



## Development and Evaluation of a Sensory Game Teaching Module for Texture Recognition in Early Childhood Education

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### ABSTRACT

Early childhood learners require developmentally appropriate strategies to support their sensory growth, particularly in recognizing and categorizing textures through direct experiences. This study aimed to develop and evaluate a sensory play-based instructional module designed to enhance texture recognition skills in early childhood learners. Employing a Research and Development (R&D) approach using the ADDIE model (Analysis, Design, Development, Implementation), the module was validated by three subject matter experts and implemented in classroom settings. Data were collected through expert validation instruments and teacher assessments to measure its practicality and effectiveness. The module received a validity score of 84.72%, indicating strong content alignment and instructional accuracy. Its practicality was rated at 92.25%, reflecting ease of implementation and contextual relevance, while its effectiveness reached 90.27%, demonstrating improved learner engagement and the ability to distinguish textures through structured sensory activities. These findings confirm the module's high validity, practicality, and effectiveness. Its application offers a valuable instructional strategy for early childhood education by promoting sensory development through evidence-based, play-integrated learning.

**Keywords:** Sensory Play, Texture Recognition, Instructional Module Development, Early Childhood Education

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## INTRODUCTION

Education plays a crucial role in shaping the character and potential of individuals (Innes et al., 2023; Rohali & Sitorus, 2025; Uzlal & Suryana, 2022). The educational process does not only take place in formal environments such as schools but also includes informal learning that occurs at home and in the community, enabling individuals to compete in the global market (Aulia & Amra, 2021; Jannah et al., 2023; Wikaningtyas & Nasir, 2024). Competitiveness in education can be understood as a country's ability to create an efficient, inclusive, and high-quality education system that produces knowledgeable, skilled individuals who are ready to compete globally (Hidaya & Aisna, 2020; Mallillin et al., 2020). Various types of education, from primary to higher education, aim to develop the knowledge, skills, and attitudes that individuals need to contribute to society (Sanga & Wangdra, 2023).

Among the various stages of education, early childhood education (ECE) plays a very important role. ECE covers the period of child development from birth to six years of age, which is a crucial period for children's growth and development in physical, cognitive, social, and emotional aspects (Saleha et al., 2022). At this stage, education should be designed to provide a comprehensive and enjoyable learning experience that allows children to explore and interact with their surrounding environment. Early childhood learning emphasizes not only knowledge acquisition but also character development and social skills required for everyday life (Andari & Anadhi, 2023). By creating a positive environment and providing adequate learning facilities and opportunities, children can grow and develop well (Pitriani et al., 2023).

Experts also identify developmental patterns and stages that emerge from within the child, such as cognitive, social-emotional, and physical aspects. With this understanding, we can create a fun and play-based learning environment, which is expected to support children's development (Ciolan, 2013; Kurniawati & Husnayain Madani, 2024; Priyanti & Warmansyah, 2021). This is supported by Gestalt Theory, which shows that early childhood has great potential for holistic and integrated learning. In the context of early childhood education, this approach emphasizes the importance of a well-rounded learning experience, rather than just focusing on separate parts. This approach helps children develop critical thinking skills and creativity, which are essential for their future development (Rohmah et al., 2023). However, previous research has primarily focused on cognitive and social aspects, often overlooking the integration of sensory experiences in the learning process, which is an important aspect of early childhood development. Therefore, the development of learning modules that emphasize child-centered methods, including sensory play, is highly appropriate for early childhood education (Patria & Zulkarnaen, 2023).

Currently, teaching modules are considered a crucial tool for the smooth implementation of learning with a new paradigm, especially in the face of the transformation brought by the industrial and digital revolutions (Maipita & Dalimunthe, 2021). Teaching modules refer to a series of media tools, methods, instructions, and guidelines that are systematically designed, engaging, and tailored to the needs of learners. Teaching modules also consider what will be learned with clear learning objectives. Of course, their development is also long-term oriented (Bunyamin et al., 2020; Munir & Warmansyah, 2023; Rahmanto et al., 2023). Teachers also need to understand the concept of teaching modules to ensure that the teaching and learning process becomes more engaging and meaningful.

The preparation of teaching modules must be oriented towards the approach of the models, methods, and media used, as the completeness of these tools directly affects the success of learning achievements. With the selection of appropriate models and methods, the play-based approach is considered successful in combining fun activities that suit children's developmental needs with learning, as well as the use of appropriate media (Syamsuardi et al., 2019). Teaching modules can create a more effective and engaging learning environment, enabling students to more easily understand the material and achieve the expected learning outcomes. This makes careful planning in the preparation of teaching modules very important to support an optimal learning process (Abdul Azis et al., 2022). By utilizing integrated teaching modules, teachers can create a more dynamic and engaging learning experience,

motivating students to be more actively involved. Through the module, teachers can incorporate various activities, such as games, into the learning process.

Efforts to stimulate early childhood senses begin with touch, which is one of the most sensitive senses in children. Through touch, children can recognize various textures (Budiarti et al., 2022). Texture is a physical or visual characteristic that can be felt or seen on the surface of an object. These characteristics include various types such as smooth, rough, soft, hard, porous, and structured. Variations in texture are highly dependent on the physical properties of the object, and can affect how it is perceived by our senses, both visually and tactilely (Farida & Nuraeni, 2025; Zubaidah et al., 2025). A holistic learning approach based on multisensory stimulation is needed to support optimal child development (Purnamasari et al., 2022). In this case, integrated teaching modules and sensory play media play an important role in the meaningful learning process. Through sensory play, children not only learn to recognize textures through touch but also learn to distinguish between different textures, which in turn can enhance their sensory skills (Vyshedskiy & Khokhlovich, 2022). By introducing various textures through play that involves the children's sense of touch, they can gain experiences that enrich their understanding of the world around them, which is crucial for both cognitive development and fine motor skills.

Through field observations and literature review, it is evident that there is a need to develop integrated teaching modules that not only focus on cognitive aspects but also include sensory stimulation to support holistic child development. The gap in existing literature highlights the need to develop teaching modules that effectively integrate sensory play with clear learning objectives. Integrated teaching modules with sensory play can provide a richer, more diverse, and meaningful learning experience for children. Therefore, this research aims to develop teaching modules integrated with sensory play.

This study contributes to filling that gap by providing an innovative solution to improve early childhood sensory skills through structured sensory play. The research is titled *Development and Evaluation of a Sensory Game Teaching Module for Texture Recognition in Early Childhood Education*. The main issue in developing this teaching module is the sensory abilities and understanding of students in recognizing different types of textures. This study seeks to enhance children's sensory abilities by addressing this gap and providing practical, effective solutions to improve early childhood education practices.

## **RESEARCH AND METHODOLOGY**

This study is a research and development (R&D) study aimed at producing a learning product in the form of a teaching module integrated with sensory box games and testing its practicality and effectiveness in supporting early childhood sensory and texture recognition development. The development model adopted is the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. However, only four stages were implemented in this study:

### **Analysis Stage**

The analysis phase involved identifying the needs and challenges of sensory learning at Az-zahra Kindergarten Makassar. Field observations were conducted to assess the existing

teaching practices and identify gaps in learning materials. This stage served as the foundation for designing a developmentally appropriate and responsive teaching module.

### **Design Stage**

In this phase, a teaching module was designed, incorporating sensory box games as interactive learning tools to help children explore various textures. This phase also involved the creation of instructional guides and learning aids tailored to the needs of early childhood educators.

### **Development Stage**

This stage involved the production of the teaching module and accompanying learning media. The module was subjected to expert validation and revised based on feedback. A small-scale trial was also conducted to assess usability and gather preliminary responses from teachers who tested the product in a real classroom context.

### **Implementation Stage**

The finalized module was implemented in classroom learning activities. Teachers who participated in the research were given training on how to use the module appropriately. This stage aimed to assess the practicality and effectiveness of the module as perceived by teachers, especially in facilitating children's sensory exploration and texture recognition. The research was carried out over a one-month period in the odd semester of the 2024–2025 academic year at Az-zahra Kindergarten Makassar. The research subjects were early childhood educators selected based on specific involvement criteria related to the innovative sensory module.

A purposive sampling technique was employed to select participants. The participants were early childhood teachers from Az-zahra Kindergarten who met the following inclusion criteria: 1) Actively teaching during the research period, 2) Willing to participate in training and use the module in their classroom, 3) Experienced in early childhood education and willing to provide feedback on the module's implementation.

The focus of the study was on evaluating the perspectives of these educators regarding the practicality and effectiveness of the developed module, not on measuring children's individual performance.

### **Data Collection**

Data collection was conducted using a triangulation approach that included questionnaires, interviews, and observations, supported by the following instruments:

**Teaching Module Validation Sheet.** Used to obtain assessments from subject matter experts and media experts regarding the content, language, layout, and systematic structure of the teaching module. The results guided revisions before the classroom implementation.

**Teacher Response Questionnaire.** Designed to assess the practicality and effectiveness of the teaching module from the teacher's perspective. The questionnaire consisted of Likert-scale items (1 to 4) and focused on two main dimensions: 1) *Module Effectiveness* : The degree to which the module helps achieve sensory learning objectives; 2) *Module Practicality* : The ease with which teachers can use the module in their daily classroom routines.

**The data were analyzed** using both qualitative and quantitative approaches. Qualitative data analysis was applied to responses from open-ended interview questions and expert comments, particularly in evaluating the module's content and design. Quantitative data analysis was used to assess the module's level of validity, practicality, and effectiveness, based on questionnaire scores provided by teachers and validators. The data were calculated using the following percentage formula:

$$\text{Percentage} = \frac{\text{Acquisition Score}}{\text{Highest Score}} \times 100$$

The results of these calculations are then categorized into certain assessment intervals to determine the quality of the developed product. With the interpretation of the scores as follows :

Table 1. Interpretation of the score

Interval	Assessment Criteria
75.00 to 100%	Very Valid/Practical/Effective
50.00 to 74.99%	Valid/Practical/Effective
25.00 to 49.99%	Less Valid/Practical/Effective
0 to 24.99%	Not Valid/Practical/Effective

To ensure validity, the teaching module was developed based on established theories in child development and sensory play. It was subjected to expert validation by professionals in the field of early childhood education and instructional media. Each item in the questionnaire was designed based on theoretical constructs to enhance content validity.

To ensure reliability, standardized instruments were used across all data collection stages. Clear rubrics were employed for assessments, and protocols for interviews and observations were applied consistently across participants. Pilot testing was also conducted to refine the instruments prior to the actual study.

Although the main focus of this study was on teachers, children participated indirectly during the module implementation. Therefore, strict ethical considerations were followed: 1) Informed consent was obtained from the participating teachers and written parental consent was secured for children who were involved in sensory play activities; 2) Participants were informed of their right to withdraw from the study at any point without any consequences; 3) All data were anonymized to maintain confidentiality and privacy, and no identifiable personal information was disclosed in any publication or presentation of the findings, 4) The research was conducted with full respect for the well-being and rights of young children, adhering to ethical guidelines for research involving minors.

## RESULTS AND DISCUSSION

This module was designed as a guide for teachers in providing fun and effective learning experiences through sensory activities involving children's sense of touch. The teaching module was developed using the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation), with four main stages applied in this research.

## **Analysis**

At the analysis phase in the development of teaching modules based on sensory play, data collection and analysis were carried out regarding the needs and problems faced by children in learning textures at Az-zahra Kindergarten Makassar. Based on the results of interviews with teachers at the kindergarten, it was found that children had difficulty distinguishing various textures around them. This is mainly due to the learning approach that relies more on verbal and visual methods, such as describing or showing Figures of textures, without providing opportunities for children to feel or observe textures directly.

This analysis process explores deeper information about teacher readiness and school environmental conditions that can support the use of sensory-based learning media. Interviews with teachers showed that although texture learning had been conducted, children were not fully able to understand the differences in texture well due to limitations in direct sensory experience. Therefore, in this analysis stage, researchers assessed the need for media development that can provide a more direct and thorough sensory experience, such as sensory box games that allow children to practically feel, observe and distinguish textures. Thus, the results of this analysis led to the design of a more effective module development, which would integrate sensory play to support children's cognitive and fine motor development. The module is also equipped with guidelines for teachers in implementing each activity so that learning can run effectively.

## **Design**

In the design phase, the sensory play module for texture recognition was developed with a focus on the needs and characteristics of the children at TK Az-zahra Makassar. The design emphasizes hands-on experiences that involve children's sense of touch, aiming to help them recognize and differentiate various textures through fun and interactive games. Based on interviews with teachers, it was found that children struggled to distinguish textures only by looking at Figures or listening to verbal explanations. Therefore, the module was designed to provide real sensory experiences through games like "Guess the Texture," "Group the Textures," and "Texture Exploration," allowing children to feel objects with different textures and identify them.

Additionally, the learning materials were designed using safe and engaging materials such as sand, small stones, soft fabrics, and other natural elements. All materials used were carefully selected to ensure the children's safety during the activities. The module also provides guidelines for teachers to facilitate the games, with clear step-by-step instructions. Evaluation is carried out through direct observation of the children's ability to distinguish and describe textures, with verbal feedback provided to improve their understanding. With a design that considers children's sensory needs and play-based learning principles, this module is expected to effectively enhance texture recognition and tactile skills.

## **Development**

The development phase involves the preparation of teaching materials and game media that suit the needs of early childhood. The materials used in the game include different types of textures, such as rough, smooth, slippery and hairy. Initial trials were conducted to

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ensure the safety and effectiveness of the materials in supporting sensory learning. The following is an overview of the teaching module guide used by teachers in implementing sensory play.



Figure 1. Cover of Module

The cover of module includes information about the identity of the book and the identity of its development. Where the results of determining the cover have also been approved by the supervisors and validators.

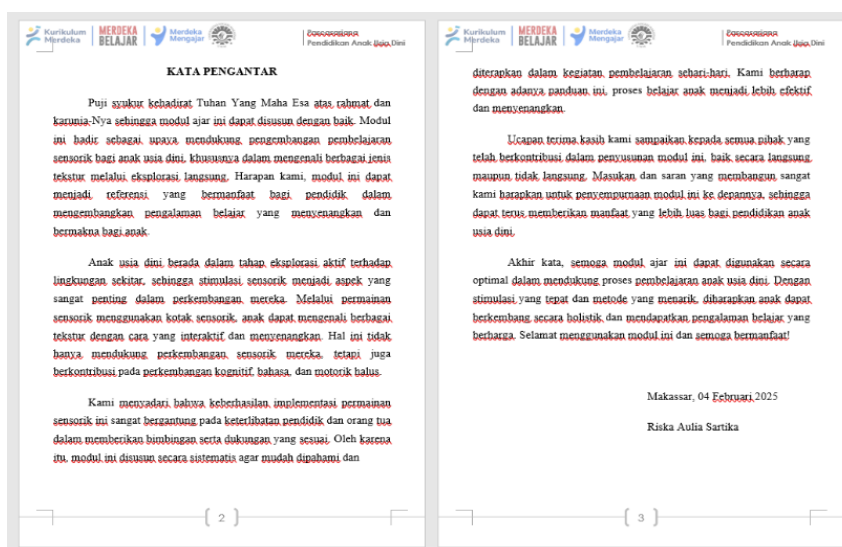


Figure 2. Home Page Display

On the first page of the teaching module guide, there is an introduction from the module developer. In this section, the developer provides a welcome and brief explanation of the purpose of this teaching module and the expectations to be achieved through the

application of the module. This foreword aims to provide context and an overview of how this teaching module will be used, as well as the importance of sensory play in children's learning, especially in texture recognition.

In addition, on the first page there are also acknowledgments to those who have contributed to the process of preparing the teaching module guide. This acknowledgment is addressed to various parties who have provided support, both directly and indirectly, in the development and completion of this teaching module.

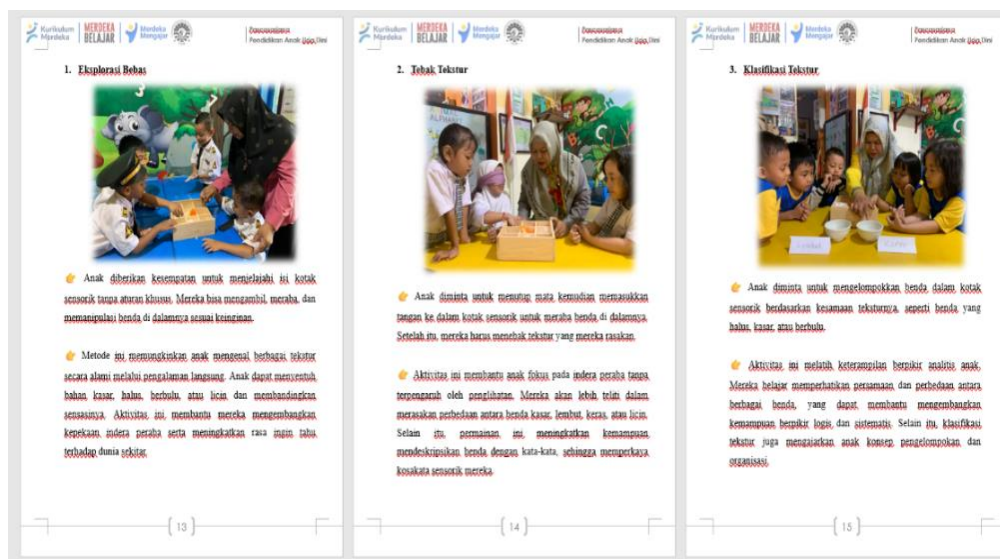


Figure 3. Game Guide

This page contains how to use the sensory box game, on this page various ways of playing the sensory box game are explained, containing Figures and playing steps. This page aims to provide a comprehensive overview of the use of sensory box games. Readers will gain an understanding of the methods and objectives of the game, the materials used, and how the game can be utilized in the context of children's learning and development.

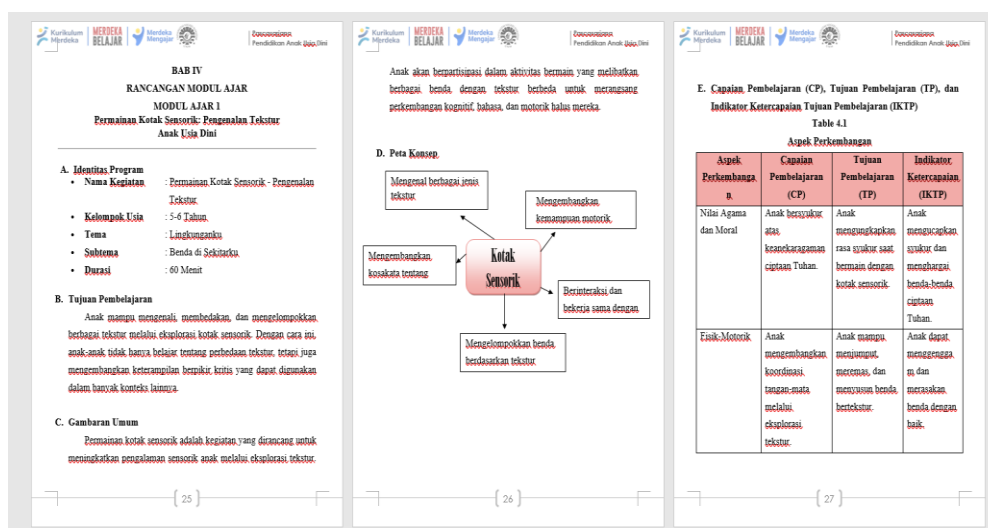


Figure 4. Teaching Module



On this page, the teaching module will contain a sequence of learning steps designed to ensure teaching and learning activities can take place systematically and effectively. These steps are designed to make learning easy for the teacher, and for the children to follow each step with enthusiasm and structure. The learning steps described above are a structured sequence. From the preparation of materials and clear instructions to the evaluation and reflection activities, each step is designed to support the all-round development of children's sensory and language skills.

In this study, an in-depth analysis of the validity, practicality and effectiveness of the texture recognition sensory game teaching module was conducted. The research aims to determine the extent to which this module can improve early childhood texture recognition skills, as well as the impact on their learning motivation. The following discussion will outline important findings obtained from the research related to an overview of this teaching module, its validity, practicality, and effectiveness in supporting early childhood learning at Az-zahra Kindergarten Makassar.

### **Implementation**

In the implementation phase of the sensory play module for texture recognition at Az-zahra Kindergarten in Makassar, this study has successfully applied the previously prepared teaching module. The implementation was conducted with the aim of evaluating the effectiveness and practicality of the teaching module in the context of direct learning, as well as identifying the impact caused on children's ability to recognize and describe textures through sensory activities. The following are the results of teacher assessments of the development of open modules:

### **Validity of the Sensory Game Teaching Module**

Tabel 2. Module validation assessment

No	Validator	Percentage Score
1	Validator 1	75%
2	Validator 2	82.29%
3	Validator 3	96.87%
Overall Percentage		84.72%

The validity of this sensory game teaching module was measured through an evaluation conducted by three expert validators, consisting of lecturers, principals, and an early childhood education expert. Based on the evaluation results, this module showed very good validity with a high percentage value. The first validator gave a value of 75%, the second validator gave a value of 82.29%, and the third validator gave a value of 96.87%. The overall average validation value of this module was 84.72%, indicating that this teaching module is very valid and can be applied well for the learning objectives that have been set. This validation assessment assesses various aspects, ranging from the suitability of the module to the curriculum, the structure and format of the module, to the diversity of materials presented in the module. Overall, this module is considered very appropriate for the learning objectives to be achieved, as well as relevant to the development needs of early childhood. The

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validators assessed that the material compiled in this module was very clear and easy to understand, and provided clear instructions for teachers in implementing sensory games in the classroom. The validity of this module is also reflected in its usefulness for educators. The validators assessed that this module not only provides benefits in introducing textures to children, but also has the potential to help develop their fine motor, sensory, and cognitive skills. Based on the results of this validation, it can be concluded that this sensory game teaching module for texture recognition is very valid to be applied in early childhood learning activities at Az-zahra Kindergarten Makassar.

### **Practicality of Sensory Game Teaching Module**

Tabel 4. Percentage of Practicality Value

No	Validator	Percentage Score
1	Responden 1	92.85%
2	Responden 2	91.66%
	Overall Percentage	92.25%

The practicality of the sensory game teaching module for texture recognition at Az-zahra Kindergarten Makassar has been evaluated through an assessment by two respondents from teacher class. Based on the evaluation results, this module shows a very high level of practicality, with a percentage score of 92.85% from the first respondent and 91.66% from the second respondent. This shows that both respondents feel that this module is very practical and easy to apply in learning activities. This is reflected in the ease of implementation suggested by this module, as well as efficient time management in its implementation.

The practicality of this module is also seen from the fact that the materials and tools used in sensory games are very easy to obtain and do not require complicated preparation. Teachers feel that they can easily follow the steps suggested in the module without difficulty, which allows them to allocate time efficiently in class. The learning process that is arranged in a simple and structured manner makes it easy for teachers to facilitate children to be actively involved in the activities held.

In addition, the level of children's acceptance of this teaching module is very good. Most of the children felt happy and actively involved in every game played. Activities involving the sense of touch are very interesting for children and provide a fun learning experience. The teachers also felt that this module provided considerable support in achieving the learning objectives, namely introducing textures through direct experience. Thus, the practicality of this module has proven effective in supporting fun learning and is easy to apply in the classroom.

**Effectiveness of the Sensory Game Teaching Module**

Tabel 4. Percentage of effectiveness

No	Validator	Percentage Score
1	Responden 1	88.88%
2	Responden 2	91.66%
<b>Overall Percentage</b>		90.27%

The effectiveness of the texture recognition sensory game teaching module can be seen from the assessment results given by two respondents from teacher class. Based on the data obtained, both agreed that this module was very effective in achieving the learning objectives that had been set. The percentage values obtained from the two respondents, namely 88.88% and 91.66%, showed that this module succeeded in helping children recognize various textures in a fun and interactive way. The activities carried out in this module also succeeded in attracting children's attention, motivating them to actively participate in each activity.

This module not only provides a sensory experience that hones children's ability to recognize textures, but also helps improve their fine motor and cognitive development. Through game activities that involve direct contact with textured objects, children can better understand the differences between various types of textures, such as rough, smooth, and slippery. This also plays an important role in their language development, because they are encouraged to describe and illustrate what they feel during the activity.

Early childhood education has a very important role in forming the basis of children's abilities in the future. In this phase of development, children experience rapid progress, especially in terms of cognitive abilities (Musi et al., 2022), but also the most important thing to note is the sensory abilities of early childhood. One effective way to support children's development at an early age is with a play-based learning approach, which can stimulate children's various senses simultaneously. At this stage, education should be designed to provide a well-rounded and fun learning experience that allows children to explore and interact with the environment around them and children are encouraged to learn as freely as possible in a cheerful, calm and comfortable way (Yafie et al., 2024). This research examines sensory game-based teaching modules as learning media that can support the development of early childhood sensory abilities.

The texture recognition sensory game teaching module studied aims to introduce children to various types of textures that exist in the environment around them. By using games as a learning medium, children can learn through their sense of touch, which directly supports their fine motor and cognitive development. Therefore, the ability to develop teaching modules is an important aspect of teachers' pedagogical competence that needs to be improved, so that teaching methods in the classroom become more effective, efficient, and remain in accordance with the established achievement indicators (Maulida, 2022). By providing the right stimulation, we help children explore the world and build confidence in learning (Meilanie, 2020). This research shows that the use of this module not only provides a fun learning experience for children but is also very beneficial in introducing and developing their ability to recognize textures.

Overall, the effectiveness of this sensory game teaching module can also be seen from the increased involvement of children in learning activities. They do not just sit listening to instructions, but interact more with objects that have different textures. This supports learning objectives that focus on direct experience and active exploration, which are important for early childhood development. Thus, this module has proven effective in achieving learning objectives and improving children's sensory skills at Az-zahra Kindergarten Makassar.

Although the sensory play teaching module has been proven valid, practical, and effective based on data analysis, there are several limitations that need to be addressed. One key limitation lies in the limited time allocated for children to explore each texture in depth. In some sessions, not all children had sufficient opportunity to truly feel, compare, and understand the differences between textures. Adjustments in session duration may be necessary to allow more meaningful engagement. Moreover, while most children were actively involved, a few displayed low levels of participation, which may be attributed to the limited variety of games or instructional approaches that did not fully motivate every child. This indicates the need to diversify activities and adopt more flexible and personalized teaching strategies to better accommodate individual interests and the needs of children with learning differences.

On the other hand, this module possesses notable strengths that make it a valuable tool in early childhood education. Its primary advantage lies in its ability to promote active engagement through enjoyable and hands-on learning. By allowing children to directly touch and explore textured materials, the learning process becomes more meaningful and easier to comprehend compared to traditional methods that rely solely on images or verbal explanations. Additionally, the module is designed to be easily implemented by teachers without requiring complicated preparation, making it highly practical in classroom settings.

Furthermore, this module supports holistic child development by not only introducing the concept of texture but also stimulating fine motor, sensory, and cognitive skills. Through direct tactile experiences, children are encouraged to recognize, categorize, and verbally describe different textures, which strengthens their language development. The combination of sensory stimulation, emotional engagement, and verbal expression makes this sensory play module an effective and comprehensive learning tool that significantly enhances early childhood development.

## **CONCLUSION**

The study demonstrates that the sensory play-based instructional module is effective in enhancing early childhood learners' ability to recognize, differentiate, and categorize textures through direct tactile experiences. Validated by expert reviews and teacher feedback, the module meets the standards of validity, practicality, and effectiveness. Activities such as "Guess the Texture" and "Texture Classification" provide meaningful learning aligned with children's sensory development stages, offering a concrete alternative to conventional, predominantly verbal or visual methods. The module enables more active, enjoyable, and adaptive learning tailored to the diverse needs of young learners. Educators are encouraged to incorporate such modules into daily practice to improve engagement and understanding,

while future research should explore its application in varied settings and the integration of additional sensory modalities to support holistic development.

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