

Findings from a Survey on Pre-K Teachers' Perception of STEM Integration and Education in Early Years

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ABSTRACT. *In order to understand the current situation of STEM integration and education for young children, this paper uses the methods of literature and questionnaire to investigate pre-k teachers' understanding, attitude and action, and educational practice on STEM education. The results show that pre-k teachers generally do not have a high understanding of STEM education, but they are full of expectation for the implementation of STEM education in the future. Through an in-depth analysis of the problems and difficulties existing in the STEM education for young children, the aim of this paper is to provide scientific basis for the formulation of STEM education policies for young children, teacher training and the solution of related problems.*

KEYWORDS: *Young children, STEM education, Investigation and analysis*

1. Introduction

High quality early childhood education in science, technology, engineering, and mathematics (STEM) have gained recognition as one of the key levers contributing to young children's later school achievement [1] [2]. Previous studies have found that the earlier STEM education is carried out, the more effective it is [3]. STEM experience originates from the time when children start to observe and contact with their surrounding environment right after birth, so STEM education should begin in early childhood [4]. STEM education in pre-k stage is not only of great significance to children's personal development, but also directly affects the cultivation of talents in related fields in the future[5]. Therefore, emphasizing early STEM education for pre-k children has become an important trend in the development of international pre-k education. In addition, pre-k teachers with sound STEM literacy is of great importance to conduct early STEM education. In recent years, China has made great efforts to promote STEM education in K-12 education. In order to understand the actual situation of current pre-k STEM education, this study investigated and analyzed pre-k teachers from three dimensions of understanding, attitude and action,

and educational practice to provide scientific basis for the formulation of STEM education policies for young children, teacher training and the solution of related problems.

2. Methods

1. Study subjects

The subjects of this survey are 65 kindergarten teachers participating in STEM education and training in Sichuan province. These teachers come from public and private kindergartens in Sichuan province, of which 71% are teachers with first-class and second-class professional titles, and 77% are teachers with more than 5 years of teaching experience. Most teachers have been engaged in multidisciplinary teaching covering five major areas which are language, society, science, art and health. A total of 65 questionnaires were issued and 65 were recovered, with a recovery rate of 100%. All the questionnaires recovered were valid questionnaires. In this study, the questionnaire was conducted anonymously to protect the privacy of the respondents.

2. Research Tools

This study adopts the methods of literature review and questionnaire survey. Literature review provides theoretical support for the analysis of relevant data in this study. Interview pre-k teachers on STEM education through questionnaire survey. Before the formal investigation, some kindergarten teachers were randomly selected for trial test and interview. According to the feedback, some problems are modified. The questions of the questionnaire are closed questions, mainly including factual and attitudinal questions. The design of this questionnaire mainly includes pre-k teachers' understanding of STEM education, attitude and action, and educational practice. The results of 65 valid questionnaires were input into SPSS20.0 software, and the basic frequency analysis and frequency analysis under multiple reactions were carried out.

3. Data analysis

1. Understanding of STEM education for young children

The understanding of pre-k STEM education includes the attention to young children's STEM education and the recognition of its significance. According to the data, more than 35% of teachers have not heard of STEM education. Obviously, pre-k teachers do not have a high understanding of STEM education for children. As for the significance of carrying out STEM education in kindergartens, teachers generally agree. In addition, teachers who think STEM education can promote scientific and engineering education for young children, taking up 67.2%. In fact, the core idea of STEM integration and education has a good foundation in Chinese kindergartens. The education in the five major fields in Chinese kindergartens do not have clear subject boundaries, which matches STEM education concept. In addition, there are multiple opportunities for STEM education in one-day activities in

kindergartens. From this point of view, STEM education in early childhood is not only necessary but also feasible. The key is that teachers should first have a "STEM literacy" and use STEM thinking to re-examine the usual educational methods.

2. Attitude and behavior of participating in STEM education for young children

The attitude of pre-k teachers determines the efficacy of STEM education and teachers' participation. Data shows only 1.3% is unwilling to carry out STEM education. Therefore, pre-k teachers have realized the importance of STEM education. It is also found that less than half of the teachers can take initiatives to carry out STEM education, representing only 41.8%. Teachers' worries and confusions about STEM education are mainly in two aspects: they don't know much about how to deliver pre-k STEM education; Teachers think that the implementation of STEM education needs a lot of high-tech equipment and funds. Pre-k teachers' STEM education training fails to keep up contributes to this situation. Most teachers have not participated in the STEM education and training, taking up 87%. Moreover, lack of relevant teaching methods and knowledge reserve also lead to pre-k teachers' worry about STEM education.

3. Difficulties and expectations in developing STEM education for young children

According to the data, there are great difficulties in implementing STEM education in kindergartens in terms of policies, curriculum resources and teachers, accounting for 68.1%, 54.2% and 52.1% respectively. Although China has introduced relevant policies on STEM education, but not specific for young children. The relevant policy perception of teachers is greatly reduced. In terms of curriculum, the data shows

That 78.2% of teachers think that there is no mature pre-k STEM curriculum, 79.7% of teachers think they lack engineering and technical knowledge in particular. As for teachers, they are the main body of implementing STEM education, but most teachers in kindergartens lack sufficient confidence in implementing interdisciplinary STEM teaching. Because the curriculum system of China's pre-k education major hardly involves courses of technology and engineering, and pre-k teachers seldom have knowledge and practice in technology and engineering.

4. Conclusion

Based on the results of this survey, the following suggestions are put forward:

1. Policy Support

Put forward policies to support the development of STEM education for young children, clarify the objectives, content system, teaching methods, implementation purposes and project examples of STEM education, and provide financial support. Give policy preference and encouragement to teachers who carry out STEM education for young children.

2. Curriculum resources development

Develop curriculum resources for pre-k STEM education and provide supporting conditions to promote the rapid development of it. Organize an interdisciplinary team of experts, develop a STEM education curriculum system suitable for children's development, provide abundant STEM teaching cases for children, and formulate supporting practical conditions.

3. Teacher training

Pre-k teachers generally have a low understanding of STEM education and need to take various actions, such as establishing seed schools and demonstration schools, collecting STEM teaching project cases, holding STEM teaching competitions and other activities to enhance the related understanding of pre-k teachers. At the same time. Through strengthening the STEM education and teaching training of pre-k teachers, the knowledge and ability of STEM education of pre-k teachers can be improved. The mixed training mode combining online and offline can be adopted to improve the basic concepts, basic knowledge and basic methods of STEM education for pre-k teachers, especially the knowledge and skills in engineering and technology, as well as, STEM project design and development capabilities.

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