

Research on the teaching mode of the "Preschool Children's Science Education" course in colleges and universities based on the STEAM education concept

Ding Xiuying

College of Education, Chongqing University of Arts and Sciences, Yongchuan 402160, Chongqing, China

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Abstract: STEAM education is widely carried out in the field of education at home and abroad, and it is also a new trend of talent training mode in future education. STEAM education has been actively explored in all educational stages in my country, and it has penetrated into teaching, but it is rarely seen in college teaching. Based on the concept of STEAM education, this study takes the course "Science Education for Preschool Children" as an example, and puts forward suggestions for teaching reform from four aspects: course objectives, course content, teaching methods, and assessment methods. Provide reference for colleges and universities to promote STEAM education and classroom teaching reform.

1. Introduction

The world has entered the era of the 4th industrial revolution. The development and change of modern society is extremely fast, and new things are constantly emerging. In this era of uncertainty, how should we face the future? What kind of talents should education cultivate? The Outline of the National Medium- and Long-Term Education Reform and Development Plan (2010-2020) emphasizes that education reform and development should focus on improving students' self-inquiry learning ability, pioneering and innovative spirit, and problem-solving practical ability. At present, our country's colleges and universities are still mainly based on the traditional teaching mode. Under this traditional teaching mode, it is difficult to develop students' creativity, autonomous learning and practical problem-solving ability. Colleges and universities undertake the dual mission of cultivating innovative talents and improving innovation ability, and should actively carry out teaching reform and continuously improve the quality of teaching. STEAM education, which is currently sweeping the world, is a new way to cultivate integrated talents who can solve social problems autonomously and creatively by integrating various disciplines such as science, technology, engineering, mathematics and art. Therefore, colleges and universities, which are cultivating innovative and applied talents in the new era, should integrate the STEAM education concept into relevant courses,

and provide new ideas for the construction of innovative applied talents in preschool education majors in colleges and universities.

2. Analysis of the fit between STEAM education and preschool education professional courses

At present, the concept of STEAM education has been widely recognized and promoted, and countries are actively exploring ways to promote STEAM education. With the support of policies, concepts and social resources, my country's STEAM education is developing more and more, and STEAM curriculum teaching practice is actively carried out at all stages of education. The multi-disciplinary integration emphasized by STEAM education is in the same vein as the curriculum concept of the integration and integration of young children's lives. The activities of the five areas of kindergarten do not have clear subject boundaries like other education stages. It is necessary to break the boundaries between fields with integrative thinking, seek linkage and mutual promotion between subject fields, and realize the comprehensive and complete development of children. In the "Guidelines for Kindergarten Education", it is also clearly pointed out that kindergarten education activities should focus on comprehensiveness, interest and activity, and emphasize the need for organic connections between different curriculum contents. [1]

Traditional science and mathematics are integrated under the science domain in the Guide to Learning and Development for Children Ages 3-6. Among them, the field of science is centered on inquiry, and the field of mathematics is problem-solving, and requires teachers to establish an inner connection between the two disciplines to provide real cognitive activities for young children. It can be seen that my country already has a guiding program for the development of STEAM education in kindergartens, which has laid an effective foundation for the implementation of STEAM education in kindergartens. [2] In this field, which is full of opportunities and challenges, the biggest challenge currently facing is that there is a serious shortage of teachers with STEAM literacy. [3] Therefore, when kindergartens use the STEAM education concept to organize related activities, it is because of the limited STEAM literacy of teachers themselves. Including their own lack of relevant education awareness, the development of activities can only be given to the surface, and it is difficult to support children to explore a certain problem in a long-term and integrated thinking. [4]

The courses of preschool education are multi-disciplinary integration courses, including education, psychology, history, information technology, art, etc. Preschool education majors should have applied talents with theoretical foundations, who should not only have solid theoretical knowledge, but also have interdisciplinary and practical abilities. And pre-school education is not like sub-discipline education in other education stages, but as an interdisciplinary, multi-disciplinary integration of comprehensive courses. And in the course implementation process, it pays attention to the combination of theory and practice, and points to discovering and solving problems in practice, which is highly compatible with the STEAM education concept. [5]

The preschool education major in colleges and universities must take on the important task of cultivating innovative and applied teachers, and help pre-service preschool teachers develop the abilities of autonomous learning, inquiry and discovery, creativity, and problem solving. Therefore, the "Science Education for Preschool Children" course needs to use the STEAM education concept to cultivate students' ability to develop multidisciplinary thinking, discover problems in life and use the knowledge they have learned to solve problems, which is an inevitable requirement for the

development of current preschool education.

3. Construction of the teaching model of the "Science Education for Preschool Children" course based on the STEAM education concept

"Science Education for Preschool Children" is the core course of preschool education major. The main course task is to help students understand the significance of science education in children's growth, and master the professional knowledge of kindergarten science education goals, content, teaching methods and evaluation. And develop the ability to design, implement and evaluate kindergarten science activities.

3.1 The goal of the "Science Education for Preschool Children" course based on the STEAM education concept

Most undergraduate colleges emphasize on cultivating students' knowledge of preschool children's science education and the ability to carry out scientific activities when formulating teaching objectives. The mastery of knowledge and ability is of course important for colleges and universities to cultivate applied talents, but this kind of utilitarian goal tends to ignore students' attitudes towards science. [6] The vast majority of pre-school education majors are female, and they have received knowledge-based science education for a long time in basic education. They are generally interested in science and have weak motivation. This leads to a low sense of efficacy in science teaching, and is afraid of designing scientific activity plans and children's science activities that will be engaged in in the future. [7] Therefore, we must first let students approach science and understand that science is not "high", nor is it the exclusive property of a certain group. Science is everywhere in our life, and we should guide students to have an interest in exploring the things around them and experience the fun that inquiry brings to them.

Because STEAM education is in the stage of exploration and experimentation in colleges and universities, students' understanding of the concept of STEAM education is superficial. The author learned that most of the students know that STEAM education is a new educational concept and a multi-disciplinary integration education, but they lack the knowledge of its connotation and implementation strategies, and have never practiced STEAM education. Theory is the basis of practice. Only by fully understanding the concept of STEAM education can we better design and implement STEAM education activities.

Therefore, the teaching objectives of the "Science Education for Preschool Children" course should include the following aspects:

Knowledge goal: understand the connotation of STEAM education, and integrate the STEAM education concept into kindergarten science education activities. Understand and master the characteristics and laws of children's science learning and the goals and requirements of children's science education, be able to correctly choose the content of science education activities suitable for children's development, and basically master the teaching methods and strategies.

Ability goal: According to the current situation of kindergartens in my country and the characteristics of children's learning and development, comprehensively use STEAM education knowledge to design, organize, and implement appropriate kindergarten science education activities;

in the process of group cooperation to complete tasks, they can share opinions, learn, and discuss with each other. Promote common development.

Emotional goal: establish a scientific view of scientific education for preschool children, stimulate students' interest in scientific activities, and initially cultivate interdisciplinary integration awareness, innovation ability and reflection ability.

3.2 The content of the "Science Education for Preschool Children" course based on the STEAM education concept

Optimizing teaching content is an important guarantee to achieve teaching goals. STEAM education is different from the traditional single-subject educational concept, and has the characteristics of emphasizing practice. In college classrooms, teachers teach step by step, and imparting knowledge will make students boring, boring, and affect their enthusiasm for learning. Lack of teaching practice will lead to the failure of students' accumulation of subject knowledge and ability to be transformed into practical knowledge. Due to the lack of practical knowledge, many students have difficulty grasping the actual teaching of kindergarten after entering the workplace, and even feel that theory and practice are disconnected. [8] Based on this, the content of the "Science Education for Preschool Children" course can be divided into four modules. The first module is an overview of science education for preschool children: including the nature of science education, the value of children's science education, and the introduction of STEAM education concepts (development background, connotation, and characteristics). The second module is the goal and content of science education for preschool children: Interpret the goals in the field of science in the "Guidelines for Kindergarten Education" and "Guidelines for Children's Learning and Development for 3-6 Years Old", master the content scope and core experience of scientific activities. The third module is the design and organization strategy of science education activities for preschool children. The fourth module is practice. Various teaching strategies can be used to guide students to operate and carry out teaching practice.

3.3 The teaching method of the course "Science Education for Preschool Children" based on the STEAM education concept

This course is a highly practical course. It is difficult to arouse students' interest and enthusiasm only by teaching methods. As kindergarten teachers, students need to understand certain scientific experimental methods and master certain scientific teaching skills. Therefore, after having a certain theoretical foundation, it can help students to understand the knowledge they have learned more deeply through practice. With the help of the STEAM education concept, combined with the current situation of classroom teaching of "Science Education for Preschool Children", the following teaching methods are proposed.

3.3.1 The combination of case analysis method and discussion method

Pay attention to the use of cases in the teaching process. Students do not have much contact with scientific activities based on the STEAM education concept. They can select the cases of STEAM education activities in kindergartens, and conduct in-depth analysis from the design intent, goals, activity process, teacher-child interaction, and activity effects of the cases. After the analysis, the

group communicated with each other and shared their views. Through the process of communication, the value of the case could be fully tapped, and the idea of designing kindergarten scientific activities was formed. This enables students to better exert their initiative and enthusiasm, is conducive to the cultivation of independent thinking ability, and promotes the ability to use knowledge and reflection flexibly.

3.3.2 Project-based teaching method

The project-based teaching method is that students combine classroom teaching, combine theory and practice in small groups, and undertake small projects independently by consulting literature, collecting materials, and conducting research by themselves. After the project, students will introduce their own project implementation process and exchange learning methods with each other. [9] Taking planting activities as an example, the planting process is a way for children to get close to nature. Planting activities can promote children's development in many aspects, such as nature, quantity, measurement, space, collaboration, planning, performance, sense of responsibility, task awareness and aesthetics. The development of planting activities provides children with a platform for direct perception, practical operation and personal experience. We can introduce kindergarten planting activities into university classrooms, and use the project-based learning method to allow students to experience the planting process from beginning to end, and explore the value of STEAM educational activities in it. Taking the group as a unit, the members of the group plant the same vegetable. The planting process should be guided by STEAM education, which fully reflects the interdisciplinary, practical, artistic and collaborative nature. Each student makes a vegetable growth record book, records the basic information of vegetables, observes the record sheet, and compares each other within the group two months later to analyze the growth changes of their respective vegetables. Finally, the group organizes the content and publishes it in class. This project-based teaching method fully reflects the subject status of students, and constructs knowledge by solving problems found in real situations. The application of theoretical knowledge in the process of solving practical problems can effectively improve the enthusiasm of students and effectively improve the teaching effect of the course.

3.3.3 Simulation teaching method: simulate the scene of kindergarten science education activities, so that students can have a more specific and comprehensive understanding of their own teaching activities in a realistic teaching atmosphere. After the activity, self-assessment and mutual assessment will be carried out, and the teaching activities will be continuously reviewed, analyzed, and improved, which is conducive to the overall improvement of students' professional quality.

3.3.4 Hands-on operation method: Letting students operate by hands is sometimes more effective than the teacher's explanation. In the process of personal experience, students will encounter a series of practical problems, which will promote students to think, explore, and use various knowledge and methods to try to solve problems. Therefore, small scientific experiments such as light and shadow, sound transmission, and surface mixing can be set up in the classroom, so that students can learn to use scientific experimental methods to discover and solve problems in the process of hands-on experiments.

3.4 The assessment method of the "Science Education for Preschool Children" course based on the STEAM education concept

At present, the assessment method adopted by most colleges and universities is mainly based on closed-book written examinations. The purpose of teaching is not to cope with exams and complete credits, but to correctly understand and understand the content of the course. The "Science Education for Preschool Children" course based on the STEAM educational concept is to gradually cultivate students' knowledge application ability and problem-solving ability in the process of students' hands-on practice. In teaching, we should not only focus on results, but also on the improvement of students' understanding of knowledge, knowledge application ability, practical ability, problem-solving ability, interdisciplinary ability, and creativity in the entire learning process. Therefore, evaluation should be incorporated into the entire teaching process before, during and after class, and continuous attention should be paid to changes in students' abilities. Based on this, the course adopts the method of "basic knowledge evaluation + activity design and simulation teaching + project implementation" for assessment. The basic knowledge evaluation can be carried out in the form of closed-book examination, and its assessment content is the understanding of the core concepts of the course. It mainly evaluates whether students have established the internal connection between knowledge and knowledge, and can combine and expand the old and new knowledge to establish their own knowledge system. Activity design and simulation teaching is to assess the application of knowledge and the ability to apply teaching practice. It can be combined with on-campus practice and off-campus practice to enter the kindergarten to experience the sense of accomplishment of children's scientific activities. Finally, teachers in the school and front-line teachers jointly evaluate the teaching, which will conduct a more comprehensive evaluation of the students' professional ability, thereby effectively improving the students' practical ability. The implementation of the project mainly assesses students' ability to learn cooperatively, explore together, be good at finding problems, and use different methods to solve problems in the learning community.

4. Conclusion

In order to cultivate talents who will lead the future society, colleges and universities undertake the important task of talent cultivation. In recent years, the reform of college classrooms has been continuously carried out and implemented. We need to change the traditional teaching mode, integrate new ideas, adopt new methods, and promote the vigorous development of classroom teaching reform. STEAM education is a scientific education concept of interdisciplinary integration, which has been widely developed around the world. Vigorously advocating and developing STEAM education will effectively promote the quality development of education and teaching services in my country. STEAM education emphasizes students' personal experience and inquiry-based learning, which is conducive to cultivating students' creativity, interdisciplinary integration ability, logical thinking ability and problem-solving ability, thereby promoting the cultivation of high-quality applied preschool education professionals. This paper studies the construction of the curriculum model of "Science Education for Preschool Children" based on the STEAM education concept, and to a certain extent has some enlightenment for the teaching reform of preschool education in colleges and universities. Of course, for STEAM education to land in college classrooms, we need to conduct more

research and practice, and the conclusions obtained will have greater inspiration for teaching reform.

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References

- [1] Ministry of Education: "Notice of Kindergarten Education Guidance (Trial)" [EB/OL]. (2001-07-02)[2022-02-14]http://www.moe.gov.cn/srcsite/A06/s3327/200107/t20010702_81984.html.
- [2] Li Jimei, Feng Xiaoxia. Interpretation of "Guidelines for Learning and Development of Children Aged 3-6" [M]. Beijing: People's Education Press, 2013.
- [3] Zheng Wei. China STEAM Education Development Report [M]. Beijing: Science Press. 2017.
- [4] Xiao Ying'e. Analysis of the current confusion in the practice of STEAM education in kindergartens [J]. *Thinking*, 2021, 10: 16-19.
- [5] Cheng Anna, Pei Jianan. Research on the teaching mode of preschool education in higher vocational education based on STEAM education concept [J]. *Education Observation*, 2021, 10(44): 66-69.
- [6] Qian Xiaoling. Strategies to optimize the teaching of science education courses for preschool children in undergraduate colleges [J]. *Journal of Suzhou Institute of Education*, 2016, 19(1): 104-106.
- [7] Cui Shujing. PBL teaching reform of preschool children's science education courses in normal normal schools: Based on the perspective of improving students' scientific literacy and scientific teaching efficacy [J]. *Journal of Chongqing University of Arts and Sciences (Social Science Edition)*, 2018, 37(4): 92-98.
- [8] Huang Liyan. The predicament and key points of the course teaching of "Science Education for Preschool Children" [J]. 2016, *Science Education*, 346: 45-46.
- [9] Wang Xiangqian, Zhang Xiaopei. Research on the application of PBL teaching mode in the curriculum of "Science Education for Preschool Children" [J]. *New Curriculum Research (Mid-term)*, 2016(1): 25-28.