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#### DOI: 10.18173/2354-1075.2023-0106

## FOSTERING LANGUAGE DEVELOPMENT IN PRESCHOOLERS THROUGH STEAM EDUCATION ACTIVITIES

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Abstract. Developing preschoolers' language in STEAM education is an issue that has received special attention from researchers worldwide in recent years. The article presents the tasks of language development for preschool children and analyzes the relationship between STEAM education and children's language development. Thereby, we propose some measures to foster children's language development through STEAM education activities, including (1) Using questions to stimulate children to converse and discuss before, during, and after activities; (2) Using literary works in STEAM activities; (3) Provide opportunities for children to draw - write and read in STEAM activities/projects; (4) Encourage children to recount their experiences in various forms. If used in a suitable and flexible combination, these measures will help children favorably develop their language ability and positively impact their acquisition of STEAM concepts and STEAM practical skills.

Keywords: language, language development, STEAM, preschoolers.

#### 1. Introduction

Language is a crucial factor in children's comprehensive development. It serves as their primary means of communication, enabling them to form their initial perceptions of the world around them and of human society. Moreover, it is a prerequisite for developing thinking skills and facilitates children's learning and play. Developing language skills in children entails enhancing their listening and comprehension abilities, pronunciation, expanding their vocabulary, fostering fluent speech, promoting pre-reading and writing skills, artistic language, and cultivating communication culture. This constitutes a primary objective underscored by the Vietnam preschool education program and numerous countries worldwide. Language development in preschool children can take various forms of diverse school activities, among which experiential activities such as STEAM offer many advantages [1].

STEM education has transformed into STEAM education, an integrated approach to education that is regarded as a reform strategy in contemporary schools. STEAM represents a significant advancement by adding the arts (A) component to STEM, thus transforming STEM into STEAM. The components of STEAM aim to achieve several important objectives, including language development. Language is the "glue" that connects the STEM elements through children's exploration, reasoning, communication, and creativity [1]. Recent studies on STEAM education for preschoolers have highlighted the need to provide opportunities to develop vocabulary, utilize language for communication, and promote early literacy skills.

Additionally, certain studies have emphasized the significance of communication, drama,

Received May 22, 2023. Revised June 18, 2023. Accepted July 8, 2023. Contact Tran Viet Nhi. Email address: tranvietnhi@hueuni.edu.vn

and storytelling in STEAM education for directing children's activities and fostering language development [2] [3]. This illustrates that establishing a language-rich setting to enhance children's language acquisition in STEAM education is a topic of considerable interest to researchers. Nonetheless, there still needs to be more research on fully leveraging the benefits of STEAM education activities to facilitate language development in children, particularly in the Vietnamese context. Therefore, further investigation is warranted to address this issue.

This article aims to analyze the correlation between organizing STEAM activities and language development in preschool children while proposing several measures for fostering their language skills during STEAM education activities. These measures yield positive effects on children's acquisition of STEAM concepts and skills and offer valuable recommendations for preschool educators to facilitate children's language development effectively and efficiently.

### 2. Content

### 2.1. Language development - a particularly important task in preschool education

The development of language for preschool children is defined as the process of organizing educational activities that facilitate children's acquisition of the functions and structures of language, as well as the social conventions that govern language usage to express and receive thoughts, emotions, and ideas [4]. This is an especially crucial objective in early childhood education. When planning educational activities for preschool children in both school and home settings, the following language development tasks should be considered [5-6]:

Main task	Specific tasks
Educating standard Vietnamese phonetics.	<ul> <li>Educating standard Vietnamese language pronunciation</li> <li>Training children to listen to language sounds.</li> <li>Teaching children to accurately pronounce phonemes, words, and sentences according to the standard Vietnamese pronunciation.</li> <li>Teaching children to adjust the volume, express correct intonation, and have cultural manners during communication.</li> <li>Correcting pronunciation errors for children.</li> </ul>
Building and developing vocabularies for children	<ul> <li>Enriching children's vocabulary: increasing the number of words and providing words that refer to objects, phenomena, activities, states, characteristics, and features.</li> <li>Enhancing children's understanding of word meanings: teaching children to use words accurately and developing their vocabulary of synonyms, antonyms, and homonyms to help them choose and use words correctly.</li> <li>Actively reinforcing children's vocabulary: using words correctly in sentence structure. Each word can be used in many different sentences and appropriately applied in communication activities.</li> </ul>
Teach children proper grammar and use different types of sentences for communication.	<ul> <li>Teach children to speak correct Vietnamese grammar and use different types of sentences for specific purposes.</li> <li>Teach children to speak sentence structures in Vietnamese and understand how different types of Vietnamese sentences are constructed, forming the habit of speaking with correct grammar.</li> <li>Teach children to speak different types of sentences for specific purposes: narrative sentences (reporting or summarizing), interrogative sentences (asking questions), imperative sentences (giving commands), and exclamatory sentences.</li> </ul>

Teaching fluent speech to children	<ul> <li>Teaching fluent speech in dialogues: Teach children to listen and understand dialogue, know how to talk, answer questions, and ask questions. When speaking, they should be able to control themselves in a cultured manner and be polite when answering and asking questions.</li> <li>Teaching fluent speech in monologues: Teach children to retell stories they have heard, recount their own experiences, and create simple stories that demonstrate independence and creativity in both content and form.</li> </ul>
Educating cultural communication in language	<ul> <li>Using appropriate tone, intonation, and expression.</li> <li>Using precise, rich, and suggestive vocabulary.</li> <li>Using appropriate sentence patterns for the communication context.</li> <li>Speaking clearly and coherently, using appropriate expressive means and rhetorical devices with culture.</li> <li>Training children to coordinate nonverbal communication means.</li> </ul>
Developing pre-reading and writing skills:	<ul> <li>Introduce children to the Vietnamese alphabet system.</li> <li>Familiarize children with language symbols/concepts: sound, syllables, words, sentences, and text.</li> <li>Gradually introduce children to skills such as sitting, holding a pen to write/draw/colour on paper, flipping through books and reading from left to right, top to bottom.</li> </ul>
Developing artistic language through literary works	<ul> <li>Through introducing children to literary works, teachers help them to listen and understand the works, evaluate the characters in the works, remember the content of poems and stories, and learn how to read/recite with emotion, especially learning to appreciate artistic imagery through the beauty of language.</li> <li>Children become familiar with the language style of literature, develop their artistic vocabulary, and learn the use of artistic language, sentence structure, expression, rhythm, and intonation.</li> </ul>

Children's language development will be enhanced when they are given opportunities to actively engage with language through experience. Hence, in executing language development tasks for children, teachers should expose them to real-life situations and contexts that motivate them to inquire, communicate constructively, exchange and share information, address challenges, and employ pre-reading and writing techniques competently.

# 2.2. STEAM Education Activities with Preschooler's Language Development 2.2.1. STEAM education for preschool children

STEAM education is gaining momentum as an innovative educational strategy in numerous countries and territories worldwide, including Australia, Canada, Taiwan, England, Spain, Israel, South Korea, the Netherlands, Turkey, and Malaysia [7]. It is an educational approach that emphasizes the integration of knowledge and skills from at least two domains of science, technology, engineering, arts, and mathematics to encourage learners to think and solve problems in a holistic and interconnected manner [8].

The STEAM education approach is an experiential-based integrated education approach. This approach emphasizes experiential activities that facilitate long-term understanding and memory, synthesis of knowledge, and problem-solving skills rather than relying solely on passive learning through listening or observing. The goal is to teach children how to learn through feedback from their experiences, form concepts in new experiences, and apply what they have learned to new situations [9]. STEAM not only enables teachers to integrate multiple fields

simultaneously and promote learning experiences for children to observe, question, research, explore, and develop creative building skills but also provides more options for educators to present STEM concepts to children through arts [10]. The STEAM approach allows children to learn and play in meaningful ways simultaneously.

### 2.2.2. Advantages of STEAM education activities for the language development of preschool children

Several studies, including those by Mchombo, S.A. (2018), Vislavath, R. (2018), and Siti Umroh et al. (2021), have demonstrated a positive relationship between participating in STEAM activities and the language development of preschool children [11] [12] [13]. STEAM activities offer various advantages, including providing opportunities for children to interact with tools, materials, and scientific situations, which can help them expand their vocabulary. STEAM also creates a language-rich environment that encourages children to ask questions, share ideas, debate, showcase their creations, and engage in interactive relationships with teachers, peers, and guests. This supports children's use of language for communication and fosters the acquisition and development of their vocabulary, expressive skills, and fluency in real-life situations.

Furthermore, STEAM education activities offer teachers numerous opportunities to incorporate poetry, stories, and drama into the curriculum, engaging children in the learning process and encouraging them to retell and share their experiences [2-3] [13]. Fleer et al. (2020) argue that storytelling is a crucial element and the heart of STEM activities in their study on preschoolers' STEM conceptual play [2]. This not only enhances children's language development but also provides opportunities for educators to teach language arts, including feeling the rhythm and melody of poetry, folk songs, and nursery rhymes, identifying artistic forms in stories, poetry, folk songs, and nursery rhymes, evaluating characters in stories, telling stories based on pictures, and teaching children to act in plays. As a result, children can enrich their vocabulary with artistic expressions, metaphors, imagery, and music and apply them in specific situations.

Umroh et al.'s (2021) study conducted in Indonesia with 4-5-year-old children revealed that those taught using STEAM education had better language development than those taught using traditional methods [13]. The authors suggest that children respond well to language stimuli when they engage in interactive, communicative, storytelling, and play activities. Thus, it is essential to provide positive and continuous language stimuli during STEAM activities. STEAM experiences also offer many opportunities for children to generate language appropriate to the situation and for teachers to help children improve their vocabulary in STEAM fields, language reflexes, and the ability to express ideas fluently, coherently, appropriately, accurately, expressively, creatively, and culturally. Moreover, STEAM education provides opportunities for children to draw and write to record their observations, explore objects, and access books, including science fiction books, which are an essential part of STEAM education and can promote children's learning process.

Several empirical studies have found that children's language development in STEAM activities and projects is closely linked to their cognitive development [13]. By exposing children directly to real-life objects, phenomena, events, and situations, STEAM activities, and projects help children gain experience in understanding the function and structure of language and using language to express their thoughts, emotions, and ideas through speaking, drawing, and writing. This is a significant advantage of the STEAM approach in preschool education, as it allows children to use language in conjunction with tools and devices in diverse processes to acquire knowledge and skills in science and math. The STEAM approach provides children with opportunities to engage in real-life situations and contexts, which can stimulate and develop their natural and meaningful pre-reading and writing abilities. This approach not only promotes language development but also supports education in science, technology, engineering, and math in a balanced way. In addition, language plays an essential role in facilitating children's

cooperation, problem-solving, communication, and creativity in group activities [3]. These skills are critical and long-term goals of STEAM education, aimed at developing the skills necessary for success in the 21st century.

# 2.3. Measures to foster preschooler's language Development in STEAM Education Activities

To effectively develop language skills in children through STEAM education, teachers must understand the significance of creating a language-rich environment and employing specific strategies. This article offers recommendations for teachers to implement during the process of language development in preschool children:

### 2.3.1. Using questions to stimulate children to converse and discuss before, during, and after activities

Asking questions is an effective way to expand conversations with preschoolers. According to Marie Fridberg and Andreas Redfors' (2021) [14] research, language strategies used in STEAM education significantly impact the quality of children's conversations and communication. Specifically, when teachers use rich language and ask prompting questions, children are stimulated to speak and express themselves more. To effectively incorporate these language strategies during STEAM-focused educational activities, teachers should:

- (1) Create a rich and engaging environment with various tools, toys, and materials for children to work with:
- (2) Allow children to explore, observe, examine, and hypothesize about objects and phenomena around them using all appropriate senses through play activities;
- (3) Provide ample time for children to discover, experience, share, and express their opinions;
- (4) Encourage children to think about what they are seeing, doing, and developing their thoughts and ideas while caring about the environment around them;
  - (5) Use open-ended questions to help children develop their thinking skills;
- (6) Allow children to engage in activities and perform tasks that serve themselves, as these activities can be valuable lessons and experiences for children in STEAM fields.

Questions must be used in specific situations and contexts to stimulate children's thinking, use language to respond, and share their thoughts and ideas with peers, teachers, and those participating in STEAM activities/projects. Teachers can use specific types of questions to stimulate children's language in organizing STEAM educational activities, such as:

<b>Question Content</b>	Specific Examples
Asking children about what they are doing	<ul> <li>What are you doing?</li> <li>You are working very hard. Can you tell me about your project?</li> <li>What are your plans for those materials?</li> </ul>
Asking to stimulate children to explain	<ul> <li>Why do you think that happened, in your opinion?</li> <li>How can I help you solve that problem?</li> <li>How did you go about doing that?</li> </ul>
Asking to stimulate children to predict, share plans	<ul> <li>What do you think will happen next?</li> <li>What will we use this container for?</li> <li>If it was you, what would you do?</li> <li>What would you change if you had a chance to do it again?</li> </ul>

Asking to connect what they have learned to the practical aspects of their lives

- What do you think about this?
- How have you done that before?
- What does this situation remind you of?

The importance of asking questions to stimulate children's thinking, activity, and language-based communication can be observed in the table presented above. It is a crucial strategy that needs to be emphasized in organizing STEAM activities/projects. Teachers should be flexible during conversations with children, providing a rich vocabulary and encouraging them to communicate actively. This creates opportunities for children to share and exchange ideas, which helps develop their fluent language skills, reflexive language in various situations, and confidence in using language.

### 2.3.2. Using literary works in STEAM activities

Poems and stories are valuable tools in STEAM activities. This was confirmed by Fleer and her colleagues in "Conceptual Playlab", a five-year research project in Australia. The study used storytelling as a critical tool to create play situations and lead games and activities to educate children aged 0-6 in STEM. This not only helps children learn STEM in a more accessible and engaging way but also provides many opportunities for teachers to develop their vocabulary and rich imagery and tone through the situations in the story.

To effectively use poetry and stories in organizing STEAM activities and achieving two goals: exploring STEAM and educating language for children, teachers need to carefully select stories or poems that can be integrated into activities rather than using them continuously from beginning to end. In addition, teachers need to fulfill specific requirements:

#### (1) Choosing literary works

This is the first and most crucial step in developing language and STEAM education for young children. In general, literary works written for preschool children need to ensure the following principles:

Firstly, ensure the general standards of a literary work

Reflect reality through artistic images constructed through language. These artistic images are both typical and specific. Readers will feel and comprehend the typical and representative characteristics of an age group, a class, an era, or a region through the specific image that the author constructs. There is an organic unity between content and form. In a story, the content, ideas, and themes that the author wants to convey to the reader must be expressed through appropriate artistic elements, including plot, structure, characters, and language. In poetry, the author's emotions about a landscape, a phenomenon, or an object in life will be expressed through an appropriate artistic form that the author chooses in terms of meter, rhyme, and language of the poem.

Secondly, a literary work must have high artistic value:

An actual literary work is valuable to children only when it is well-written and has artistic qualities explicitly demonstrated through the following criteria:

Language must be concise, profound, and natural, like the daily speech and thinking of children. For poetry, word selection should focus on creating a fresh melody and precise rhythm for the poem.

The structure must be simple: Choosing works with a structure along a timeline, a structure with two opposing character lines, or a structure that repeats itself is advisable. (Because these types of structures help children remember the plot and content of the work).

Character development: Characters can be animals, objects, etc., personified. The way they speak and think could create intimacy, affection, and attraction for children, making the names and faces of the characters in work exist, live long in memory and emotion, and enter the world

of children.

Thirdly, literary works must ensure suitability:

Children always have the desire and need to explore and discover the world. Literature employs artistic language to convey a multitude of subjects to children - ranging from the present and past to even future concepts - allowing them to be spoken of and comprehended. However, children have a limited vocabulary and life experience, which makes it necessary to guide them in comprehending the meaning and themes conveyed in literary works. Therefore, it is essential to select literary works suitable for children carefully. Suitability should be evaluated based on the work's content and form.

Regarding content: It is necessary to select works that reflect familiar and close-to-home topics surrounding children. These are issues that children are interested in, often encounter, and experience in life with family, school, and relationships with parents, grandparents, teachers, and friends. Sometimes, it is also appropriate to choose issues suitable for children's interests, imagination, and desire to explore, such as fairy tales and stories about wonders, adventures, animals, and mobile objects.

In terms of artistry, suitability should only select works that are short in terms of sentences because the short length of works manifests a small number of details. The art of the works is not too complicated but also not too simple. Specifically, the language must be clear, easy to understand, and suitable for the way children speak and think. It Must be able to build funny, innocent, lovely, and close-to-children characters. The structure of literary works needs to be simple, helping children easily grasp and remember the details of the work.

In summary, ensuring suitability when choosing literary works will create pleasure and excitement for children. From there, it helps children expand their understanding of the world and choose the right way to behave.

#### (2) Reading and telling literary works with artistry

Preschool children who have not yet developed reading fluency and cannot become "readers". Instead, they are listeners, and it is up to the teachers to introduce literary works to them. Therefore, teachers must be skilled in reading, storytelling, and performing literary works with emotion. The art of presenting works for children to listen to is an essential aspect of organizing children's exposure to the literature [15].

Reading and telling literary works with artistry involves using nuances of the voice to present the work, helping children to recreate mental images and evoke certain feelings and emotions. To achieve this, teachers need to analyze the content and artistry of the work and read and tell it with appropriate emotions, including speed, rhythm, and intonation. This helps convey aesthetic emotions to children about characters, authors, and works.

Reading and telling literary works with emotions has several benefits, such as arousing interest and curiosity, helping children recreate and imagine images from work, and experiencing the artistic values of the work. This stimulates children's aesthetic emotions, sharpens their perception, and introduces them to ways of expressing themselves in literary language.

For instance, in the STEAM activity "Building a House," the teacher can use the story of "The Three Little Pigs" to create a situation and lead the activity from start to finish. Similarly, in the project "Dentist", the story of "The Little Bear with Tooth Decay" could be selected as a way to lead the project. To use literary works effectively in STEAM activities to achieve both STEAM and language education goals, teachers should carefully select appropriate stories or poems and use them as a part of the activity, not necessarily continuously from beginning to end. In addition, teachers should meet specific requirements, such as analyzing the content and artistry of the work and performing it with appropriate emotions to convey aesthetic emotions to children.

### 2.3.3. Providing opportunities for children to draw, write, and read books in STEAM activities

STEAM education is focused on learning through experiences and activities that produce tangible outcomes. Therefore, during the observation and investigation of objects or brainstorming ideas, children should be given opportunities to draw and write about what they have observed within their capabilities (Moore & Holmes, 2021). This helps children learn how to gather information like real scientists and develops pre-writing skills. Teachers should encourage children to use paper and pens and dedicate time for observing, measuring, drawing, and writing. After each activity, teachers can encourage children to share their work in small groups or in front of the class. The products can be compiled into a collection, checked and compared to track the children's progress throughout the project. Redrawing models based on their ideas before construction is also essential in STEAM activities with design elements. Teachers must understand that children's drawings or designs may not be aesthetically pleasing due to their limited writing and drawing skills. However, these skills will progress significantly through exploration and should be viewed from a long-term perspective.

In STEAM education for preschool children, picture books are a vital tool. Educators must make an effort to create engaging stories in the form of picture books with few written words for children to read and look at during activities. Books are a crucial source of information for children in STEAM activities whenever they need to seek information and expand their ideas about science and math. Introducing children to books also aims to develop pre-reading skills, helping them form a reading habit and a love for reading. When teachers spend time reading books and using storybooks as a means to create situations and guide children's activities, it also creates many opportunities to provide vocabulary, develop coherent expression skills, and develop artistic language for children.

In addition to providing opportunities for children to read books on their own, teachers can also read books to children or read with them. This is essential for developing vocabulary and basic reading skills. Teachers need to choose books related to children's activities to create situations for communication and discussion. They should guide situations in stories or poems in books to stimulate children's engagement. Poetry, stories, and puppet performances can be combined to attract children's attention and interest.

#### 2.3.4. Encourage children to recount their experiences in various forms

In addition to utilizing existing stories, it is also beneficial to encourage preschool children to retell their experiences using picture stories or meaningful language, as this can aid in their language development. Through activities such as creating picture books with images and text or recounting experiences, children have the opportunity to not only organize what they have learned but also to recreate and innovate language, promoting creativity in storytelling. These stories can be performed in small groups or with the entire class, depending on the scope of the activity or project.

After each activity or at the end of a STEAM project, teachers can collaborate with children to create a book that captures what they have explored and learned. The materials used to create the book can include images, children's drawings, text, objects the children have collected, or materials provided by parents or teachers. The materials are not just objecting that children have explored but also include images of the process of children's exploration. Teachers can encourage children to name the book, develop ideas for its content, and work together to complete the book. Upon completion, teachers can provide opportunities for children to share their stories with friends, parents, and teachers in school, allowing them to use language and contribute to their language development actively. During this process, teachers can also introduce written language through the use of images of words or letter combinations to help children understand the role of writing in recording their own ideas and knowledge.

### 3. Conclusion

Developing language skills for preschool children is a crucial task that requires an emphasis on organizing educational activities in preschools. STEAM education offers numerous advantages in providing children with opportunities to practice language and develop their vocabulary, listening and speaking abilities, artistic language, and pre-reading and writing skills. Moreover, language plays a significant role in children's understanding of STEAM concepts and skills. Implementing language development strategies and measures for children in STEAM education can positively impact their learning processes and interactions.

This article proposes four language development measures for preschool children in STEAM education based on the characteristics of STEAM education and relevant research. These suggestions are beneficial for preschool teachers to help children develop language skills effectively and positively impact their acquisition of STEAM concepts and skills. This article serves as an introduction to a long-term research project on language development for preschool children in STEAM education. Further in-depth studies will clarify specific tasks in language development for children.

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#### Tran Viet Nhi\* and La Thi Bac Ly

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