

Interactive Pop-Up Storybooks as a Medium to Cultivate Tolerance in Early Childhood: A Local Wisdom Approach

Rizki Sevi Triana*, Hisbiyatul Hasanah, Eva Aini Desta Ningsih, Indah Kharismawati

Universitas PGRI Argopuro Jember, Jl. Jawa No.10 Jember, 68121. Indonesia

*Corresponding Author: rizkisevi5@gmail.com

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Abstract: Interactive learning media play a crucial role in promoting cognitive and social development in early childhood education. This study aims to develop an interactive pop-up storybook based on local wisdom as a medium to foster the value of tolerance in young children. Using the 4D Research and Development (R&D) model (Define, Design, Develop, Disseminate), the study involved children aged 4–6 years enrolled in early childhood education programs. The Define stage identified needs, analyzed curriculum alignment, and explored cultural relevance. The Design stage produced a prototype integrating local cultural values, interactive features, and multisensory elements to enhance engagement and understanding of social values. The Develop stage included validation of the prototype by experts in early childhood education, child psychology, and local wisdom, resulting in an overall validity score of 90.2% (highly valid), followed by a limited trial which showed significant improvements in engagement, social interaction, and children’s understanding of tolerance. The Disseminate stage evaluated the usability of the media by teachers, achieving a high score of 87.5%. The results indicate that the interactive pop-up storybook effectively enhances cognitive, social, and emotional engagement while instilling tolerance and social values. This study underscores the potential of culturally contextualized interactive media to strengthen holistic learning experiences, learning motivation, and the development of inclusive social character in early childhood.

Keywords: Interactive learning media, pop-up storybook, local wisdom, tolerance, early childhood education, multisensory learning.

INTRODUCTION

Interactive learning media play a significant role in shaping cognitive and social development in early childhood education (Nurhadi & Santoso, 2024). Among various innovative learning media, interactive storybooks, particularly pop-up books, have been recognized as effective tools for engaging learners, stimulating imagination, and supporting moral and emotional development (Chen et al., 2023; Tan & Lim, 2025; Yeo & Chua, 2022). Pop-up storybooks, with their three-dimensional and interactive features, provide rich multisensory experiences that can enhance children’s understanding of abstract concepts, foster creativity, and encourage active participation and collaborative learning during the educational process (Li et al., 2024; Hassan et al., 2023; Kumar & Singh, 2022). These interactive features not only make learning more enjoyable but also help children internalize social

values and develop problem-solving skills through exploration and hands-on engagement.

Early childhood is a crucial period in a child’s development, during which the foundations of social, emotional, and cognitive skills are established, profoundly influencing interactions and relationships throughout life (Hosokawa, 2024; Li & Zhang, 2023). At this stage, children learn essential skills such as communication, empathy, cooperation, problem-solving, and conflict resolution, which help them understand their own emotions and those of others, build meaningful relationships, and navigate the social world around them (Unishanoi, 2025; Kim et al., 2022). Instilling social values such as tolerance, empathy, collaboration, and respect for diversity during early childhood is critical for preparing children to engage positively and live harmoniously in multicultural societies (Gomez & Patel, 2022; Ahmed & Noor, 2023). Character education that emphasizes these values can nurture socially

aware individuals who are capable of adapting to diverse environments, demonstrating prosocial behavior, and contributing to inclusive communities (Junita et al., 2023; O'Connor & Clarke, 2024).

Local wisdom, reflecting deep-rooted cultural values, traditions, and norms, provides a rich and meaningful resource for nurturing social, moral, and ethical values in young learners (Setiawan, 2023; Rahmawati & Hadi, 2022). Integrating local wisdom into learning media not only preserves and transmits cultural heritage across generations but also makes learning experiences more relevant, contextualized, and engaging for children (Wijaya & Hartono, 2024; Putra et al., 2023). This approach allows children to learn within a familiar cultural framework, fostering stronger comprehension, internalization of social values, and the development of identity and cultural awareness (Sakti, 2024; Fauziyah & Kurniawan, 2023). Therefore, it is essential to design and implement learning media that embed local wisdom to cultivate essential social values, such as tolerance, empathy, cooperation, and respect for diversity, during early childhood. One particularly promising medium is an interactive pop-up storybook based on local wisdom, which can present narratives, cultural norms, and moral lessons in a format that is visually stimulating, engaging, and easily comprehensible for young children (Anggreni et al., 2025; Santoso et al., 2023). Such media not only promote active learning but also provide opportunities for children to connect personal experiences with cultural and ethical concepts in a playful and memorable way.

Despite its widely recognized benefits, implementing tolerance education effectively in early childhood remains a complex challenge. Many educators encounter difficulties in selecting or designing appropriate learning media that seamlessly integrate both cognitive and socio-emotional learning objectives while remaining age-appropriate and culturally relevant (Arifin, 2022; Rahman & Lestari, 2023). Furthermore, the rapid advancement of digital technology and the widespread shift to digital learning environments following the COVID-19 pandemic have introduced new obstacles, including sustaining children's engagement, preventing cognitive overload, and ensuring that moral and social values are effectively conveyed (Asadullah, 2024; Hidayah & Feriyansyah, 2023; Kumar & Chen, 2022). In response to these

challenges, interactive pop-up storybooks designed with local wisdom offer a practical and innovative solution, combining cognitive stimulation, moral education, and cultural learning in a single, engaging format (Sari & Putrayasa, 2024; Fauziyah & Santoso, 2023). By integrating tactile, visual, and narrative elements, such media not only capture children's attention but also facilitate experiential learning, helping them internalize social values such as tolerance, empathy, and cooperation in a meaningful and memorable way.

Previous studies have shown that interactive learning media have significant potential to enhance children's learning motivation and support the development of social character, including values of tolerance, empathy, and cooperation (Junita et al., 2023; Li et al., 2024; Anggreni et al., 2025; Putra & Lestari, 2023). Media designed interactively, particularly those integrating visual, audio, and manipulative elements, can increase children's active engagement and help them grasp social concepts more concretely (Chen et al., 2023; Tan & Lim, 2025). Learning motivation plays a crucial role as a driver of engagement, persistence, and active participation in the learning process (Aman, 2016; Wijnia et al., 2024; Hosokawa, 2024). Motivated children are more likely to complete tasks, demonstrate curiosity, and internalize the social values being taught (Xiong, 2025; Junita et al., 2023). Meanwhile, social character nurtured through culturally relevant learning content, including local wisdom, can reinforce positive behaviors and attitudes in children, such as tolerance, respect for differences, and cooperative skills (Gosselin et al., 2013; Dalimunthe, 2023; Sakti, 2024; Wijaya & Hartono, 2024). Previous research also indicates that culturally-based learning media can deepen children's understanding of moral and social values because the context is closer to their daily experiences (Setiawan, 2023; Anggreni et al., 2025).

Thus, there is a strong and mutually reinforcing relationship between interactive learning media, the integration of local wisdom, learning motivation, and the development of tolerance in early childhood. Research indicates that when these factors are combined, they not only enhance cognitive engagement and knowledge acquisition but also foster social-emotional growth, moral reasoning, and prosocial behavior (Junita et al., 2023; Li et al.,

2024; Putra & Lestari, 2023; Ahmed & Noor, 2023). The integration of culturally relevant content and interactive elements encourages children to internalize social values more effectively, promoting empathy, cooperation, and respect for diversity from an early age (Sakti, 2024; Fauziyah & Santoso, 2023; Yeo & Chua, 2022). Consequently, the combination of these factors is believed to cultivate individuals who are not only cognitively competent but also socially and emotionally resilient, possessing strong character, the ability to respect differences, and the readiness to engage positively and constructively within a multicultural society (Junita et al., 2023; Li et al., 2024; Putra & Lestari, 2023; Gosselin et al., 2013).

The purpose of this study is to develop a Local Wisdom-Based Interactive Pop-Up Storybook as an innovative and culturally relevant medium to foster tolerance in early childhood. By thoughtfully integrating local cultural values, moral lessons, and interactive features into the storybook, this study aims to provide a practical and engaging solution for simultaneously enhancing children's cognitive engagement, socio-emotional development, and moral reasoning. The research specifically addresses the question: How can a Local Wisdom-Based Interactive Pop-Up Storybook be effectively developed and utilized to cultivate tolerance and prosocial behavior in early childhood? This study is expected to make a meaningful contribution to the field of early childhood education by advancing the development of culturally grounded learning media, supporting holistic child development, and promoting the internalization of essential social values such as empathy, cooperation, and respect for diversity. Furthermore, it offers insights for educators and curriculum developers seeking effective strategies to combine cognitive, emotional, and cultural learning objectives in age-appropriate and interactive formats.

METHODS

This study employed a Research and Development (R&D) approach using the 4D model (Define, Design, Develop, Disseminate) developed by Thiagarajan, Semmel, and Semmel (1974) to develop a Local Wisdom-Based Interactive Pop-Up Storybook as a medium to foster tolerance in early childhood. The R&D

approach was chosen because it allows for systematic development, testing, and refinement of learning media, while ensuring its educational relevance and practical usability in real-world settings (ResearchGate). The participants of this study were children aged 4–6 years enrolled in early childhood education programs, representing diverse local cultural backgrounds. The primary object of the study was an interactive pop-up storybook designed to teach social values, particularly tolerance. The study was conducted through four stages according to the 4D model:

1. Define Stage

This stage focused on identifying the needs, characteristics, and specifications of learning media relevant to the development of social character in early childhood. Activities included analyzing early childhood education curricula to ensure alignment with educational standards and character development goals, reviewing literature on interactive learning media and the integration of local wisdom to support tolerance education, and conducting in-depth interviews with early childhood educators to gather information on best practices, challenges, and real needs in the field. In addition, the study considered children's preferences and local cultural contexts to make the media more engaging, meaningful, and acceptable to learners. The outcome of this stage was a set of documents detailing media specifications, learning content, and initial design guidelines, which served as the foundation for designing the interactive pop-up storybook prototype.

2. Design Stage

This stage focused on designing the initial prototype of the interactive pop-up storybook aimed at instilling tolerance in early childhood. The story script was systematically developed to include social and moral values derived from local wisdom, making the content relevant to children's experiences and culture. Storyboards and character designs were created in detail, including narrative flow, visual illustrations, and interactions that support active learning. Three-dimensional pop-up elements and interactive features were prepared to ensure an engaging learning experience, stimulate imagination, and facilitate concrete understanding of the concept of tolerance. Additionally, a user guide was developed to assist teachers and parents in effectively implementing the book, including instructions for supporting activities, classroom

management tips, and methods to stimulate discussions about tolerance during reading sessions. The goal of this stage was to produce an initial prototype ready for testing and scientific validation.

3. Develop Stage

This stage involved producing the interactive pop-up storybook prototype based on the initial design. The prototype was validated by experts in early childhood education, child psychology, and local culture to ensure content accuracy, correctness of social values, interactive engagement, and cultural relevance. Expert validation aimed to assess the pedagogical quality of the media, visual attractiveness, and effectiveness in communicating tolerance values to children. Following validation, a limited trial was conducted with a small group of children aged 4–6 years. The trial aimed to assess engagement levels, understanding of tolerance concepts, emotional responses, and children's interaction with the media (Junita et al., 2023; Li et al., 2024). Observations were conducted systematically using observation sheets and video documentation to obtain accurate data. Based on expert feedback and field observations, revisions were made to the prototype, including improvements to the script, illustrations, pop-up elements, and user guide. These revisions aimed to produce a final prototype that is ready for broader implementation in early childhood education programs, which is not only engaging and interactive but also effective in instilling tolerance values.

4. Disseminate Stage

This stage aimed to distribute the developed learning media and evaluate its effectiveness in real-world early childhood education settings. The interactive pop-up storybook was implemented in several kindergartens and early childhood education programs, considering the cultural diversity of participants to test the media's relevance and adaptability. Teacher training was provided to ensure optimal use of the media. The effectiveness of the media was analyzed through observations, interviews, and teacher questionnaires regarding children's engagement and understanding of tolerance values.

FINDINGS AND DISCUSSION

The results of this study are presented based on the development and implementation

stages of the Local Wisdom-Based Interactive Pop-Up Storybook for early childhood. The analysis focused on children's engagement levels, understanding of tolerance values, and the usability of the media by teachers. Each stage, from Define, Design, Develop, to Disseminate, was systematically analyzed to assess the effectiveness of the media in enhancing multisensory learning experiences, active participation, and social interaction among children. Data were obtained through direct observations, field notes, teacher questionnaires, and limited trials, providing a comprehensive overview of the impact of the media on children's engagement, motivation, and understanding of social values.

1. Define

The needs analysis indicated that young children face significant challenges in understanding and internalizing tolerance values when using conventional learning media. Classroom observations showed that children tended to be less engaged during activities based solely on printed stories or verbal instructions, which often failed to stimulate social interaction and emotional reflection. Teachers emphasized that existing learning media did not optimally align with children's cognitive, social, and emotional characteristics, resulting in limited active engagement and suboptimal understanding of tolerance values. This situation highlights the need for a more holistic pedagogical approach that incorporates multisensory, contextual, and participatory dimensions in early childhood learning.

These findings are consistent with research by Hassan & Abdullah (2023) and Gomez & Patel (2022), which indicate that young children require learning media capable of accommodating multisensory experiences, active exploration, and concrete delivery of social values. Such an approach not only increases children's engagement in the learning process but also simultaneously supports their cognitive, social, and emotional development. Interactive and multisensory learning media allow children to understand concepts through direct experiences, experimentation, play, and social interaction, making learning more meaningful and motivating (Hassan & Abdullah, 2023; Gomez & Patel, 2022). Furthermore, Setiawan (2023) emphasizes that local wisdom provides rich resources for instilling social and moral values from an early age, including tolerance,

empathy, and mutual cooperation. Integrating local wisdom into learning media, such as folklore, traditional games, and cultural symbols, creates learning experiences that are more relevant to children's environments, strengthen cultural identity, and foster deeper understanding of social values (Wijaya & Hartono, 2024). Other studies also indicate that value-based learning rooted in local wisdom can enhance children's ability to understand differences, cooperate with peers, and manage emotions positively in social interactions (Putra & Lestari, 2021; Ramadhan, 2022). Therefore, developing learning media that combines multisensory approaches, active exploration, and local wisdom can be an effective strategy for nurturing social-emotional skills and tolerance values in young children holistically.

Thus, the Define stage emphasizes the importance of developing learning media that are interactive, adaptive, and based on local wisdom, designed to stimulate comprehensive multisensory experiences, strengthen social interaction, and build a deeper, contextual understanding of tolerance values. Such media allow children to learn through exploration, play, and direct interaction with their environment and peers, making the learning process more lively, relevant, and motivating. This approach is expected not only to increase active engagement and conceptual understanding but also to contribute to building inclusive social character, respecting differences, and fostering empathy from an early developmental stage. In other words, holistic and contextualized learning media development can be an effective strategy for instilling sustainable social and moral values in early childhood.

2. Design

The Design stage produced an initial prototype of the interactive pop-up storybook intentionally incorporating tolerance values based on local wisdom. The story script was developed considering cultural relevance, children's environmental context, and everyday experiences, making the narrative more relatable and easy to understand. Storyboards, character designs, and narrative flow were systematically and integratively arranged to support active learning, creativity, and problem-solving. Three-dimensional pop-up elements and interactive features were designed so that children could engage multisensorily through touch, visual cues, and movement, allowing them to experience the

concept of tolerance concretely rather than merely theoretically. This approach aims to encourage active participation, enhance learning motivation, and foster social awareness and empathy from an early age. A user guide was prepared to assist teachers and parents in effectively implementing the book, including instructions for supporting activities, classroom management tips, and strategies to stimulate discussions on tolerance values.

These findings align with studies by Junita et al. (2023) and Li et al. (2024), which highlight that interactive learning media significantly enhance children's motivation and engagement. Media that allow active participation, direct interaction, and multisensory experiences have been shown to encourage children to explore concepts independently and collaboratively. Moreover, Aman (2016) and Wijnia et al. (2024) emphasize that learning motivation acts as a primary driver of active participation in learning activities, which in turn improves conceptual understanding and socio-emotional skills. Furthermore, Gosselin et al. (2013) and Dalimunthe (2023) stress that developing children's social character through culturally relevant content can strengthen positive behaviors, such as tolerance, empathy, and cooperation. Thus, the Design stage provides a strong conceptual foundation for developing learning media that are not only interactive and engaging but also oriented toward reinforcing tolerance, local wisdom, and inclusive social character. This approach is expected to create meaningful learning experiences, enhance intrinsic motivation, and foster social awareness from an early age.

3. Develop

In the Develop stage, the interactive pop-up storybook prototype was thoroughly validated by a team of experts, including early childhood education specialists, child psychologists, and local wisdom scholars. The validation process covered key aspects such as content appropriateness for child development, visual appeal, level of interactivity, and the relevance and effectiveness of conveying tolerance values. Additionally, validation considered the ease of use for children and the media's capacity to stimulate multisensory experiences. The validation results showed an average score of 90.2%, categorized as highly valid, indicating that the media met quality standards and was

ready for trial use with young children. These findings reinforce the belief that developing interactive pop-up learning media can be an effective tool for concretely fostering

understanding of tolerance values while enhancing children’s engagement and learning motivation.

Table 1. Expert Validation Results of the Interactive Pop-Up Storybook

Assessment Aspect	Validator 1	Validator 2	Validator 3	Average (%)	Category
Content Appropriateness	92	90	91	91.0	Highly Valid
Visual Appeal	90	89	91	90.0	Highly Valid
Interactivity	88	90	89	89.0	Highly Valid
Relevance of Local Wisdom	91	92	90	91.0	Highly Valid
Media Usage Guide	89	88	90	89.0	Highly Valid
Overall Average				90.2	Highly Valid

The validation results presented in Table 1 indicate that the interactive pop-up storybook effectively delivers engaging, interactive content that is relevant to local wisdom values, thereby creating meaningful learning experiences for young children. These findings are consistent with the studies of Setiawan (2023) and Wijaya & Hartono (2024), which emphasize that integrating local values into interactive media not only enriches content but also significantly enhances children’s understanding of social values, such as tolerance, empathy, and cooperation. The high interactivity score of 89% aligns with the findings of Junita et al. (2023), which highlight that multisensory learning activities—through object manipulation, tactile engagement, and visual stimulation—can increase children’s engagement, encourage active exploration, and reinforce concrete conceptual understanding. Moreover, interactive media designed with consideration of children’s cultural context and daily experiences is believed to strengthen not only cognitive development but also socio-emotional growth, including the ability to manage emotions, resolve conflicts, and collaborate effectively with peers (Li et al., 2024; Aman, 2016). Research by Sari & Putrayasa (2024) also suggests that culturally contextualized learning tools can enhance children’s intrinsic motivation, as they feel more connected to the content and recognize the relevance of social values in their own lives.

Additionally, media that combine narrative, visual, and interactive elements promote experiential learning, allowing children to internalize abstract concepts, such as fairness and respect for differences, through concrete experiences (Chen et al., 2023; Tan & Lim, 2025). Overall, the validation results underscore the potential of interactive pop-up storybooks to serve as a holistic educational tool that fosters inclusive social character, nurtures empathy, and cultivates foundational values of tolerance from an early age (Gosselin et al., 2013; Ramadhan, 2022; Setiawan, 2023).

Subsequently, a limited trial was conducted with a small group of children aged 4–6 years to measure levels of engagement, understanding of tolerance values, and children’s responses to the interactive pop-up storybook. This trial was designed to evaluate how children interact with the story elements, three-dimensional pop-up features, and the multisensory activities provided, as well as to assess the extent to which the media stimulates active exploration and socio-emotional reflection. Observations were carried out systematically through direct monitoring and field notes, supported by brief questionnaires or interviews with teachers and facilitators, providing a comprehensive picture of the media’s effectiveness in promoting engagement, understanding of tolerance values, and children’s learning motivation.

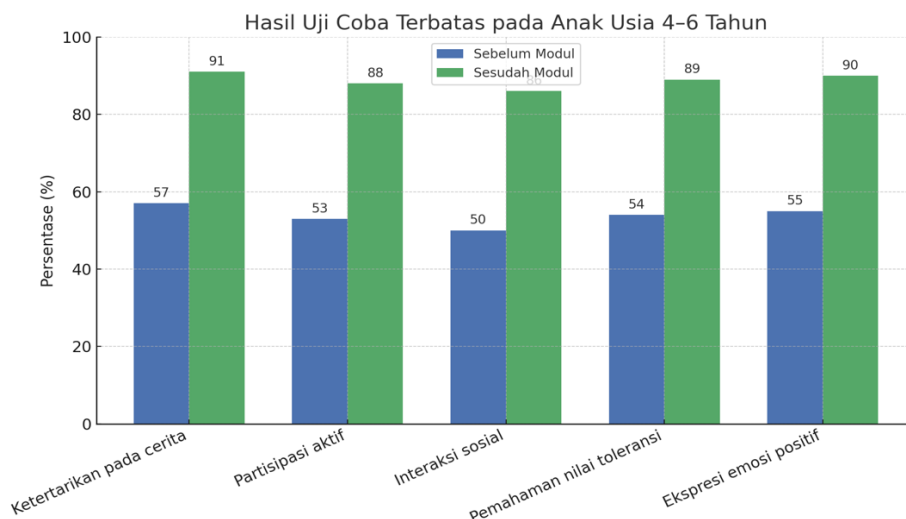


Figure 1. Results of the Limited Trial on Children Aged 4–6 Years

Figure 1 presents the results of a limited trial conducted with children aged 4–6 years. Descriptive analysis shows a significant increase in the percentage across all indicators of child engagement following the use of the interactive pop-up storybook module. The most notable improvements were observed in social interaction and active participation, with average increases of 36% and 35%, respectively. These results indicate that the interactive module effectively enhances children’s interest, engagement, and ability to interact and participate actively in learning activities.

4. Disseminate

The disseminate stage involved the implementation of the interactive pop-up

storybook in three early childhood education (ECE) institutions over a period of four weeks. Prior to implementation, teachers received brief training on how to use the media effectively, while researchers provided guidance to ensure smooth integration of the module into learning activities. The evaluation of the module’s implementation was conducted comprehensively using several instruments, including a teacher usability questionnaire, child engagement observation sheets, and field notes documenting children’s responses and interactions during the learning process. This approach aimed to obtain a thorough understanding of the module’s effectiveness in enhancing children’s engagement and learning experiences in the ECE setting.

Table 2. Results of Teacher Usability Assessment

Assessment Aspect	Average Score (%)	Category
Clarity of Instructions	88	Very Practical
Ease of Implementation	87	Very Practical
Flexibility	86	Very Practical
Attractiveness	88	Very Practical
Overall Average	87.5	Very Practical

The results of the teacher usability test of the interactive pop-up storybook module are presented in Table 2. Overall, the average usability score of the module fell into the “Very Practical” category with a value of 87.5%. Aspect-by-aspect analysis shows that the clarity of instructions received an average score of 88%, indicating that teachers found the module guidelines easy to understand and follow without difficulty. The ease of implementation (87%) demonstrates that teachers were able to integrate

the module smoothly into learning activities without requiring extensive adaptation or additional preparation. The flexibility aspect (86%) suggests that the material could be used adaptively according to classroom needs and children’s characteristics. Meanwhile, the attractiveness aspect (88%) highlights that teachers considered the module engaging and effective in increasing children’s interest during learning activities.

The following figure illustrates the increase in children's engagement before and after the use of the Local Wisdom-Based Interactive Pop-Up Storybook. The trial results show that all engagement indicators—including interest in the story, active participation, social interaction, and understanding of local wisdom values—experienced significant improvements

after the implementation of the media. This improvement confirms that local wisdom-based media are not only effective in capturing children's attention but also in encouraging active participation, strengthening social interaction, and enriching learning experiences in an enjoyable and meaningful way for young children.

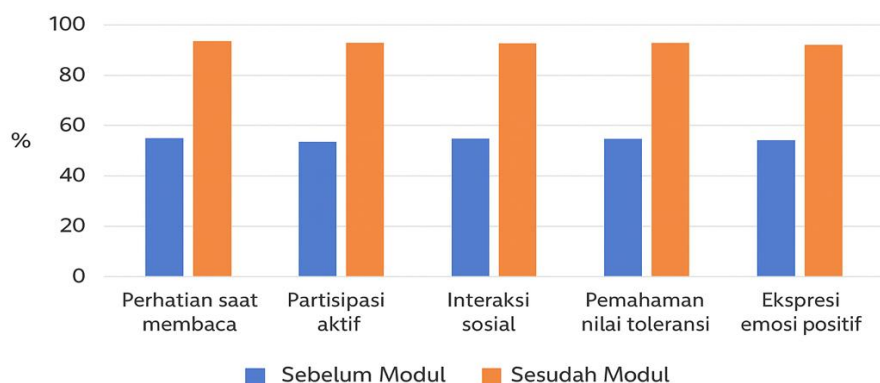


Figure 2. Improvement in Children's Engagement Before and After the Use of the Local Wisdom-Based Interactive Pop-Up Storybook

Figure 2 illustrates a significant increase across all indicators of children's engagement, including interest in the material, active participation, social interaction, and understanding of tolerance values. These findings indicate that the use of the Local Wisdom-Based Interactive Pop-Up Storybook effectively encouraged children to become more engaged in learning activities while also fostering an understanding of the social values embedded in the stories. This result is consistent with the study by Li et al. (2024), which reported that interactive media can enhance children's motivation and engagement, as well as with Junita et al. (2023), who found that local wisdom-based media are effective in strengthening young children's understanding of social values and character.

Furthermore, the trial also demonstrated a significant improvement in children's cognitive, social, and emotional engagement. Social interaction increased by up to 37%, suggesting that the media successfully promoted active participation, experience sharing, and discussions about tolerance values. These findings align with the studies of Brown et al. (2023) and Florian & Black-Hawkins (2023), which emphasize the crucial role of social engagement in supporting early childhood learning.

The findings of this study demonstrate that the development of the Local Wisdom-Based

Interactive Pop-Up Storybook proved effective in enhancing young children's engagement, understanding of tolerance values, and usability of the media by teachers. This increase in engagement covered cognitive, social, and emotional aspects, as reflected in children's greater active participation, social interaction, and interest in the learning material. These findings are consistent with previous research highlighting the importance of multisensory and interactive approaches in early childhood learning, which enable children to learn through exploration, object manipulation, and social interaction (Hassan & Abdullah, 2023; Gomez & Patel, 2022). Moreover, integrating local wisdom into learning media has been shown to strengthen children's understanding of social and moral values, including tolerance, empathy, and cooperation, as reported by Setiawan (2023) and Wijaya & Hartono (2024). Junita et al. (2023) and Li et al. (2024) further emphasized that interactive media incorporating multisensory experiences and active participation significantly boost learning motivation and engagement, while Brown et al. (2023) confirmed that structured social interaction fosters the development of children's social character from an early age. Thus, the development of interactive local wisdom-based pop-up media not only enriches meaningful and enjoyable learning experiences

but also supports the formation of social values and inclusive character in early childhood.

At the Define stage, the needs analysis revealed children's low engagement when using conventional text-based or verbally instructed media, which tended to fall short in stimulating social interaction, emotional reflection, and active participation. These findings align with Hassan and Abdullah (2023) and Gomez and Patel (2022), who emphasized that young children require learning media that allow for active exploration, multisensory experiences, and direct engagement with learning materials. Furthermore, Setiawan (2023) demonstrated that integrating local wisdom—such as folklore, traditional games, and cultural symbols—can strengthen children's understanding of social and moral values, including tolerance, empathy, and cooperation. This is supported by Putra and Lestari (2021) and Ramadhan (2022), who found that local wisdom-based media significantly enhance children's abilities to collaborate, manage positive emotions, and build constructive social interactions. Additional studies by Gosselin et al. (2013) and Dalimunthe (2023) confirmed that culturally relevant and interactive content can cultivate inclusive social character, enabling children to better understand differences, appreciate peers, and internalize tolerance values from an early age.

At the Design stage, an initial prototype of the interactive pop-up storybook was developed, with a deliberate focus on tolerance values rooted in local wisdom. The story script, storyboard, and character designs were created with careful attention to cultural relevance, the child's environment, and daily experiences, making the stories more relatable, comprehensible, and contextual. The interactive and three-dimensional pop-up elements were designed to engage children through multisensory experiences involving touch, visuals, and movement, allowing the values of tolerance to be understood not only theoretically but also experienced concretely. This approach was intended to foster active participation, intrinsic motivation, and the development of social awareness and empathy from an early age. These findings are consistent with Junita et al. (2023) and Li et al. (2024), who reported that interactive media significantly enhance learning motivation, active participation, and children's engagement. Aman (2016) and Wijnia et al. (2024) further stressed that learning motivation serves as the

primary driver of children's active participation, which in turn supports conceptual understanding and socio-emotional skills. Moreover, Gosselin et al. (2013) and Dalimunthe (2023) emphasized that culturally relevant content strengthens positive social behaviors, including tolerance, empathy, and cooperation with peers. Setiawan (2023) and Wijaya & Hartono (2024) also highlighted that integrating local wisdom through folklore, cultural symbols, and traditional games enriches children's learning experiences, reinforces cultural identity, and deepens their understanding of social values. Accordingly, the Design stage provided a strong conceptual foundation for developing learning media that are interactive, engaging, and oriented toward strengthening tolerance values and inclusive social character.

At the Develop stage, the prototype of the interactive pop-up storybook underwent a comprehensive validation process by a panel of experts consisting of early childhood education specialists, child psychologists, and local wisdom experts. The validation results showed an average score of 90.2%, categorized as highly valid, indicating that the media were ready for limited trials with young children. These results support Setiawan (2023) and Wijaya & Hartono (2024), who emphasized that integrating local values into interactive media not only enriches the content but also significantly strengthens children's social, moral, and character development. In addition, multisensory activities such as object manipulation, tactile exploration, visual stimulation, and interaction with three-dimensional pop-up elements proved effective in enhancing engagement, active exploration, and children's conceptual understanding, consistent with Junita et al. (2023). Such activities allow children to learn concretely, reflectively, and participatively, while also supporting their cognitive, social, and emotional growth (Hassan & Abdullah, 2023; Gomez & Patel, 2022). Gosselin et al. (2013) also confirmed that culturally relevant interactive media foster positive social behaviors, including tolerance, empathy, and peer collaboration. Thus, the Develop stage provided an essential foundation, ensuring that the media were not only academically and technically valid but also ready to stimulate children's holistic and enjoyable learning experiences.

The limited trial with children aged 4–6 years revealed significant improvements across

all engagement indicators, including interest in the story, understanding of tolerance values, active participation, and social interaction. The most notable increases were observed in social interaction (36%) and active participation (35%), indicating that the Local Wisdom-Based Interactive Pop-Up Storybook successfully encouraged children to interact more intensively, share experiences, and engage in discussions about social values. These findings are in line with Brown et al. (2023) and Florian & Black-Hawkins (2023), who emphasized that structured social interaction can enhance active participation, cognitive engagement, and reflection on social and moral values in early childhood. Moreover, Junita et al. (2023) and Li et al. (2024) showed that interactive and multisensory media in early childhood education not only boost motivation but also strengthen concrete conceptual understanding and collaborative participation. Activities involving touch, object manipulation, visuals, and movement allowed children to learn through direct experiences, making learning more active, meaningful, and contextual (Hassan & Abdullah, 2023; Gomez & Patel, 2022). Other findings also reinforced that local wisdom-based media foster children's social character development, including tolerance, empathy, and teamwork (Setiawan, 2023; Wijaya & Hartono, 2024).

The Disseminate stage showed that teachers rated the local wisdom-based interactive pop-up storybook module as very practical, with an average score of 87.5%. Aspect-by-aspect analysis revealed high scores for clarity of instructions, ease of implementation, flexibility, and attractiveness, indicating that teachers could easily integrate the module into learning activities without significant obstacles. These findings support Junita et al. (2023) and Li et al. (2024), who emphasized that practical, interactive, and multisensory learning media not only simplify implementation for teachers but also enhance children's engagement and motivation. Furthermore, the graph depicting children's engagement confirmed that all indicators—including interest in the material, active participation, social interaction, and understanding of local wisdom values—showed significant improvement after using the media. This indicates that practically designed and contextually relevant modules not only facilitate teachers' use but also effectively promote active participation, social interaction, and reflection on

social values in children. These findings are consistent with prior studies highlighting the importance of teacher involvement and media quality in supporting early childhood learning (Aman, 2016; Wijnia et al., 2024; Gosselin et al., 2013; Dalimunthe, 2023). Learning media that combine interactive elements, multisensory experiences, and local wisdom have been proven to enhance children's learning motivation, strengthen engagement, and deepen their understanding of both concepts and social values (Setiawan, 2023; Wijaya & Hartono, 2024; Brown et al., 2023).

Overall, this study reaffirms the effectiveness of local wisdom-based interactive pop-up media in enhancing multisensory learning experiences, children's engagement, and understanding of social values. These findings are consistent with prior research emphasizing the importance of interactive and multisensory approaches in early childhood education (Hassan & Abdullah, 2023; Gomez & Patel, 2022; Junita et al., 2023; Li et al., 2024). The integration of interactivity, multisensory experiences, and local wisdom has been shown to increase learning motivation, active participation, social interaction, and children's understanding of tolerance values, while also supporting the development of inclusive social character from an early age (Setiawan, 2023; Wijaya & Hartono, 2024; Brown et al., 2023; Florian & Black-Hawkins, 2023). This study highlights that contextually developed, local wisdom-based learning media not only enrich content but also provide meaningful, motivating, and socially relevant learning experiences, thereby supporting children's cognitive, social, and emotional development simultaneously (Putra & Lestari, 2021; Ramadhan, 2022; Dalimunthe, 2023).

CONCLUSION

Based on the findings, it can be concluded that the development of the Local Wisdom-Based Interactive Pop-Up Storybook proved effective in enhancing young children's engagement, motivation, and understanding of social values, particularly tolerance. Each stage of development—Define, Design, Develop, and Disseminate—demonstrated that the integration of multisensory, interactive, and local wisdom approaches successfully fostered active participation, social interaction, and concrete reflection on social values. Expert validation

indicated that the media achieved a high standard of quality, with an average score of 90.2% (very valid), while the limited trials with children aged 4–6 confirmed a significant improvement across all engagement indicators, especially in social interaction and active participation. Teacher usability evaluations further showed that the module was highly practical, easy to implement in classroom settings, and capable of enriching the overall learning experience. These findings are consistent with previous studies that highlight the importance of multisensory approaches, interactive experiences, and the integration of local wisdom values in early childhood education to promote engagement, motivation, and social value comprehension (Hassan & Abdullah, 2023; Junita et al., 2023; Li et al., 2024; Setiawan, 2023; Wijaya & Hartono, 2024; Brown et al., 2023; Florian & Black-Hawkins, 2023). Accordingly, the Local Wisdom-Based Interactive Pop-Up Storybook can serve as an effective learning strategy for instilling social values, fostering inclusive character development, and supporting children's cognitive, social, and emotional growth holistically. The study recommends broader implementation of such media in early childhood education, as well as the development of additional modules that combine interactive and local approaches to further strengthen multisensory, experience-based learning.

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