ISSN 2663-8169 Vol. 4, Issue 4: 12-21, DOI: 10.25236/IJNDE.2022.040403

Research on the Design and Practice of Early Childhood Science Education Activities Based on the Concept of STEAM

Jie Zhou

School of Education Science, Liupanshui Normal University, Liupanshui, China

Abstract: *STEAM education emphasizes the interdisciplinary integration of the five disciplines of science, technology, engineering, art, and mathematics, based on real situations, with the goal of cultivating core literacy. Early childhood science education activities and STEAM education both emphasize the holistic development of young children, and advocate the cultivation of children's inquiry ability and scientific literacy. This article attempts to integrate the STEAM concept into early childhood science education activities. By sorting out STEAM education related materials, try to design kindergarten science activities based on the STEAM concept, and design activity plans for implementation. Through the implementation of the activity plan, this study achieved the following effects: 1) acquired the ability to solve problems in the situation; 2) embodied the concept of child-centeredness; 3) promoted the development of children's higher-order literacy. In view of the shortcomings of the activities, this paper puts forward the following suggestions: 1) Make full use of the resources around you to help the effective implementation of the exploration activities; 2) The activity materials are reasonably put in to ensure the effective development of the exploration activities; 3) The activity process pays attention to guidance and triggers the exploration activities effective exploration.*

Keywords: *STEAM concept, science education, activity design, kindergarten*

1. Introduction

The "Explanation" of the "Guidelines for Children's Learning and Development of 3-6 Years Old" points out that the implementation of the "Guidelines" should grasp the following four aspects: pay attention to the integrity of children and learning and development; respect individual differences in children's development; understand children's learning methods and Characteristics; attach importance to the quality of children's learning [1]. The STEAM education concept emphasizes the organic combination of various disciplines and fields, and aims to cultivate comprehensive, innovative and applied high-quality talents, which echoes the integrity mentioned in the "Guide". This study attempts to combine the STEAM education concept with the science education of young children, so as to improve the level of science education activities in action classes, and also provide theoretical and practical references for kindergartens to carry out STEAM science education activities.

2. The design orientation of early childhood science education activities under the concept of STEAM

2.1 Commonality: experience in multiple fields

STEAM is a comprehensive education that integrates science, technology, engineering, art, and mathematics. The application of the existing single curriculum is difficult to meet the country's demand for talents. In the future, it is necessary to cultivate more comprehensive high-quality talents. The implementation of STEAM education is an inevitable trend.

The design and practice of science teaching activities under the STEAM concept should be based on the integration of multiple fields, making it a new whole. In teaching practice, teachers should focus on cultivating children's interest in learning, and more importantly, on the development of children's various abilities such as initiative, exploration, thinking and questioning. Therefore, in the development of current kindergarten activities in the five fields, its scattered knowledge should also be integrated to improve children's cooperation, problem solving and practical innovation [2].

ISSN 2663-8169 Vol. 4, Issue 4: 12-21, DOI: 10.25236/IJNDE.2022.040403

2.2 Symbiosis: Multi-situation interacts to generate experience

One of the characteristics of the STEAM educational philosophy is the pursuit of meaningful learning in real situations. In real situations, children can experience and actively explore, which is more likely to arouse their curiosity and thirst for knowledge. Situation builds a bridge for young children to understand the world, helps young children to integrate, and can use multi-disciplinary (STEAM) to solve real problems. Through learning by doing and problem solving, children develop the ability to discover, think and solve problems.

In the early childhood science education activities and practice based on the STEAM concept, attention should be paid to the connection between children's learning and real life, and based on the real life of children, so as to understand the surrounding things in the exploration activities. The "Learning and Development Guide for Children aged 3 to 6" points out that young children's learning is based on direct experience, in play and in daily life [1]. Teachers need to observe carefully, discover the interests of children, connect with children's existing experience, return the knowledge they have learned to rich real life, discover specific problems in children's life and carry out exploration activities.

3. Action plan design of early childhood science education activities based on STEAM concept

5E teaching mode is a main learning mode of STEAM education. The American Biology Curriculum Research will locate it in the teaching mode of science education activities. It mainly includes five links: Engage, Explore, Explain, Elaborate and Evaluate. This research is based on the 5E model to carry out teaching, aiming at cultivating children's inquiry ability and scientific literacy.

This study selects the theme of "fun water" as the content of the scientific activity design. After communicating with the teachers of the action class, combined with the development of the science education activities of the action class and the age development characteristics of the children, the design based on the STEAM concept is made. "Vegetable Dressing", "Secrets of Umbrellas" and "Simple Water Purifier" three scientific education activities, the design before each round of action research and the reflection after practice will serve as the basis for the improvement of the design of the next round of scientific activities .

3.1 Background of the proposed activity plan

Table 1: "Fun water" theme activity schedule

theme name	time	Centralized education activities				
		health	language	science	society	art
amusing The water	the first week	Water and all of our bodies	Small water droplets travel	Water that can climb	Spring of Life	Wonderful water song
	the second week	The use of water	Ill water doll	Heavy and floating	protect water resources	The magic of water
	the third week	Drink more water and be in good health	If there is no water	The change of water	Water saving guard	Design water-saving signs

The action class designed the "Fun Water" theme activity plan (see Table 1), through the development of five areas, let children know the characteristics of water and the awareness of water conservation, and gain relevant experience. I communicated with the class teacher and learned that through the development of this theme activity, although children's knowledge of water characteristics and water-related knowledge has been improved, there is no obvious progress in children's exploration ability in activities. In the operation activities such as "Floating", although the children are allowed to take the initiative to discover problems, the children are less likely to think, and more often the teachers ask questions, and the children verify, and do not reflect the children's exploration. Through the analysis of the activity schedule and the interpretation of the activity lesson plan, and based on the interests and existing experience of the children in the action class, the researchers comprehensively considered and designed three scientific education activities with the theme of "fun water" based on the STEAM concept. Help children improve their scientific inquiry ability and scientific literacy.

ISSN 2663-8169 Vol. 4, Issue 4: 12-21, DOI: 10.25236/IJNDE.2022.040403

3.2 The formulation of the objectives of the program of activities

The goal of the activity is mainly based on the STEAM education concept, and is formulated from the three-dimensional goals in science education activities. The specific goals all reflect the disciplinary dimension of STEAM education.

3.2.1 "Vegetable Dressing" activity goal

"Vegetable Dressing" originated from a question when children were watering in the plant area, how do plants drink water? Can the leaves on the side drink water too? As children's watering problems continue to expand, this is also a good time to inspire and guide children. The researchers designed this activity based on the interests of children. Capillary phenomenon is a common scientific phenomenon in life. Through the development of activities, children can understand the capillary phenomenon in their hands and brains, and they also have successful fun in exploration. (See Table 2 for activity goals)

Table 2: "Vegetable Dressing" Activity Objectives

moving target	Knowledge skills	Know the color mixing law of three primary colors, and the capillary of water
	process and method	Group cooperation to explore, try to debug different pigment water
	Emotional attitude and values	Feel the pleasure of the capillary phenomenon, and experience the joy of success
STEAM Elements target	science	Understand the capillary phenomenon, and can be connected to the specific use of life
	technology	Through group cooperation, debug different colors of pigment water; flexibly use dropper, measuring cups, mixing rod and other operating materials
	engineering	Through the guidance of the teacher, I put the cabbage removed from the root into the pigment water, and in the process, I think about how to make the color of the vegetables more bright, and constantly trying
	art	Vegetable leaves become the modified pigment color, which can be simply decorated to beautify the classroom environment
	mathematics	The amount of pigment used was estimated

3.2.2 The goal of the "Secret of the Umbrella" campaign

Table 3: "The Secret of the Umbrella" campaign goals

moving target	Knowledge skills	Know the properties of the material to absorb water
	process and method	Group collaboration, using nearby materials for water absorption test
	Emotional attitude and values	Like to conduct inquiry activities, experience the fun of scientific inquiry
STEAM Elements target	science	Understand the characteristics of different materials, and understand the differences of different materials in the absorption of water
	technology	Experiment the water absorption of different materials with water droplets; soak different materials in the measuring cup and observe the remaining water over time
	engineering	The group collaborated to design the experimental record table and write down the observation record
	art	Use water-absorbing resin to make ocean bottles, add shell conch for decoration and beautification
	mathematics	Speed of water absorption of different materials (length of time)

In the last round of "vegetable dressing", children accidentally splashed water on the table, wiped the water off with a paper towel, and said "Why can paper towels absorb water?" The researchers developed the feature of "water absorption". "The Secret of the Umbrella" scientific activity, umbrella is an object

ISSN 2663-8169 Vol. 4, Issue 4: 12-21, DOI: 10.25236/IJNDE.2022.040403

that children often come into contact with in life, this activity can let children know that the umbrella surface of the umbrella is made of non-absorbent cloth, and the children know it through conjecture verification during the exploration process The water absorption of different materials, so as to understand the principle that umbrellas can hide from the rain. (See Table 3 for activity goals)

3.2.3 "Simple water purifier" activity goal

The "Simple Water Purifier" activity originated from the fact that children found that the rainwater in the rainwater collector in the plant corner was dirty and could not clean the rags. One of the children asked how to clear the dirty water? Therefore, after communicating with the class teacher, the "Simple Water Purifier" activity was designed, so that the children could feel the process of sewage purification, initially master the method of multi-layer filtration, and use multi-disciplinary knowledge and ability to clear the sewage. Through the development of this activity, it also promotes the concept of protecting the environment among children, and germinates the emotion of caring for and cherishing water resources. (See Table 4 for activity goals)

Table 4: "Simple water purifier" activity target

moving target	Knowledge skills	1. Understand the basic structure and characteristics of the water purifier; 2. Initially understand the concept of filtration and adsorption; 3. In the experimental operation, initially grasp the factors affecting water purification.
	process and method	1. Group cooperation and exploration, and design of water purifier drawings; 2. Select materials and tools for production according to the design drawings.
	Emotional attitude and values	1. Experience the fun brought by scientific inquiry; 2. Be willing to cooperate with your peers and develop the habit of cooperative exploration.
STEAM Elements target	science	Understand the principle of water purification, initially understand the concept of filtration, adsorption.
	technology	Group cooperation, the design of water purifier drawings and production.
	engineering	Through cooperation and communication, the group explored the installation order of the water purifier materials and made them. In this process, the relationship between the filtration times, the order of the material and the degree of water cleanliness could be felt and verified.
	art	Observe the appearance characteristics of the water purifier and draw, germination of the emotion of cherishing water resources.
	mathematics	In the process of inquiry, feeling that numbers are symbols that can represent an object.

3.3 Selection of the content of the activity plan

This research carried out a series of scientific educational activities of "Fun Water". According to the three characteristics of STEAM teaching thought integration, situational and project-based, and combined with children's learning interest and existing experience, "vegetable dressing", Three activities, "Secrets of Umbrellas" and "Simple Water Purifiers", delve into capillary phenomena, water absorption and filtration and their influencing factors. Through the development and practice of STEAM science activities, it can be found that children's inquiry ability has been significantly improved, they are good at finding problems, analyzing problems, and using multiple ways to solve problems, forming a good scientific literacy. In addition, in the exploration activities, the children cooperated with each other, formed a good peer relationship, and developed the children's social communication ability. The specific activity plan is shown in Table 5.

ISSN 2663-8169 Vol. 4, Issue 4: 12-21, DOI: 10.25236/IJNDE.2022.040403

Table 5: "Fun water" activity plan

project	class	Vegetable change	The secret of the umbrella	Simple water purifier
science	The use of science Program ability	Observe, guess, verify, and try	Observe, guess, verify, and try	Observe, guess, verify, and try
	Experience / verify scientific concepts	capillarity	hygroscopicity	Filtering, adsorption
technology	Record tools	Record sheet, pen, mobile phone	Record sheet, pen, mobile phone	Record sheet, pen, mobile phone
	Making tools	Measure cups, cabbage, food coloring, Stir the bar, tap water	Small towel, umbrella cloth, sponge, plastic cloth, dropper	Mineral water bottles, activated carbon, small stones, cotton, sand, tap water
	Programs and Steps	1. Add some tap water and then add pigment to the measuring cup; 2. Remove the root of the cabbage and put it into the measuring cup; 3. Modify those with poor discoloration effect.	1. Experiment the water absorption of different materials with water droplets; 2. Soak different experimental materials in the measuring cup, and observe the remaining water quantity over time; 3. Make ocean bottles using water absorption resin.(Extended experiments)	1. Cut the bottom of the bottle with scissors and tie several holes in the cap with a needle; 2. Put the bottle backwards, add cotton, activated carbon, sand and pebbles in turn; 3. Improve the water purifier with poor water purification effect.
engineering	design	Try debugging other colors in three primary colors	Group cooperated to design the experimental record table	Group cooperation to design of water purifier drawings and thinking How can it make its water purification capacity stronger
	Thinking and production	The two colors are mixed to get another color	Think about which material can absorb water and test the guess	Make water purifier
	Improvement and optimization	Observe the effect, improve the discolored vegetables, make the color more bright	Watch the volume cup surplus water	Check the purification effect with rainwater, and improve the water purifier
art	Feel and appreciate	Observe the appearance characteristics of Chinese cabbage and know the vein structure of its blade	Observe the characteristics of the experimental material	Observe the appearance and characteristics of the water purifier
	Performance and creation	Adjust the pigment water and add the cabbage	Add the experimental material and observe	Make the water purifier according to the design drawings
mathematics	Quantity and measurement	Capacity of tap water The concentration of pigment	Measure the remaining water quantity of the cup	Number of small holes in the bottle cap Quantity of the various materials
	measure	The time when the cabbage changes color	Different materials The speed of water absorption	The speed of water purification

4. Implementation of action plan for early childhood science education activities based on STEAM concept

4.1 The first round: the implementation of the "vegetable dressing" activity of scientific education activities

4.1.1 Participation link

Capillarity is a common scientific phenomenon in life. In the early stage of activities, researchers use home cooperation to let children understand what capillarity is and find out what capillarity is in life.

ISSN 2663-8169 Vol. 4, Issue 4: 12-21, DOI: 10.25236/IJNDE.2022.040403

During the activity, the researchers asked the children, "What are the characteristics of cabbage?" "Why does the pigment water spread along the veins of the leaves?" The children found that there are many "pipes" in cabbage. The capillary phenomenon occurs as the water rises along the capillaries and is slowly transported to the various parts of the blade.

4.1.2 Exploration link

The researchers showed the experimental materials, including red, yellow, and blue pigments, droppers, measuring cups, and cabbage. Work in groups to see how these materials are useful. The researcher asked, "What colors can be debugged by combining the three pigments, red, yellow, and blue?" Young children found that mixing the two pigments with each other could debug the three colors of orange, green, and purple. The three pigments of yellow and blue are mixed to make black.

4.1.3 Interpretation link

"Can we change vegetables to other colors?" The researcher guided the children in groups to explore and try to use the three-primary color mixing rule and capillary phenomenon to make vegetables of various colors, especially to explore the relationship between pigment concentration and the final effect. The team members observed carefully and kept trying. During the exploration activities, it was found that the higher the pigment concentration, the brighter the final vegetable dressing. Then why some of the pigment concentration is enough, but the vegetables have not changed color, the children found that the roots of the vegetables were damaged and could not absorb the pigment water well. The researcher asked: "In addition to using cabbage, what other materials can we use for experiments?" "White flowers can be used." At the end of the activity, the children used white roses for experiments.

4.1.4 Delicate links

The group leader shared the difficulties encountered by the members of the group in vegetable dressing in the collective communication, and how the effect was after adjusting the strategy. The researchers encouraged the collective children to discuss the problems that occurred in each group of inquiry, and guided the children to discover the influencing factors of each group's inquiry effect to adjust.

4.1.5 Evaluation link

The researchers encouraged children to share with their peers the difficulties and feelings they encountered in participating in the inquiry activities, and invited individual children to share in front of the group.

4.2 The second round: the implementation of the "Secret of the Umbrella" activity of science education activities

4.2.1 Participation link

Umbrellas are common items in life. Why can umbrellas hide from rain and what are the characteristics of their materials? The researchers encouraged children and their parents to observe the material characteristics of umbrellas in their free time, and share them in front of the group after careful observation. The children discussed the characteristics of umbrellas. The exchange found that umbrellas use materials that cannot absorb water.

4.2.2 Exploration link

"Which common materials in life can't absorb water?" The question was given to the children. The researchers put small towels, umbrella cloths, sponges, plastic sheets, droppers and other materials into the science area. The children were free to observe and experiment with water droplets. The water absorption of different materials, some children use the immersion method to test the water absorption of different materials, and observe and record. The activity found that materials such as small towels and sponges can absorb water, but umbrella cloth and plastic cloth cannot absorb water.

4.2.3 Interpretation link

"Why are some materials absorbent and others not?" The researchers encouraged children to discover the differences in experimental materials. Children observed experimental materials and found that different materials have different water absorption properties. Sponges and towels are highly absorbent, so sponges can be used. And towel to wipe water. Plastic sheets and umbrella cloths are not absorbent, so umbrellas keep the rain out. Water-absorbent resins are polymer materials, they are particularly absorbent and can absorb a lot of water.

ISSN 2663-8169 Vol. 4, Issue 4: 12-21, DOI: 10.25236/IJNDE.2022.040403

4.2.4 Delicate links

Each group briefly explained the phenomenon of the experiment in this group, explained the difficulties and solutions encountered during the experiment, and proposed the next improvement plan. , let the child try again.

4.2.5 Evaluation link

The children made all kinds of marine bottles using water-absorbing resin with strong water absorption. How to share the findings of this research with other children? After group discussion, the children in the class decided to carry out an ocean exhibition. They placed the made ocean bottles on the table at the front desk of the kindergarten, and warmly invited children from other classes to visit. After the activity, the children shared with their peers the difficulties encountered in the process of exploration, solutions, their own feelings, etc. The researcher invited individual children to share and communicate in front of the group to evaluate the "secret of the umbrella".

4.3 The third round: the implementation of the "Simple Water Purifier" activity of scientific education activities

4.3.1 Participation link

There is a rainwater collector in the plant corner of the class. One day, the children found that the rainwater was dirty and could not clean the rags, so the children were very interested in the water purifier that can turn dirty water into clean water. Before the event, the researchers used the cooperation of the home to encourage parents and children to check the relevant information of the water purifier together, and shared the water purifier with the children, so that the children could collectively observe the water purification of the water purifier and have a preliminary understanding of water purification. Finally, through collective sharing and communication, it is concluded that the water purifier is composed of a water purifier body, a filter element and a water outlet.

4.3.2 Exploration link

How to use materials in life to make a simple water purifier? How to design a simple water purifier? Under the guidance of the researcher, the children tried to design the structural drawings of the water purifier using common materials in life. After the design was completed, each group of children shared it separately. Due to the actual situation such as environmental protection, the children finally discussed the use of discarded plastic bottles as the main body of the water purifier.

4.3.3 Interpretation link

Can the water purifier made by the group purify water normally? Each group of children tested the water purification performance of the water purifiers made in the group to observe whether the water purifiers could purify water normally. For water purifiers that cannot purify water normally, the children in the group guessed the factors affecting water purification and made adjustments.

4.3.4 Delicate links

After improving the water purifier with poor performance, there is no sign of improvement. Children observe and communicate with the water purifier in groups and adjust the water purifier, analyze the factors that affect the performance of the water purifier, and try to find problems and make adjustments.

ISSN 2663-8169 Vol. 4, Issue 4: 12-21, DOI: 10.25236/IJNDE.2022.040403

4.3.5 Evaluation link

The researchers encouraged young children to share their difficulties in making water purifiers and their own feelings in the process, and to evaluate the water purifiers.

5. Analysis of the practical effect of early childhood science education activities based on the STEAM concept

5.1 Activity effectiveness

5.1.1 Acquired the ability to solve problems in a situation

STEAM education does not simply add up the knowledge of five subjects, but transforms the scattered knowledge learned into the ability to explore real-world connections [3]. Through the development of the "Fun Water" theme activity, children have a deeper understanding and understanding of capillary phenomenon, water absorption and water purification. During the activity, children can not only verify by guessing, experimenting, recording and other methods own perspectives and use knowledge from multiple disciplines to solve problems. It can be seen that STEAM teaching frees children from scattered knowledge and enables them to guide them to connect knowledge between different disciplines, so as to improve children's thinking ability, problem-solving innovation ability, cooperation ability between peers, and self-realization ability. Improve [4].

5.1.2 Embodying the concept of child-centered

STEAM education is a learner-centered concept. It provides learners with a real situation. Learners achieve the purpose of learning through the experience of solving problems in this environment. It emphasizes that learners are in the process of solving problems. skills and abilities developed. In the early stage of the activity, the researchers and action class teachers chose "water", a common theme in children's life. When the learning content and life experience were linked, the enthusiasm of children's participation was significantly improved. During the activity, when the children encountered difficulties, they did not immediately seek help from the teacher. Instead, they would think independently, communicate and cooperate with their peers, and find a solution to the problem together. After the exploration activities, teachers actively encourage children to share and exchange experience with their peers, so as to promote the processing and improvement of children's scattered knowledge, and promote a more systematic system of children's scientific cognition. It can be found that teachers are not overly involved in inquiry activities, but are observers, guides, and supporters of children.

5.1.3 Promote the development of children's higher-order literacy

The unique value of the STEAM education concept is to provide learners with a real learning situation through integration. Learners use multi-disciplinary knowledge and skills to carry out learning, acquire knowledge beyond books, and develop problem-solving skills. Through the "Fun Water" theme activity, children develop the ability of logical thinking, conjecture, verification, analysis, evaluation, reasoning, deduction and induction in the activities. It is not difficult to see that the scientific education activities based on the STEAM concept can effectively promote the good quality of children and the improvement of various literacy, which fully reflects the social significance of STEAM education, that is, to reserve comprehensive and innovative talents for the future society. At the same time, in early childhood science education activities, teachers should give children time and space to explore independently, and minimize the time for explanation and interpretation, so that children can cooperate with their peers to complete scientific inquiry tasks together. In this process, teachers should be patient and listen to children's ideas, and at the same time, they should give children proper guidance, and they should also correctly view children's trial and error in the process of inquiry.

5.2 Activity reflection

5.2.1 Make full use of the resources around you to help the effective implementation of exploration activities

STEAM education can be linked to different contexts related to learners. Children are in different situations of kindergarten, family, and community. In addition to taking kindergarten as a general situation for STEAM education, teachers should give full play to the educational functions of various social resources, promote more effective integration of resources, and build a "kindergarten- The "social-enterprise" three-in-one education environment should fully mobilize social forces, especially the active

ISSN 2663-8169 Vol. 4, Issue 4: 12-21, DOI: 10.25236/IJNDE.2022.040403

participation of the business community [5]. This provides more support and help for children, allowing children to learn and explore in the social environment. After the exploration activities are over, teachers should use resources in the kindergarten, community resources and other resources in a timely manner to lead the theme of the activities to the kindergarten. Through exhibitions, exchanges and other forms, children can become spokespersons for scientific exploration activities, and they can use their own exploration activities in the form of exhibitions, exchanges and other forms. Difficulties or discoveries encountered in the process, share and display with others, actively interact and communicate, and experience more sense of achievement and joy of exploration.

5.2.2 Reasonable delivery of activity materials to ensure the effective development of exploration activities

The delivery of activity materials in the science area is the core content of the kindergarten science education activities. When delivering materials in the science area corner, teachers should rationally use the activity materials according to the needs of the science education activities, guide the children to carry out exploration activities, and encourage them to explore actively and independently. Choose and communicate with each other, so that young children gain indirect or direct experience, and cultivate children's ability to solve scientific problems.

First of all, it is necessary to ensure sufficient materials. The amount of materials put in by teachers is closely related to the effect of children's self-exploration. Insufficient materials will not only seriously affect the development of exploration activities, but may also cause conflicts between children. Explore the number of materials, so that the exploration activities can be carried out smoothly. Secondly, the materials put in should stimulate children's active thinking. Through self-exploration, children can improve their ability to discover, think and solve problems, expand children's life experience, and enhance children's interest in scientific inquiry.

5.2.3 The process of activity focuses on guidance and triggers effective exploration of exploration activities

In the science education activities for children based on the STEAM concept, children are the main body of the exploration activities. In the process of exploration, children need to pay attention to observation and comparison to find out the existing problems, and can use their own experience to speculate the method of solving the problem, and finally try to use A multidisciplinary approach to problem solving in science, technology, engineering, arts and mathematics. However, in the actual process, whether children can find the problem and whether their own methods can hit the key points of the problem are closely related to children's cognition, thinking characteristics and their own experience. When children's exploration encounters a bottleneck, teachers should ask key questions in a timely manner to trigger the key elements of children's thinking, so that they can find a solution to the problem within a certain period of time, so as to promote the next stage of exploration.

6. Conclusion

STEAM education emphasizes the interdisciplinary integration of the five disciplines of science, technology, engineering, art, and mathematics. It is based on real situations and aims to cultivate core literacy. As a comprehensive multidisciplinary education model, STEAM education has gradually extended to the preschool education stage, which has had a positive impact on kindergartens and opened up new ideas for the design of scientific activities for children's scientific literacy. , still lacks integration.

Based on the theoretical basis of STEAM education connotation and research, this study designed three sub-activities under the "Fun Water" series of scientific educational activities for the big class, namely "Vegetable Dressing", "Secrets of Umbrellas" and "Simple Water Purification". device". These activities are children's self-construction of a series of knowledge and experience about water through self-exploration. Three rounds of action research have been conducted successively, and the implementation process of each round of activities has been evaluated and reflected to explore the direction of next optimization. It can be found that children's inquiry ability and scientific literacy have been significantly improved. However, in order to give full play to the positive role of STEAM education in early childhood science education activities, we need to think more about how to cultivate young children into people who can think independently and solve problems in early childhood science education activities, so that children have the ability to explore activities. Have a process of observation, exploration, practice and continuous improvement to improve their high-level literacy.

ISSN 2663-8169 Vol. 4, Issue 4: 12-21, DOI: 10.25236/IJNDE.2022.040403

Acknowledgement

This work was supported by the 2021 Guizhou Province College Students Innovation and Entrepreneurship Project National-level "Research on Early Childhood Science Education Design and Practice Based on STEAM Concept" (Project No.: 202110977014).

References

[1] Ministry of Education. 3-6 year old children's learning and development guide [R]. Beijing, 2012.
[2] Cui Ning, Liu Shuqing. Exploration of STEAM education strategies in kindergartens [J]. Journal of Ningbo Institute of Education, 2020, 22(06): 83-86.
[3] Gong Yidan. A direct look at STEM education: how to do STEM in kindergartens [J]. Early Childhood 100 (Teacher Edition), 2017 (11): 23-25.
[4] Zhao Huichen, Lu Xiaoting. Carrying out STEAM education and improving students' innovative ability: An interview with Professor Gretel Yackman, a well-known American scholar of STEAM education [J]. Open Education Research, 2016, 22(05): 4-10.
[5] Li Xueshu, Fan Guorui. STEAM-based kindergarten science education reform strategy [J]. Education Science, 2020, 36(01): 82-90.