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Application of Stem Methods in Children Education

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ABSTRACT: *STEM method has been implemented in the educational program at the high school education levels, focusing on Information Technology and Robotics subject, but in the preschool education program, the paper explores the advantages of STEM education, the need to put STEM methods into practice in preschool programs and measures to promote the application of STEM methods in education of children aged 5-6 at Vietnamese preschools today.*

Keywords: *Kindergarten; Preschool education; STEM; Methods of education; Skills; STEM application; Experience*.

I. AN OVERVIEW OF STEM EDUCATIONAL METHODS

STEM is a brief of Science, Technology, Engineering, and Mathematics. STEM education is an interdisciplinary approach in learning, where academic concepts are combined with practical lessons in a specific context; in terms of the nature of STEM education is understood as the process of equipping learners with the necessary knowledge and skills related to the fields of science, technology, engineering, and mathematics. Teaching STEM means integrating science, technology, technology, and math into each lesson, is learning by teaching principles through practice, on practical and vivid experiments that can be applied immediately in everyday life practice, where learners develop their own knowledge and follow their own passion [lead [4,5,6]].

STEM education is designed for learners of skills that can be used to work and develop in today's modern technology world, including:

***Scientific skills*:** This is the ability to link concepts, principles, scientific laws and theoretical foundations of scientific education to practice and use this knowledge to solve problems in practice.

Technology skills: This is the ability to use, manage, understand and access technology. In particular, technology is understood as the simplest everyday items such as pencils, pinwheel toys that are made from pineapple leaves to complex use systems such as the internet, the national electricity network, satellites ... Set of methods of processing, manufacturing, changing of the status, nature, shape of raw materials or semi-finished products used in the process of creating a complete product to serve human needs.

***Technical skills*:** This is the ability to solve practical problems that take place in life by designing objects, systems and building production processes to create objects. Simply understood, learners are equipped with technical skills to be able to produce objects and understand the process to make them. In doing so, learners must be able to analyze, synthesize and combine to know how to balance the relevant factors (such as science, art, technology, technology) to get a solution the best in design and process construction. In addition, learners also have the ability to recognize the needs and reactions of society in technical issues.

***Math skills*:** The ability to recognize and capture the role of mathematics in all aspects of the world's existence; ability to express ideas correctly, applying mathematical concepts and skills to everyday life.

The knowledge and skills formed through STEM education (called STEM skills) are integrated and complemented to help learners not only understand the principles but also apply to practice and create products in daily life.

In addition, STEM education promotes a new learning style for learners, which is a creative learning style. Putting the learner into the role of an inventor, the learner will understand the nature of the equipped knowledge, know how to expand their knowledge, fix and reprocess them to suit the situation that the learners are having to resolve; develop problem-solving skills, critical thinking, collaboration skills, communication skills.

In developed countries such as the US, South Korea, Finland, Japan, Singapore, STEM education has been widely used and has also achieved certain successes. In which, the United States considers STEM education as a survival factor in maintaining high qualitative creative human resources. Regarding the role of STEM method in education, US President Obama once said: "STEM is more than a subject or a periodic table. It is an approach, a way to understand and explore the world from which to change it "[cited [4.5].

It can be said that STEM education is not aimed at education so that learners become mathematicians, scientists, engineers or technicians who mainly equip people with knowledge and skills to working and developing in the world of modern technology. STEM education breaks the gap between academia and practice, creating people with the ability to work in highly creative specific environments with jobs that require a mind. STEM education creates people who can meet the work needs of the 21st century, meet the nation's socio-economic development and can positively impact the knowledge economy's change in the context of globalization. We are living in an age where integration between nations is a fundamental law, which includes both the need for exchanges of work and human resources. In this context, the Vietnamese education sector needs to prepare learners for the knowledge and skills that STEM education can bring. This is in line with the integrated approach in the high school education program and new preschool education.

II. THE NECESSITY TO APPLY STEM METHODS IN IMPLEMENTING KINDERGARTENCHILDREN EDUCATION PROGRAMS IN VIETNAMESE PRESCHOOLS

On December 30, 2016, the Minister of Education and Training issued the preschool education program with Circular No. 28/2016/TT-BGDDT, which stipulates the objectives, content, methods, and forms. and educational environment, assess the results of educational activities for children of all ages. Accordingly, the preschool education program aims to develop personality for children according to five development areas, including: Physical development (development of movement, nutrition and health education); cognitive development (social discovery, scientific discovery and familiarization with math); language development (familiarizing literary works, familiarizing letters and reading and writing); social-emotional development and aesthetic education (music, shaping) [1].

In order to well implement preschool education for children until 2025, December 3, 2018, the Prime Minister issued Decision No. 1677 approving the Preschool Education Development Project for the period of 2018 - 2025. Scheme identifies "Pre-school education is the first level of the national education system, laying the foundation for the physical, intellectual, emotional and aesthetic development, forming basic elements of personality for children before entering grade 1 "; "The goal, content, and method of preschool education innovate towards the development of quality and capacity of children, ensuring communication and connection with the high school education" [2]. In terms of tasks and solutions, the Project emphasizes the need to "Innovating professional activities in schools; apply advanced preschool education methods of countries in the region and the world in accordance with Vietnamese practices to improve the quality of child care and education; step by step prepare the necessary conditions to build and promulgate a pre-school education program in 2020 with advanced contents and methods, suitable to practical conditions, meeting the requirements of innovation and international integration [2].

Special preschool age in the period of 3-6 years old is the golden age to develop curiosity, flying imagination and ability to associate, develop thinking skills, communication, cooperation through educational topics are designed, organized specifically and intuitive and lively teaching tools. STEM method has an important meaning to help the preschool education work effectively, specifically:

First, natural preschoolers are very curious about the world around them and are very interested in learning through play. Activities relate to experiment, discovery, construct or collect, which are always great ways to teach children. Designing and organizing play-by-learning activities or organizing activities together in a fun way outside or in the corners of the classroom are important for children (For example: Playing assembling games to build houses, parks and schools, play games to act as sellers, shoppers, bakers from flour, playing doctors and patients, playing learning games with watercolor-like drawing, coloring yellow fish painting ...). This is the content that the STEM method focuses on the most.

Secondly, STEM experiences are designed to be suited for development at any age, but necessarily organizational activities for children aged 3-6 years,besides, attractiveness and fun, they must meet the performance of children. An interesting STEM activity must be challenging and make children find new information and facts to solve a problem. Keeping the balanced activity between challenges and children's abilities is very important in STEM education. This is especially necessary to encourage and motivate learning for children at present and in the future.

Third, it is hand on and the actual process of conducting research is one of the reasons that STEM education becomes very successful in early education. Learning through practice is essential in preschool education. Directly experience activities make children happier, more attracted to the content and facilitate the

development of the necessary skills of children. STEM education brings the experience into the child's learning process. Children are learning on a project basis, are assigned tasks according to each project, thereby maximizing the ability to think creatively and apply scientific knowledge to complete tasks. Each knowledge or skill will become meaningful when the lesson is linked to creating a specific product such as a lantern, a basket, a ball, a lovely robot ... Each scientific principle should be specific, be directly applied, create a favorite item, toys, will impact strongly on the excitement and passion for exploration of children.

Fourth, STEM activities are designed closely to the reality of the classroom, the school's education program and the needs of children to help them solve real-world problems associated with their daily life. With each activity and experiment implemented, children will understand the process of implementation, see the change of state, shape, size of things and phenomena. By each STEM lesson, children can produce real and useful products, which give children more excitement and love to go to school, love to explore and understand all the problems in life.

Fifth, the foundation from skills: The best approach to STEM education in preschool in general and children from 3-6 years old in particular is based on STEM skills. In addition, when children work together, they form the skills of collaboration, prediction, calculation, measurement, assumptions, and communication. Open research activities help children choose their own skills to solve problems in their own creative way. This is often the best way to practice creative ability and create conditions for children to test their skills.

III. Measures to promote the application of STEM methods in implementing preschool children education programs in Vietnamese preschools

STEM method has an important meaning in the education of preschool children, but the conditions of policies and people, material facilities and learning resources at preschool institutions have not met the requirements of implementing STEM education program smoothly, we propose some of the following measures and argue that the implementation of these measures will promote the use of STEM methods to improve the quality of child education at Vietnam preschool institutions today. Measures include:

The Ministry of Education and Training should issue regulations and guidelines for preschool education institutions to develop STEM-oriented education programs in line with the practical needs of children and conditions of schools, teachers, and socialization of practical education;

Organizing training programs, fostering knowledge, qualities, and capacity of STEM education for preschool teachers;

To step by step develop the school education program according to the STEM education orientation, manage the implementation of teachers and preschool children in all grades to ensure educational efficiency;

Organizing compilation of STEM-oriented education materials for children of all ages associated with the areas of cognitive education, aesthetic education, social-emotional education, and information technology application;

Using improvement activities and enriching materials to promote greater involvement of teachers and children's parents with STEM education at preschool levels;

Identifying the roadmap for compiling STEM integrated education standards, to promote and further enhance the need to standardize preschool education at STEM-oriented educational institutions throughout the country;

Establishing and use cooperative relationships between teachers, schools and social education forces to promote the effective mobilization and use of resources for implementing STEM-oriented educational programs in school;

Learning experiences in organizing the implementation and successful development of preschool education programs of countries with advanced education succeeded in implementing STEM education at preschool levels;

IV. CONCLUSION

STEM education is based on a child-centered education perspective, respecting the role of the activist and appreciating children's creativity. Children learn that children live and lessons are the daily life of children, therefore, in applying STEM methods, teachers need to help children perform well the roles: people participate, people learn, and people connect data resources; people implement solutions; people synthesize information; people present results. Incorporating STEM method into preschool education program in preschool institutions is an initial step for children to learn and experience from real life in an intuitive way, contributing to improving the quality of Vietnamese children development in the context of current educational development that the government, schools, and teachers need to be aware of and step by step implement specific and practical measures can bring about efficiency.

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