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Framing Early Childhood Creativity: Integrating Local Culture Visualization into the DACAR Learning Model

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ABSTRACT

Early childhood requires an active, collaborative, and contextual learning approach to develop fundamental cognitive abilities, critical thinking, and creativity. The integration of local-culture-based visual technology into the DACAR (Description, Analysis, Story, Reflection) learning model is believed to enrich the learning experience and instill cultural values from an early age. This quantitative study employed a one-group pretest–posttest design at TK ABA 69 Surabaya (n = 28, aged 5–6 years), using assessment instruments based on a 1–3–5 rubric across seven indicators of cognitive and creative development. Data were analyzed descriptively and inferentially: a paired t-test was used for normally distributed data, while the Wilcoxon Matched-Pairs Test was used if normality assumptions were not met. Mean score visualizations per indicator were presented to complement the statistical interpretation. Although posttest mean scores increased across all indicators, only the second indicator (relevance of questions to the material) showed a statistically significant improvement (median difference = 0.5; CI = 0.5–1; p < 0.05). The other six indicators—curiosity, experiential connection, analysis, local culture mastery, creation, and imagination—had median differences of 0–0.5 with confidence intervals including zero (p > 0.05), indicating inconsistent changes. These findings confirm the effectiveness of visual technology in enhancing contextual questioning but highlight that developing higher-order thinking skills (HOTS) and creativity requires deeper, more exploratory, and sustained interventions. Limitations such as the one-month intervention period and children's prior familiarity with local cultural content were identified. Future recommendations include enriching the assessment scale (1–5), implementing tiered project assignments, and combining digital and physical media to stimulate critical thinking, analysis, and creative expression in children.

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1. INTRODUCTION

Early childhood is a critical stage for developing basic cognitive abilities. During this period, children begin to develop the capacity to understand abstract concepts through real-life experiences. Therefore, learning approaches that stimulate exploration and reflection are essential. Active, collaborative, and authentic learning, as part of cognitive learning models, can provide opportunities for children to think deeply, solve problems, and build a stronger understanding of the world around them. Recent studies show that exploratory learning activities, such as play-based learning, have significant potential to enhance problem-solving skills, critical thinking, and conceptual understanding in early childhood (Annuar et al., 2024). Moreover, project-based learning and physical activities have also been proven to stimulate deeper cognitive development in children (Salmawati, 2023).

Alongside these developments, the STEAM Loose Part method, which emphasizes freedom to explore and problem-solve, has been shown to be effective in enhancing creativity and problem-solving skills in young children (Muntomimah & Wijayanti, 2021). This approach, which aligns with cognitive development theories, allows children to think critically, evaluate situations, and find solutions while forming abstract concepts through real experiences. Thus, this learning model strongly supports the cognitive development stage of early childhood, fostering the critical thinking skills necessary to face real-world challenges (Annuar et al., 2024; Muntomimah & Wijayanti, 2021).

With the progress of globalization and technology, the field of education—particularly early childhood education (ECE)—has undergone significant changes. One major change is the integration of technology into learning, which can enrich children's educational experiences. Local wisdom-based visual technologies, such as videos, animations, and interactive images, not only enrich the learning process but also help children grasp abstract concepts in more concrete and engaging ways. By utilizing these technologies, children can more easily connect learning materials with their everyday experiences, thus facilitating deeper understanding. Recent studies indicate that appropriate use of technology can enhance cognitive, language, and artistic development, as well as boost learning motivation in early childhood (Emi et al., 2024; Sulistyaningtyas et al., 2023). Consequently, visual technology becomes a highly effective tool for making abstract concepts more relatable and understandable to young children (Emi et al., 2024).

However, the integration of technology into early childhood education is not without challenges. One issue is that teachers often struggle to maintain children's attention and select tools appropriate to their developmental stage (Sutiyono et al., 2022). Furthermore, integrating local wisdom into early childhood education is increasingly important, as it not only helps children understand their own culture but also prepares them to become global citizens. Although teachers

generally have positive attitudes toward the use of technology, they still require support to integrate it effectively into their pedagogy (Sutiyono et al., 2022; Sulistyanyingtyas et al., 2023). Therefore, while technology offers great potential, its integration must be implemented wisely and in accordance with children's cultural contexts.

Aligned with these considerations, the DACAR (Description, Analysis, Story, and Reflection) learning model provides an approach that actively engages children in the learning process by encouraging them to gather information, analyze situations, create narratives, and reflect on their experiences. Local-culture-based visual technology—such as folklore animations, traditional cultural videos, or AR simulations of traditional houses—can enrich every phase of DACAR. This integration not only introduces local cultural contexts to children but also fosters the development of critical thinking skills. Existing studies support the importance of embedding local culture into early childhood education, as it enhances children's engagement and sense of belonging to the learning material, while strengthening their cultural identity (Rohmatun & Zufahmi, 2024). Early introduction to local culture has been shown to nurture politeness, nationalism, and openness toward other cultures, while effectively fostering moral values and socio-environmental character (Afriliani et al., 2023; Martati et al., 2019). Thus, incorporating local wisdom-based visual technologies into the DACAR model not only enriches learning experiences but also contributes to cultural preservation and character building.

The research problem arising from this review is how the application of local-culture-based visual technology can be made more effective in enhancing young children's cognitive abilities, particularly critical and creative thinking. Although visual technology has proven beneficial in several aspects, the major challenge remains how to optimize its use to stimulate higher-order thinking skills such as analysis and creativity, which are not yet fully achieved through current learning approaches.

This study aims to develop and implement the DACAR learning model combined with local-culture-based visual technology to enhance young children's cognitive abilities. The novelty of this study lies in the integration of local-culture-based visual technology into the DACAR model, offering a more contextual and culturally relevant approach to children's experiences. The study focuses not only on cognitive development but also on fostering deeper appreciation for local cultural values. Additionally, this study seeks to explore the potential of visual technology in strengthening critical and creative thinking skills among children, an area that has been relatively under-researched.

The implications of this research are significant for educators, content developers, and policymakers. For teachers, the study provides insights into more effective ways to integrate visual technology into early childhood learning. For educational content developers, it offers guidance in designing more interactive,

culturally based learning materials. For policymakers, the findings could serve as a foundation for developing innovative and culturally relevant curricula that meet the needs of early childhood education in the digital era. It is expected that the results of this study will make a meaningful contribution to the development of curricula and learning strategies that holistically support children's growth amid rapid technological advancements.

2. METHODS

The research method should be included in the Introduction. The method contains an explanation of the research approach, subjects of the study, the conduct of the research procedure, the use of materials and instruments, data collection, and analysis techniques. The implementation of the DACAR (Description, Analysis, Storytelling, and Reflection) learning model integrated with local wisdom-based visual technology for early childhood education was carried out at TK ABA 69 Surabaya during the research period from March to April 2025. The study involved children from TK B class with a total sample of 27 participants. This research was conducted through three main stages: planning, implementation, and evaluation.

1. Planning

The planning phase for local wisdom-based learning began with the selection of themes relevant to the children's local cultural context. Several steps were carried out during this phase:

a) Selecting Learning Themes Based on Local Wisdom

Themes were focused on aspects of local culture easily recognized by children, such as traditional houses, folklore, and traditional foods. These themes were chosen to introduce culturally relevant values and to familiarize children with the rich cultural diversity of Indonesia.

b) Selecting Appropriate Visual Technology for Children's Age and Abilities

The visual technologies used in this learning model included Augmented Reality (AR), animated videos, and interactive images. AR was employed to introduce cultural objects in an interactive manner, while animated videos were utilized to present folklore in an engaging way. The selected technologies were adjusted to match the cognitive development level and capabilities of early childhood learners.

2. Implementation

The implementation stage was conducted according to the previously developed plan. During this phase, several learning activities involving local wisdom-based visual technology were carried out:

a) Using AR to Introduce Local Cultural Objects

Children were introduced to cultural objects through AR technology, such as traditional houses and cultural symbols. The use of AR provided an engaging and interactive learning experience for the children.

b) Screening Animated Videos for Folklore

Animated videos were used to illustrate folklore related to local culture. Children were encouraged to discuss the stories, recognize the values conveyed within, and relate these values to their daily lives.

c) Engaging Children in Digital Games

Children participated in digital games designed to enhance their critical and creative thinking skills. These games focused on problem-solving tasks related to the cultural themes studied.

3. Evaluation

The evaluation phase was conducted to assess the extent to which the learning objectives were achieved. It employed a combination of a scoring rubric and activities that allowed children to recount their learning experiences.

a) Scoring Rubric

Assessments were based on a rubric covering children's participation in DACAR activities, their ability to describe cultural objects, and their understanding of the folklore studied. The rubric and assessment instruments are presented in Table 1.

b) Recounting Learning Experiences

Children were given opportunities to recount their experiences through speaking or drawing activities, enabling them to integrate and reflect on the knowledge they had acquired.

Table 1. Scoring Rubric and Instrument

Indikator	Instrumen Pretest	Instrumen Posttest	Skor (1, 3, 5)
1. Anak menunjukkan rasa adat) dan tanyakan: "Apa yang ingin tahu dengan ingin mengajukan pertanyaan mengajukan pertanyaan	Tampilkan gambar objek budaya lokal (misal rumah ingin kamu tanyakan tentang ini?" Catat apakah anak bertanya dan apa pertanyaannya.	Setelah belajar, tunjukkan gambar yang sama dan tanyakan lagi: "Ada pertanyaan baru?"	1 = Tidak ada pertanyaan 3 = Ada pertanyaan sederhana 5 = Ada pertanyaan yang mendalam
2. Pertanyaan anak relevan dengan materi disampaikan	Saat anak bertanya tentang objek budaya, apakah pertanyaan mereka tentang fungsi atau ciri khas objek.	Setelah pembelajaran, perhatikan apakah pertanyaan anak masih sesuai dengan materi yang diajarkan.	1 = Tidak relevan 3 = Relevan tapi sederhana 5 = Relevan dan mendalam
3. Anak menghubungkan	Tanyakan: "Apakah kamu pernah melihat sesuatu yang	Setelah belajar, tanyakan lagi: "Apa yang kamu	1 = Tidak ada kaitan 3 = Menyebutkan satu pengalaman

Indikator	Instrumen Pretest	Instrumen Posttest	Skor (1, 3, 5)
dengan pengalaman atau pengetahuan sebelumnya	mirip dengan ini di rumah atau sekolah?"	ingat dari pembelajaran ini?"	5 = Menghubungkan dengan lebih banyak pengalaman 1 = Tidak bisa
4. Anak menunjukkan kemampuan untuk menganalisis atau menyimpulkan informasi	Setelah menonton video animasi, tanyakan: "Apa yang terjadi di cerita ini?"	Setelah sesi diskusi, tanyakan: "Apa yang kamu pelajari dari cerita tadi?"	3 = Menyebutkan bagian cerita 5 = Menghubungkan pesan atau moral cerita
5. Anak mengenal dan memahami elemen budaya lokal melalui teknologi visual	Tanyakan setelah melihat AR atau video: "Apa yang kamu lihat di gambar ini?"	Tanyakan setelah belajar: "Apa yang kamu tahu tentang rumah adat atau cerita ini?"	1 = Tidak tahu 3 = Menyebutkan sedikit informasi 5 = Menyebutkan ciri khas budaya lokal
6. Anak mampu menciptakan sesuatu berdasarkan teknologi visual yang dilihat (contoh: menggambar, bercerita)	Setelah melihat gambar atau video, beri kesempatan anak menggambar atau bercerita tentang apa yang mereka lihat.	Setelah pembelajaran, beri kesempatan anak untuk membuat gambar atau cerita yang lebih kreatif tentang budaya lokal.	1 = Tidak menggambar/bercerita 3 = Menggambar/bercerita sederhana 5 = Menggambar/bercerita dengan detail dan imajinasi
7. Anak menunjukkan imajinasi dan kreativitas dalam kegiatan menggunakan teknologi visual	Tanyakan: "Buatlah cerita sendiri berdasarkan gambar yang kamu lihat!"	Setelah pembelajaran, beri anak kesempatan untuk membuat alur cerita sendiri dari materi yang dipelajari.	1 = Tidak ada imajinasi 3 = Imajinasi sederhana 5 = Imajinasi yang sangat kreatif

This study employed a descriptive statistical approach with a one-group pretest–posttest design to evaluate the effectiveness of the intervention. Data were collected through pretest and posttest assessments, which were supplemented with a scoring rubric for each step of the DACAR model—ranging from the description of cultural objects, story analysis, to children's creative reflection—allowing each skill aspect to be systematically measured. After data collection, the distribution of pretest and posttest scores was examined; if the data met the assumption of normality, the differences were analyzed using a paired t-test. If the distribution was not normal, the Wilcoxon Matched-Pairs Test was used instead. Both tests aimed to determine whether there were statistically significant differences between the children's scores before and after the implementation of the local wisdom-based visual technology learning model.

3. FINDINGS AND DISCUSSION

Fig. 1. illustrates the comparison of the average pre-test (blue) and post-test (green) scores across the seven indicators of the DACAR learning model based on local wisdom visual technology. Subsequently, each indicator will be discussed in depth, referring to the visualization while maintaining the descriptive statistical results and supported by relevant literature.

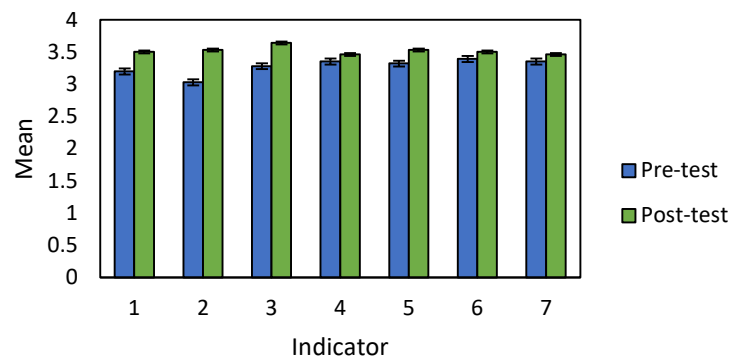


Fig 1. The comparison of the average pre-test (blue) and post-test (green) scores

The first indicator showed a median difference between posttest and pretest scores of 0.5, with a 94.98% confidence interval ranging from (0, 0.5), indicating a slight increase but not statistically significant. This suggests that although some children experienced an improvement in curiosity, the changes were not consistent across all respondents, possibly influenced by factors such as the children's confidence in asking questions and the classroom's social climate. Previous studies have shown that direct and interactive interventions—such as live science demonstrations—tend to be more effective in fostering curiosity. For instance, Kaltakci and Gurel (2016) reported a significant increase in students' scientific curiosity scores following direct demonstrations. Similarly, Özkan and Topsakal (2020) found that nature education activities could enhance affective tendencies toward the environment and scientific curiosity. Conversely, interventions limited to single quiz formats do not always yield meaningful changes, as D'Souza and Manjunath (2020) observed no significant increase after a one-time quiz intervention, underscoring the importance of intervention designs that consider duration, intensity, and the learning context.

On the other hand, the second indicator showed a median difference of 0.5, with a 94.98% confidence interval ranging from (0.5, 1), statistically confirming a significant improvement between pretest and posttest scores. This finding highlights that visual technology-based learning effectively assists children in posing questions relevant to the material, aligning with contextual learning principles that link material to concrete experiences through visualization. Empirical evidence shows that visual technology can enhance students' comprehension and learning motivation (Katsioloudis, 2007), while teaching students to formulate questions about the material studied has been shown to significantly improve understanding, with median effect sizes ranging from 0.36 to 0.86 depending on the type of assessment (Rosenshine et al., 1996).

While the second indicator recorded significant improvement, the third indicator showed a median difference of 0.5, with a confidence interval between (0, 0.5), suggesting that although some improvement occurred, the difference was not statistically significant because the confidence interval included zero. This finding indicates that children's ability to connect visuals with previous experiences or knowledge was influenced by their diverse backgrounds and life experiences. Visual literacy is crucial for helping children navigate and interpret visual media, with significant benefits if introduced early (Lopatovska, 2016). Picture books, for example, offer opportunities for children to relate personal experiences and express them through visual arts (Mantei & Kervin, 2014). Such approaches can enhance self-awareness, foster creativity, and promote empathetic perspectives regarding human similarities and differences (Shipe, 2018), highlighting the importance of further exploration in actively engaging students in visual-based learning.

However, despite the improvements observed in the third indicator, the fourth indicator showed a median difference of 0.0, with a confidence interval between (0, 0.5), indicating no statistically significant change between pretest and posttest scores. This may be due to the fact that the ability to analyze and draw conclusions represents higher-order thinking skills (HOTS), which cannot develop

through passive visual presentations alone. These skills require a more exploratory and interactive learning environment that allows students to think critically, analyze information deeply, and draw structured conclusions. HOTS are vital in 21st-century learning, encompassing skills such as analyzing, evaluating, and creating (Dhewa et al., 2017). To foster HOTS effectively, educational approaches must actively involve students in problem-solving activities while cultivating creativity and innovation (Jaenudin et al., 2020). Thus, to develop HOTS, education must incorporate not only visual strategies but also interactive and problem-solving-based methods.

Aligned with the emphasis on higher-order thinking skills discussed in the fourth indicator, the fifth indicator showed a median difference of 0.0, with an extremely narrow confidence interval (0, 0), indicating no variation or change in scores. This suggests that the local cultural material presented through visual technology was already highly familiar to the children at the outset, or that a ceiling effect occurred, whereby the children had already mastered the material. Consequently, the intervention did not produce a significant additional impact. Research has shown that interventions utilizing multimedia and culturally relevant materials can effectively enhance various skills in young children. For example, a learning trajectory-based curriculum significantly improved preschoolers' mathematical skills (Clements et al., 2011), and culturally-based video learning content was found to positively impact teachers' skills and children's tolerance attitudes in Bali (Pembelajaran et al., 2024). Nevertheless, in some cases, interventions may not show significant impacts if children are already familiar with the material or have reached a learning ceiling.

The sixth indicator showed a median difference of 0.0 with a confidence interval between (0, 0.5), suggesting that although some respondents showed improvement, the overall difference was not statistically significant. The ability to create something, such as drawing or storytelling, requires creative stimulation and deeper practice. The visual material presented may not have been sufficiently challenging or stimulating to trigger strong creative impulses in the children. Therefore, a learning approach that focuses more on creative exploration, such as project-based activities or workshops, is needed to foster children's creative expression. Research indicates that developing children's creativity requires targeted approaches and stimulating environments. Project-based learning models have shown promising results in enhancing children's creativity (Sadaruddin et al., 2023). In addition, pragmatic approaches to creativity have also successfully stimulated children's cognitive creative skills and overall development (Kusnadi & Ismail, 2020). These findings underscore the importance of diverse and tailored methods to foster children's creative expression and development.

Similar to the findings for the fourth and sixth indicators, the seventh indicator showed a median difference of 0.0, with a confidence interval between (0, 0.5), indicating that while there was an indication of improvement, the change was not statistically significant. Imagination and creativity are complex competencies that cannot be stimulated through passive visualization alone. Without exploratory activities and open-ended challenges to develop imagination, children may not demonstrate significant changes in creativity. A more dynamic, project-oriented learning approach would be more effective in fostering imaginative and creative skills in children. Research shows that creative activities and imagination play crucial roles in children's cognitive and creative development, with activities such as music, art, and storytelling enhancing originality and problem-solving skills (Aulakh et al., 2024). Creative visualization techniques have also shown positive impacts on children's independence, innovation, and collaboration (Piasecka, 2022). These methods, which go beyond passive visualization, offer exploratory activities and open-ended challenges that can lead to significant improvements in children's creativity and cognitive abilities.

4. CONCLUSION

Among the seven analyzed indicators, only the second indicator showed a statistically significant improvement in post-test scores, while the others did not show significant differences. This indicates that the effects of the applied intervention were not uniformly distributed across all assessed aspects. Certain skills, such as analysis and creativity, may require a longer time and more in-depth

methods to develop higher-order thinking skills and creative expression. Moving forward, enhancing learning outcomes will require the strengthening of more interactive and project-based methods that can better support the development of critical thinking and creativity skills in young children.

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