ThufuLA: Jurnal Inovasi Pendidikan Guru Raudhatul Athfal
Volume 11 issue 2, 2023
http://dx.doi.org/10.21043/thufula.v11i2.21224
https://journal.iainkudus.ac.id/index.php/thufula
p-ISSN 2355-0163 | e-ISSN 2502-3845

IMPLEMENTATION OF INTERACTIVE BOOKS BASED ON LOCAL WISDOM AND STEAM AS CREATIVE LEARNING IN ISLAMIC EARLY CHILDHOOD EDUCATION

Choirul Qomariah[1]✉, Nikmahtul Khoir Tri Yulia[2]
[1]IAI Al-Qolam, Gondanglegi, Malang, Indonesia
[2]IAI Al-Qolam, Gondanglegi, Malang, Indonesia
✉*Correspondence: choirulqomariah22@alqolam.ac.id*

Abstract: *There is a scarcity of research specifically addressing the integration of interactive books in Early Childhood Care and Education (ECCE) units, with a focus on improving literacy through the integration of local wisdom and STEAM (Science, Technology, Engineering, Arts, and Mathematics) elements. This research aims to investigate the implementation of interactive books based on local wisdom and STEAM as a means of creative learning in Islamic early childhood education through a case study method. The study was conducted at KB-TA Amanah Bunda Lawang Malang, with a focus on the local wisdom of East Java and the theme of creating traditional toys for children. Data were obtained through observations, where 80% of students were observed learning through interactive books with a STEAM approach, and 90% of students actively engaged in making toys after reading the book. Additionally, feedback from students and teachers indicated the need for synchronization between illustrations and text in STEAM interactive books. These findings provide valuable insights into the effectiveness and the need for further development regarding the implementation of interactive books based on local wisdom and STEAM at KB-TA Amanah Bunda Lawang. Research recommendations include the development of more visually integrated STEAM interactive books that are culturally relevant, as well as the use of teaching methods that support children's creativity and active participation.*

Keywords: *Creative Learning, Interactive Books, Local Wisdom, STEAM Implementation*

A. Introduction

Early Childhood Care and Education (ECCE) has an important role to play in preparing children to develop the skills and knowledge needed in children's lives (Egert et al., 2020; Jones et al., 2020). One of the effective learning approaches in Early Childhood Education is the integration of literacy and the STEAM (Science, Technology, Engineering, Arts, and Mathematics) approach in learning activities (Ng et al., 2022; Rodrigues-Silva & Alsina, 2023; Syarah et al., 2022). Although STEAM has been recognized as an effective educational approach in the learning of ECCE learners, its concrete application in the context of early childhood education is still limited.

The STEAM approach involves problem-solving, creative exploration, and collaboration in real contexts (Hawari & Noor, 2020). More than just teaching these subjects separately, the STEAM approach also aims to connect and apply knowledge and skills from different fields of science. Through this approach, children are encouraged to develop critical thinking skills, creativity, and communication skills (Bassachs Birosta et al., 2020) that are essential to prepare them for future real-world challenges.

The STEAM approach, on the other hand, involves the integration of different disciplines in learning such as literacy. Literacy in early childhood involves learning to read, write, listen, and speak (Alatalo & Westlund, 2021; Taylor & Leung, 2020). Increased literacy in children at an early age not only helps them develop language skills but also builds an important foundation for concept understanding and critical thinking skills in ECCE learners.

In the context of ECCE education, it is important to consider local wisdom as an important aspect of curriculum development and learning (Ramdhani, 2019). Local wisdom includes knowledge, values, traditions, and practices owned by local communities (Uge et al., 2019). Integrating local wisdom in literacy learning and the STEAM approach in ECCE can provide contextual, relevant, and empowering learning experiences for children. In this study, the local wisdom carried out was the East Java Regional Language which became an introduction in an interactive STEAM-based book.

The interactive book in the context of this research is a learning

tool that combines picture story narratives with various interactive activities related to STEAM concepts. These activities are designed to actively engage children in the learning process and encourage them to apply STEAM knowledge and skills.

For example, an interactive book can present an illustrated story involving the adventures of the main character with challenges to overcome. After reading the story, children will be given activities that encourage them to apply STEAM knowledge and skills to solve problems or challenges encountered in the story.

Previous research has shown the benefits of using interactive books in ECCE learning (Puspitarini & Hanif, 2019). Incorporating arts into STEM education, particularly through a STEAM approach, aims to enhance science learning while promoting equity for emerging bilingual learners (Hughes et al., 2022). Also, In preschool education, educators tailor the curriculum for visually impaired companions, emphasizing STEAM education (Hacıoğlu & Suiçmez, 2022). However, research that focuses on the implementation of interactive books on literacy-based local wisdom and STEAM in ECCE units is still limited. Therefore, this study aims to fill this knowledge gap by examining the implementation of interactive books on literacy-based local wisdom and STEAM as creative learning in ECCE units.

In this research, the interactive book serves as a pedagogical tool that combines narrative storytelling with interactive STEAM-related activities. Designed to actively engage children in the learning process, these activities prompt the application of STEAM knowledge and skills. For instance, an interactive book may present an illustrated story featuring a main character navigating challenges, followed by activities that encourage children to apply STEAM concepts to resolve the depicted problems.

By infusing local wisdom into literacy-based learning and the STEAM approach, the study seeks to provide contextual, relevant, and empowering learning experiences for children, using the East Java Regional Language as a focal point.

B. Method

This study employs a qualitative approach methodology utilizing a case study design (Cresswell & Cresswell, 2022) with 20 participants and 1 teacher in KB-TA Amanah Bunda Lawang

Malang. The stages of this research are: 1. Determine the purpose of the study, Collection data, 3. Data analysis, 4. Interpreting data, 5. Reporting the research.

First, determine the purpose of the study (Hancock et al., 2021) with steps: a. Explain the process of implementing interactive books on local wisdom based on literacy and STEAM in creative learning in ECCE units, b. Analyze the effectiveness of using interactive books on local wisdom based on literacy and STEAM in improving the quality of creative learning in ECCE units, c. Evaluate student responses and participation in using interactive books on local wisdom based on literacy and STEAM in creative learning in ECCE units.

Second, the collection data (Thomas, 2021) by: a). Participatory observation, making direct observations in class at KB-TA Amanah Bunda Lawang when STEAM interactive books are used as learning aids, recording activities, interactions between teachers and learners, as well as student responses to STEAM interactive books, using previously developed observation guidelines to guide observations. B). Interview, conducting interviews with teachers involved in the implementation of STEAM interactive books, asking questions related to their perception of the STEAM interactive book, experience in implementing it, challenges faced, and benefits gained, recording interviews with permission from respondents, and recording learners' responses. C). Document analysis, collecting and analyzing documents related to the implementation of STEAM interactive books, such as lesson plans, class notes, or learning materials used, searching for relevant information about the goals, processes, and results of the implementation of STEAM interactive books in these KB-TAs.

Third, data analysis, analyzing observational data, interviews, document analysis, and questionnaires separately using appropriate qualitative analysis techniques by reduction, display, and conclusion by Miles and Huberman (Miles & Huberman, 1994), identifying patterns, themes, or categories that emerge from the collected data, recording the results of the analysis in the form of notes or summaries that can be used for data interpretation. Data analysis uses triangulation between observation data in the field, interpretation of interviews with teachers and students, and relevant related documents (Xu & Zammit, 2020).

Fourth, interpreting data, interpreting the findings of each type of data collected, looking for linkages and relationships between findings from various data sources, and compiling in-depth and contextual interpretations based on data analysis (Lester et al., 2020).

Sixth, report preparation, preparing a structured research report using appropriate formats, such as introduction, methodology, research findings, interpretation, and recommendations, presenting data and findings clearly and support with relevant citations and examples (Johnson et al., 2020).

C. Result and Discussion

Description of KB-TA Amanah Bunda Lawang Context

KB-TA Amanah Bunda is located on Jl. Dorowati Timur Rt 04 Rw 09 Mulyoarjo Lawang, with a total of 62 students. The school has achieved various achievements, including Management Innovation in 2018, and ECCE Learning Innovation in 2017, and received grant assistance for STEAM-based learning in 2020. In addition, the school also carried out an earthquake disaster preparedness pilot project in 2019 and was selected as a driving school in 2023. The selection of PAUD was carried out because it has succeeded in implementing STEAM learning that combines with local wisdom.

KB-TA AMANAH BUNDA is committed to providing a holistic educational experience by combining academic excellence and the preservation of local culture. By combining the principles of STEAM with local wisdom, they aim to shape creative mindsets, problem-solving skills, and appreciation of cultural heritage among learners. The school's achievements in innovative management and proven educational practices demonstrate their dedication to delivering high-quality education that matches the developmental needs of learners and prepares them for future challenges.

Through the implementation of STEAM-based learning, KB-TA Amanah Bunda creates an interesting and interactive educational environment. The integration of science, technology, engineering, art, and mathematics not only develops learners' cognitive abilities, but also encourages curiosity, exploration, and collaborative skills. By incorporating local wisdom, the school recognizes the importance of cultural identity and values in

shaping the educational experience of learners.

The selection of KB-TA AMANAH BUNDA as a driving school also shows its commitment to innovation and continuous improvement. They are recognized for progressive approaches that empower learners to become active learners, critical thinkers, and contributors to society.

Implementation of STEAM-Based Interactive Books and Local Wisdom

The interactive book used in this activity is titled *Hore! Aku Bisa Nggawe Dolanan Dhewe* by Redite Kurniawan. The book was published by Balai Bahasa Jawa Timur, which is part of the Ministry of Education and Culture, in 2022. The book has an ISBN 9786028334860.

Figure 1. Book Cover and Story Content Inside

Hore! Aku Bisa Nggawe Dolanan Dhewe is a bilingual book written in East Javanese and Indonesian (Kurniawan, 2022). The story in this book tells the adventures of three children who feel challenged to make their toys, even though their friends prefer to play with gadgets or electronic devices.

The stories in this book inspire students to be more creative and active in creating their toys. In this book, learners will follow the journey of the main characters who find joy and satisfaction in making toys from simple materials. They face the challenge of creating and developing their imagination while learning the values of hard work, collaboration, and perseverance.

Through this interesting and inspiring story, the book *Hore! Aku*

Bisa Nggawe Dolanan Dhewe gives an important message about the importance of creative play and appreciating the creative process in this all-digital world. This book also captivates readers with an engaging narrative that conveys a crucial message about the significance of fostering creative play and valuing the creative process by expressing profound appreciation for local wisdom (Hidayati et al., 2020) and East Javanese regional languages, which are represented in the bilingual stories used.

By developing these stories, learners are exposed to learning experiences that combine local wisdom, creativity, and language development. This book invites students to think critically, collaborate, and hone their language skills, all heightened by the inherent attractiveness of the book (Liang & Fung, 2021), while expanding their knowledge of East Javanese culture and local wisdom.

Based on the observations of 20 children in the PIAUD unit, this study shows that the use of STEAM-based local wisdom interactive books as creative learning has a positive impact.

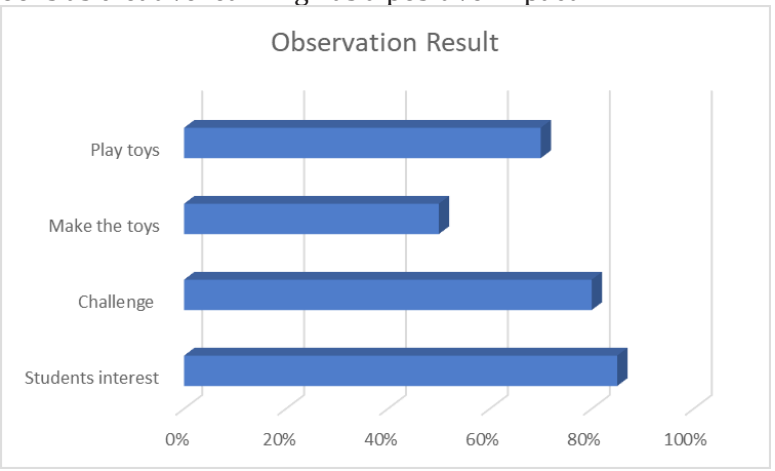

Figure 2. Observations Result

The resulting study shows that the use of STEAM-based local wisdom interactive books as creative learning has a positive impact. It found that as many as 85% of children showed interest in using interactive books read aloud. In addition, as many as 80% of children feel challenged and excited to make traditional toys after using the interactive book. Although only

50% of children fully understand how to make toys according to books, this can be a reference for further development so that interactive books can more clearly and intuitively teach the process of making toys. Despite the challenges, teachers continue to discover ways to engage students in the learning process, and interactive books provide a valuable avenue for achieving this goal (Song, 2021).

Furthermore, as many as 70% of children understand how to play with toys according to books, showing the effectiveness of interactive books as a learning resource in teaching how to play with traditional toys. These results illustrate the potential of STEAM-based interactive books as an interesting and effective approach to generating interest, creativity, and understanding of children in PIAUD units toward local wisdom. Advancing the assessment and refinement of interactive books could serve as the subsequent stage to enhance the quality of creative learning at that level (McKenney & Reeves, 2021).

The results also showed that the use of STEAM-based local wisdom interactive books in PIAUD units can arouse children's interest and enthusiasm in learning. This shows that this approach is effective in grabbing the attention of learners and getting them actively involved in the learning process. This interdisciplinary approach not only sparks curiosity but also fosters a dynamic and participatory educational environment, promoting a holistic understanding of various subjects (Balgan et al., 2022a).

The implementation of interactive books on local wisdom in STEAM learning provides an opportunity for children to get to know and appreciate their cultural heritage (McHugh, 2020). This can help strengthen their local identity and increase their pride in the culture and traditions that surround them.

However, the analysis also indicated a challenge in children's understanding of interactive book instruction (Danaei et al., 2020). Although most children show interest and enthusiasm, the percentage of children who fully understand how to make toys according to the book still needs to be increased. In this case, there needs to be further evaluation of the design of this interactive book to ensure clearer and more intuitive instructions, so that learners can easily follow the instructions given. However, observations still show that STEAM-based interactive books are effective as a

learning resource in teaching students how to play traditional toys (Jiang, 2020) in PIAUD units.

In future research, recommendations for further interactive book development can be made based on these findings. In-depth evaluation of interactive book design and further testing can help improve children's understanding as well as the effectiveness of the learning approach used. Thus, the results of this study provide an overview of the benefits and challenges of using STEAM-based local wisdom interactive books as creative learning tools (Needles, 2022) in PIAUD units, as well as providing a foundation for further development in improving the quality of creative learning at that level.

Figure 3. Hearing Stories and making Toys

In the activities integrated into the interactive book, several STEAM elements are very relevant. First, there is the element Science (S) that arises through changing the shape of objects. Learners learn about the properties of matter and how they can manipulate it to create new forms (Hughes et al., 2022). Through experiments and experiments, they understand how objects can change shape and how they can change them according to their needs.

Furthermore, there is an element of Technology (T) that is seen in the way the toy wheel is balanced. Learners must use logic and reason to understand how the wheel works and how to adjust its balance (Balgan et al., 2022b) so that the toy can move smoothly. Learners may need to think about the various mechanisms and systems involved in designing toys, including the design of wheels, and shafts, and how they interact with each other.

Then, the Engineering element (E) emerges through the toy design process (Ozkan & Umdu Topsakal, 2021). Students are invited to design their toys with the help of environmental materials. Learners must think creatively about combining Engineering materials and creating functional and attractive designs (Rodier et al., 2019). This process teaches learners about engineering, problem-solving, and the ability to design and create something from scratch.

The Art element (A) is visible in the product results produced by the learners. After going through the process of designing and making toys, learners reveal their creativity (Perignat & Katz-Buonincontro, 2019) and art through the shapes, colors, and decorations on the toys they make. The result of this activity becomes a tangible manifestation of the creative expression of students (McKeown, 2019).

Lastly, element (M) can be seen through various forms of vehicles according to their imagination, supported by different numbers of wheels as well. In this process, students can calculate the number of wheels used and the desired shape according to their respective ideas (Bertrand & Namukasa, 2023).

In the context of STEAM education, the integration of Mathematics is particularly notable. Students engaged in STEAM projects involving, for instance, designing a moving object or constructing a structure, can actively apply mathematical concepts. In the realm of designing a vehicle, students can employ mathematical calculations to determine the precise number of wheels required, ensuring functionality and balance (Hacıoğlu & Suiçmez, 2022).

Thus, through interactive books that combine local wisdom and the STEAM approach, learners engage in activities involving elements of Science, Technology, Engineering, Art, and Math. They not only learn scientific and technological concepts but also develop engineering and art skills. This approach helps learners to link knowledge and skills across disciplines, as well as increase learners' understanding of the importance of collaboration between those disciplines in everyday life (Li et al., 2022).

After getting the story from the STEAM book, learners not only show a strong understanding of the game concept, but they can also design their games with high creativity. Through the use of

loose part materials provided, children can apply their knowledge to make desired toys (Cankaya et al., 2023), such as cars and boats.

This process involves the steps of critical thinking, problem-solving, and design skills that they learn through the interactive book. By designing and making toys independently, children can explore their imagination and realize creative ideas in real form (Harris, 2021). In addition, this activity also provides an opportunity for them to hone their fine motor skills as they manipulate loose-part materials with precision. Thus, STEAM-based interactive books provide a holistic learning experience that engages the cognitive, creative, and motor aspects of children in PIAUD units, and encourages them to become designers and creators of their toys.

In addition, through books in East Javanese which is the daily language of students, they can also gain local wisdom. This book helps maintain and introduce local cultural values to children. In the book, children are invited to use environmental materials, such as grapefruit peels, watermelon peels, and banana fronds, to make games. This step not only introduces children to a variety of natural ingredients that can be used as creative resources but also teaches them about sustainability and the importance of protecting the environment (Corbolino et al., 2020).

Through books in East Java, students not only learn about local wisdom but also acquire local languages that are usually rarely exposed in reading books or daily stories. This book provides an opportunity for learners to expand their vocabulary and understanding of their regional language (Kim, 2020).

In the book, students will find expressions, vocabulary, and phrases in East Javanese used in the story. They learn about the cultural richness of their regional language and develop communication skills in local contexts. This process strengthens their cultural identity and allows them to better connect with local communities and traditions.

Local language acquisition through East Javanese language books also has a positive impact on the overall development of students' language skills. They can expand their reading, writing, listening, and speaking skills in their regional language. It also increases their understanding and appreciation of Indonesia's linguistic and cultural diversity.

Learners not only learn about their local wisdom and local language but also develop a sense of pride in their cultural heritage. They have the opportunity to maintain and respect the language and culture of their region, while still gaining an understanding of Indonesian that is important in the national context. This encourages multicultural awareness and helps build a deeper appreciation of cultural diversity in Indonesia (Huda et al., 2020).

Through direct involvement in the process of making games from these natural materials, children can understand practically the values of local wisdom. They learn to appreciate the environment and use available resources wisely. In addition, this process also stimulates children's creativity and imagination, as they have to think "out of the box" (Ershadi & Winner, 2020) to create interesting games with materials that may be unusual.

Thus, East Javanese language books and the use of environmental materials in making games provide a richer dimension to the learning experience of children in PIAUD units. They not only learn about the concept of STEAM but also gain a deep understanding of local wisdom and environmental sustainability. It helps children develop a sense of pride in their own culture and become caring agents of change towards their surroundings.

In facilitating STEAM-based creative learning and local wisdom, teachers have an active role in stimulating learners to open ideas and ideas after interactive books are read. Teachers provide sparking questions that encourage students to think critically and creatively and involve them in discussions about storybook content. This step not only stimulates the cognitive abilities of learners but also strengthens their language skills and creativity (Quigley et al., 2020).

Furthermore, teachers provide full support to learners in designing and making their creative ideas into real toys. Some learners are assisted in cutting orange peels, watermelon peels, and banana fronds in certain shapes. However, it is important to note that some learners are already able to make their efforts in making the shapes they want. This reflects the level of confidence and independence of students in applying their ideas and creativity.

The active involvement of learners in the process of designing and making toys from environmental materials also helps improve their fine motor skills (Rahardjo, 2019). Through this process, they

learn to control hand movements and manipulate materials with precision. Teachers provide the necessary direction and guidance while providing freedom for learners to develop their ideas.

Thus, the approach taken by teachers in facilitating STEAM-based creative learning and local wisdom includes steps that stimulate critical thinking, language engagement, and creativity of learners. Through full support and freedom to experiment, learners can develop the ability to design and make toys with environmental materials (Juškevičienė et al., 2021). This approach not only enriches their learning experience but also helps improve learners' fine motor skills and independence in exploring their creative ideas.

Challenges and Constraints in Implementation

In the interactive books used, there is a discrepancy between the illustrations and the text of the book which can raise critical questions from learners. For example, if the text of the story states that the character went on an adventure using coconut fronds, but the illustration shows banana leaves, this creates a discrepancy between the text and the image (Dowdall et al., 2020).

This discrepancy can raise critical questions from learners, such as questions about the reliability of the story. For example, a learner might ask, "Will a banana leaf not tear if it is climbed by a child and pulled by another child, as happens in this story?" This question indicates that learners are using their critical thinking skills to evaluate the consistency and practicality of the stories presented in the book.

The discrepancy between illustrations and text in this interactive book can be a valuable learning opportunity. Learners can be invited to question and reflect on the difference between the text and the images they see. It encourages them to develop critical thinking skills, logic, and problem-solving skills.

Teachers can take advantage of this opportunity to invite students to discuss and formulate answers together. They can encourage learners to think about possible reasons behind this asynchrony, such as errors in the book production process or differences in interpretation between authors and illustrators. This discussion can also stimulate learners to propose creative solutions, such as redrawing illustrations that fit the text of the

story (Arizpe et al., 2023).

Thus, the incongruence between illustrations and text in interactive books provides an opportunity for learners to practice their critical thinking and logic skills. Teachers can take advantage of this moment to develop learners' analytical and problem-solving skills while helping them understand that mistakes and discrepancies can occur in creative processes such as bookmaking.

One of the challenges faced in using interactive books is finding material for loose parts that fit the story. However, this challenge can be overcome by looking for natural materials available around the school environment. This provides an opportunity for students to understand and appreciate the natural resources that are around them (Chawla, 2020).

In finding materials for loose parts, students can be invited to devote ideas on how to find materials around their school environment. They can name materials such as leaves, stones, twigs, or other natural materials suitable for use in the story that has been read. The process of searching for this material is also an opportunity to observe and learn more about the flora and fauna around them.

By using natural materials as loose parts, learners not only engage in creative activities but also learn about sustainability and the importance of protecting the environment. They realize that the natural materials they use come from their environment, and this teaches them the values of local wisdom and sustainability.

Another challenge faced in the process of making toy products is the safety and availability of adequate space. In using cutting aids such as knives, it is necessary to pay attention to the safety of all learners. This requires extra supervision and assistance from teachers or teachers to ensure that students use the tool correctly and safely.

In addition, to cut natural materials used in making toys, a large enough space is needed so that students can move freely. Limited space can hinder the movement of learners and limit their creativity. Therefore, it is necessary to ensure that the learning environment provides a large enough and comfortable area for learners to work.

In the face of these challenges, teachers can take proactive steps to address safety and space concerns. Teachers should provide

clear instructions and demonstrations on the safe use of cutting aids (Love et al., 2022), as well as ensure that students understand how to use them. Teachers can also organize learning spaces in a way that allows learners to have enough space to move and work comfortably.

During the process of making toys, teachers should also be prepared to provide the necessary assistance and guidance to the learners. By ensuring the presence of an experienced teacher or assistant, learners can feel more confident and comfortable in performing their duties.

By paying attention to safety and adequate space availability, challenges in the process of making toy products can be overcome. With proper supervision, clear instructions, and ample space, learners can develop their skills in safely cutting natural materials and producing creative work that meets expectations.

While the interactive books utilized in this study offer valuable learning experiences, a notable limitation lies in the observed discrepancy between the illustrations and the text within the books. This incongruity has the potential to raise critical questions from learners, prompting inquiries about the reliability and practicality of the presented stories. Such questions may challenge the authenticity of the learning content and impact the overall effectiveness of the interactive books.

Looking ahead, future research could delve deeper into understanding the pedagogical implications of addressing discrepancies between illustrations and text in interactive books. Exploring strategies to enhance learners' critical thinking skills and problem-solving abilities in response to such discrepancies would be valuable. Additionally, investigating the impact of incorporating learner-led discussions on the reasons behind asynchronies, and encouraging creative solutions, could contribute to the ongoing development of effective teaching methods.

Furthermore, as educators face challenges in finding suitable materials for loose parts in interactive book-related activities, future studies could explore innovative approaches to overcome this obstacle. Exploring alternative sources of materials or developing guidelines for educators to adapt activities based on locally available resources could enrich the practical implementation of interactive book initiatives.

D. Conclusion

This study concludes that the implementation of STEAM-based local wisdom interactive books as creative learning in PIAUD units has a positive impact on students' creativity, motivation, and language development. Through the use of this interactive book, learners can engage in activities that involve changing the shape of objects, balancing toy wheels, and designing and making toys creatively. In addition, the use of East Javanese language in books also provides opportunities for students to enrich their understanding of local languages.

Suggestions for curriculum developers and teachers in PIAUD units can integrate STEAM-based interactive books and local wisdom in the learning process. This will provide opportunities for learners to develop creative, problem-solving, and language development skills from an early age.

References

Alatalo, T., & Westlund, B. (2021). Preschool teachers' perceptions about read-aloud as a means to support children's early literacy and language development. *Journal of Early Childhood Literacy*, *21*(3), 413–435. https://doi.org/10.1177/1468798419852136

Arizpe, E., Noble, K., & Styles, M. (2023). *Children Reading Pictures: New Contexts and Approaches to Picturebooks*. Taylor & Francis.

Balgan, A., Renchin, T., & Ojgoosh, K. (2022a). An experiment in applying differentiated instruction in STEAM disciplines. *Eurasian Journal of Educational Research*, *98*(98), 21–37. https://doi.org/DOI: 10.14689/ejer.2022.98.02

Balgan, A., Renchin, T., & Ojgoosh, K. (2022b). An Experiment in Applying Differentiated Instruction in STEAM Disciplines. *Eurasian Journal of Educational Research (EJER)*, *98*.

Bassachs Birosta, M., Cañabate Ortiz, D., Nogué Vila, L., Serra Putellas, T., Bubnys, R., & Colomer, J. (2020). Fostering Critical

Reflection in Primary Education through STEAM Approaches. *Education Sciences, 2020, Vol. 10, Núm. 12, p. 384*. https://doi.org/10.3390/educsci10120384

Bertrand, M. G., & Namukasa, I. K. (2023). A pedagogical model for STEAM education. *Journal of Research in Innovative Teaching & Learning*, *16*(2), 169–191. https://doi.org/10.1108/JRIT-12-2021-0081

Cankaya, O., Rohatyn-Martin, N., Leach, J., Taylor, K., & Bulut, O. (2023). Preschool children's loose parts play and the relationship to cognitive development: A review of the literature. *Journal of Intelligence*, *11*(8), 151. https://doi.org/10.3390/jintelligence11080151

Chawla, L. (2020). Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. *People and Nature*, *2*(3), 619–642. https://doi.org/10.1002/pan3.10128

Corbolino, N., Bisaccia, P., Corrà, F., Bonato, M., Irato, P., & Santovito, G. (2020). The vegetable garden. An instrument for sustainable development education and care pedagogy. *INTED2020 Proceedings*, 4618–4626. https://library.iated.org/view/CORBOLINO2020VEG

Cresswell, J. W. (2012). Educational research: Planning, conducting, and evaluating quantitative and qualitative research. *Lincoln: Pearson*.

Cresswell, J. W., & Cresswell, J. D. (2022). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (6th ed.). SAGE Publications.

Cuccurullo, D., & Cinganotto, L. (2020). Fostering cultural awareness for a global competence. In *Handbook of research on bilingual and intercultural education* (pp. 125–158). IGI Global. https://www.igi-global.com/chapter/fostering-cultural-awareness-for-a-global-competence/251388

Danaei, D., Jamali, H. R., Mansourian, Y., & Rastegarpour, H. (2020). Comparing reading comprehension between children reading augmented reality and print storybooks. *Computers & Education*, *153*, 103900.

Dowdall, N., Melendez-Torres, G. J., Murray, L., Gardner, F., Hartford, L., & Cooper, P. J. (2020). Shared picture book reading interventions for child language development: A systematic review and meta-analysis. *Child Development*, *91*(2), e383–e399. https://doi.org/10.1111/cdev.13225

Egert, F., Dederer, V., & Fukkink, R. G. (2020). The impact of in-service professional development on the quality of teacher-child interactions in early education and care: A meta-analysis. *Educational Research Review*, *29*, 100309. https://doi.org/10.1016/j.edurev.2019.100309

Ershadi, M., & Winner, E. (2020). Children's creativity. *Encyclopedia of Creativity*, *1*, 144–147. https://doi.org/10.1016/B978-0-12-809324-5.23693-6

Hacıoğlu, Y., & Suiçmez, E. (2022). STEAM education in preschool education: We design our school for our visually impaired friend. *Science Activities*, *59*(2), 55–67. https://doi.org/10.1080/00368121.2022.2056111

Hancock, D. R., Algozzine, B., & Lim, J. H. (2021). Doing case study research: A practical guide for beginning researchers. *Teachers College Press, New York*. https://books.google.com/books?hl=id&lr=&id=e7lLEAAAQBAJ&oi=fnd&pg=PP1&dq=case+study+first+determine+the+purpose+of+the+study&ots=5-q5UJMO8h&sig=u2F_--wO6cV2Fi08xJAOH0ZR3l8

Harris, P. L. (2021). Early Constraints on the Imagination: The Realism of Young Children. *Child Development*, *92*(2), 466–483. https://doi.org/10.1111/cdev.13487

Hawari, A. D. M., & Noor, A. I. M. (2020). Project-based learning pedagogical design in STEAM art education. *Asian Journal of University Education*, *16*(3), 102–111. https://doi.org/10.24191/ajue.v16i3.11072

Hidayati, N. A., Waluyo, H. J., & Winarni, R. (2020). Exploring the Implementation of Local Wisdom-Based Character Education among Indonesian Higher Education Students. *International Journal of Instruction*, *13*(2), 179–198. https://doi.org/10.29333/iji.2020.13213a

Hsiao, P.-W., & Su, C.-H. (2021). A study on the impact of STEAM

education for sustainable development courses and its effects on student motivation and learning. *Sustainability*, *13*(7), 3772. https://doi.org/10.3390/su13073772

Huda, M., Nor Muhamad, N. H., Isyanto, P., Muhamat, R., Marni, N., Ahmad Kilani, M., & Safar, J. (2020). Building harmony in a diverse society: Insights from practical wisdom. *International Journal of Ethics and Systems*, *36*(2), 149–165. https://doi.org/10.1108/IJOES-11-2017-02

Hughes, B. S., Corrigan, M. W., Grove, D., Andersen, S. B., & Wong, J. T. (2022). Integrating arts with STEM and leading with STEAM to increase science learning with equity for emerging bilingual learners in the United States. *International Journal of STEM Education*, *9*(1), 1–19. https://doi.org/10.1186/s40594-022-00375-7

Jiang, L. (2020). *Learning while playing with educational toys for children learning STEAM knowledge* [Ph.D. Thesis, University of Illinois at Urbana-Champaign]. https://www.ideals.illinois.edu/items/117230

Johnson, J. L., Adkins, D., & Chauvin, S. (2020). A review of the quality indicators of rigor in qualitative research. *American Journal of Pharmaceutical Education*, *84*(1), 7120. https://doi.org/10.5688/ajpe7120

Jones, S. M., Lesaux, N. K., Gonzalez, K. E., Hanno, E. C., & Guzman, R. (2020). Exploring the role of quality in a population study of early education and care. *Early Childhood Research Quarterly*, *53*, 551–570. https://doi.org/10.1016/j.ecresq.2020.06.005

Juškevičienė, A., Stupurienė, G., & Jevsikova, T. (2021). Computational thinking development through physical computing activities in STEAM education. *Computer Applications in Engineering Education*, *29*(1), 175–190. https://doi.org/10.1002/cae.22365

Kim, D. (2020). Learning Language, Learning Culture: Teaching Language to the Whole Student. *ECNU Review of Education*, *3*(3), 519–541. https://doi.org/10.1177/2096531120936693

Kurniawan, R. (2022). *Hore! Aku Bisa Nggawe Dolanan Dhewe*. Balai Besar Bahasa Jawa Timur.

Lester, J. N., Cho, Y., & Lochmiller, C. R. (2020). Learning to Do Qualitative Data Analysis: A Starting Point. *Human Resource Development Review*, *19*(1), 94–106. https://doi.org/10.1177/1534484320903890

Li, J., Luo, H., Zhao, L., Zhu, M., Ma, L., & Liao, X. (2022). Promoting STEAM education in primary school through cooperative teaching: A design-based research study. *Sustainability*, *14*(16), 10333. https://doi.org/10.3390/su141610333

Liang, W., & Fung, D. (2021). Fostering critical thinking in English-as-a-second-language classrooms: Challenges and opportunities. *Thinking Skills and Creativity*, *39*, 100769. https://doi.org/10.1016/j.tsc.2020.100769

Love, T. S., Roy, K. R., Gill, M., & Harrell, M. (2022). Examining the influence that safety training format has on educators' perceptions of safer practices in maker spaces and integrated STEM labs. *Journal of Safety Research*, *82*, 112–123. https://doi.org/10.1016/j.jsr.2022.05.003

McHugh, S. (2020). *Meaningful Play: Exploring the design of technology, learning, and play to enhance children's engagement with cultural heritage in schools and museums* [PhD Thesis]. NUI Galway.

McKenney, S., & Reeves, T. C. (2021). Educational design research: Portraying, conducting, and enhancing productive scholarship. *Medical Education*, *55*(1), 82–92. https://doi.org/10.1111/medu.14280

McKeown, A. (2019). From STEM to STEAM at the Beautiful Midden Field School: An Artist/Educator Perspective. In A. De La Garza & C. Travis (Eds.), *The STEAM Revolution* (pp. 107–124). Springer International Publishing. https://doi.org/10.1007/978-3-319-89818-6_8

Miles, MB., & Huberman, AM. (1994). *Qualitative data analysis: An expanded sourcebook*. SAGE Publications.

Needles, T. (2022). *Steam power: Infusing art into your STEM curriculum*. International society for technology in education.

Ng, A., Kewalramani, S., & Kidman, G. (2022). Integrating and

navigating STEAM (inSTEAM) in early childhood education: An integrative review and inSTEAM conceptual framework. *Eurasia Journal of Mathematics, Science and Technology Education*, *18*(7), em2133. https://doi.org/10.29333/ejmste/12174

Ozkan, G., & Umdu Topsakal, U. (2021). Exploring the effectiveness of STEAM design processes on middle school students' creativity. *International Journal of Technology and Design Education*, *31*, 95–116. https://doi.org/10.1007/s10798-019-09547-z

Perignat, E., & Katz-Buonincontro, J. (2019). STEAM in practice and research: An integrative literature review. *Thinking Skills and Creativity*, *31*, 31–43. https://doi.org/10.1016/j.tsc.2018.10.002

Puspitarini, Y. D., & Hanif, M. (2019). Using Learning Media to Increase Learning Motivation in Elementary School. *Anatolian Journal of Education*, *4*(2), 53–60. https://doi.org/10.29333/aje.2019.426a

Quigley, C. F., Herro, D., King, E., & Plank, H. (2020). STEAM designed and enacted: Understanding the process of design and implementation of STEAM curriculum in an elementary school. *Journal of Science Education and Technology*, *29*, 499–518.

Rahardjo, M. M. (2019). How to use Loose-Parts in STEAM? Early Childhood Educators Focus Group Discussion in Indonesia. *Jurnal Pendidikan Usia Dini*, *13*(2), 310–326. https://doi.org/10.21009/JPUD.132.08

Ramdhani, S. (2019). Integrative Thematic Learning Model Based On Local Wisdom For Early Childhood Character. *Indonesian Journal of Early Childhood Education ...*, *Query date: 2023-05-09 16:27:04*. https://journal.unnes.ac.id/sju/index.php/ijeces/article/view/33703

Rodier, C., Galaleldin, M., Boudreau, J., & Anis, H. (2019). From STEM to STEAM in engineering design. *Proceedings of the Canadian Engineering Education Association (CEEA)*. https://doi.org/10.24908/pceea.vi0.13752

Rodrigues-Silva, J., & Alsina, Á. (2023). STEM/STEAM in Early Childhood Education for Sustainability (ECEfS): A Systematic Review. *Sustainability*, *15*(4), 3721. https://doi.org/10.3390/su15043721

Song, Y. (2021). Research on Interactive Design in Children's Books. *7th International Conference on Arts, Design and Contemporary Education (ICADCE 2021)*, 531–536. https://www.atlantis-press.com/proceedings/icadce-21/125960085

Syarah, E. S., Pujianti, Y., & Gunarti, W. (2022). Instilling Children's Ocean Literacy Through Comic Media: STEAM to R-SLAMET Learning Design for ECE educators. *Jurnal Pendidikan Usia Dini*, *16*(1), 01–16. https://doi.org/10.21009/JPUD.161.01

Taylor, S. V., & Leung, C. B. (2020). Multimodal literacy and social interaction: Young children's literacy learning. *Early Childhood Education Journal*, *48*, 1–10. https://doi.org/10.1007/s10643-019-00974-0

Thomas, G. (2021). How to do your case study. *SAGE Publications*, 1–320.

Uge, S., Neolaka, A., & Yasin, M. (2019). *Development of Social Studies Learning Model Based on Local Wisdom in Improving Students' Knowledge and Social Attitude*. https://doi.org/10.29333/IJI.2019.12323A

Xu, W., & Zammit, K. (2020). Applying Thematic Analysis to Education: A Hybrid Approach to Interpreting Data in Practitioner Research. *International Journal of Qualitative Methods*, *19*, 160940692091881. https://doi.org/10.1177/1609406920918810