



Development of Touch Box Educational Games to Improve Early Childhood Vocabulary Skills

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ABSTRAK. Penelitian ini dilatarbelakangi oleh terbatasnya penggunaan media pembelajaran inovatif untuk meningkatkan kemampuan kosakata anak usia dini. Penelitian ini bertujuan untuk mengembangkan alat permainan edukatif kotak raba guna meningkatkan kemampuan kosakata anak usia 4–5 tahun di RA Muslimat NU Wiroditan. Penelitian menggunakan metode Research and Development (R&D) dengan model pengembangan Borg and Gall yang meliputi tahap pengumpulan data, perencanaan, pengembangan produk, uji coba lapangan, revisi, dan penyempurnaan produk. Teknik pengumpulan data dilakukan melalui observasi, wawancara, dokumentasi, dan angket. Hasil penelitian menunjukkan bahwa permainan kotak raba termasuk dalam kategori sangat efektif berdasarkan validasi ahli, dengan skor 81,25% dari ahli media dan 97,5% dari ahli materi. Penggunaan media juga menunjukkan peningkatan kemampuan kosakata anak secara signifikan, yaitu dari 51% pada tahap pra penelitian menjadi 63% pada uji lapangan terbatas dan 86% pada uji lapangan luas. Hasil penelitian menunjukkan bahwa permainan edukatif berbasis sensorik mampu menciptakan pembelajaran yang interaktif dan bermakna. Permainan kotak raba dapat digunakan sebagai media pembelajaran inovatif untuk mendukung perkembangan kosakata anak usia dini.

Kata Kunci : Kosakata; Kotak Raba; Educational Game

ABSTRACT. This research is motivated by the limited use of innovative learning media to improve vocabulary skills of early childhood. This study aims to develop an educational game tool of the touch box to improve the vocabulary skills of children aged 4-5 years at RA Muslimat NU Wiroditan. The study used the Research and Development (R&D) method with the Borg and Gall development model which includes the stages of data collection, planning, product development, field trials, revisions, and product refinement. Data collection techniques were carried out through observation, interviews, documentation, and questionnaires. The results of the study showed that the touch box game was included in the very effective category based on expert validation, with a score of 81.25% from media experts and 97.5% from material experts. The use of media also showed a significant increase in children's vocabulary skills, namely from 51% in the pre-research stage to 63% in the limited field test and 86% in the extensive field test. The results of the study indicate that sensory-based educational games are able to create interactive and meaningful learning. The touch box game can be used as an innovative learning medium to support the vocabulary development of early childhood.

Keyword : Vocabulary; Touch Box; Educational Game

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INTRODUCTION

Language development in early childhood is a complex process involving children's abilities to comprehend, express, and use language in social interactions, which serve as the foundation for the development of communication and cognitive skills [1], [2]. During this stage, children are in the golden period of development, requiring appropriate stimulation through an environment that provides rich interactions and meaningful learning experiences [2]. In line with the implementation of the Merdeka Curriculum for Early Childhood Education, which emphasizes play-based and child-centered learning, language development needs to be facilitated through activities that encourage exploration, active communication, and children's emotional engagement in the learning process [1]. However, various challenges remain, including inadequate stimulation and limited learning media, while overly academic learning practices may restrict opportunities for children to engage in natural language interactions, thereby hindering their language development [3]. Therefore, the development of innovative educational game media is essential for supporting children's language development comprehensively, which may ultimately contribute to improving their early vocabulary skills.

Current issues in early childhood language development indicate that many young children continue to experience delays in language abilities due to inadequate stimulation during the learning process [4]. One of the main contributing factors is the continued use of conventional teaching methods that are not sufficiently supported by engaging learning media, resulting in lower motivation and limited active participation in learning activities [5]. Recent studies emphasize that learning media play an important role in stimulating language development through concrete, interactive, and enjoyable learning experiences that are appropriate to the characteristics of young children [6]. In addition, multisensory media have been shown to enhance children's understanding, interaction, and ability to process language-related information more effectively than learning without media [7]. Therefore, the use of innovative, experience-based learning media is increasingly necessary to optimize early childhood language development, which serves as an important foundation for enhancing children's vocabulary skills.

Early childhood vocabulary learning needs to be designed innovatively through meaningful play-based activities that align with children's active and exploratory developmental characteristics [8]. Young children can understand and retain vocabulary more easily through concrete experiences that engage their senses and involve direct social interaction [9]. The use of interactive and engaging learning media is essential for increasing children's engagement and learning motivation during the language development process [10]. Game-based learning media can provide enjoyable learning experiences while helping children recognize, pronounce, and understand vocabulary more actively [11].

The solution proposed in this study is the development of an educational touch-box game designed to stimulate children's vocabulary skills through touch sensory exploration and verbal language expression [12]. The game can be developed as a Touch

Box, a closed box containing various real objects or miniatures, such as fruits, animals, household items, and toys. Children are encouraged to identify the objects by touching and guessing them, followed by naming the objects aloud, thereby encouraging them to recognize and produce new vocabulary [13]. Interactive and enjoyable play activities can increase children's learning interest and enrich their vocabulary because they acquire language through direct experiences and stimulating learning environments [14]. The use of creative, game-based learning media has also been shown to support young children's understanding of language concepts and enhance their early literacy skills. Therefore, the development of a Touch Box game can serve as an innovative learning medium that connects children's sensory experiences with language use, thereby supporting the development of early childhood vocabulary skills.

The benefits of developing a Touch Box game for young children lie in its ability to provide multisensory stimulation that supports optimal language development, particularly vocabulary acquisition. The Touch Box game enables children to learn through touch, object recognition, and the association of words with concrete experiences, thereby helping them expand their vocabulary naturally and meaningfully. This is consistent with findings showing that interactive learning media can significantly improve children's vocabulary skills, confidence in speaking, and language comprehension [15]. In addition, game-based media such as the Touch Box can enhance children's learning motivation, concentration, and active engagement in the learning process [7]. Therefore, the development of a Touch Box game not only contributes to vocabulary acquisition but also supports overall language development through concrete, enjoyable, and meaningful learning experiences for young children.

Previous studies have shown that the use of educational game media can improve the language skills of young children. Kusmiati, Muhammad Ali, and Halida [16] found that the Touch Box game combined with a chain whispering game could improve children's vocabulary mastery and speaking skills. Similarly, Panarangi [17] demonstrated that the Touch Box game was effective in improving the cognitive abilities of children aged 4–5 years. Meanwhile, Amelia and Rahmadani [18] found that PEMA (Papan Edukasi Main Anak), an educational play board, could improve children's vocabulary acquisition through the introduction of pictures and letters.

However, these studies have primarily focused on the implementation of existing media to improve children's language and cognitive abilities, while research on the development of the Touch Box as an Educational Game Tool (Alat Permainan Edukatif/APE) specifically designed to enhance young children's vocabulary skills remains limited. In addition, no study has been identified that develops such a learning medium based on the instructional needs of RA Muslimat NU Wiroditan. Preliminary observations and interviews with teachers revealed that there is currently no learning medium specifically designed to stimulate children's vocabulary development. Consequently, learning activities still rely heavily on conventional media, limiting children's opportunities to engage in learning experiences that are engaging, concrete, and meaningful through play-based activities. Based on the identified research gap and the needs observed in the field, there is a need to develop the Touch Box as an

Educational Game Tool (APE) designed in accordance with the characteristics and developmental stages of early childhood, particularly to support children's vocabulary development.

Based on the background described above, the researcher intends to develop an innovative educational game tool called the Touch Box, which is expected to help improve young children's vocabulary skills. The Touch Box is an educational game that utilizes children's sense of touch, in which children are encouraged to describe the characteristics of objects they touch and feel. The Touch Box is made of a wooden board with an opening on one side, allowing children to insert their hands into the box to hold, touch, and identify the objects placed inside.

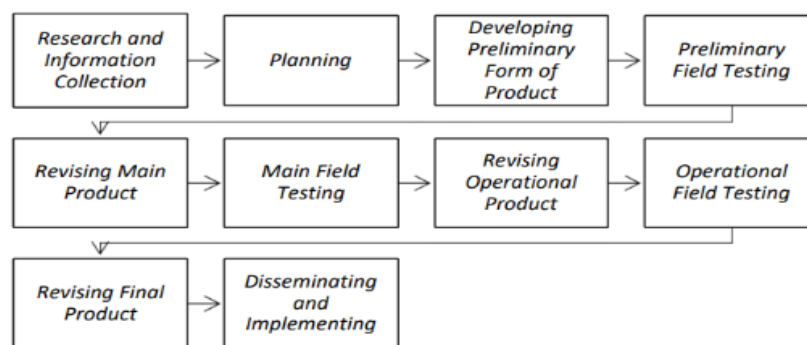
The development of a game-based learning activity to enhance young children's vocabulary skills at RA Muslimat NU Wiroditan is considered necessary, as the school currently does not have a specific Educational Game Tool (APE) designed to support children's vocabulary development. The availability of appropriate educational games is important in providing children with meaningful learning experiences through play while facilitating the development of their language skills. Furthermore, a study conducted by Kusmiati, Muhammad Ali, and Halida demonstrated that the Educational Touch Box Game was effective in improving children's Indonesian vocabulary, particularly their ability to describe the characteristics of objects explored through touch [16]. These findings indicate the potential of the Touch Box as an educational game for supporting vocabulary development in early childhood. Therefore, based on the needs identified at RA Muslimat NU Wiroditan and the findings of previous research, the researcher proposes a study entitled "Development of Touch Box Educational Games to Improve Early Childhood Vocabulary Skills".

METHOD

This study employed a Research and Development (R&D) methodology using the development model proposed by Borg and Gall. The study aimed to develop an educational game tool in the form of a Touch Box designed to support young children's vocabulary development. Of the ten stages proposed in the Borg and Gall model, this study adopted seven stages: research and information collecting, planning, development of the preliminary form of the product, preliminary field testing, main product revision, main field testing, and operational product revision. These stages were selected because the primary objective of the study was to develop a feasible educational game product that could subsequently be evaluated in terms of its validity, practicality, and effectiveness by relevant validators and through field testing.

Borg and Gall define research and development as a process used to develop and validate educational products. The R&D process generally involves a systematic cycle consisting of reviewing research findings relevant to the product to be developed, developing the product based on these findings, conducting field testing in the setting where the product will ultimately be used, and revising the product based on deficiencies identified during the testing process [19].

The Borg and Gall development model provides a systematic framework for developing educational models or products. The complete development procedure consists of ten stages: research and information collecting, planning, development of the preliminary form of the product, preliminary field testing, main product revision, main field testing, operational product revision, operational field testing, final product revision, and dissemination and implementation [20]. In the present study, seven stages were implemented, namely research and information collecting, planning, development of the preliminary form of the product, preliminary field testing, main product revision, main field testing, and operational product revision. The remaining stages were not conducted due to the scope and limitations of the study.



However, this study was conducted only up to the operational product revision stage, due to limitations in funding, human resources, and the time available to the researcher. Accordingly, the development process was limited to the stages that could be implemented within the scope and resources of the study. The sequence of the development stages is presented in the following diagram.

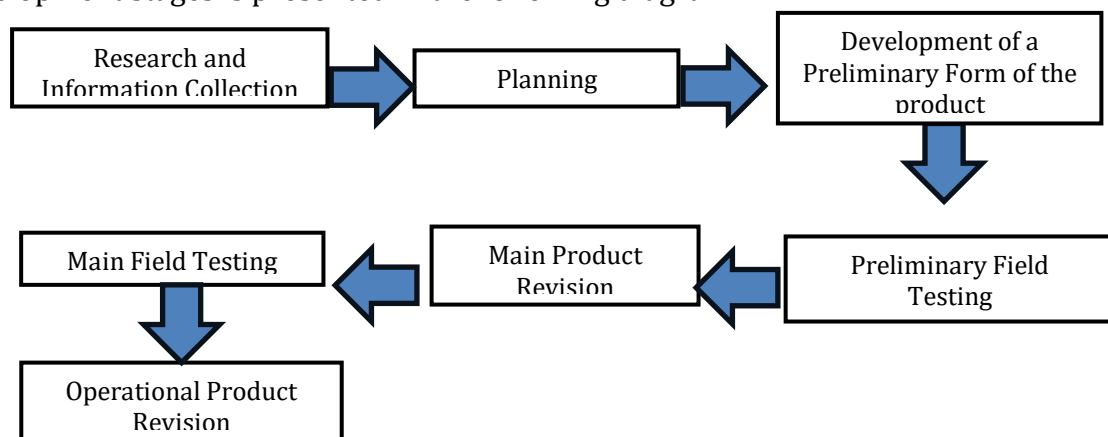


Figure 1. Scheme of R&D Research Steps to be carried out by Researchers

The participants in this study consisted of the school principal, classroom teacher, children aged 4–5 years, a media expert, and a subject matter expert who were involved in the product development and testing processes at RA Muslimat NU Wiroditan. A total of 10 children aged 4–5 years participated in the study as subjects in the trial use of the developed educational game tool. The school principal and classroom teacher served as informants who provided information regarding the learning conditions, instructional media needs, and characteristics of the children. The study also involved two expert validators, namely a media expert and a subject matter expert. The

media expert was a university lecturer with expertise in teaching materials or instructional media for early childhood education. The media expert was responsible for evaluating the product in terms of its design, visual appearance, usability, and suitability for the characteristics of young children. Meanwhile, the subject matter expert was a classroom teacher who teaches children aged 4–5 years. The subject matter expert was responsible for assessing the suitability of the content and learning materials incorporated into the educational game tool in relation to the learning objectives and the developmental characteristics of children aged 4–5 years. The study was conducted at RA Muslimat NU Wiroditan, which served as the setting for both the development and field testing of the Touch Box educational game tool.

The data collection techniques used in this study included interviews, observations, documentation, and questionnaires. Interviews were conducted face-to-face with the teacher of Group A at RA Muslimat NU Wiroditan to obtain information regarding the learning conditions, children's needs, and challenges encountered in developing children's vocabulary skills. Observations were conducted through direct observation of the learning process in the Group A classroom at RA Muslimat NU Wiroditan. The observations were intended to obtain data regarding teacher and children's activities during the learning process, particularly those related to the use of learning media and vocabulary development activities. Documentation was used to collect supporting data, including children's demographic data, learning materials and instructional documents, as well as documentation of activities relevant to the research process. Meanwhile, questionnaires were used as assessment instruments administered to the media expert and subject matter expert to evaluate the feasibility of the developed product. The questionnaires were also used to assess the development of children's vocabulary skills based on predetermined indicators during the product trial.

The validators involved in this study consisted of a media expert and a subject matter expert. The media expert was a university lecturer with expertise in instructional media and the development of teaching materials for early childhood education. Therefore, the media expert was considered competent to evaluate the feasibility of the Touch Box educational game in terms of its design, visual appearance, ease of use, safety, and suitability for the characteristics of young children. Meanwhile, the subject matter expert was a classroom teacher who teaches children aged 4–5 years and has experience in implementing learning activities in early childhood education settings. The subject matter expert was responsible for assessing the suitability of the content, learning objectives, and language development indicators, particularly those related to the vocabulary skills of children aged 4–5 years, with the developmental characteristics and learning needs of the children.

The data analysis in this study consisted of two types: expert validation data analysis and children's assessment data analysis. Data obtained from the expert validation sheets and children's response sheets were analyzed using a Likert scale. The percentage of the ideal score was calculated using the following formula:

$$P = \frac{F}{N} \times 100\%$$

P : Percentage

F : Score obtained

N: Maximum score

The expert assessment results were used to determine the quality and feasibility of the developed Touch Box educational game. The assessment guidelines and criteria for determining the feasibility and effectiveness of the developed product are presented below:

Table 1 Likert Scale Criteria

Analysis Quantitative	Score
Very good	4
Good	3
Not good	2
Very Bad	1

The scores obtained from each item were summed to obtain the actual score, representing the total score achieved by the product. The actual score was then compared with the maximum score, which was determined by multiplying the number of questionnaire items by the highest score assigned to each item.

The expert validation questionnaire was used to assess the feasibility of the developed educational game media. The final score was determined by calculating the mean score for each aspect of the questionnaire. This was done by dividing the total score obtained for each aspect by the number of statements within that aspect. The resulting scores were subsequently converted into predetermined assessment criteria, as presented in the following table.

Table 2 Effectiveness Criteria

Presentation	Criteria
81% - 100%	Very Effective
61% - 80%	Effective
41% - 60%	Less Effective
≤ - 40%	Ineffective

Based on these criteria, the developed product or educational media was considered effective when it achieved a minimum percentage score of 61%. A percentage score ranging from 81% to 100% indicated that the product was categorized as highly effective. In contrast, a score below 61% indicated that the product required further revision or refinement before it could be considered effective.

RESULT AND DISCUSSION

The media development process involved designing the structure and visual appearance of the Touch Box educational game tool in accordance with the learning needs of young children. The product design considered several aspects, including color, shape, safety, and ease of use, to attract children's attention and support vocabulary learning activities. The Touch Box was designed in the form of a box with multiple interactive sides that can be used to introduce vocabulary, letters, numbers, and familiar

objects from children's surroundings through tactile exploration and object-guessing activities.



Figure 2. Touch Box Game

The expert validation stage was conducted to determine the feasibility of the Touch Box educational game tool before it was implemented in the learning trials. The validation process involved a media expert and a subject matter expert using an assessment instrument based on a Likert scale. The validation results were used to determine the feasibility level of the developed media and to provide a basis for revising and refining the product prior to its implementation in the field trials.

Table 3 Expert Validation Results

No	Validator	Validation Score	Criteria
1	Media Expert	81.25%	Very Effective
2	Subject Matter Expert	97.5%	Very Effective

Based on the validation results, the Touch Box educational game tool was categorized as highly effective by both the media expert and the subject matter expert. These findings indicate that the developed media is suitable for use in learning activities aimed at supporting the vocabulary development of young children at RA Muslimat NU Wiroditan. Nevertheless, several revisions were made in accordance with the validators' recommendations to improve the visual appearance and functionality of the media, making it more engaging, interactive, and accessible for children.

The storyboard and initial product design indicated that several revisions were made based on the recommendations provided by the media and subject matter experts. The revisions included the following:

Table 4. Touch Box Design Before and After Revision by Media Expert

No	Before Revision	After Revision	Information
1			In the section color background back of the original colored yellow replaced become color green on the side top and back box so that combination color become more interesting, and in the section side behind the original box only decoration shaped geometry replaced become instruction method use tool easy game understood by the user.

Table 5. Touch Box Design Before and After Revision by Material Expert

No	Before Revision	After Revision	Information
1			In the section side introduction original letters only pasted permanent and as decoration replaced use Velcro so that can used and utilized in learning like compile a word.
2			In the section side introduction the original number only pasted as decoration replaced use Velcro so that can used in learning like game guess missing numbers.

The initial study was conducted prior to the development of the Touch Box educational game by observing the learning process related to children's vocabulary development. The study involved 10 children from Group A1, aged 4–5 years, at RA Muslimat NU Wiroditan. At this initial stage, the researcher assessed the children's vocabulary skills through storytelling activities.

The subsequent stage of the product development process involved product trials conducted in two stages, namely a small-scale trial and a large-scale trial. At this stage, the effectiveness of the Touch Box educational game was evaluated through limited and extended field trials. The effectiveness of the media was determined by analyzing the assessment results obtained before the implementation of the Touch Box (pre-intervention assessment) and after its implementation during the field trials. The mean assessment results from the field trials are presented below:

Table 6Field Trial Assessment Results

Research Stage	Average Percentage	Category
Pre-Research	51%	MB
Small-Scale Trial	63%	BSH
Large-Scale Trial	86%	BSB

Based on the results of the trials, an improvement in children's vocabulary skills was observed across each stage of the study. In the pre-intervention assessment, the mean percentage score was 51%, which was categorized as Mulai Berkembang (MB; Beginning to Develop). Following the implementation of the Touch Box educational game during the limited field trial, the mean percentage increased to 63%, corresponding to the Berkembang Sesuai Harapan (BSH; Developing as Expected) category. Subsequently, a more substantial improvement was observed during the extended field trial, with the mean percentage reaching 86%, which fell within the Berkembang Sangat Baik (BSB; Very Well Developed) category.

The findings indicate that the development of the Touch Box educational game tool supported the improvement of vocabulary skills among children aged 4–5 years at

RA Muslimat NU Wiroditan. An increase in children's vocabulary development was observed across the successive stages of the study, from 51% in the pre-intervention assessment, categorized as *Mulai Berkembang* (MB; Beginning to Develop), to 63% in the limited field trial, categorized as *Berkembang Sesuai Harapan* (BSH; Developing as Expected), and ultimately to 86% in the extended field trial, categorized as *Berkembang Sangat Baik* (BSB; Very Well Developed). These findings suggest that play-based learning media can provide more meaningful language stimulation for young children by engaging them in concrete, active, and enjoyable learning experiences. The interactive nature of the Touch Box encourages children to explore objects through tactile experiences and communicate their observations, thereby providing opportunities to develop and expand their vocabulary through play.

The improvement in children's vocabulary skills may be attributed to the multisensory nature of the Touch Box game, which enables children to learn through direct experiences involving their sense of touch. Rather than relying solely on visual recognition, children are encouraged to explore the texture, shape, and physical characteristics of objects before verbally identifying and naming them. This activity helps strengthen the connection between concrete experiences and language acquisition, making newly introduced vocabulary more meaningful and easier for children to understand and retain.

Furthermore, the integration of play into the learning process can stimulate children's curiosity and concentration while encouraging their confidence to speak and express their ideas. Children become more actively engaged in learning because they participate directly in play-based activities. Such an approach creates a less monotonous learning environment and can increase children's enthusiasm and engagement in classroom activities. The combination of tactile exploration, object identification, and verbal expression therefore provides meaningful opportunities for children to develop vocabulary through active and enjoyable learning experiences.

The effectiveness of the Touch Box in supporting children's vocabulary development was also influenced by its engaging design and its alignment with the developmental characteristics of young children. The use of bright colors, interactive game components, and object-guessing activities encouraged children to remain interested and motivated to participate. The product revision process, which incorporated recommendations from the media and subject matter experts, also contributed to improving the overall quality of the developed media. Modifications to the color scheme and user instructions, along with the addition of Velcro components for letter and number recognition activities, made the media more varied and adaptable to different language-learning activities. Accordingly, the developed Touch Box functions not only as a play tool but also as an educational and flexible learning medium that can be integrated into various early childhood learning activities.

The findings of this study are consistent with those reported by Kusmiati, Muhammad Ali, and Halida [16], who found that the use of a Touch Box game could improve young children's speaking skills and Indonesian vocabulary mastery. Their study demonstrated an increase in children's ability to express vocabulary related to the

characteristics of objects explored through touch, from 36.7% in Cycle I to 76.7% in Cycle II. The similarity between their study and the present research lies in the use of the Touch Box as a language-stimulation medium through activities that involve tactile exploration and direct verbal identification of objects. The present study differs in that it focuses not only on children's speaking skills but also on the development of the learning medium itself. The Touch Box developed in this study underwent validation by both a media expert and a subject matter expert prior to its implementation in learning activities. This development process was intended to ensure that the resulting product was appropriate for use as an educational learning medium for young children.

This study is further supported by the research conducted by Zahrina Amelia and Anisa Rahmadani [18] on the use of PEMA as an educational medium to improve vocabulary acquisition among children aged 3–4 years. Their findings indicated that educational game media could support children's ability to recognize symbols, letters, and sounds, as well as acquire new vocabulary through play-based activities. The similarity between their study and the present research lies in the use of play-based learning media that provides children with active and enjoyable learning experiences, thereby facilitating their understanding of new vocabulary. Learning activities presented in the form of educational games can provide children with greater opportunities to participate directly in the learning process compared with conventional teacher-centered approaches. Direct involvement in enjoyable play-based activities can facilitate children's understanding and retention of newly introduced vocabulary [21],[22].

In addition to supporting vocabulary development, the use of the Touch Box game may also contribute to other aspects of children's development, including cognitive, communication, and social skills. This finding is consistent with the study conducted by Panarangi, which reported that the Touch Box game could support the development of thinking skills among children aged 4–5 years through activities involving the classification and identification of objects using their sense of touch. In the present study, children were not only encouraged to name objects but also to describe their characteristics, distinguish their shapes, and relate the objects to their prior experiences. These activities provide opportunities to develop children's cognitive processes, memory, and communication skills as they express their observations and opinions in simple verbal forms. The multisensory and interactive nature of the Touch Box therefore allows vocabulary learning to be integrated with broader developmental experiences.

The findings of this study also indicate that the use of educational game media can support teachers in implementing more innovative and child-centered learning activities. Prior to the implementation of the Touch Box, vocabulary learning at RA Muslimat NU Wiroditan tended to rely on conventional methods, such as teacher-led explanations and the use of a blackboard, which provided limited opportunities for children to participate actively in the learning process. Following the implementation of the Touch Box, children demonstrated greater participation by asking questions, responding to questions, and interacting with teachers and peers. This condition suggests that learning media designed in accordance with the developmental

characteristics of young children can facilitate more active participation and improve the quality of interaction during the learning process.

The implications of this study suggest that teachers should incorporate innovative, interactive, and developmentally appropriate learning media to support more effective learning processes in early childhood education. The use of educational game tools, such as the Touch Box, can serve as an engaging and practical alternative for language-learning activities in early childhood education settings. In addition to supporting children's vocabulary development, the media can create an enjoyable learning environment that encourages children to participate more actively and enthusiastically in learning activities. This study also contributes to the development of play-based learning media that can be utilized by teachers to provide more meaningful opportunities for stimulating children's language development. Accordingly, the Touch Box can be considered as one possible learning-media innovation that supports the implementation of play-based learning in early childhood education.

CONCLUSION

Based on the findings of this study, the Touch Box educational game tool was successfully developed as an innovative and effective learning medium to support the vocabulary development of children aged 4–5 years at RA Muslimat NU Wiroditan. The media was designed by incorporating educational, interactive, and sensory aspects to provide children with concrete and enjoyable learning experiences. The validation results indicated that the Touch Box obtained scores of 81.25% from the media expert and 97.5% from the subject matter expert, both of which were categorized as highly effective. Furthermore, the field trial results demonstrated an improvement in children's vocabulary skills, from 51% in the pre-intervention assessment to 63% in the limited field trial, and subsequently to 86% in the extended field trial, which was categorized as Berkembang Sangat Baik (BSB; Very Well Developed). The findings indicate that the Touch Box can support vocabulary development among children aged 4–5 years by providing opportunities for direct learning experiences through the sense of touch. The Touch Box consists of a box with an opening that allows children to insert their hands and explore objects inside without directly seeing them. Through this activity, children are encouraged to identify object characteristics based on sensory experiences, such as shape, texture, size, and other observable features, before describing and identifying the objects they have explored. This process stimulates children to recognize, understand, remember, and verbally produce vocabulary associated with the objects they encounter.

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