


A Contextual Teaching and Learning Method to Enhance the Critical Thinking Abilities of Children with Special Needs

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ARTICLE INFO	ABSTRACT
Article history Received May 22, 2023 Revised Dec 15, 2023 Accepted Dec 30, 2023	<p>The study aims to examine the impact of Contextual Teaching and Learning (CTL) methods on improving the critical thinking skills of students with special needs, particularly visual, hearing, and physical impairments. Critical thinking is vital for individuals with diverse abilities, so it requires focused attention on their cognitive and socio-emotional aspects. The study uses a quantitative approach, utilizing the interrupted time series design to measure critical thinking capabilities at various intervals. The study involved four measurements, including initial observations and three post-intervention assessments. The results showed a significant improvement in critical thinking skills among students with special needs after CTL intervention. Students showed progress in explaining conditions and building arguments, while students showed advances in identifying terms, evaluating the credibility of sources, and constructing arguments. Students with physical disabilities improved in formulating alternative solutions, answering “why” questions, interpreting statements, and giving reasons. The findings underscore the effectiveness of CTL methods in developing critical thinking skills among students with special needs, stressing the need for an educational approach tailored to support their cognitive development.</p>
Keywords Critical Thinking Student with Special needs Contextual teaching Learning	

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I. Introduction

Critical thinking is an essential skill that students should possess and master in the era of globalization. Critical thinking is regulated in the 2017 Directorate General Regulation on Curriculum Structure, Core Competencies-Basic Competencies, and Curriculum 2013 Implementation Guidelines stipulate that students should have four competencies: spiritual attitudes, social attitudes, knowledge, and skills. Critical thinking is an ability that involves providing both simple and advanced (more complex) explanations, building foundational skills, analyzing data, identifying assumptions, and generating solutions to problems (Ramdani et al., 2020). Critical thinking is crucial to effectively enhancing students' problem-solving abilities, generating new ideas, and gathering evidence to solve problems (Hadiprayitno et al., 2022). This ability cannot be cultivated independently, especially for students with special needs.

Students with special needs need to enhance their critical thinking abilities due to the importance of these skills in interacting and competing globally (Retnaningrum, 2016). Recognizing the significance of

critical thinking skills for students with special needs, it becomes a challenge for teachers to enhance these abilities. Everyone has a different level of critical thinking ability, depending on the extent to which they are engaged in routine exercises to develop their critical thought skills (Fakhriyah, 2014). The statement is consistent with critical thinking abilities cannot develop independently, particularly for students with special needs Critical thinking abilities cannot develop independently, particularly for students with special needs (Lombardi & Savage, 1994). Students with special needs exhibit distinct intellectual, communication, mental, and socio-emotional abilities. These differences necessitate adaptation in the teaching methods used, tailored to the characteristics of students with special needs.

Students with special needs experience challenges in bodily functions, intellectual capacities, mental aspects, and socio-emotional dimensions. Mental support and education are provided to assist in overcoming functional limitations and activities (Russell et al., 2021). Students with special needs require modifications in educational services (Strogilos et al., 2021). According to the Individuals With Disabilities Act Amendments (IDEA) as

cited in Desiningrum (2017), which was reviewed in 2004, students with special needs can be classified into those with physical impairments (visually impaired, hearing impaired, and physically disabled), emotional and behavioral disorders (conduct disorders, speech disorders, hyperactivity), and intellectual disabilities (intellectual disabilities, slow learners, students with specific learning difficulties, gifted students, autism, and indigo children).

Visual impairment is a hindrance to the sense of sight. According to the World Health Organization (WHO), visual impairment is a disorder of visual function categorized into seven levels: no impairment, mild impairment, moderate impairment, severe impairment, blindness, slight light perception, no light perception, and no visual acuity detected (Larsen et al., 2019). Somantri (2006) explains that visual-impaired students have motor development, social, personality, language, and cognitive characteristics. In social development and personality, students have a low self and introvert tendency, while in language and cognitive development, they are slightly below standard students, but can be balanced with well and routine intervention. Among these visual impairments, visually impaired students cannot obtain information through the sense of sight. Adjustments in learning are necessary to maximize students' ability to gather information and comprehend concepts effectively (Ardiansyah et al., 2019).

Hearing impairment is a hindrance that affects the sense of hearing, necessitating specialized educational services (Aswasulasikin et al., 2023). According to the World Health Organization (WHO), hearing impairment is an inability to hear with a hearing capacity of less than 30 dB (Brown, 2020). The inability to obtain auditory information significantly hampers cognitive development (Azizah, 2018). Somantri (2006) explains that the development of languages is hampered by the inability to hear, which makes language conservation minimal. Instable emotional development where there is a possibility of misinterpretation in the negative direction and social skills that need to be developed. Behavioral and cognitive depend on the weight of use. The heavier the use, the less vocabulary affects the child's ability to process information or material, so the child tends to lag. Recommended learning strategies for hearing-impaired students involve maximizing visual and direct experiential inputs to form a similar perception.

Physical impairment is a problem with the function of muscles, bones, and joints, so they cannot function as they should. Such barriers do not have an intellectual influence but tend to affect students' academic skills (Daulay et al., 2022). According to Somantri (2006) physical development did not differ, but the limbs inhibited suffer from flatulence. There are no obstacles in the language and speech development of a child with physical impairment. Emotional, social, and personal development depends on the parenting of parents. Caring patterns have an impact

on one's self-reliance in activity. On the cognitive side, other than cerebral palsy, it does not impact cognition. Exciting and enjoyable learning can help students improve their understanding by choosing learning that matches their needs (Kadarisman & Sartinah, 2018).

Enis in Maolida (2017) explains five aspects of critical thinking skills: providing simple explanations, building foundational skills, making conclusions, providing advanced explanations, and strategies and tactics. Among these five aspects, on average, students with special needs can give simple explanations such as asking and answering, identifying, and formulating questions. This is influenced by students' cognitive abilities, the severity of their impairments, and the support from their environment.

Observations were conducted at SLB ABD Kedungkandang in classes 8A (visual impairment) with one student, 8B (hearing impairment) with five students, and 8D (physical impairment) with two students. The gathered information indicates that, on average, students' critical thinking abilities are still at the stage of providing simple explanations. This ability is influenced by students' cognitive capacities to process and comprehend the materials and the severity of their impairments.

The descriptions of visual impairment, hearing impairment, and physical disability above highlight the necessity of training critical thinking skills among students with special needs. Through critical thinking, students can develop an open-minded perspective. An open-minded perspective assists students with special needs consider various ideas, viewpoints, and opinions without bias or rejection. Critical thinking abilities in students with visual impairments, hearing impairments, and physical disabilities enable them to identify problems, analyze situations, and seek practical solutions when facing the challenges, they may encounter daily.

Choosing the appropriate teaching methods that align with the characteristics of students with special needs can enhance critical thinking abilities. Selecting suitable teaching methods can assist in information acquisition and organization when applied to basic and complex learning tasks (Weinstein et al., 2000). John Dewey, as cited in Agus (Agus, 2019), explains that new knowledge is best absorbed when relevant to everyday life. This approach has the potential to boost critical thinking abilities. Learning that connects knowledge with everyday life is contextual teaching and learning (CTL). CTL is an approach that can be used to enhance critical thinking skills (Tari & Rosana, 2019). Through CTL, students are directed toward performing experiments and constructing meaningful knowledge (Lestari et al., 2021).

Based on the above description, enhancing critical thinking skills for students with special needs is crucial. Through the subject of science, using the contextual teaching and learning (CTL) teaching method, it is anticipated that the critical thinking abilities of students

with special needs will improve throughout the learning process. These students will be observed during the instruction, guided by observation guidelines.

II. Method

This study aims to identify the impact of contextual teaching and learning methods on improving critical thinking skills in children with special needs. Therefore, the required data before and after the intervention is given, an approach that matches the purpose of the research is quantitative. The kind of research that is used is quasi-experimental research (Winarno, 2013). The interrupted time-series (ITS) design is a research design where dependent variables are measured at many different time points in a group before and after treatment. The focus is to observe changes in the trend or pattern of the variable related to time after the implementation of the intervention so that it allows the researcher to control and consider factors that influence the study's results.

ITS design is the ideal design for assessing a long-term intervention or event. This design captures changes over time by observing variables before and after intervention over a long period. By dividing time into two parts, the intervention point can be accurately identified, patterns can be investigated, and random variations can be considered. ITS design helps continuously observe, identify intervention points, and observe the development of patterns of critical thinking skills using the CTL method. This design enables control of external factors by conducting observations before and after intervention, ensuring that the observed effects can be attributed to CTL. Overall, ITS Design provides a comprehensive understanding of the long-term impact of an intervention and supports the evaluation of teaching and learning methods more effectively.

Table 1. Design Interrupted Time Series

Design Interrupted Time Series							
O ₁	X ₁	O ₂	X ₂	O ₃	X ₃	O ₄	

The research was carried out in three classes: 8A (visual impairment), 8B (hearing impairment), and 8D (physically disabled) without using control groups due to the limitations of the subjects used. Each class will be treated using contextual teaching and learning (CTL) methods to know the impact on the ability to think critically. Students will be observed after the treatment is given. In this study, data collection will be done using performance tests in the form of observations. Student activity during learning will be observed and measured using a formula set by the researcher.

Validity is the degree of measurement of data accuracy that occurs on the research object with the power that the researcher can report (Sugiyono, 2013). The validity of the contents was obtained through expert judgment by a

lecturer of the Department of Education of the State University of Malang and a practitioner, the teacher of the eighth grade at the SLB ABD Kedungkandang. Validation is done using a Likert scale that the validator will fill in.

The data that has been collected will be analyzed by examining, grouping, systematizing, interpreting, and verifying the data. The results are analyzed by performing data processes that the observer evaluated during the study. The results include observations of student's ability to think critically during learning. Scores will be analyzed using the assessment guidelines of Arifin (2017), as follows:

$$CapS = \frac{B}{N} \times 100$$

The analytical technique used is non-parametric inferential analysis with hypothesis testing using the Wilcoxon sign rank test. The Wilcoxon signed test is used when the study subject is less than 30 students. Data distribution is considered abnormal, and the average difference of the subjects concerned through pre-test and post-test values.

III. Results and Discussion

Based on the results of the research, it can be found that there is an improvement in the ability of critical thinking in students with special needs in the USS ABD State Kedungkandang. The critical thinking ability of students in need begins with the implementation of observation 1 to identify initial skills before intervention is given, then continues with three interventions using contextual teaching and learning (CTL) methods and three observations after intervention. Critical thinking skills need to be developed in students with special needs to face everyday challenges and interact effectively in the surrounding environment (Lestari et al., 2021).

In observation 1, the average ability of the student who is in the category is either on the example-giving aspect or not the example. The average student is not sufficiently capable of formulating problems, answering questions why, giving explanations, giving reasons, displaying operational definitions, and determining what to do temporarily without assistance. Whereas aspects in the category cannot identify, interpret statements, construct arguments, and formulate alternative solutions. The findings align with Khoiriyah (2018), which explains that not all students with special needs have 5 indicators of critical thinking skills.

At observation 4, students' ability to think critically in some aspects showed good progress. According to Tari and Rosana (2019), CTL learning methods can help build critical thinking skills. During the discussion activities, students are active in delivering their arguments. Yusyac et al. (2021) believe that learning methods can encourage students to be active in conversation by making

relationships between what is learned with real life. There are some unexpected things on indicators of strategy and tactics when practice takes place, but students can figure out what solutions to do to respond to such incidents.

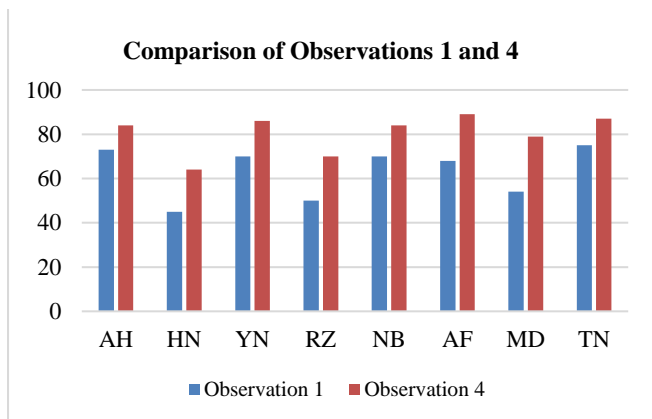


Fig. 1. Comparison of Observations 1 and 4

Figure 1 shows that observation 1 scores are lower than observation 4 scores. It can be concluded that there is an improvement in the ability to think critically after intervention.

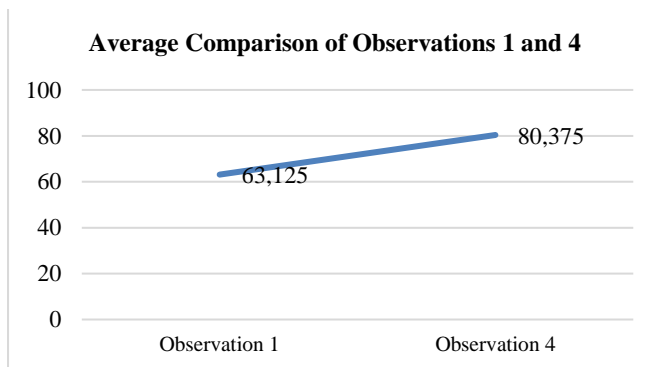


Fig. 2. Average Comparison of Observations 1 and 4

Figure 2 shows a significant increase in the average from observation 1 to observation 4. There is a rise in the observance 1 average, with a score of 63.125 to a point of 80.375 on observation 4.

Data analysis is used to test the hypothesis. The hypothesis is tested using non-parametric statistics, the Wilcoxon Signed Rank Test.

Table 2. Results of the Hypothesis Test

Observation 4 - Observation 1	
Z	-2.521 ^b
Asymp. Sig. (2-tailed)	.012

Based on the output of the statistical test in the above-known Asymp table, Sig (2-tailed) is 0.012. Since 0.012 is smaller than < 0.050 , it can be concluded that the hypothesis is accepted. This means that there is a difference between the ability to think critically in observation 1 and observation 4, so it is possible to

conclude that there has been an influence of the use of contextual teaching and learning (CTL) methods on IPA subjects to improve the ability of critical thinking of students with special needs in Class VIII at the SLB ABD Negeri Kedungkandang.

From the above exposure, it can be concluded that the critical thinking ability of students with special needs has improved after the contextual teaching and learning (CTL). The increase is indicated by the difference between the individual and overall average score, which has experienced a significant improvement.

A. Critical Thinking Abilities of Visually Impaired Students

The student's ability to think critically in aspects explains a condition or understanding undergoing improvement. Students can demonstrate an understanding of the changes in objects, such as melting, explaining the conditions of melted ice and the meltdown processes that occur. Students have cognitive constraints from a lack of experience in shaping concepts (Handoyo, 2016). Through inquiry learning by conducting experiments, present practical experiences to students by observing on ice rocks. According to Hendawati & Kurniati, (2017), through experiments, students can observe existing objects, analyze them, prove them, and draw conclusions about a particular object, circumstance, or process to find truth and principles based on experienced experience. Through the inquiry principle, students can explain a condition based on experience.

The ability to think critically about aspects of building arguments is improving. When asking for answers or discussing groups, students can convey their arguments. Students' ability to think critically depends on their level of intelligence, experience, and the amount of support around them (Al-Shenikat, 2022). The exposure explains that students need support by providing facilities for students to express their experiences. Students are dependent on rules that they already know. Through question-and-answer activities and discussions, students can rely on similar situations as a reference to convey their arguments. The statement is supported by Masrukin & Arba'i (2018) that discussion and questioning help the ability of students to solve problems supported by the submission of arguments.

CTL learning methods are applied to students by maximizing their senses and vision. Students with visual impairment gain experience from the sense of hearing and sense of peripheral. Children's mobility has been affected, resulting in less exploration of the surrounding area. According to Baraga (2001), experience should be gained by gradually paying attention to every detail or element. The principle of constructivism is used by connecting the experience between perception and hearing, in the sense of perception presenting concrete objects as a means of understanding the shape, nature, and nature of such

objects. The principle of inquiry is a principle that can support improving the understanding of students with visual impairment.

Everyone has experience is different, and the learning community helps students see from a new and different perspective. This leads students to consider the results of the deduction and identify the assumptions they have. The principles of modeling can be applied to students in maximizing tactile abilities. Modeling can help improve students' strategic and tactical ability to receive new information and ideas. The reflection principle evaluates the student's understanding of the learning course. The authentic assessment of students is done using audio and braille. Authentic evaluation is done to identify students' ability to think critically in terms of providing simple explanations and considering the credibility of sources.

B. Critical Thinking Abilities of Hearing Impairment Students

Students are determined to depend on sign language, images, and writing, which suggests that what they see will influence the student's understanding. From the previous explanation, it is known that identifying terms and considering the credibility of sources depends on the student's understanding of a notion and the understanding of concepts that students have by maximizing their ability to visualize and understand concepts. Student understanding can be developed through the principles of constructivism and social learning. Constructivism can be done by students building an understanding through learning processes that actively involve students (Muchlis & Maizora, 2018).

A learning society is a concept of learning together through exchanging minds (Depdiknas, 2002). The results of an exchange of thoughts or discussion can be presented in front of the classroom by writing on a board. Constructivism, supported by visualization and exposure to discussion findings through writing, helps students build an understanding to present operational definitions and give sound reasoning.

The ability to think critically on the building aspects of student arguments has been improved. According to Yusyac et al. (2021), students cheering through discussions are trained to work in groups to share ideas with classmates without fear. Students have problems with social development (Somantri, 2006). Minimum language skills make students during learning tend to be passive during learning. Through discussing problems that are often found in the surroundings, students' socialization skills are improved. It is a scan of the ability to think critically in presenting your arguments. Students' knowledge connected to everyday life and learning with friends keeps students active during discussions.

The CTL learning methods in the students are applied by maximizing the visualization and knowledge they already have. Through the principle of constructivism,

knowledge will be constructed based on visual experience (Depdiknas, 2002). Such experiences can be through pictures, photographs, or everyday activities. The discovery principle helps students find an idea or idea through observation and experimentation. The principle of asking students to whisper is done through signals or visual media. The inability to hear affects the ability to acquire language (Somantri, 2006).

On the principle of modeling for students, the teacher gives examples to students that students can then practice. Modeling helps the students visually to perform an activity safely. Students can decide what actions should be taken or what solutions should be given if the student is uncomfortable with the activities. Next is the principle of reflection, which evaluates students' knowledge throughout the learning process (Depdiknas, 2002). Students are given questions about the subject matter and can answer by signal, orally, or in writing. At the authentic assessment, each student is given a test that must be done to measure the student's understanding.

C. Critical Thinking Abilities of Physically Impairment Students

Critical thinking has increased by answering why, interpreting statements, and giving reasons. Students can answer questions in need. Cognitively, students are just like children in general, with no problems in thinking. (Somantri, 2006). However, a student's lack of conceptual understanding sometimes affects the ability to interpret statements and answer questions of why and give reasons. Conceptual understanding is the ability of the student to understand a concept or fact without changing the meaning, and answering the question why means giving an explanation or reason by mentioning or explaining a phenomenon, event, or event. Such an exhibition that explains why and gives a reason is unity when answering the question of the reason that will be presented. According to Muchlis & Maizora (2018), student's ability to understand concepts can be enhanced through constructivism by constructing students' knowledge and involving students to build understanding independently. A student's understanding of the concepts formed helps them interpret the statement and answer why based on their knowledge.

Through the method of learning CTL in students can be implemented by adapting the needs of students. An abnormality in muscle function results in the exploration of students not like children without movement barriers. As a result of the lack of exploration, the understanding of concepts in students is as high as other regular students. Constructivism will build students' knowledge by combining their experience with the material (Depdiknas, 2002). The inquiry principle helps people analyze and formulate problems from observations (Nurhadi, 2003). Inquiries can be done with heat transfer experiments and changes like objects, and non-experiments are observations of events or anything in the surroundings

related to the studied material. Inquiry helps to think critically, providing simple explanations, strategies, and tactics. The principle of asking is that knowledge is built through questions (Depdiknas, 2002). Questions teachers or students ask help enhance students' understanding of concepts. Through the learning community, students will be allowed to discuss with the selected learning group. Discussions help improve critical thinking on strategic and tactical aspects and provide further explanation. Students can imitate, modify, or adapt to the activities through modeling.

Based on the above exposure, learning using CTL methods supports improving critical thinking skills for students with special needs. CTL method principles can accommodate learning needs by adjusting student characteristics. Every principle is consistent in improving the ability of critical thinking especially in students with physical impairments. The inquiry principle is superior in helping students with visual impairment to think critically. On the other hand, in students with hearing impairment the principle of modeling helps understand the situation and decide the necessary action. Different characteristics of students with special needs require appropriate learning methods to help students understand and think critically. CTL methods help students connect material to experiences or situations deliberately created to make learning more meaningful. Contextual teaching and learning are one of the approaches that can be used to enhance the ability to think critically (Tari & Rosana, 2019).

The study was carried out with students with special needs, including visual impairment, hearing impairment, and physical impairment, with a total of 8 students. Subjects were taken with consideration of age over 12 years and had no intellectual barriers. However, the three subjects have different characteristics and needs, so the ability to think cannot be compared between utilities. Students with special needs refer to the different treatment of everyone with a special need, so they have different difficulties in following learning (Rosnita et al., 2022). The school environment and the family environment also influence the results of research on high-level thinking skills in students (Kurniawan & Maryani, 2016)

IV. Conclusion

The ability to think critically in children with special needs improved after interventions using the given CTL method, averaging 80,375 with very good categories. In students, the ability to think critically about explaining a condition or understanding is influenced by inquiry, and building arguments is affected by questions and responses and group discussions. In addition, students have experienced improvements in the aspects of formulating alternative solutions that are influenced by inquiry, answering questions why, interpreting statements, and giving reasons affected by constructivism.

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