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Original Paper

Action Research on Picture Book Reading Activities for Kindergarteners in Large Classes under the STEAM Concept

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Abstract

The STEAM education philosophy, as an emerging educational concept in recent years, has gained a dominant position in the educational systems of various countries due to its modernization and progressiveness. This philosophy emphasizes interdisciplinary teaching methods, focusing on the development of comprehensive abilities in learners. Many countries have integrated STEAM education into their kindergartens, and China has also begun to explore the integration of STEAM education into early childhood teaching activities.

In kindergartens, STEAM education is more often integrated into scientific activities, with less emphasis on picture book reading activities. The author believes that integrating STEAM education into picture book reading activities is highly feasible and valuable for research. This paper, considering the age characteristics of young children and various other factors, conducts an action research study on the integration of STEAM education into picture book reading activities for older kindergarten children. Through action research, it is concluded that integrating STEAM education into picture book reading activities for older kindergarten children can improve their classroom participation, develop their self-exploration abilities, and foster the development of various abilities. The paper also proposes suggestions for the localization of STEAM education in China and further integration into picture book reading teaching activities.

Keywords

STEAM Education concept, Picture book reading activities, Large class children

1. Introduction

The STEAM education philosophy, as an emerging educational concept, holds significant research value. In kindergarten education activities, it can cultivate children's logical thinking and exploration

abilities from a young age, laying a solid foundation for future learning. As an emerging modern educational philosophy, its educational methods are continuously evolving and innovating with practice and research.

Picture book reading activities are an essential part of kindergarten education, playing a crucial role in children's cognitive development, emotional interaction, behavioral habit formation, and language proficiency development (2001). Ages 3 to 6 are the golden years for the development of children's language skills (Zhao, 2019). Through reading picture books, children can expand their vocabulary and develop their ability to use language effectively, enhancing their capacity to express their emotions. The author's research has found that while most children's picture books are primarily focused on the storyline, there are still opportunities within the plot to integrate STEAM education for young children, providing them with multidisciplinary inspiration and cultivating their thinking and exploration abilities. Therefore, integrating the STEAM education philosophy into children's picture book reading activities is highly possible. This positive combination not only allows children to have a more engaging learning experience during picture book reading but also promotes their comprehensive physical and mental development.

2. Action Research Design

2.1 Picture Book Selection Criteria

2.1.1 Suitable for the Age Characteristics of Older Kindergarten Children

When selecting picture books, it is important to choose ones that match the age characteristics of older kindergarten children. The content and plot of the picture books should be appropriate for their age, not too simple or complex, and should stimulate their curiosity and reading interest while being understandable to them.

2.1.2 Content Close to Real Life

When selecting picture books, the content should be closely related to the real life of children, allowing them to connect the plot of the picture books with their daily life. Starting from things around them, they can think about and solve problems, and apply the knowledge learned from picture book reading activities to their actual life.

2.1.3 Picture Book Content Designed with Multidisciplinary Elements

When selecting picture books, it is important to intentionally choose books that facilitate multidisciplinary expansion and the integration of the STEAM concept. The content should involve elements of science, technology, engineering, art, or mathematics. The STEAM education philosophy emphasizes interdisciplinary integration, so when selecting picture books, it is not enough to include only a single element; instead, the books should have comprehensive elements, covering as many STEAM contents as possible. This allows children to receive a well-rounded knowledge infusion during reading activities, aiming to cultivate their interdisciplinary thinking abilities [3]. The content of the selected picture books should be extendable for multidisciplinary education, facilitating teachers to

conduct interdisciplinary education through picture book reading activities, thereby enhancing the cultivation of their comprehensive abilities (2022).

3. Problem Generation

The STEAM education philosophy has been gradually applied in kindergarten curricula in recent years, but most of its applications are related to scientific activities and planting and breeding, with fewer studies on its combination with picture book reading activities. The integration of the STEAM education philosophy with picture book reading activities holds significant research value. The rich plots and substantial content of children's picture books contain the feasibility for the expansion of STEAM educational elements. Therefore, action research methods will be utilized to explore picture book reading activities for older kindergarten children under the STEAM philosophy. Through action research, it is concluded that integrating the STEAM education philosophy into picture book reading activities for older kindergarten children can improve their classroom participation, develop their self-exploration abilities, and foster the development of various abilities. Suggestions are also made for the localization of the STEAM education philosophy in China and further integration into picture book reading teaching activities.

4. Participant Selection

4.1 Selection Criteria for Older Kindergarten Children

Selecting older kindergarten children as the subjects for action research is because children in this age group can also significantly improve their comprehensive abilities through the application of the STEAM education philosophy in reading activities. Older kindergarten children are at a critical period of cognitive development, and integrating the various elements of STEAM can promote the development of their cognitive abilities. At the same time, based on their age characteristics, there is a significant scope for innovation and improvement in integrating the STEAM education philosophy into reading activities for older kindergarten children. This can stimulate their interest in learning and encourage them to actively participate in picture book reading activities.

4.2 Teacher Involvement

Teachers are responsible for selecting appropriate picture books and designing the entire classroom to ensure the integration of STEAM educational philosophy elements, which is the foundation of the whole class. During the activity, teachers should also ask targeted questions to guide children, stimulate their curiosity, and cultivate their ability to think independently and solve problems. Teachers should also provide the necessary resources and materials for classroom extension, ensuring that the classroom is centered around the children, allowing each child to participate in practical activities and fully utilize their creative abilities. At the same time, teachers should also pay attention to their implicit participation, providing necessary guidance without actively intervening in the children's activities. Teachers should consider providing various possibilities for classroom extension based on the content

of the picture books and the integration of STEAM elements, such as scientific experiments or handicrafts.

Teachers also take into account the individual differences among children, providing necessary help and support based on their learning abilities and characteristics during the teaching process, and encouraging children to think actively and collaborate with peers to solve problems. After the activity, teachers should reflect on the effectiveness of the classroom that integrates STEAM elements by observing and evaluating children's reactions and performance in class, thereby making further adjustments and improvements to the implementation of teaching activities (Chen, Yan, & Lin, 2022).

5. "The Three Little Pigs" Action Research Plan

5.1 First Round of Implementation

Teaching Objectives:

1) Understand the plot of "The Three Little Pigs" and cultivate children's story comprehension skills.

2) Guide children to experience the picture book story through STEAM elements (Science, Technology, Engineering, Art, Mathematics) to promote interdisciplinary comprehensive development.

3) Cultivate children's teamwork and creative thinking.

4) Provide children with a preliminary experience in understanding building materials and construction knowledge.

Material Preparation:

- "The Three Little Pigs" picture book
- Building materials: bricks, straw, stones, foam, cardboard, paper cups, cotton, toothpicks, etc.
- Drawing materials: paper, paint, brushes.

Activity Process:

1) Read the story of "The Three Little Pigs" to understand the main plot and improve language expression skills. Have children read the story of "The Three Little Pigs" aloud, and ask questions to guide them to discuss the events and characters in the story. Use the illustrations in the picture book to have children describe the problems faced by the pigs and their solutions.

Teacher: "Children, have you ever heard of a story called 'The Three Little Pigs'? Let's listen to this story together today, shall we?"

Children: Eagerly respond, showing great interest in the upcoming picture book story.

2) Utilize STEAM elements to experience the process of the pigs building houses through engineering activities. Provide materials such as bricks, straw, stones, and foam for children to feel, and offer various building materials (cardboard, paper cups, cotton, toothpicks, etc.). Divide into groups and have children design and build their own pig houses, guiding them to think about how to make the houses stronger, involving mathematical, scientific thinking, and artistic design.

Teacher: "We know what materials the three little pigs used to build their houses and whose house was the strongest. Now, I'd like everyone to touch these materials and then build a strong house for the

pigs."

Children: Show great interest in the building materials, and the process of actually touching and working with the materials to build houses is more engaging and creates a better classroom atmosphere than traditional teaching activities limited to the picture book story.

3) Draw beautiful houses for the pigs and explain the building materials and design concepts, expressing appreciation for beauty and understanding of construction knowledge through artistic creation.

Teacher: "We have already made houses for the pigs. Next, let's draw the most beautiful house you think for the pigs. I will ask the children to come up and show the houses they have drawn for the pigs later."

Children: "I want to draw the strongest diamond house for the pigs." "I want to draw a princess house for the pigs." The children show great enthusiasm for the upcoming drawing activity, and the classroom atmosphere reaches a climax.

4) Post-class summary and reflection, encourage children to share their "building experiences" and understanding of different building materials, promoting their oral expression skills and strengthening teamwork and communication. At the same time, guide children to reflect on the different building strategies of the pigs, cultivating their ability to think about problem-solving.

Teacher: "Today, we have learned about so many building materials. Do you know what other materials we use in our daily lives to build houses?"

Children: "Cement, lime, and houses built with glass..."

Teaching Reflection: Through the implementation of the first action research plan, I found that children showed curiosity about this new model of picture book reading activities that integrates the STEAM education philosophy. During the teaching process, they were able to ask more questions and actively participate in the various activities extended from the picture book reading activities under the guidance of the teacher, showing great interest and enthusiasm for learning new knowledge. However, due to the lack of experience in the first action research plan, many inevitable problems also arose during the teaching activities. For example, although children could understand the plot well, they still showed some unfamiliarity when extending the STEAM education elements, and in this case, the guidance of the teacher became extremely important. For example, children showed some creativity when integrating artistic elements into drawing houses and explaining the intent of their drawings, but they still showed some unfamiliarity and uncertainty when choosing materials.

5.2 Second Round of Implementation

Teaching Objectives:

1) Understand the plot of "The Three Little Pigs" and cultivate children's story comprehension skills.

2)Guide children to experience the picture book story through STEAM elements (Science, Technology, Engineering, Art, Mathematics) to promote interdisciplinary comprehensive development.

3) Cultivate children's teamwork and creative thinking.

4) Provide children with a preliminary experience in understanding building materials and construction knowledge.

Material Preparation:

- "The Three Little Pigs" picture book
- Building materials: bricks, straw, stones, foam, cardboard, paper cups, cotton, toothpicks, etc.
- Drawing materials: paper, paint, brushes.

Activity Process:

1) Read the story of "The Three Little Pigs" to understand the main plot. Have children discuss in groups about whose house is stronger and why, encouraging them to express their ideas boldly, cultivating their logical thinking and in-depth exploration skills. Ask questions to guide children to talk about the events and characters in the story. Use the illustrations in the picture book to have children describe the problems faced by the pigs and their solutions.

Teacher: "We have read the story of 'The Three Little Pigs'. The teacher would like to ask the children, what kind of story is this book about? What kind of houses did the three pigs build, and whose is stronger?"

Children: They can actively answer the teacher's questions, can roughly retell the story content, and think actively to express their own ideas.

2) Utilize STEAM elements to experience the process of the pigs building houses through engineering activities. Show children video images to let them observe the similarities and differences in houses built with different building materials. Provide bricks, straw, stones, foam, etc., for children to feel and touch the differences in material texture, and provide various building materials (cardboard, paper cups, cotton, toothpicks, etc.). Divide into groups and have children design and build their own pig houses, guiding them to think about how to make the houses stronger, involving mathematical, scientific thinking, and artistic design.

Teacher: "Today, every child is a little architect. The teacher would like to ask the children to watch how houses are built and then choose materials to build a strong and beautiful house for the pigs."

Children: "I will build the strongest house for the pigs with stones." "A house made of foam will definitely be blown away by the wolf." The children show great enthusiasm for the upcoming activity.

3) The teacher guides the children to conceive a house for the pigs in their minds, thinking about the building materials, layout, and overall appearance of the house, whether the house is strong, etc. The teacher first draws and tells their own design concept of the house as a demonstration, and then asks the children to draw "the pigs' house," encouraging them to express boldly and talk about the building materials and design concepts of the house, expressing their appreciation for beauty and understanding of construction knowledge through artistic creation.

Teacher: "After making the house, the teacher would like to ask the children to draw a house for the pigs. We can draw materials that we don't have here. The children are asked to imagine what the house they draw for the pigs could be made of and what it could look like."

Children: The children brainstorm and discuss the houses they want to draw. After the teacher distributes the drawing tools, they quickly get involved in the creative process.

4) Post-class summary and reflection, encourage children to share their "building experience" and understanding of different building materials, encourage children to share the experiences and knowledge they learned in the classroom, promote their oral expression skills, and strengthen teamwork and communication. At the same time, guide children to think about the different building strategies of the pigs, let them know the consequences of being lazy, and cultivate their ability to think about problem-solving.

Teacher: "Through the study of this lesson, the children know why the house of the little pig can resist the wolf, but the houses of the big and middle pigs cannot, right? What other building materials do you know?"

Children: "Because the little pig didn't slack off and built the house with stones seriously." The children think actively and say a lot of common building materials in daily life.

Teaching Reflection: In the implementation process of the second action research plan, the children still showed great interest in the class. However, when dividing into groups to let the children design and build houses by themselves with simple materials, due to the lack of verification of the strength of the houses, the children paid more attention to the aesthetics of the houses rather than their strength when designing, and at the same time, they had less understanding of construction knowledge, mostly obtained in the classroom, lacking exercise in self-exploration ability.

5.3 Third Round of Implementation

Teaching Objectives:

1) Understand the plot of "The Three Little Pigs" and cultivate children's story comprehension skills.

2) Guide children to experience the picture book story through STEAM elements (Science, Technology, Engineering, Art, Mathematics) to promote interdisciplinary comprehensive development.

3) Cultivate children's teamwork and creative thinking.

4) Provide children with a preliminary experience in understanding building materials and construction knowledge.

Material Preparation:

- "The Three Little Pigs" picture book
- Building materials: bricks, straw, stones, foam, cardboard, paper cups, cotton, toothpicks, electric fans, etc.
- Drawing materials: paper, paint, brushes.

Activity Process:

1) Read the story of "The Three Little Pigs" to understand the main plot. Have children discuss in groups about whose house is stronger and why, encouraging them to express their ideas boldly, cultivating their logical thinking and in-depth exploration skills. Ask questions to guide children to talk about the events and characters in the story. Have children observe the illustrations in the picture book

and describe the problems faced by the pigs and their solutions.

Teacher: "After reading the story of 'The Three Little Pigs,' the teacher wants to ask the children, whose house is the strongest in the story? Why? Everyone, look at the pictures in the picture book and help the pigs think about what else they can do when the wolf comes?"

Children: "The little pig's house is the strongest because it's made of bricks, and brick houses are much stronger than wooden houses and straw houses." "You can also put a basin of water in the fireplace, and when the wolf comes down the chimney, you can drown it."

2) Utilize STEAM elements to experience the process of the pigs building houses through engineering activities. Show children video images to let them observe the similarities and differences in houses built with different building materials. Provide bricks, straw, stones, foam, etc., for children to feel and touch the differences in material texture, and provide various building materials (cardboard, paper cups, cotton, toothpicks, etc.). Divide into groups and have children design and build their own pig houses, guiding them to think about how to make the houses stronger, involving mathematical, scientific thinking, and artistic design.

Teacher: "We just watched different building materials and touched them with our hands. Now, please choose materials for the pigs to make a house and see whose house is stronger."

Children: Enthusiastically select materials and quickly get involved in the process of making houses.

3) Let each group present their finished houses on stage, introduce the building materials and design concepts, and after the teacher fixes them to the table, turn on the electric fan to blow at the houses, observing the stability of the houses as the wind force gradually increases.

Teacher: "Now, please introduce the houses you made, and we will do a little experiment to see which group's house is the strongest."

Children: Seriously introduce their construction concepts and watch the changes of the houses in front of the fan with great attention.

4) The teacher guides the children to conceive a house for the pigs in their minds, thinking about the building materials, layout, and overall appearance of the house, whether the house is strong, etc. The teacher first draws and tells their own design concept of the house as a demonstration, and then asks the children to draw "the pigs' house," encouraging them to express boldly and talk about the building materials and design concepts of the house. Through artistic creation, they express their appreciation for beauty and understanding of construction knowledge. At the same time, let the children go home and read different versions of "The Three Little Pigs," appreciate their different painting styles, and cultivate their imagination and aesthetic ability.

Teacher: "We made houses for the pigs in groups, and we also know how to make houses stronger. Can we draw a house for the pigs with our hands? After drawing, the teacher will ask the children to talk about what the house they drew for the pigs is made of and why they drew it that way?"

Children: Under the teacher's guiding questions, the children can relatively orderly say their design intentions for the house and can do it without stage fright.

5) Summarize and reflect after class, encourage children to share their "building experience" and understanding of different building materials, encourage children to share the experiences and knowledge they learned in the classroom, promote their oral expression skills, and strengthen team cooperation and communication. At the same time, guide children to think about the different building strategies of the pigs, let them know the consequences of being lazy, and cultivate their ability to think about problem-solving.

Teacher: "What have you all learned through this lesson?"

Children: The children say a lot of things they learned according to the classroom learning situation.

6) Encourage children to go home and learn more about building materials and knowledge, understand China's traditional ancient buildings and their construction methods, and make an observation record newspaper to share with the children at school.

Teacher: "In addition to these modern construction methods, there are many different construction methods in ancient China. Some can build houses with wood without a single nail. The teacher asks the children to go home to look up China's unique ancient buildings and share them with the children at school."

Children: The children's enthusiasm for the classroom has not subsided, and at the same time, they have a great interest in ancient buildings due to the teacher's guiding questions.

Teaching Reflection: Through the implementation of the third action research plan, in addition to the children's active participation in the classroom during the activity, they also expressed interest in the STEAM field after the class, such as the children showing curiosity about other types of building materials and houses through this class, and even some children expressed their wish to be an architect in the future. The activity extends through the event of the pigs building houses, presenting a variety of materials for children to judge which material is more stable for house construction and to explore its principles, involving scientific and engineering thinking in the STEAM concept. Using this picture book as a starting point, it popularizes knowledge of house construction for children, letting them know the process of building houses and how to build houses more stably, using a variety of materials for practical operation and verification, and exercising children's engineering and technical thinking. In addition, letting children design houses by drawing and handicrafts, and then telling their peers about their performance, appearance, and interior decoration also cultivates children's aesthetic education.

6. Conclusion

The "Three Little Pigs" picture book reading activity, by integrating the STEAM concept, has successfully stimulated children's curiosity and desire for knowledge, allowing them to actively participate in the process of picture book reading and creating a positive and interesting classroom atmosphere. This activity encouraged the creativity and logical thinking skills of older kindergarten children, enabling them to consider issues from different perspectives and provide their own solutions. Through this action research, the author found that integrating the STEAM education philosophy into

picture book reading has cultivated a positive learning attitude among older kindergarten children, enriching and enlivening the activity effects and children's learning experiences.

However, there are inevitably some difficulties and challenges in the actual implementation process. For example, in teaching activities, teachers need to effectively integrate the various elements of STEAM into the teaching process, subtly teaching children. Therefore, when integrating STEAM elements, teachers face the challenge of how to balance the elements of various disciplines and effectively cover the knowledge of each discipline. This requires teachers to have good professional qualities and an understanding of the STEAM education philosophy. At the same time, the individual differences of students also affect the implementation of the STEAM education concept in teaching activities, which requires teachers to exert their flexibility and classroom leadership during the teaching process to conduct differentiated teaching. The limitations of activity time also need to be considered; when integrating STEAM educational elements into picture book reading, it is necessary to follow the principle of moderation and quantity to ensure that the activity goals can be achieved within a limited time. It is also important to reserve flexible time to deal with unexpected situations, such as when students suddenly show great interest in a certain part, which requires teachers to actively guide, shift the focus of teaching, and embody the concept of student-centered teaching activities.

7. Suggestions for Integrating the STEAM Education Philosophy into Picture Book Reading Activities

7.1 Select Appropriate Picture Books Based on the STEAM Concept

In terms of picture book selection, science-themed picture books can be chosen, such as those involving elements of animal and plant science, weather phenomena, etc. Classroom extensions can include organizing children to conduct field investigations, observing the content elements involved in the picture books, and drawing conclusions. In terms of artistic elements, every picture book can be used for artistic creation, such as encouraging children to express and create through painting, handicrafts, and other means based on their understanding of the picture books. The same applies to other elements; teachers integrate the elements included in STEAM during the implementation process, creating an interdisciplinary comprehensive educational environment that stimulates children's interest and creativity through a multidisciplinary integration model.

7.2 The Integration of the STEAM Concept into China, Seeking Localization, can be Translated into English as "The Integration and Localization of the STEAM Concept in China."

In the process of integrating the STEAM education philosophy into picture book reading activities, it is essential to consider the impact of educational concepts under different cultural backgrounds, the issue of implementation time, and the acceptability of the STEAM education philosophy among domestic teachers and children in China. We should seek a reform route for the localization of the STEAM education philosophy in China. By integrating China's traditional culture into the STEAM education philosophy of picture book reading activities, we can promote children's understanding of local culture.

At the same time, it is important to select Chinese traditional stories that are easy to implement STEAM educational elements, and use these stories as a starting point to carry out picture book reading activities that integrate the STEAM education philosophy. These picture books with Chinese cultural characteristics can be traditional stories, folk tales, or historical stories. Additionally, traditional Chinese handicraft activities can be introduced based on the content of the picture books, such as the picture book "The Story of the Nian Monster," where children can engage in paper-cutting for window flowers and writing the character "Fu" as part of the art education. This not only exercises children's fine motor skills but also promotes the excellent traditional culture of China. Furthermore, STEAM education activities can be designed based on traditional Chinese festivals. For example, during the Dragon Boat Festival, the picture book "The Story of Qu Yuan" can be used to deepen children's understanding of Chinese traditional festivals, and activities such as making zongzi, inserting mugwort, making bracelets, and paper boat making can be used to cultivate children's practical hands-on operation skills. In summary, as a country with a profound culture, China has great potential and operability in integrating the STEAM education philosophy into picture book reading activities and combining it with its traditional culture. It is also important to regularly train teachers to enable them to better understand the STEAM education philosophy and its application in picture book reading activities, cultivating teachers' sensitivity to integrating the STEAM education philosophy with Chinese traditional culture.

7.3 Exploring Integration, Home-School Co-Education

When integrating the STEAM education philosophy into picture book reading activities, it is important to avoid having STEAM elements that are too singular. This requires teachers to select picture books that are easy to integrate with STEAM educational elements during the selection process and to pay attention to the integration of these elements in teaching activities. Before implementing the activities, teachers should have an in-depth study and understanding of each element of the STEAM education philosophy, so as to find the specific manifestations and application possibilities of each element in the picture book, and then study how to integrate multiple elements of STEAM into the same picture book reading teaching activity and integrate them.

The implementation of teaching activities should not be limited to the content of the picture book. Teachers should also exert their positive subjective initiative and divergent thinking to provide more possibilities for the picture book. At the same time, the role of parents in integrating the STEAM education philosophy into picture book reading activities should be emphasized, cooperating with parents to form a home-school co-education model, and promoting the implementation of STEAM-based children's picture book activities.

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