

Fostering Children's Critical Thinking Skills through Problem-Based Interactive Worksheets at Sekolah Rakyat Merdeka Kalimantan Tengah

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ABSTRACT

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Critical thinking is an essential skill that must be stimulated from early childhood, particularly in non-formal learning environments that do not follow standardized instructional structures. Sekolah Rakyat Merdeka Kalimantan Tengah is an independent non-formal educational community with fluctuating participant numbers and a heterogeneous age range, necessitating flexible, engaging learning media that can be implemented within a single session. This activity aims to stimulate and foster children's critical thinking skills through problem-based interactive worksheets that promote problem identification, solution selection, and justification. The activity was conducted in one session using a descriptive-exploratory qualitative approach and employed two interactive worksheets, namely Problem and the Right Place and Problem and the Things to Use. Data were collected through direct observation, worksheet results, children's verbal responses, and scoring using a reasoning rubric on a scale of 0 to 3. The findings indicate that the problem-based interactive worksheets successfully stimulated children's basic critical thinking abilities, as reflected in the varying quality of reasoning among participants aged five to thirteen. Younger children tended to provide literal explanations, whereas older children demonstrated more logical and analytical reasoning. These findings suggest that problem-based interactive worksheets are practical, simple, and easily adaptable learning media for fostering children's critical thinking skills in non-formal educational contexts.

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I. INTRODUCTION

Critical thinking is a fundamental skill that must be cultivated from an early age, as it relates to children's ability to analyze information, understand situations, and make appropriate decisions in daily life (Ren et al. 2020). The stimulation of critical thinking skills does not emerge automatically; instead, it requires guided learning experiences, prompting questions, and learning media that encourage children to provide reasons and consider their choices (Rusmin et al. 2024). In Indonesia, efforts to cultivate critical thinking are often concentrated within formal education. However, the context of non-formal education presents different challenges, particularly within alternative learning communities that lack standardized curricula, have limited learning resources, do not follow fixed instructional structures, and involve participants with highly heterogeneous age ranges. One such non-formal educational community with these characteristics is Sekolah Rakyat Merdeka Kalimantan Tengah, an independent community that is not affiliated with the government or any formal institution. This community operates autonomously through collaboration with various local groups, volunteers, and universities. The number of participants attending each meeting varies and depends heavily on the activities conducted that day, with ages ranging from 4 to 13 years old. Based on preliminary observations, learning activities at Sekolah Rakyat Merdeka tend to focus on play-based activities, general assistance, coloring, drawing, and thematic activities resulting from collaborations with different communities. While these activities contribute positively to children's creativity and social development, they do not specifically stimulate higher-order thinking skills, especially in reasoning. This condition aligns with findings

from other community engagement programs, which highlight that non-formal educational communities often face limitations in the availability of media and methods capable of systematically fostering cognitive development (Lausa, Rahman, and Puspitasari 2024; Wihartati and Sari 2025). Given these conditions, there is a need for learning media that are simple, engaging, applicable within a single meeting, flexible across age variations, and still capable of stimulating critical thinking skills. One medium that can address these needs is problem-based interactive worksheets, which are visual task sheets that present simple problem situations, invite children to connect a problem with an appropriate solution, and then require a justification for "why" (Dewi 2020). This medium incorporates elements of game-based learning that enhance children's participation and focus while simultaneously encouraging the development of reasoning as an early foundation for critical thinking skills (Muzakka et al. 2025).

Various studies have shown that problem-based visual stimuli can enhance children's engagement and reasoning abilities, particularly in contexts with limited resources (Lubis, Lubis, and Anas 2022). Although problem-based approaches have been widely implemented in formal education, their application in independent non-formal settings such as Sekolah Rakyat Merdeka Kalimantan Tengah, primarily through interactive worksheets that can be used within a brief single session, remains rarely reported in community service programs. Furthermore, there is no practical assessment model available for measuring children's reasoning quality in non-formal contexts, even though such an assessment is essential for understanding the extent to which learning media can stimulate critical thinking skills (Zannrni 2022). Therefore, this community engagement activity aims to stimulate and foster children's critical thinking skills through problem-based interactive worksheets at Sekolah Rakyat Merdeka Kalimantan Tengah, and to analyze children's reasoning quality using a 0–3 rubric that evaluates types of justification ranging from literal to analytical. This activity is expected to offer practical contributions in the form of a learning media model that various non-formal educational communities with heterogeneous participant characteristics can adopt. In line with these objectives, this study formulates the following research question:

1. How do problem-based interactive worksheets stimulate children's critical thinking skills at Sekolah Rakyat Merdeka Kalimantan Tengah?
2. What is the quality of children's reasoning abilities based on the 0–3 assessment rubric after participating in the problem-based interactive worksheet activity?
3. How do children's critical thinking skills vary across different age groups within the context of independent non-formal education?

II. PROBLEM DESCRIPTION

Sekolah Rakyat Merdeka Kalimantan Tengah is a non-formal educational community located on Jalan S. Parman, specifically in an open area beneath the Kahayan Bridge. The learning activities in this community are conducted on a weekly basis, with a variable number of participants from diverse age ranges. Preliminary observations indicate that the activities of children primarily consist of coloring or playing. While these activities are undoubtedly beneficial, they have not specifically encouraged children to connect problems with solutions or express reasons for the choices they make. Concurrently, the ability to engage in critical thinking has become an increasingly essential skill for children to comprehend various learning contexts and make informed decisions. In light of this necessity, there is a pressing demand for a learning medium that is uncomplicated, adaptable, and efficacious. This medium should be capable of providing initial stimulation while concurrently cultivating children's critical thinking abilities within a single non-formal learning session. Therefore, the objective of this community service activity is to facilitate a more meaningful thinking process among children by employing problem-based interactive worksheets.



Figure 1. Learning Location under Kahayan Bridge

III. METHOD

Instruments and Materials

The main instrument used in this activity was a set of problem-based interactive worksheets designed to stimulate children's critical thinking skills through problem identification, solution selection, and justification. The worksheets were printed on 80 gsm A4 paper with full-color visual designs. They consisted of two sections, Problem and the Right Place and Problem and the Things to Use, each containing five to six illustrations depicting simple problem situations relevant to children's daily lives. The worksheet design followed principles of game-based learning, utilizing visual elements, action choices, and problem stimuli to encourage children's engagement. Visual media of this type have been shown to be effective in enhancing children's focus and comprehension within activity-based learning. Visual games also support the emergence of reasoning processes by providing concrete contexts that young learners easily understand (Kaushik and Bhau 2025). Critical thinking skills were assessed using a 0–3 reasoning rubric that evaluates the quality of children's justifications across four categories: no reasoning (0), literal reasoning (1), simple logical reasoning (2), and analytical reasoning (3). The rubric was applied to evaluate children's verbal responses during the activity. In addition to the worksheets and rubric, supporting instruments included observation sheets, writing tools, and work mats to facilitate children's participation (Andriani and Hamdu 2021). These materials were selected to ensure that the activity remained practical, flexible, and adaptable to varying participant numbers in each meeting, as recommended in non-formal education practices (Rogers et al. 2005).

Implementation Method

The community engagement activity was conducted at Sekolah Rakyat Merdeka Kalimantan Tengah, an independent, non-formal educational community located under the Kahayan Bridge on Jalan S. Parman in Palangka Raya City. The number and age range of participants in this community vary from one meeting to another, which necessitated a flexible activity design aligned with the characteristics of non-formal learning environments. The activity was carried out in a single session lasting approximately 90 minutes and was structured adaptively in accordance with the principles of community learning flexibility.

1. Introduction and Orientation

The opening stage aimed to build rapport and foster a conducive learning atmosphere through light games, ice-breaking, and brief conversations. This approach is effective in increasing participation, particularly among young children and helps facilitators identify the age range and condition of participants present.

2. Implementation of the Problem-Based Interactive Worksheets

In the main stage, children were given the worksheets and asked to observe each illustration. Facilitators posed guiding questions such as "What is happening in the first picture?", "What should be done?", and "Why did you choose that answer?" These questions were intended to stimulate reasoning in line with the principles of guided questioning, which have been shown to foster children's critical thinking skills. All

children's justifications were recorded and assessed using the 0–3 reasoning rubric. Interactions were conducted individually or in small groups, depending on the number of participants.

3. Reflection and Closing

After completing all worksheet sections, facilitators conducted a brief reflection session on the decisions children made and their consequences. This reflection stage helps strengthen understanding of cause–and–effect relationships and supports meaningful learning. The activity concluded with an expression of appreciation for the children's participation.

Data obtained from observations, children's verbal responses, and worksheet results were analyzed using a qualitative descriptive approach. The analysis involved grouping reasoning scores, comparing reasoning patterns across age groups, and interpreting the findings in light of learning dynamics in non-formal environments.

IV. RESULTS AND DISCUSSION

The community engagement activity was conducted in a single session at Sekolah Rakyat Merdeka Kalimantan Tengah and was attended by 23 children aged 4 to 13 years.



Figure 2. Activity Poster

The activity began with a warm-up worksheet on color–fruit matching, intended to build children's focus and not included in the assessment. The children then completed two problem-based interactive worksheets containing simple illustrations and everyday situational contexts. Each child provided verbal justifications for their choices, and all justifications were assessed using the 0–3 reasoning rubric. Observational findings indicate that all participants completed the worksheets and provided verbal explanations, although the quality of their reasoning varied by age and language ability. In general, there was individual variation: one child aged 4–5 scored 0, several children aged 6–10 scored 2, and the remaining participants scored 1 or 3. These variations did not alter the overall scoring tendencies within each age group.

Table 1. Reasoning by Age

Age Group	Number of Children	Dominant Score	Reasoning Category
4-5 years	5	1	Literal reasoning
6-7 years	6	3	Analytic reasoning
8-10 years	8	3	Analytic reasoning
11-13 years	4	3	Analytic reasoning

The overall results show that every child was able to justify their choices on the worksheet. None of the participants refused to give reasons when prompted with guiding questions, although the quality of their

reasoning varied by age and verbal ability. These initial findings serve as an entry point for understanding how problem-based interactive worksheets function as cognitive triggers within non-formal learning contexts. This aligns with the view that children's critical thinking skills can be developed through challenging, contextual learning experiences that require active meaning-making. Accordingly, the following discussion focuses on the mechanisms by which these worksheets stimulate critical thinking and on how children's responses relate to the worksheet design and the facilitation strategies used.



Figure 3. Children Working on the Interactive Worksheets

Cognitively, the two types of worksheets administered presented different challenges that activated varying levels of thinking processes. The Problem and the Right Place worksheet stimulated context-based reasoning, requiring children to match a situation with the most relevant location. Meanwhile, the Problem and the Things to Use worksheet encouraged function-based reasoning, which required children to understand the purpose and utility of specific objects before making a choice. Such problem structures have been shown to expand children's cognitive processes beyond simple image recognition toward considering cause and effect relationships and the goals of actions. The intervention's effectiveness depended not only on the visual media but also on the facilitator's guidance during interactions. Active facilitation through prompting questions such as "Why did you choose this answer instead of the others?", "What is this object used for?", or "What would happen if you chose a different one?" served as a key mechanism encouraging children to articulate their thinking processes in a more structured manner.



Figure 4. Guide Questioning (1)

Guided questioning has been shown to improve children's reasoning quality by prompting them to develop cause-effect connections, provide justifications, and evaluate decisions. Additionally, the facilitator's verbal scaffolding helped children transition from intuitive understanding to explicit reasoning a crucial shift, especially for children in the preoperational or early concrete operational stages (Hardy, Stephan-Gramberg, and Jurecka 2021).



Figure 5. Guide Questioning (2)

In the context of non-formal education, such as Sekolah Rakyat Merdeka Kalimantan Tengah, the dynamics of activities become more complex. The heterogeneous age range, open learning environment, and limited curriculum structure require flexible, easy-to-understand media that require minimal instruction. Interactive worksheets can be used without extreme differentiation by age, but remain challenging enough to stimulate reasoning in younger age groups. Simple visualisations and problem contexts that are close to children's lives facilitate understanding without lengthy instructions. These findings align with previous community service programs that emphasise the importance of visuals and problem-based activities in increasing children's engagement (Nemakhavhani 2024). However, this community service provides an additional contribution by using a reasoning rubric as a systematic evaluation tool. This rubric allows for structured assessment of the quality of reasoning across different age groups and of children's critical thinking skills. Thus, this activity not only facilitates learning experiences but also produces a rich descriptive picture of the characteristics of reasoning that emerge in alternative educational environments. The efficacy of problem-based interactive worksheets in fostering cognitive triggers that facilitate children's fundamental critical thinking skills is evident (Rahmawati, Rahmadani, and Imamah 2025). Problem visualisation helped children focus their attention, while the task structure provided a framework for evaluating situations and choosing solutions. When combined with appropriate facilitation techniques, the worksheets transformed simple activities into meaningful analytical thinking processes. These findings are consistent with the principles of problem-based learning, which emphasise authentic problems as key drivers of reasoning (Smith et al. 2022), as well as game-based learning theory, which highlights how visual elements, challenges, and choice-making enhance children's focus and reasoning quality (Rajendran et al. 2024). Thus, problem-based interactive worksheets function as media capable of fostering critical thinking skills even within short interventions particularly in non-formal environments with highly heterogeneous participant groups.



Figure 6. Children Showing Their Completed Worksheets

V. CONCLUSION

This community engagement activity demonstrates that problem-based interactive worksheets can stimulate and cultivate children's foundational critical thinking skills in heterogeneous non-formal learning environments. Through a combination of visual elements, simple problem contexts, and active facilitation using guiding questions, children were able to develop more structured reasoning in accordance with their cognitive developmental capacities. The learning media proved effective, flexible, and easily adaptable across a wide age range, making it a relevant instructional alternative for educational communities such as Sekolah Rakyat Merdeka Kalimantan Tengah. This activity also shows that mapping children's reasoning using a simple rubric can yield rich qualitative insights into their thinking. For future programs, it is recommended that activities be carried out over multiple sessions to allow for more in-depth observation of reasoning progression, as well as to develop worksheet variations that challenge analytical skills and support more complex problem exploration.

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