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Contextual teaching-learning effectiveness in improving critical thinking skills kindergarten children in Environmental Education Materials

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Abstract

This study aims to test the effectiveness of environmental education learning with contextual teaching-learning (CTL) model and to train students in analysis to develop critical thinking skills. The theory behind the CTL model comes from tectonic theory. This experiment was performed with observation techniques before and after applying the learning model. The sample for this study included preschool children, including 93 children with the CTL model and 119 students with a teacher-centered approach. Data were analyzed using the independent sample tTest and the paired sample tTest with the program SPSS 22. The results show that there is a significant difference in children's critical thinking skills between the experimental class and the control class, and there is a significant difference in the critical thinking skills of the experimental class after being educated. learning environment by CTL model. This study proves that the CTL model can be applied in learning environmental education, especially in preschool.

Keywords: Critical Thinking, CTL Model, Early Childhood Education Programs

1. Introduction

Environmental education plays a very important role in reducing the environmental problems that occur. Where environmental problems arise will impact people's lives. Environment is an integral part of human life. Throughout his life, man is highly dependent on the conditions of his surroundings. Changes occurring in the environment will directly affect people's quality of life (Parker & PrabawaSear, 2019) [29]. Poor environmental management is caused by people's lack of awareness of environmental protection, lack of understanding and understanding of preserving the surrounding environment, which significantly affects their lives. (ÖzerKeskin & Aksakal, 2020) [28].

Therefore, people need to be aware that a part depends heavily on the conditions of the surrounding environment to jointly maintain the conservation and sustainability of the surrounding environment in order to improve the quality of life in the future. now and future. Therefore, it is extremely important to instill an understanding of environmental education at an early age, especially in children, especially early childhood education. Environmental education is carried out early with the aim of developing a positive attitude towards environmental sustainability. Introduction to the natural environment through environmental education at an early age is the first step for children to appreciate the environment (Altun, 2019; Dynia *et al*., 2018) [1, 10]. The above is supported by a number of expert findings, including: (Erdogan, 2015) [12] PLH Learning with Summer Education (Zaenuri *et al*., 2017) [42]; The implementation of environmental education can be achieved through personal hygiene habits, clean classrooms and prayer together, (Szczytko *et al*., 2018) [37] Learning PLH by teaching outdoor science, (Andrikopoulou & Koutrouba, 2019) [3] classroom stage activities that facilitate the effective achievement of environmental education goals, (Nogueira, 2018) [25] education of sustainable development through environmental education, (Masub) *et al*., 2016) [24], (Saremi & Bahdori, 2015) [33], (Effendi, 2019) [11] Studying PLH. This ability to think critically is an essential skill in the era of Industry 4.0 (Khasanah *et al*., 2017; Anazifa & Djukri, 2017; Bustami *et al*., 2018).

One of the indications of children understanding environmental education is the ability to think critically about their environment(Amin *et al*., 2020) [2]. With the ability to think critically, children will be more responsive to environmental symptoms that occur around them. Based on the results of preliminary studies in the field, children`s critical thinking skills have not yet been touched but are only limited to remembering and memorizing. Critical thinking skills are important in life and the world of work and have an effective function in all other aspects of life to improve human quality (Fitriani *et al*., 2020; Tahrir *et al*., 2020) [15, 38].

Children's critical thinking emphasizes the process of questioning and assessing things; furthermore, there is a power that encourages students to build information or concepts they find in their language. (Sarwanto *et al*., 2021) [34]. For example, children can explain the causes and effects of natural disasters, floods, children can explain the similarities and differences between two natural disasters, children state the importance of protecting the environment, children can distinguish grouping of data, for example environmental classification. clean and dirty classification.

Based on the results of the previous studies above, the research looking at the critical thinking skills of preschoolers and relating to the environmental education literature is still limited. Therefore, this study focuses on the effectiveness of the CTL model in improving the critical thinking skills of preschool children in environmental education.

2. Literature review

2.1 Critical thinking skills

The classical concept of critical thinking interpretation is reflected in the way Socrates taught knowledge, but what is more qualified as defined by Jhon Dewey's critical thinking is: "Active, persistent and attentively examines a supposed belief or form of knowledge in light of its background, what supports it, and the subsequent conclusions it points to (Fisher, 2011) [14] a process in which all knowledge and skills are mobilized to solve problems, make decisions, analyze all the hypotheses that arise, and carry out investigations or research based on data data and information obtained to reach the desired information or conclusions (Patonah *et al*., 2021) [30].

Critical thinking is a series of steps for how humans use their mental and intellectual abilities in understanding, analyzing, assessing and deciding what to do with the problems and phenomena they face. The same thing was said, Facione introduces five steps in the thinking process: interpretation, analysis, evaluation, concluding skills, arguing, and reflecting. Thus, critical thinking in this study is outlined as the ability of students to analyze, assess and draw conclusions both inductively and deductively. (Pratomo *et al*., 2021; Sutiani *et al*., 2021) [31, 36]. The constructs of interpretation and explanation are not included; these two things have been contained and embedded in the process of analysis, evaluation, and inference. (Facione & Gittens, 2016; Fisher, 2011) [13, 14]. In addition, critical thinking is also the first dimension of higher-order thinking skills and must be the main goal of an educator(Ghanizadeh *et al*., 2020) [17]. Critical wondering is defined because the capacity of interpretation, analysis, evaluation, and inference (Facione & Gittens, 2016; Fisher, 2011; Ghanizadeh *et al*., 2020) [13, 14, 17]. Critical wondering is one of the dimensions of higher-order wondering skills (Ghanizadeh *et al*., 2020) [17].

2.2 Contextual Teaching Learning

Contextual learning (CL) is a learning system that associates brain actions with meaningful evaluation patterns (Johnson, 2002) [21]. The CL Process links academic content with real-world context. This is important because in addition to helping to preserve short-term memories that are often easily forgotten by students, it also helps preserve long-term memories that help them apply those memories to activities later. This agrees with the view (Qudsyi *et al*., 2018; Suryawati & Osman, 2018) [32, 35] that contextual learning as a teaching system is based on the idea that meaning arises from the relationship between content and context scene.

Consult Johnson (2002) [21] There are three main principles in contextual learning: interdependence, differentiation, and self-regulation. In the context of classroom learning, the application of contextual learning involves the following steps: (1) Developing the idea that children will learn most meaningfully by working alone, exploring themselves and build on their knowledge and skills. (2) Carry out investigative activities (cycle of observation, questioning, hypothesising, data collection, and drawing conclusions). (3) Develop children's curiosity by asking questions. (4) Create a learning community (study in groups, small groups, equal classes or bring in experts). (5) Present the model as a learning example. (the teacher acts as a role model by doing something, such as kindergarten, recycling, etc.). (6) Reflection at the end of the meeting (e.g. direct statements about what was learned during the learning process, notes or diaries in children's books, children's impressions and suggestions about learning, discussion thesis or work). (7) Perform authentic assessment by assessing activities and reports, homework, quizzes, child labor, reports, diaries, test scores, and written assignments. (Johnson, 2002) [21].

CTL has seven stages of constructivist learning: Learn, Ask, Community Learning, Modeling, Reflection, and Validate Evaluation. Based on the principles and stages of contextual learning, contextual learning models are appropriate for use in environmental learning (Damanik *et al*., 2017) [8] and to explore critical thinking skills. argument because they can be linked to the context of childhood life (Gayatri *et al*., 2018; Hariyati & Tarma, 2018) [16, 19]. Critical thinking is a systematic thinking process (Johnson, 2014). Environmental knowledge is considered a fundamental component of environmental education (Otto & Pensini, 2017) [27]; Effective environmental education is not just about imparting information, but developing and enhancing attitudes, values and knowledge about the environment and building skills that prepare individuals and communities to work together. implementation of positive actions on the environment. (Ardoin *et al*., 2020) [5]. Environmental education has a lifelong impact (Gough *et al*., 2001; Otto & Kaiser, 2014; Wals & Benavot, 2017; Ardoin & Bowers, 2020) [18, 26, 41, 4].

3. Research methods

The research method used is semi-empirical. The study design used was a non-equivalence group design (Creswell, 2014). This study was conducted in two groups, namely (a) experimental group and (b) control group. The two groups were treated differently, with the control group using the direct learning (DL) model while the experimental group using the contextual teaching-learning (CTL) model.

Location and subjects The study was conducted in 16 kindergartens in Bandung with a total of 212 children. The 16 kindergartens were divided into two groups: eight kindergartens in the experimental group (93 children) and eight kindergartens in the control group (119 children). This study was conducted in the even semester of the 2018/2019 school year in group B, 5-6 years old. The data collection techniques used were observational and documentary studies. Observation was used to view the behaviors and workflows related to children's critical thinking skills in both groups using observational spreadsheets. Photographs

and learning administration studies were used to collect administrative data and recorded operational data as evidence of learning activities in kindergarten in Bandung city.

Two statistical methods were used through mean difference test (trial test) to analyze the data. The SPSS 22 application was used to test for differences in mean values (trial test), namely independent sample t test and paired sample t test. The mean difference test is used to determine if there is a difference in children's critical thinking skills between the experimental and control classes and if there is a difference in critical thinking skills before and after receiving the CTL learning model in the experimental class. (Bluman, 2012) [6]. The research instrument used was adapted from Facione and reliability and validity tests were performed. Table 1 shows that the search engine passed the validity and reliability test. The tool variable is declared valid if its significant value <0> rtable. If both research variables have Cronbach's alpha value > 0.75, the reliability of the variable is good (Joseph Check, 2012) [22].

The instruments used to measure critical thinking skills are listed in table 1 below.

Table 1: Grid of Critical Thinking Instruments (Facione & Gittens, 2016) [13]

S. No	Indicator	Statement Items
1.	Analysis	a. Children can explain the cause and effect of a disaster, for example, a flood disaster.
		b. Children can explain the similarities and differences between the two natural disasters
		c. Children can give reasons why it is important to protect the environment
		d. Children can group data, for example, by grouping the environment into clean and dirty categories.
2.	Evaluation	a. Children can evaluate the arguments stated, for example, assessing the arguments of their friends
		b. Children can set criteria based on assumptions. For example, setting a clean and dirty environment
		c. Children can select criteria to make solutions. For example, setting criteria for a healthy/clean environment can provide solutions for a dirty environment.
		d. Children can decide what to do tentatively. For example, deciding to sort waste according to its type.
3.	Inference	a. Children can collect information related to something. Examples of natural disasters
		b. Children can conclude the results of PLH activities
		c. Children can look for evidence for an event, for example, a flood

The rating scale used to measure critical thinking skills adjusts a comprehensive critical thinking rubric with a rating scale ranging from strong (strong), acceptable (acceptable), unacceptable acceptable (unacceptable) to weak (weak) (Facione & Gittens, 2016) [13]. Details will be presented as follows:

1. Strong (score 3)

This category is applied to students who consistently answer the following questions:

- Accurately interpret discourse, questions, evidence, and graphs.
- Identify the most important point of an argument or statement
- Analyze and assess alternative viewpoints
- Reviewing important evidence
- Give the right conclusion

2. Acceptable (score 2)

This category is applied to students who, in answering any questions, do the following things:

- Interpreting discourse. Evidence questions and graphs are less accurate.
- Identify the relevant things from an argument or statement.
- Only analyze and assess clear alternative viewpoints.

3. Unacceptable (score 1)

This category is applied to students who, in answering any questions, do the following, namely:

- Misinterpreting discourse, question evidence, and graphs.
- Failing to recognize the relevance of an argument or statement.
- Ignoring other points of view.
- Justifying procedures without reason.
- Ignoring the evidence and sticking to one's understanding.

4. Findings

The pre- and post-test data of the control and experimental classes were analyzed by ttest or tvalue test. An independent sample t-test was used to determine the difference in critical thinking skills between students in the experimental class and the control class. Paired t-sample tests were used to determine differences in critical thinking skills before and after receiving the CTL model. School.

Table 2: Independent Sample Test Results on Critical Thinking Skills

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Scores	Equal variances assumed	18,387	.000	6.579	210	.000
	Equal variances not assumed			6.877	206.758	.000

Table 2 shows data on children's critical thinking skills between the experimental class and the control class. Data were analyzed using the assumption of equal variance because Sig. the value of the critical thinking skill variable (0.000) is less than 0.05 and, as seen from the value of tcount (6,579), is larger than the array df. 210 (1,64), then Ho was rejected, which means that there is a difference in improved critical thinking skills between the experimental and control classes (Bluman, 2012; Wahyudin, 2019) [6, 40].

Table 3: Paired Sample Test Results on Critical Thinking Skills

Paired Samples Test				
		T	df	Sig. (2-tailed)
Pairs 1	pretest - posttest	-31,662	92	.000

Table 3 shows data on children's critical thinking skills between before and after receiving environmental education using the CTL model. sig value. (two-sided) 0.000 is less than 0.05 and tcount(31,662) is greater than ttable df. 92 () then Ho is eliminated ± 1.98 (Bluman, 2012; Wahyudin, 2019) [6, 40], which means that it can be concluded that there is a difference in critical thinking skills in the experimental class before and after learning about environmental education with CTL model.

5. Discussion

The results of the study show the difference in critical thinking skills between students in the experimental and control classes and the students' critical thinking skills in the experimental class before and after receiving environmental education. field with the CTL model. An independent sample test shows the value of Sig. (0.000) is less than 0.05 and is seen from the tcount value (6,579) greater than the df of the array. 210 (1.64). Similarly, the paired sample test shows the value of Sig. (0.000) is greater than 0.05 and is seen from the tcount value (31,662) greater than the df ttable value. (92). This proves that students who received environmental education with the CTL model had different critical thinking skills than those who studied with the teacher-centered direct learning method. In addition, there is a difference in the critical thinking skills of the experimental class before and after receiving environmental education with the CTL model. The research results prove that the CTL model can be applied in preschool environmental education learning to develop critical thinking skills. It is consistent with the results of previous studies, which reported that the CTL model can improve the critical thinking of students *et al*., 2021).

In the control class learning with the direct learning model, the teacher directly provides material through presentations using either power points or videos. Power points and videos shown by teachers related to environmental education materials. After finishing giving the material, the teacher gives a worksheet related to aspects of child development in the environmental education material frame.

Different from the direct learning model, the classroom experiment with the CTL model, the teacher directly invites children to places related to environmental education materials. Children can directly observe, build knowledge and analyze their situations. The role of the teacher is only as a facilitator for children to be active in activities and to build knowledge so that children develop critical thinking skills, one of the aspects of higher order thinking skills. (Ghanizadeh *et al*., 2020) [17].

Learning Environmental education using the CTL model is more effective in improving critical thinking skills because children's processes are directly related to the (concrete) objects around them and to their own lives. daily life, so learning becomes more meaningful. Children will understand matter more easily through direct interaction with concrete objects, in the view of Piaget (1965) that learning for children should go from concrete to abstract. In addition, the CTL model stimulates children to learn by doing to stimulate the ability to analyze, evaluate, and reason, as has been demonstrated (Johnson, 2002) [21], that the CTL approach is a learning concept in which teachers bring real - Bring situations into the classroom and encourage students to make connections between knowledge and its application in their lives as members family and community members. It is consistent with (Dewi & Primayana, 2019) [9] that contextual learning as a teaching system is based on the idea that meaning arises from the relationship between content and context. It is important when implementing CTL that teachers grasp the original knowledge or learning experiences that children already have, since new knowledge needs to be adapted to form understanding and positive experiences. meaningful. child. (Chaeroh *et al*., 2021) [7].

In summary, with its characteristics, the relevant CTL learning model will improve children's critical thinking skills. Children become empowered Children can explain the causes and effects of a disaster, such as a flood; children explain the similarities and differences between two natural disasters, children explain the importance of environmental protection. In addition, children can also evaluate the arguments of friends and gather information related to an issue, especially related to the environment, such as a natural disaster.

Critical thinking can be one way to improve the natural sciences that grow in students' minds (Amin *et al*., 2020) [2]. There are demands to teach PAUD children to develop their critical thinking following the 2013 curriculum revision, a challenge for teachers. It implies that the teacher must create stimulation and activities to improve children's critical thinking skills (Sarwanto *et al*., 2021) [34]. Environmental learning affects students' awareness and knowledge about nature, the environment, and how humans relate to the environment. Learning the environment will form an attitude of caring for the environment(Uludağ, 2021) [39].

6. Conclusion

This observe proves that there may be a large distinction in college students` vital wondering abilities among the experimental magnificence and the manipulate magnificence, and there may be a large growth in vital wondering abilities in environmental training studying with the CTL version. The CTL version lets in college students to apply the brand new facts and know-how they've constructed up in the course of the environmental training studying system. Each level withinside the studying system encourages college students to observe, analyze, and assemble know-how for use to clear up problems. Therefore, it isn't sudden that college students' vital wondering abilities can expand.

This observe additionally proves that the CTL version may be implemented in training, specifically studying in kindergarten, one in every of that's environmental training. The CTL version additionally affords a few new insights summarized in aspects. First, making use of the CTL version, college students can without delay observe, perform direct activities, and experience the real scenario and situations associated with environmental training. Second, the CTL version can create a snug and exciting studying environment. In addition to freedom of concept and significant studying experiences, college students can expand vital and reflective wondering frameworks via way of means of integrating know-how and action. They can take the initiative in each step of the CTL version, reflect,

discover answers with their ideas, and bring some thing beneficial for others. Therefore, in the course of studying, college students gather and switch know-how and offer blessings to the humans round them.

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