THE APPLICATION OF MAKER EDUCATION IN THE CULTIVATION OF CHILDREN'S INNOVATION ABILITY IN SHENZHEN CITY

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Received : 31 May 2023
Revised : 5 December 2025
Accepted : 5 December 2025

ABSTRACT

The focus of this study is to improve the innovation ability of Shenzhen children through maker education and the management mode of maker education, so as to promote the cultivation of children's creativity. Primary school students in Shenzhen, Guangdong Province were studied in this study. Fifteen schools were randomly selected from each district of Shenzhen, and 15 students aged 8-9 and 2 teachers were selected from each school. The research tools were :A) children's cognitive creative thinking ability assessment questionnaire and children's cognitive problem solving ability scale; B) The Williams creative Tendency Scale was used to measure children's cognitive creative thinking performance and the questionnaire was used to investigate teachers' cognition of maker education and teaching; C) Questionnaire survey to measure the actual situation of teachers in maker education; D) Performance scale questionnaire measures the impact of maker education on students' innovation ability. The main results of this study are as follows: Maker education plays a key role in the cultivation of children's innovation ability, and there is a chain intermediary relationship between the management model of maker education and the evaluation mechanism of maker education.

Shenzhen actively practices the educational concept of "morality, ability and general education", forming a path to promote the comprehensive quality training of Shenzhen students through curriculum reform. Based on the model of maker education, it is considered that maker education is a systematic project. We will coordinate and promote maker courses,

maker Spaces, maker learning, and maker teachers. The research significance of this study: innovation is the soul of a nation's progress, training innovative talents is an important responsibility and mission in the era of education, and the implementation of maker education mode is the most effective way to train innovative talents. There are many factors affecting children's creativity. (Xue Ming, 2020) The model of maker education and creative management is one of the most effective training models. The purpose of this study is to study how to improve children's creativity and imagination. Creativity is the key to a child's future competitiveness. Maker education meets the requirements of the Ministry of Education of China to improve the quality of students and teachers, and has practical significance for the research and development of maker education in China.

Keywords: Maker Education, Management Model, Evaluation Mechanism

1. Introduction

Innovation is the soul of a nation's progress, training creative talents is the important responsibility and mission of the education of The Times, and carrying out maker education to cultivate creative talents is the most effective training mode. The competition in the world today and in the future is fundamentally the competition of talents, especially the competition of innovative talents. The most important ability of innovation is innovation ability, and the cultivation of innovation ability is extremely missing in Chinese children's education. Therefore, the application research of maker education in the innovation ability of Chinese teenagers is of great significance. The cultivation of children's innovation ability in Shenzhen is selected as the research object. Shenzhen, known as the "capital of innovation", strives to explore the Shenzhen path of cultivating innovative talents in the development of education, promotes the high-quality development of education, and injects fresh vitality into the innovation-driven development of Shenzhen. , don't just talk about cultivating creative talents is the most important basic courses, as the first batch of national curriculum reform experimental zone, shenzhen active practice of "morality, ability, all-round education" concept, the formation of change in course form shenzhen path to promote students' comprehensive quality training, have produced a batch of across the country, the province influential pioneer school curriculum reform, Quality education in primary and secondary schools leads the province. From a guest education as a cut-in, and education is a systematic project, for this purpose, the shenzhen education bureau issued "the elementary and middle schools in shenzhen and guest education course construction guide" the elementary and

middle schools in shenzhen and guest room construction practice guide to the action plan for three years, shenzhen science and technology innovation education of primary and secondary schools "shenzhen city elementary and middle school students to explore the sex small project management method", etc. Series of files, We will coordinate and promote maker courses, maker environment, maker learning, maker teachers, and maker culture. (Education Bureau of Shenzhen Municipality, 2018)Innovation ability refers to the ability to produce new ideas, discover and create new things, innovation ability is a necessary psychological quality to successfully complete a creative activity, innovation ability is the comprehensive optimization of ability, intelligence, knowledge, good quality and other factors. Whether a person has the ability of innovation is an important sign to distinguish talents. For example, creating new theories, new methods, inventing new technologies and new equipment, and creating new works are all manifestations of innovation ability. Innovation ability is a series of continuous complex high-level mental activities, innovation ability requires all human physical and intellectual high tension, to ensure creative thinking at the highest level. (Zhiting, 2015) It is hoped that through this study, the influence dimension between children's maker education and creativity can be deeply analyzed, and some future prospects for children's education research can be put forward. Moreover, it is expected that children in Shenzhen can grow into excellent talents to realize their self-value and make contributions to society through the assistance of creating new abilities. The essence of education is to stimulate children's potential and let children participate in it happily . (Wikipedia, 2023)

2. Research objectives

The focus of this study is to improve the innovation ability of Shenzhen children through maker education and the management model of maker education, so as to promote the cultivation of creativity. Specifically, we developed the following two research questions to guide the research:

1. To study the influence of the education based on maker on the cultivation of children's innovation ability

2. To study studies the mediating relationship between the management model of maker education, the evaluation mechanism of the intervention variables’ and children's innovation ability

3. Research Methodology

1. Sample of research methods

This study mainly discusses the application of maker education in the cultivation of innovation ability of 8-9 year old primary school students in Shenzhen, understanding and analysis of the current situation, and the use of theories to explain phenomena. Therefore, this study mainly uses the following methods: literature research method; Method of investigation and research; Quantitative analysis method; Comparative study method; Ex post explanatory text and other methods.

2. Research design

The implementation path of this study, which is divided into three parts: ask the questions, analyze the problem and solve the problem (Figure1).

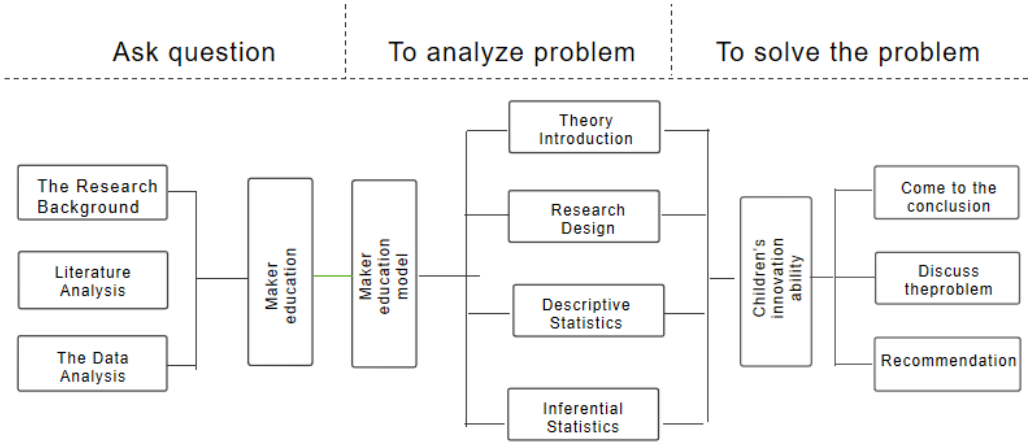

Figure 1: Ask questions

4. Research Scope

1. Scope of Population

This study mainly adopts literature research method, investigation method, quantitative analysis method, comparative research method, post-explanatory text method and so on. This paper focuses on primary school students aged 8-9 years old in Shenzhen, Guangdong Province. In 2022, primary school students aged 8-9 years old were randomly selected from 15 schools in Shenzhen. The sample selection in this study adopts the polymorphic random sampling method. As a total sample, the 15 primary schools will be randomly selected.

The researchers used optimal design and empirical evidence to determine the sample size, which was about 300. In order to ensure the accuracy of exploratory factor analysis, the sample size was increased to about 330 samples, and 303 questionnaires were received, with a response rate of 95%.

2. Scope of Content to Study

The research content is the impact of maker education on children's innovation ability in Shenzhen, in which maker education is an independent variable, including children's cognitive research, children's creative thinking ability research, children's cognitive problem solving ability research. Children's innovation ability is the dependent variable, which mainly includes children's cognitive creative thinking performance, innovative thinking, innovative consciousness and innovative ability. The management model of maker education and the evaluation mechanism of maker education are the mediating variables, which mainly include teachers' cognition of maker education and teaching and the actual situation of teachers in maker education.

5. Research Findings

Based on the comprehensive research, we developed a simple conceptual framework model for this study (Figure 2). The model shows that children's innovation ability is affected by three variables: maker education, maker education management mode and maker education evaluation system. Innovation ability depends on the "input" of children's creative thinking and the "input" of maker education, and depends on the interaction among children's innovation ability, children's maker education management mode and maker education evaluation mechanism. According to the research framework, the research content is the impact of maker education on the innovation ability of children in Shenzhen, in which maker education is the independent variable, children's innovation ability is the dependent variable, and the management mode and evaluation mechanism of maker education are the chain intermediary variables.

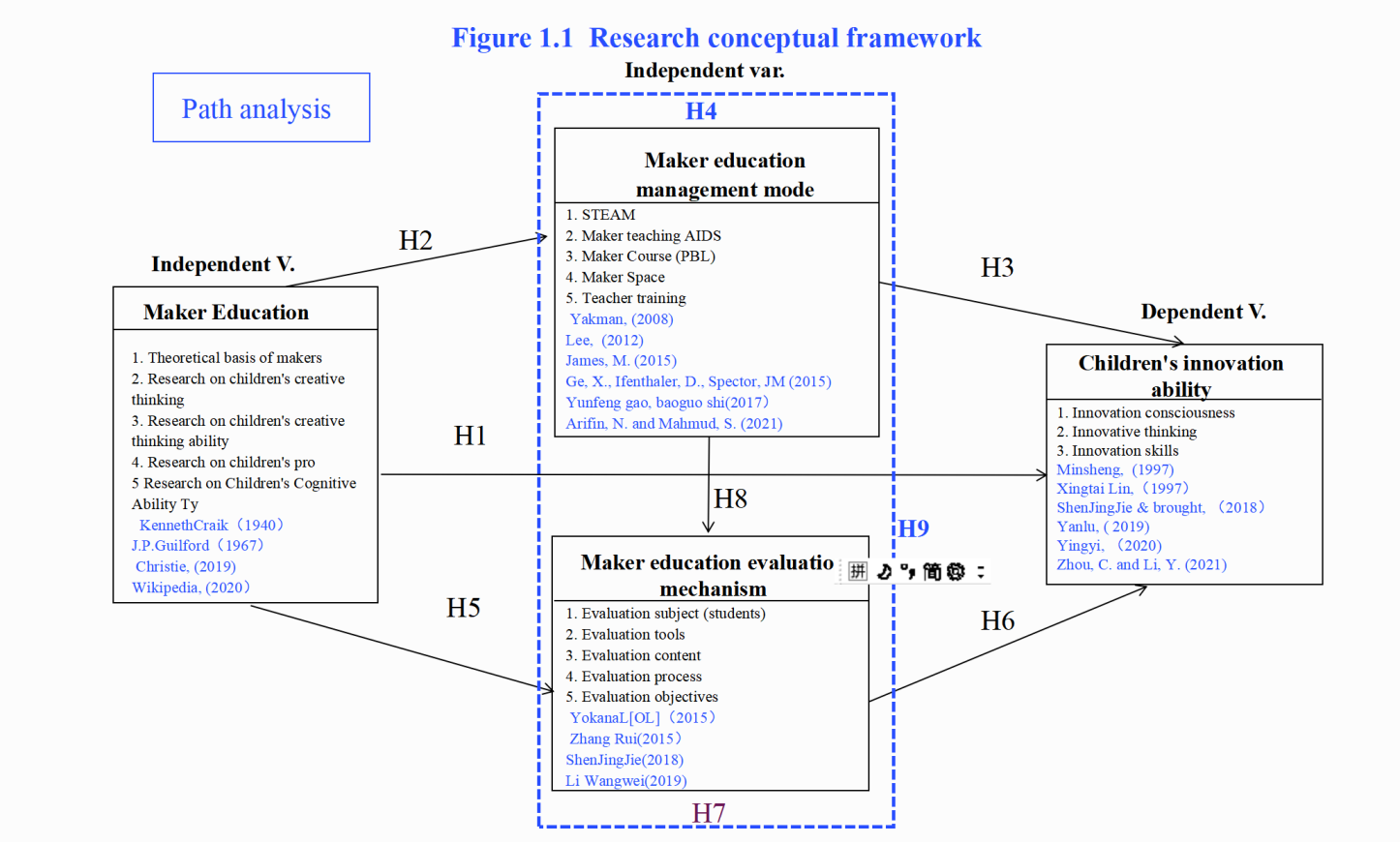

Figure 2: Research conceptual framework

The hypothesis framework of this study contains 4 variables and 9 hypotheses (H1-H9). Children's innovation ability is the dependent variable, maker education is the independent variable, and the management model of maker education and the evaluation mechanism of maker education are the intermediary variables. H1 assumes that ME will affect CIA, H2 assumes that ME will affect MEM, H3 assumes that MEM will affect CIA, and H4 assumes that MEM and ME will affect CIA mediating variables.

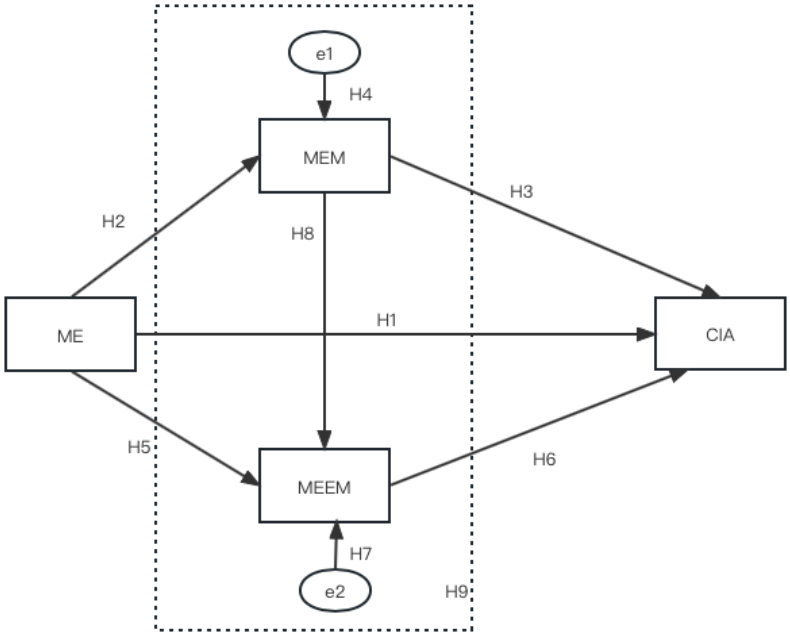

Figure 3: Hypothesis identification and structural models.

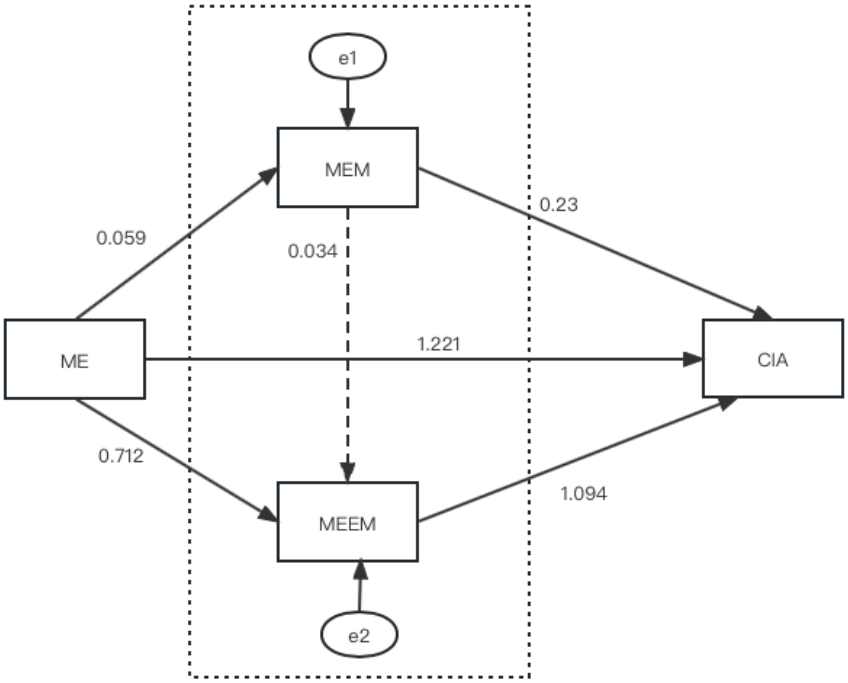

Figure 4: Diagram of results of hypophysis testing.

Table 1: Hypothesis testing in unstandardized scores

Effects			Estimate	S.E.	C.R.	P	Hypothesis
ME	--->	CIA	1.221	0.052	20.863	**	H1
ME	--->	MEM	0.059	0.021	2.395	*	H2
MEM	--->	CIA	0.23	0.059	3.106	**	H3
ME	--->	MEEM	0.712	0.121	6.078	**	H5
MEEM	--->	CIA	1.094	0.083	14.688	**	H6
MEM	--->	MEEM	0.034	0.043	0.618	0.537	H8

Note: Since H4, H7 and H9 reflect intermediary relationships, they are not shown in the table.

Table1 showed the path coefficient estimations and their hypothesis testing, the results of hypothesis testing were as followed:

ME is maker education, MEM is maker education management model, MEEM is maker education evaluation mechanism, CIA is children's innovation ability.

Hypothesis 1 (H1): There were some positive relationships between maker education and children's innovation ability, the estimated path coefficient was 1.221 which was statistically significant ($p \leq 0.01$). Hench this hypothesis was accepted.

Hypothesis 2 (H2): There were some positive relationships between maker education and maker education management model, the estimated path coefficient was 0.059 which was statistically significant ($p \leq 0.05$). Hench this hypothesis was accepted.

Hypothesis 3 (H3): There were some positive relationships between maker education management model and children's innovation ability, the estimated path coefficient was 0.23 which was statistically significant ($p \leq 0.05$). Hench this hypothesis was accepted.

Hypothesis 4 (H4): Maker education management model plays an intermediary role between maker education and children's innovation ability. The estimated results show that the intermediary effect is exist.

Hypothesis 5 (H5): There were some positive relationships between maker education and maker education evaluation mechanism, the estimated path coefficient was 0.712 which was statistically significant ($p \leq 0.01$). Hench this hypothesis was accepted.

Hypothesis 6 (H6): There were some positive relationships between maker education evaluation mechanism and children's innovation ability, the estimated path coefficient was 1.094 which was statistically significant ($p \leq 0.01$). Hench this hypothesis was accepted.

Hypothesis 7 (H7): Maker education evaluation mechanism plays an intermediary role between maker education and children's innovation ability. The estimated results show that the intermediary effect is exist.

Hypothesis 8 (H8): There were some positive relationships between maker education management model and maker education evaluation mechanism, the estimated path coefficient was 0.034 which was not statistically significant (p=0.537). So, this hypothesis was rejected which showed that was no relationship between maker education management model and maker education evaluation mechanism.

Hypothesis 9 (H9): Maker education management model and maker education evaluation mechanism play a chain intermediary role between maker education and children's innovation ability. The estimated results show that the intermediary effect is exist.

Table 2: The effects analysis.

Effects	Causes								
	CIA			MEM			MEEM		
	DE	IE	TE	DE	IE	TE	DE	IE	TE
ME	0.32	0.37	0.69	0.00	0.15	0.15	0.30	0.07	0.37
MEM	0.23	0.62	0.85	0.00	0.00	0.00	0.37	0.21	0.58
MEEM	0.32	0.37	0.69	0.00	0.16	0.16	0.00	0.00	0.00

From table 2 showed the effects decomposition between the independent variables in column and the dependent variables in row, the effects partition were as follow:

The effects of maker education on children's innovation ability the total effect was 0.69 could be partition to into direct effect=0.32, and indirect effect=0.37.

The effects of maker education on maker education management model the total effect was 0. 15 could be partition to into direct effect=0.15, and indirect effect=0.00.

The effects of maker education on maker education evaluation mechanism the total effect was 0.37 could be partition to into direct effect=0.30, and indirect effect=0.07.

The effects of maker education evaluation mechanism on children's innovation ability the total effect was 0.85 could be partition to into direct effect=0.23, and indirect effect=0.62.

The effects of maker education evaluation mechanism on maker education evaluation mechanism the total effect was 0.58 could be partition to into direct effect=0.37, and indirect effect=0.21.

The effects of maker education evaluation mechanism on children's innovation ability the total effect was 0.69 could be partition to into direct effect=0.32, and indirect effect=0.37.

The effects of maker education evaluation mechanism on maker education management model the total effect was 0.16 could be partition to into direct effect=0.00, and indirect effect=0.16.

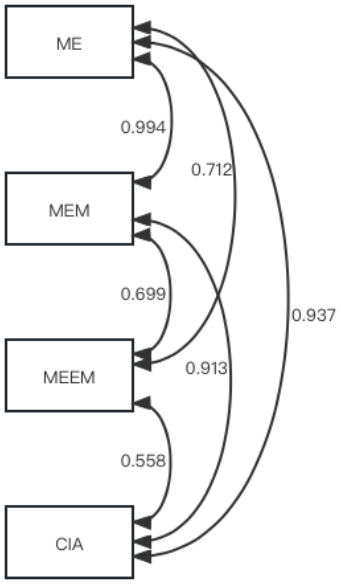

Figure 5: The correlation coefficient between dependent variable and all independent variables

Table 3: Inter correlation coefficient between variables.

Variables	ME	MEM	MEEM	CIA
ME	1.000			
MEM	0.994	1.000		
MEEM	0.712	0.699	1.000	
CIA	0.937	0.913	0.558	1.000

From Table 3 showed the correlation coefficients between variables, and the results were as followed:

There was a significant positive correlation between maker education and maker education management model, and the Pearson correlation coefficient was 0.994, indicating a strong correlation.

There was a significant positive correlation between maker education and maker education evaluation mechanism, and the Pearson correlation coefficient was 0.712, indicating a strong correlation.

There was a significant positive correlation between maker education and children's innovation ability, and the Pearson correlation coefficient was 0.937, indicating a strong correlation.

There was a significant positive correlation between maker education management model and maker education evaluation mechanism, and the Pearson correlation coefficient was 0.699, indicating a strong correlation.

There was a significant positive correlation between maker education management model and children's innovation ability, and the Pearson correlation coefficient was 0.913, indicating a strong correlation.

There was a significant positive correlation between maker education evaluation mechanism and children's innovation ability, and the Pearson correlation coefficient was 0.558, indicating a strong correlation.

Table 4: Direct effects, indirect effects, total effects, spurious effects and the correlation between children's innovation ability and the independent variables.

Independent variables	DE	IE	TE	Spurious	Pure	Square pure (%)
ME	0.32	0.37	0.69	0.028	0.937	55.809
MEM	0.23	0.62	0.85	0.446	0.913	63.728
MEEM	0.32	0.37	0.69	0.029	0.558	68.879

Note: Dependent variable is children's innovation ability

The Direct effects of independent variables maker education were 0.32, the indirect effects were 0.37, the Total effects were 0.69, and spurious Effects were 0.028. And the correlation between children's innovation ability and the independent variables were 0.937, Square pure were 55.809%.

The Direct effects of independent variables maker education management model were 0.23, the indirect effects were 0.62, the Total effects were 0.85, and spurious Effects were 0.446. And the correlation between children's innovation ability and the independent variables were 0.913, Square pure were 63.728%.

The Direct effects of independent variables maker education evaluation mechanism were 0.32, the indirect effects were 0.37, the Total effects were 0.69, and spurious Effects were 0.029. And the correlation between children's innovation ability and the independent variables were 0.823, Square pure were 68.879%.

Table 5: Summary of Hypothesis Test Results

Hypothesis	Results
H1:There were some positive relationships between maker education and children's innovation abilityt.	Yes
H2: There were some positive relationships between maker education management model and children's innovation ability.	Yes
H3: There were some positive relationships between maker education management model and children's innovation ability.	Yes
H4: Maker education management model plays an intermediary role between maker education and children's innovation ability.	Yes
H5: There were some positive relationships between maker education and maker education evaluation mechanism.	Yes
H6:There were some positive relationships between maker education evaluation mechanism and children's innovation ability.	Yes
H7: Maker education evaluation mechanism plays an intermediary role between maker education and children's innovation ability.	Yes
H8: Here were some positive relationships between maker education management model and maker education evaluation mechanism.	No
H9: Maker education management model and maker education evaluation mechanism play a chain intermediary role between maker education and children's innovation ability.	Yes

6. Discussion

There is a positive relationship between maker education and children's innovation ability, which can be verified by three components:

First, it can be seen from Table 4.6 that there is a positive correlation between maker education and children's innovation ability, and the estimated path coefficient is 1.221, which is statistically significant ($p \leq 0.01$). Therefore, this hypothesis is accepted.

Secondly, as can be seen from Table 4.7, based on the influence of maker education and children's innovation ability, the total influence is 0.85, which can be decomposed into direct effect =0.23 and indirect effect =0.62.

Third, it can be seen from Table 4.8 that there is a significant positive correlation between the maker education and children's innovation ability, with Pearson correlation coefficient of 0.937, indicating a strong correlation.

The results of this study are consistent with the findings of Wikipedia, who emphasized that maker education assists children to better understand people and things rooted in other disciplines, perspectives and cultures so they can communicate and work with one another while still maintain their own identities that help them to have better innovation ability.In addition, the findings are consistent with those of KennethCraik (Craik, 1940), J.P.Guilford (affiliations, First published November 1967), Christie (Christie,2019), Yanlu (Yanlu, 2019), Yingyi (Yingyi, 2020), Zhou (Zhou and Li) who have statistically investigated the relationship between maker education and children's innovation ability, respectively, and have achieved a more consistent view that the maker education has a significant positive correlation with children's innovation ability.

Based on the research objectives, the discussion will be presented as follows:

1. There is a positive correlation between maker education and children's innovation ability, which is verified by three components.

The results of this study are consistent with the findings of Yangfan (Yangfan,2015), who emphasized that maker education and children's innovation ability have a significant positive correlation. In addition, the findings are consistent with those of Yokanal (Yokanal[OL],2015), Zhang (Zhang Rui, 2015), Shen (Shen JingJie,2018), Li (Li Wangwei,2019), Minsheng (Minsheng, 1997), ShenJingJie&broughty, Yanlu (Yanlu,2019) who have statistically investigated the relationship between maker education and children's innovation ability, respectively, and have achieved a more consistent view that the maker education has a significant positive correlation with children's innovation ability.

2.There is a positive correlation between the influence of the maker education and maker education management model, which is verified by three components.

The results of this study are consistent with the findings of Yunfeng gao, who emphasized that maker education and maker education management model have a significant positive correlation. In practice, The integration of DIY Li Niang and information plan of maker education and rich cultural atmosphere can optimize the content and means of STEAM education of maker education mode, so that STEAM education can regain new vitality; On the other hand, the interdisciplinary comprehensive concept and project-based or problem-based teaching method of STEAM education make the maker activities more in line with the needs of school education and talent training, and make the goal, direction and implementation process of maker education clearer. In addition, the findings are consistent with those of Yakman (Yakman,2008), Lee (Lee, 2012), James,M. (James,M., 2015), Ge,X.,Ifenthaler,D., Spector,JM (Spector,JM,2015), Arifin (Arifin, N. and Mahmud,2021), Yunfeng gao,baoguo.who have statistically investigated the relationship between maker education and maker education management model, respectively, and have achieved a more consistent view that the maker education has a significant positive correlation with maker education management model.

3. Maker education management model plays an intermediary role between maker education and children's innovation ability. The estimated results show that the intermediary effect is exist. According to the previous analysis, maker education is a teaching concept aimed at cultivating students' creation and sharing, and maker education management mode, maker teaching tools, maker courses, and maker training teachers play a key role.

According to the analysis of KennethCraik (KennethCraik, 1940), J.P.Guilford (J.P.Guilford ,1967), Christie (Christie,2019), Wikipedia (Wikipedia,2020), Yakman (Yakman,2008), Lee (Lee, 2012), the maker education management model plays an intermediary role between maker education and children's innovation ability comes from the following aspects: Firstly, create teaching situation and stimulate innovative thinking through maker space and maker teaching AIDS. Secondly, Achieve your own creativity by doing it yourself. Thirdly, give play to the task-driven role and cultivate the sense of innovation. Fourthly, organize cooperation and interaction to cultivate innovation ability.

4. There is a positive correlation between maker education and maker education evaluation mechanism, which is verified by three components.

The results of this study are consistent with the findings of Yokanal (Yokanal[OL],2015), who emphasized that maker education and maker education evaluation mechanism have a

significant positive correlation. In addition, the findings are consistent with those of KennethCraik (KennethCraik, 1940), J.P.Guilford (J.P.Guilford ,1967), Christie (Christie,2019), Wikipedia (Wikipedia,2020), Zhang (Zhang Rui, 2015), Shen (Shen JingJie,2018), Li (Li Wangwei,2019) who have statistically investigated the relationship between maker education and maker education evaluation mechanism, respectively, and have achieved a more consistent view that the maker education has a significant positive correlation with maker education evaluation mechanism. Further, by integrating various studies, three influential evaluation methods have been formed for the relationship between maker education and maker education evaluation mechanism: In China, the three-level evaluation of innovative consciousness, innovative thinking and innovative ability proposed by Hogkekang is mainly adopted. In foreign countries, Yokana's design process, understanding, works, skills and concepts, habits of thinking, understanding and reflection, responsibility, effort and MRU (Miller River Union) are evaluated in five dimensions School) is represented by the evaluation of innovation and creation, critical thinking, collaboration.

5. There is a positive correlation between maker education evaluation mechanism and children’s innovation ability, which is verified by three components.

The results of this study are consistent with the findings of Shen (Shen JingJie,2018), who emphasized that maker education evaluation mechanism and children’s innovation ability have a significant positive correlation. In addition, the findings are consistent with those of Yakman (Yakman,2008), Lee (Lee, 2012), James,M. (James,M., 2015), Ge,X.,Ifenthaler,D, Arifin (Arifin, N. and Mahmud,2021) who have statistically investigated the relationship between maker education evaluation mechanism and children’s innovation ability respectively, and have achieved a more consistent view that the maker education evaluation mechanism has a significant positive correlation with children’s innovation ability. Specifically, the relationship between maker education evaluation mechanism and children’s innovation ability is expressed in the following categories: 1) Evaluation subject - Teaching evaluation should highlight the subject status of student evaluation. 2) Yokana evaluation gauge. 3) Evaluation content. 4) Evaluation process teaching evaluation adopts process evaluation and authenticity evaluation. 5) Evaluation objectives.

6. Maker education evaluation mechanism plays an intermediary role between maker education and children's innovation ability. The estimated results show that the intermediary effect is exist. According to the previous analysis, maker education is the cultivation goal of interdisciplinary authentic learning and evaluation focused on innovation.

According to the analysis of Spector,JM (Spector,JM,2015), Arifin (Arifin, N. and Mahmud,2021), Shen (Shen JingJie,2018) , Zhou,C.and Li,Y, the maker education evaluation mechanism plays an important role between maker education and children's innovation ability. Centered on interdisciplinary learning activities of maker education, it cooperates with professional institutions to carry out comprehensive learning of maker education and continuously improve it.

7. There was no relationship between maker education management model and maker education evaluation mechanism, verified with one components.

8. There is a positive correlation between the management model of maker education and the evaluation mechanism of maker education. The research results are closely related to Gao Yunfeng, Guo Baoguo, Yokanal (Yokanal[OL], 2015), Zhou, C. Et al. 's findings differ. Li,Y et al. believe that there is a positive correlation between the management model of maker education and the evaluation mechanism of maker education. According to the research of Wang Wei Li (2019), the core of STEAM teaching is the integration of interdisciplinary knowledge, understanding of phenomena and solving problems, which requires the establishment of a comprehensive learning evaluation mechanism. At the same time, transformational leaders in schools and communities lead the overall planning and design practice of STEAM integrated and integrated learning, which is of great significance for the development of STEAM creative learning and evaluation for students and teacher collaboration. Our findings suggest that schools and communities in Shenzhen may lack transformational leaders at present.

9. Maker education management model and maker education evaluation mechanism play a chain intermediary role between maker education and children's innovation ability. The estimated results show that the intermediary effect is exist.

According to the analysis of Yingyi (Yingyi,2020), Zhou,C.and Li,Y, the maker education management model and maker education evaluation mechanism play a chain intermediary role between maker education and children's innovation ability. The target of maker education is at a key stage that can stimulate curiosity and develop creativity. Paying attention to the cultivation of creative thinking not only contributes to the smooth progress of maker education, but also lays a foundation for the improvement of children's overall quality and their innovation ability.

7. Recommendations

Dissertation title was the influence of "The application of maker education in the cultivation of Children's innovation ability in Shenzhen", Research objectives were:(1) The influence of the education based on maker on the cultivation of children's innovation ability; and (2) To study the mediating relationship between Maker education management mode and maker education evaluation mechanism of intervention variables and children's innovation ability.The research methodology was mixed methodology, including qualitative and quantitative research. There were three processes of research which were research proposal preparation, research procedures, and research report. Details were as follows:

8. Conclusion

This study mainly adopts literature research method, investigation method, quantitative analysis method, comparative research method, post-explanatory text method and so on. This paper takes 8-9 year old primary school students in Shenzhen, Guangdong Province as the research object. In 2022, primary school students aged 8-9 and 30 primary school teachers were randomly selected from 15 schools in Shenzhen. The sample selection in this study adopts the polymorphic random sampling method. As the total sample, 15 primary schools will be randomly selected. The researchers used best design and empirical evidence to determine the sample size, which was about 303. In order to ensure the accuracy of exploratory factor analysis, the sample size was increased to about 330, and a total of 303 questionnaires were received, with a response rate of 95%. The researchers used two six-part questionnaires; The researchers used a six-part questionnaire; A: Measurement of variables of children's cognitive creative thinking ability (five-level scale), B: measurement of variables of children's cognitive problem solving ability (five-level scale), C: measurement of variables of children's cognitive creative thinking performance by Williams creative Tendency Scale (five-level scale), D: measurement of cognitive variables of teachers' teaching and learning makers (five-level scale), E: Measuring variables of the actual situation of teacher maker education (five-level scale). F: The measurement variables of maker education on students' innovation ability (five-level scale).

The instrument was developed by Step (1) as a questionnaire. Content validity and reliability were used to evaluate questionnaire quality. Content validity was tested by five experts and analyzed using project-to-objective consistency (IOC). Item value ≥0.60. For reliability, Cronbach alpha was analyzed in 0.80. Questionnaires were sent online, by mail and

by researchers. Demographic variables were analyzed by descriptive statistics. Frequency and percentage. Descriptive statistics were used to analyze the variables of maker education, teachers' teaching cognition, problem solving ability, innovative thinking and improving innovative ability. Mean, standard deviation (S.D.). Exploratory factor analysis (EFA) was used to analyze the components of all variables to reduce irrelevant variables. After data collection is completed, content analysis method is used to analyze the collected data.

The questionnaire uses Likert scale to measure and judge. The experts and scholars in the field are invited to review the completed questionnaire firstly, and gradually revised and improved. After that, Haiyun School in Baoan District of Shenzhen City was selected for a small scale pre-investigation. According to the feedback of the respondents, the questionnaire was modified again, and the formal questionnaire was finally determined. The questionnaire contained 6 variables and 111 measurements.

From the research objectives, major findings were revealed as follows:

1. There is a positive correlation between maker education and children's innovation ability training.

2. There is a positive correlation between maker education and the management model of maker education.

3. The educational management model of makers is positively correlated with children's innovation ability.

4. The management model of maker education play an intermediary role in the relationship between maker education and children's innovation ability.

5. There is a positive correlation between maker education and maker evaluation mechanism.

6. The evaluation mechanism of maker education is positively correlated with children's innovation ability.

7. The evaluation mechanism of maker education plays an intermediary role between maker education and children's innovation ability.

8. There is no positive relationship between the management model of maker education and the evaluation mechanism of maker education.

9. The management model of maker education and the evaluation mechanism of maker education play a chain intermediary role between maker education and children's innovation ability.

1. Recommendation for Policies Formulation

The factors affecting the formation of children's innovative ability are complex, including the influence of external conditions such as social background, school education, and family environment, as well as the influence of individual differences among students. Based on the concept of maker education, this study verifies its influence on children's innovation ability through empirical research, aiming to promote the reform of school maker education and build a school maker system. Establish a long-term mechanism for cultivating children's innovative ability.

First, advocate case teaching and encourage re-creation. Case imitation and exploration is a main way to develop maker education. Cases combine knowledge and skills, permeate the methods and processes of dealing with practical problems, and lay the foundation for the implementation of the exploration and training mode of maker practice for primary and middle school students. In case teaching, in addition to imitating, it is also necessary to actively promote the re-creation of interactive media for primary and middle school students, and actively use effective and scientific new teaching methods of maker education to promote the development from generalization to individualization. In terms of the interactivity, form of expression, and extended functions of the work, it can guide primary and middle school students to put it into practice. Under the concept of "computing participation", "re-creation" is an important practical method. Standardization, as a reliable and verifiable effective scientific tool, can help primary and middle school students to continuously accumulate innovative experience in the design process, and lay a foundation for higher education in the future. Layered innovative design lays the foundation.

Second, follow the standardization of teaching models to create a maker education environment. In recent years, as the country calls for quality education, maker education has emerged as the times require, and has been continuously applied in education and teaching. The maker education environment can continuously improve the maker education system and pay attention to the independent personality development of primary and middle school students. In the context of standardization, it is necessary to establish a "maker-oriented" educational concept, strengthen the standardization of educational concepts, follow the basic principles of teaching model standardization, implement the content determined by the teaching model standard into daily teaching work, and optimize the maker experience of primary and middle school students. The course incorporates Maker courses into the daily teaching plans of primary and middle school students, and according to the actual

development of primary and middle school students, extends the content of Maker courses, sublimates Maker education, and creates a multi-dimensional learning environment. Publish examples of outstanding students through the school's publicity website to improve the student's incentive system. Continuously expand the breadth and depth of students' maker knowledge, maximize students' enthusiasm for learning, stimulate students' personality growth, and create a good and harmonious environment for schools to carry out maker education.

2. Recommendation for Practical Application

1) Improve the quality of subject teachers. Integrating maker education in subject teaching requires teachers to have both subject expertise and maker concepts.

2) Optimize the teaching mode. The integration of subject education and maker education needs to change the way of learning, and find the starting point, entry point and main methodology of the integration of the two through project-based learning, STEAM learning, design-based learning, etc., so as to realize the deep integration and development of the two.

3) Carry out various practical activities. Club activities in primary and secondary schools can cultivate students' innovative spirit and practical ability, and promote their all-round development.

4) Innovative teaching evaluation methods. Traditional subject evaluation is a single evaluation that focuses on "double bases", which is difficult to adapt to the integrated development of subject education and maker education, and needs to be innovated.

3. Expectation

We all know that talent is an important driving force for social development and progress, and talent training must be based on social needs, must serve for the purpose of society. Educational management is an important component of campus region and a key link of talent training. The efficient educational management mode can improve the teaching quality and promote the process of education. In this paper, the advantages of the maker course have been expounded and demonstrated. If the maker course can be popularized or even added to the primary school campus in Shenzhen, the significance will be obvious to all. Here we need to formulate the management mode of maker education, that is to say, when the maker education can enter the school district, our education management mode. Foreign scholars continue to explore educational management and put forward a variety of management models. Therefore, it is very necessary to learn from foreign educational

management models to guide Shenzhen primary school districts (7-8 years old) to develop their educational management towards the international direction and improve the level of educational management.

1. Hardware management mode

2.Cultural model

3.People-oriented model

4.Pay more attention to students

5.Establish a sound educational management mechanism

6 Parallel management of class characteristics

Maker education plays a positive and huge role in promoting the creative thinking of Shenzhen children. From the micro perspective, from the perspective of individuals, maker education shoulders the enlightenment role in people's childhood. It is not used for conventional enlightenment, and its influence can run through people's life. From a macro point of view, the emergence and wide application of maker education plays a huge role in the future of China. As a Chinese saying goes, "If the young are strong, the country will be strong." How to strengthen the country? Going back to the source, talent is the most important resource. Looking at the modern history of China, we can no longer tell the truth that only with rich thoughts can we create an interesting soul. Creative thinking can make the future full of more possibilities. Therefore, this paper is not only limited to proving a theory, but also stands on a macro perspective and takes the responsibility and responsibility of an educator as the mission, hoping that maker education can be better applied to every educational institution in China.

All the issues listed above, the author will continue to pay attention to in the follow-up.

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