methods. Based on this finding, consequently, learning in Islamic studies can run more effectively using the TPS method. Widyastuti (2018), similarly, explores the elements of critical thinking shown in the text and examines the development of critical thinking in the text. Essays written by 4th-semester students were analyzed based on the criteria for Critical Thinking (CT) by Stapleton (2001), namely argument, reason, evidence, opposition and refutation, conclusion, and fallacy. The results indicate that arguments are often weak because they are not supported by sufficient reasoning and evidence. Low refutation abilities were discovered, most likely as a result of their tendency to accept assertions from other sources without evaluating and questioning them. Most conclusions in the investigated essays take the form of suggestions and fallacies, mostly in the form of generalizations and oversimplifications.

The critical thinking ability of Indonesian students at various levels of education is still low as shown by Chusni et al. (2021) in Surakarta, Maknun (2019) in Bandung, Fitriani et al. (2018) in Mataram, and Mite & Corebima (2017) in Malang. Observations made to fourth-grade students in several elementary schools in Yogyakarta Province, including in Yogyakarta Municipality, Kulon Progo Regency, and Gunungkidul Regency, strengthen this statement. All of them indicate that students have difficulty in analyzing problems, finding alternative solutions to problems, and making conclusions.

The definition of critical thinking has nonetheless changed with the emergence of the holistic view from experts while it previously emphasized the cognitive component. It is defined as an investigation that aims to determine the nature of a problem followed by trying alternative solutions (Dewey, 1910). A person, hence, can use reasonable and reflective thinking to decide what to believe or do while investigating a problem. As a cognitive skill, critical thinking involves mental processes or procedural movements that can be improved through practice (Bailin et al., 1999) and someone uses them to solve problems, make decisions, and learn new concepts. It also describes the quality of ideal thinking (Ennis, Millman, & Tomko, 2005) when viewed from a philosophical perspective.

The next definition emphasizes a person's motivation which is then referred to as a critical thinking disposition (Facione, 1990; Halpern, 1998). Behavior and critical thinking skills are the focus of attention of cognitive psychologists (Lai, 2011). Critical thinking is not only the success of using certain skills in the right context, but also the attitude or disposition to recognize when these skills are needed and whether there is a willingness to apply them. Critical thinkers tend to use these skills appropriately, without prompting, and usually with conscious intent. Critical thinkers are aware of the urgency of good thinking and seek to find quality judgments. Critical thinking is also related to problem-solving skills, providing all necessary needs, observing ongoing processes, and providing suggestions for improvement (Sternberg, 1986). Thus, the determination of a person's actual thinking process performance is influenced by cognitive and dispositional components (Facione, Sanchez, Facione, & Gainen, 1995; Halpern, 1998).

An indication of a person's critical thinking can be seen from his ability to determine the credibility of information sources, identify conclusions, reasons, and hypotheses, accept other people's arguments, expand the scope and defend points of view, clarify information with relevant questions, find reasons, and formulate conclusions that are feasible and trustworthy. (Ennis, 1993). People usually activate their critical thinking when updating and increasing mastery of knowledge (Meredith & Steele, 2011), organizing disparate information, seeking and finding causal relationships, formulating ideas based on available examples, multiplying examples to strengthen ideas, and assessing information based on its truth, its usefulness, as well as the possibility of positive or negative impacts that can be caused (Florea & Hurjui, 2015).

Concerning this, the important role of critical thinking in education has been demonstrated and supported by various shreds of evidence as a result of decades of theoretical and practical work (Lai, 2011). The school curriculum integrates critical thinking due to the influence of John Dewey since the mid-20th century (Bean, 2011). Each grade level needs to develop critical thinking skills as an explicit goal in the K-12 curriculum (Facione, 1990). Therefore, various activities in the regular classroom need to teach and integrate critical thinking (Bailin et al., 1999). Important critical thinking is taught from early childhood (Gelerstein, 2016) with the best time in the first years of primary education (Ennis, 1989). Changes in cognitive function occur from childhood to adolescence. Cognitive function is needed in various social and intellectual activities. Children's actions during social interactions are guided by assumptions about the thoughts of others, while their interpretations are framed by the actions of others. It is at this time that the concept of the nature of knowledge that contributes to the ability to reflect on one's thought processes and evaluate the reasoning of others is formed during childhood (Pillow, 2010).

Based on the results of previous research studies, investigations on critical thinking generally focus on adolescents and college students. Nevertheless, critical thinking skills are important to be taught to all students starting from elementary school students as one of the educational reform efforts (Kettler, 2014) as everyone of all ages can be involved in critical thinking (Abrami et al., 2015; Lai, 2011). Children at a young age can think and reason critically (Ramani 2012, 2014), at home, and in the school environment (Murphy et al., 2014; Aman, 2019) so that the empowerment of their metaknowledge skills can be optimized (Royanto, 2012).

Other than due to the lack of research on children's critical thinking, the current study focuses on 4th-grade elementary school students since the supporting evidence reveals that children at that age are at a critical period in reading development known as the fourth-grade slump. The critical period is marked by the emergence of understanding difficulties (Meichenbaum & Biemiller, 1998; Sweet & Snow, 2003). Besides, student intelligence generally is not distinguished by gender, but some results of cognitive ability tests found these differences. Males are better at manipulating visual images in their working memory, whereas girls are better at acquiring, retrieving, and using verbal information from long-term memory (Halpern & May, 2000). In addition, humans throughout their lives are flooded with information about what they can and cannot do depending on their classification, as females or males (Chaplan, 2010). Therefore, this paper aims to describe the critical thinking skills of fourth-grade ES students to answer the research question whether there is a difference between the critical thinking abilities of males and females in the fourth grade of elementary school.

METHOD

The non-experimental design harnessed in this study was cross-sectional based on the grades achieved by elementary school students after taking Cornell's Critical Thinking Test (CCTT). The design aims at examining the data collected at one point in time and on the same subjects. The participants selected through convenience sampling include one group of fourth-grade elementary school (ES) students. The researcher would not be able to claim if these students sufficiently represented the population, but these sample members could provide useful information for answering the research question.

The instrument, CCTT Level X (Ennis et al., 2005), was used to measure critical thinking skills. Kettler (2014) also used CCTT Level X to investigate the critical thinking skills of fourth

graders in Texas, consisting of 45 gifted students and 163 general education students. The identified gifted students showed progress in critical thinking skills compared to general education students. Regarding this, permission was gained from The Critical Thinking Company to use CCTT Level X as a research instrument. Individual purchasers of this book are licensed to reproduce student pages for use in a single class. This instrument has been used in various critical thinking skills studies since its inception in 1985 and is currently in its fifth edition. Its administration guide describes that this test can be done by students in the age ranging from grades 4 to 14. The test consists of 71 items, divided into four parts, and covers five aspects to measure critical thinking skills. Based on its manual administration guidelines, previous studies have reported reliability estimates, which are in the range of 0.67 to 0.90. The manual administration guide has also shown evidence based on the results of previous studies related to the relevance of the content and criteria to the assessment of construct validity

Besides, the instrument was translated, validated by psychologists and linguists, and tested. It has 4 sections that cover a series of stories that ask students to imagine themselves being part of an explorer group on Planet Nicoma. Section I induction (testing the hypothesis) consists of 23 statements that require students to decide on any facts that support or weaken the ideas suggested by health officers. Section II, source credibility and observation, consists of 24 statements asking students to decide which information is more reliable. Section III, deduction, comprises 14 problems that demand the respondents to make subsequent decisions based on the reasons given, and section IV, identification of assumptions, consists of 10 questions that ask students to choose the best idea based on the information presented. Each student must choose one of the three answer options provided for each question. For example, for question number 4, which belongs to the induction category, "You go into the third hut. There is no dust on the cookstove." Students are given several facts and asked to choose the answers that have been provided, namely: (a) the idea of health workers that everyone in the first group is dead is supported by facts; (b) the idea that a health worker contradicts the facts; (c) neither A nor B: None of the answer choices contributed to the decision making. The facts on the test are arranged in numerical order.

The language, format, and layout of the test questions are deemed appropriate for elementary students. Some items containing cultural references and/or western names have been adjusted so that the test is considered more relevant to the Indonesian context. As an example, a name in item number 34 was changed to suit the Indonesian context, from "That's Captain Sardus there on the left by himself" to "That's Captain Sarman there on the left by himself" (the name Sardus is not common in Indonesia). Another modification relates to the choice of vocabulary that is familiar to school students in Indonesia. Revisions were made during discussions with four experts in the fields of learning, language, evaluation, and psychology. In its data collection process, the participants completed the printed instrument and submitted it to the researcher. After that, data were analyzed quantitatively using percentages, means, standard deviations, range, and t-tests.

FINDING AND DISCUSSION

Finding

The questions and problems presented in CCTT Level X are a series of stories about the existence of a new planet named Nicoma. Students were invited to imagine and position themselves as part of the second group that landed in Nicoma and came from Earth. In the story, the first group of explorers who had landed two years earlier gave no news to the other group. Students were then required to engage themselves in making significant decisions by answering multiple-choice questions. At the beginning of each section, the instruction including an example of questions and how to answer them is provided. Sample questions for all sections of the test are listed in numbers 1, 2, 26, 51, and 66.

This instrument was completed by 45 fourth-grade ES students, consisting of 28 (62.22%) males and 17 (37.78%) females. The following data on Table 1, display the fourth graders' test results based on the percentage of true and false in each item and each section.

Table 1. Students' results for each item in section I

Item Number	Percent Correct	Percent Incorrect
3	57.77	42.22
4	40	60
5	46.67	53.33
6	35.55	64.44
7	66.66	33.33
8	48.89	51.11
9	46.67	53.33
10	44.44	55.56
11	73.33	26.67
12	75.56	24.44
13	57.78	42.22
14	28.88	71.11
15	28.88	71.11
16	8.89	91.11
17	8.89	91.11
18	33.33	66.67
19	13.33	86.67
20	44.44	55.56
21	42.22	57.78
22	53.33	46.67
23	60	40
24	22.22	77.78
25	48.89	51.11

Based on Table 1, section I presents a hypothesis about the idea of health officers assuming that all members of the first group were dead. Students were asked to explain facts; get rid of inconsistent facts, are contradictory, or weaken the hypothesis; choose facts that make sense; and support the hypothesis. These criteria function in determining the answers to items number 3-25. As an example of questions, item number 3 is presented as follows.

"There are ten huts. You go into the second hut and again find that everything is covered by a thick layer of dust."

Choose one of the following answers:

- A. The idea of health workers that they are all dead is supported by facts*
- B. The idea of health workers contradicts the facts*
- C. The choice of available facts does not provide support in decision making*

Based on Table 2, judgments about the credibility of sources and observations might encourage students to trust other people's statements because they did have direct access to the source of the assertions. Other people in this case referred to health officers, mechanics, soldiers, and anthropologists. An example of item number 27 is as follows.

- A. The health officer says, "This water is safe to drink."*
- B. Several others are soldiers. One of them says, "This water supply is not safe."*
- C. A and B are equally believable.*

Based on Table 3, section III required students to consider the words of others to be true and to decide the truth of the next statement. Deduction items are generally not emotionally loaded but require interpretation in colloquial language. One example of a question in number 52 is as follows.

*"If these beings are from Earth, then another spaceship must have landed on Nicoma. These beings are definitely people from Earth."
What will happen next?*

- A. Nicoma has become a landing site for planes from other space*
- B. The origin of these creatures is not from Earth*
- C. No other spacecraft has yet landed on Nicoma*

Table 2. Results for each item in section II

Item Number	Percent Correct	Percent Incorrect
27	64.44	35.56
28	6.67	93.33
29	35.56	64.44
30	53.33	46.67
31	44.44	55.56
32	48.89	51.11
33	28.89	71.11
34	53.33	46.67
35	71.11	28.89
36	40	60
37	62.22	37.78
38	20	80
39	53.33	46.67
40	55.56	44.44
41	42.22	57.78
42	20	80
43	53.33	46.67
44	22.22	77.78
45	42.22	57.78
46	17.78	82.22
47	28.89	71.11
48	35.56	64.44
49	48.89	51.11
50	28.89	71.11

Table 3. Students' results for items in section III

Item Number	Percent Correct	Percent Incorrect
52	64.44	35.56
53	37.78	62.22
54	46.67	53.33
55	31.11	68.89
56	40	60
57	15.56	84.44
58	15.56	84.44
59	57.78	42.22
60	20	80
61	42.22	57.78
62	11.11	88.89
63	40	60
64	22.22	77.78
65	73.33	26.77

Table 4. Students' responses to items in section IV

Item Number	Percent Correct	Percent Incorrect
67	64.44	35.56
68	55.56	44.44
69	17.78	82.22
70	33.33	66.67
71	33.33	66.67
72	33.33	66.67
73	26.67	73.33
74	31.11	68.89
75	31.11	68.89
76	31.11	68.89

One of the basic measures for identifying assumptions is that they fill in gaps in reasoning. Based on Table 4, each item in Section IV required the students choose the best answer over the other two choices. An example of a question in number 67 is as follows.

"Since our explorers are prisoners, we cannot talk to them without being discovered."

The following options that may be acceptable without much deliberation is:

A. When guards are on duty, generally no prisoners are allowed to chat

B. The conversations we have with will generally be passed on to other people.

C. The conversations we have in general will not be conveyed to others

The results of each group of test items uncover the percentage of mastery of the four aspects of critical thinking attained by fourth-grade elementary school students. They are summarized in Table 5. While if investigated by gender, the scores gained in each section can be seen in Table 6.

Table 5. Students' profile of critical thinking in each test section

Section	Sub-skill	Percent Correct	Percent Incorrect
I	Induction	42.41	57.58
II	Credibility of Sources and Observation	40.82	59.18
III	Deduction	36.98	63.02
IV	Assumption Identification	35.11	64.89

Table 6. Critical thinking subscale scores (N = 45)

Gender	Section I Induction		Section II Credibility of Sources & Observation		Section III Deduction		Section IV Assumption Identification	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Male	10.14	2.59	10.25	3.43	5.53	1.91	3.89	1.49
Female	9.11	2.03	9.00	2.62	4.70	2.34	3.00	1.65

Males score highest in Section II, the credibility of sources and observation, with a mean of 10.25, and lowest on Section IV, assumption identification (mean= 3.89). Females, on the other hand, score highest on Section I, induction, with a mean of 9.11, and lowest on assumption identification (mean= 3.00). Subscale scores for all students (male and female) were low in terms of assumption identification. This can be read to mean that the majority of the 4th graders in this study have a limited ability to choose the best ideas based on the facts supplied.

Table 7. Critical thinking total score (N = 45)

Gender	Mean	Std. Dev	Range	% Tile
Male	29.85	5.41	20	29
Female	25.82	3.84	15	25

Table 8. Differences between male and females' critical thinking total mean scores

Gender	n	Mean	Std. Dev	df	t	p
Male	28	29.85	5.41	43	2.68	0.010
Female	17	25.82	3.84	43	2.68	0.010

Note: Significant at $p < 0.05$

An independent sample t-test was performed to check whether there was a statistically significant difference in test scores by gender. Based on the previous statement, the accepted p-value is 0.05. The results of the t-test exploring the gender variable showed statistical significance with $p = 0.01$. The mean scores consequently show differences between male and female critical thinking abilities of these fourth-grade ES students. These differences in scores were statistically significant in that the mean score of the male students' (mean=29.85 and Std. Dev =5.41) is relatively higher than that of females mean=25.82, Std. Dev= 3.84).

Discussion

As one of the important skills that need to be developed in all students is critical thinking, Butler et al. (2012) emphasize the cultivation of critical thinking in all disciplines. The relevance of cultivating critical thinking skills in the curriculum, therefore, cannot be avoided, although there are many challenges that students must face, including being unable to analyze complex materials into simple elements, and adopt a critical thinking attitude by questioning, assessing, and presenting logical, reasoned arguments (Chen, 2001). Therefore, the formal education system is responsible for developing critical thinking through the formal curriculum (Novak, 2002).

Today's young generations inevitably need experience and expertise in various fields to face more complex problems. Although it is difficult to predict what skills are needed in the future, students must be able to deal with any multifaceted difficulties that may be encountered in life. Critical thinking and problem-solving skills are some of the tools that can be adapted to successfully deal with various types of foreign problems that enhance constructive and adaptive behavior in new situations and settings (Kashani-Vahid et al., 2017). Besides, critical thinking skills are vital for all children, including ES students whose abstract thinking skills are relatively undeveloped (Assaraf & Orion, 2010). This ability allows them to identify the consequences of behavior. Children's interactions with peers and adults later can increase their knowledge and experience and make the greatest contribution to the development of critical thinking skills. In addition, the improvement of critical thinking skills is also supported by their environment and exploration (Kamarulzaman & Ahmad, 2014). Manipulation from others can be avoided when children learn to express opinions about known information.

Concerning this, the ability to evaluate other people's statements becomes a key component of critical thinking. Children should learn to reason critically because information obtained from others is not always accurate (Heyman, 2008). Other people may make false statements so that children should be able to realize it. Though children might already understand that some sources of information are more credible than others, they might have not been able to draw conclusions, especially when the information obtained from adults is less reliable. They usually consider general knowledge when evaluating others as a source of information. Other evidence likely shows that there are still many constraints experienced by elementary school-age children, especially in terms of evaluating the statements of others who intend to convey false information. CCTT Section II, therefore, is relevant to this statement since it enables students to assess the credibility of information sources as a foundation for believing other people's statements. However, only 40.82% of students answered correctly so that the majority of students failed to examine the accuracy of supporting information based on statements from health officers, mechanics, soldiers, and anthropologists.

Besides evaluating the credibility of information, critical thinking involves executive functioning skills, including using known things to search for information (working memory); seeing information in new ways to deepen understanding (cognitive flexibility); and do not return to old information but use new information previously obtained (inhibitory control). Critical thinking is needed by children not only to understand the world around them, but also to provide solutions to a problem (Galinsky, 2010). Children are able to analyze and evaluate information through critical thinking so that it serves as a guide for beliefs, giving considerations in making decisions and taking an action. CCTT Section III, in line with this, analyzes learners' capability in considering the words of another person to be true and to decide the truth of the next statement. The data, however, reveal that less than a half (36.98%) of students correctly answered the questions so that the majority of them could not assess the solutions offered by others.

Teachers While the focus of this study was to analyze whether there is a difference in ES students' critical thinking skills by gender, the findings suggest that there is a significant difference between male and female critical thinking abilities. This is in line with several findings from previous studies (Kohan-Mass, 2016; Harish, 2013; Mehta et al., 2018; Subhina & Kulakli, 2019; Perdana, 2019) but somehow disputes some others (Ramdiah & Corebima, 2014; Polat, 2018; Bagheri & Ghanizadah, 2016).

From the first point of view, the level of critical thinking and creativity of the younger generation is deemed significantly influenced by gender (Subhina & Kulakli, 2019; Perdana,

2019). In addition, the level of inference and deduction of female students is higher than male students. Critical thinking consists of several components, namely inferring content, giving recognition to assumptions, reducing less important activities, eliminating some potential that tends to be biased, interpreting the results of the analysis, and evaluating the results and arguments, all of which are related to creating and constructing knowledge. The process of identifying gifted individuals when viewed from gender differences can be influenced by differences in the thinking styles of male and female students (Kohan-Mass, 2016). Female students' self-awareness regarding thinking and learning styles can contribute to their understanding that individual differences, and it reflects their habits and preference or style rather than ability.

Besides, several factors possibly affect the development of critical thinking skills in children such as age, knowledge, experience, and environment. During the learning process, the use of methods or models can also stimulate students' critical thinking skills. Male and female learners differ significantly in critical thinking skills in which males show better performance than females in critical thinking skills in mathematics (Harish, 2013), but different results were found by Mehta et al. (2018) that female students scored about 13% higher than male students on the Cornell X class reasoning test. This means that males and females have different points of view when describing ideas. Meanwhile, Zetriuslita, Ariawan, & Nufus (2016) found that at a high level of ability, both male and female students already have the ability to generalize and complete the data provided, but do not yet have the ability to properly identify, justify concepts, and analyze algorithms. Likewise, at moderate and low proficiency levels, male and female students demonstrate the same symptoms.

Nevertheless, the results of other studies present dissimilar indications. Gender differences, according to Ramdiah & Corebima, 2014, do not have a significant effect on critical thinking tests. They suggest that student achievement, metacognitive, and critical thinking skills are almost the same by gender (Ramdiah & Corebima, 2014). In addition, the level of entrepreneurial skills of students also does not indicate any significant differences by gender (Polat, 2018). Males and females do not differ in terms of making conclusions and deductions as two components of critical thinking. Men and women regardless of gender might become critical thinkers over time because every day they meet and overcome difficulties in their lives. Critical thinking in women can be linked to the process of gaining the learning experiences needed to recognize and find control over their lives, and according to Bagheri & Ghanizadah (2016), this process is not influenced by and dependent on others.

Concerning these opposing findings, Kettler (2014) revealed some information about the relationship between critical thinking and cognitive abilities based on data obtained from grade 4 ES students using CCTT Level X. He finally proved that a strong and positive correlation between cognitive ability and academic achievement has been found. Similar results were also shown by VanTassel-Baska et al. (2009) who provide evidence that students with higher cognitive abilities get higher scores. There is no explicit indication of gender differences in a person's intelligence in general, but differences in the performance of men and women on various cognitive tasks have provided accurate evidence. One specific example that supports the statement that cognitive ability is influenced by gender differences is the finding of Clinton et al. (2014) on the performance of men and women on reading comprehension assessment. Cognitive processes can be different by gender for they are not inherent features in men or women. In general, women and men have somewhat different values and interests and are involved in varying activities, so everyone can expect different levels of knowledge about different subject areas (Halpern & LaMay, 2000).

Being highly demanded by 21st generations, Chukwuyenum (2010) claims that critical thinking skills have become an effectual means of increasing students' understanding of concepts in any subject matter. A multitude of measures to advance children's critical thinking skills have been proposed, some of which include pretend play games, imagining, reading books, making puzzles, playing board games, participating in a vigorous art program (Schlegel, 2011). Achieving educational goals, however, requires teachers to instill a certain set of skills, observe the development of these skills, and provide feedback on the application of skills based on the

principle of differentiation. In this regard, the principle of differentiation requires the development of critical thinking skills as part of the basic curriculum (Kettler, 2014).

Objectives that are vaguely or implicitly stated without direct instruction might have little effect on the development of critical thinking skills (Abrami et al., 2008), and this suggests that schools aiming to develop critical thinking skills must explicitly identify their goals and provide specific and clear instructions for achieving them. These measures, however, might be impossibly implemented without challenges. These can take the form of the assumption that this process is part of maturation in general, or the emergence of resistance subject to the fear that children will be forced to challenge the authority of parents and teachers. Children may ignore or be oblivious when they encounter information that contradicts what they previously received. They can also be less motivated to engage in critical thinking if they are unsure of its importance (Kuhn, 1999), and have a limited ability to monitor and control their thoughts and actions (Moses & Baldwin, 2005). Apart from these challenges, some evidence on the link between critical thinking skills and children's social experiences has demonstrated the need of continuing to develop these abilities.

CONCLUSION

There has been a noticeable difference in gender-specific critical thinking skills in fourth-grade elementary schools. However, the findings of this study were based solely on the results of a test involving a sample of fourth-grade primary school students who were still having difficulty understanding any reading materials. As a result, the results of this research with a bigger student population and more instructional interventions may have different outcomes. However, the findings of the current study can be meaningful for primary school teachers who aim at escalating students' critical thinking skills by providing a variety of learning experiences. Educators can follow up this by considering adjustments in types of learning activities and the sequence of critical thinking skills to develop in order to provide them with diverse learning experiences.

Though this study acknowledges its limitations of the sample size, its results suggest a statistically significant difference in the critical thinking skills based on gender variable. This study's supplementary findings also suggest that grade IV primary school students generally still have difficulty in determining any facts that support or weaken an idea, deciding which information is more reliable, making decisions based on the previously given reasons, and choosing the best idea based on the information presented. Therefore, critical thinking needs to be integrated into all school curricula, from planning, teaching, textbook preparation, to assessment. All of them could be very important measures in preparing school students to be ready to cope with any real-life problems process.

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