

Thinking About Maker Education Under the Situation of Transformation and Development

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Abstract. Today education of maker has been a hot global topic. It attracts wide attention from all over the world since it has been put forward. How to develop maker education under the situation of transformation is a question. The paper discussed this question from the following aspects: origin, the concept of maker, development status, development strategy, and so on. Paper put forward its own point of view about maker education.

Introduction

In recent years, "Maker" and "maker action" have gradually become a hot spot of global concern. According to the famous "Maker Faire" official website, about 215 thousand people took part in Maker Faire hosted at Bay area and New York in 2014. In the same year, 119 independent Maker Faire were held in the world, including Tokyo, Italy, Rome, Japan, Norway and China. USA regards himself as "A Nation of Makers". In June of 2014, the White House Maker Faire was held in White House. In his speech, President Obama pointed out that "the United States should stick to a path of discovery, experiment and innovation. Innovation is not only an important symbol of human progress, but also a standard for national progress. He called for that it should release the American people's imagination, ensure that the United States is a country of creators and the next generation technology revolution takes place in the United States. He stressed that the students should be makers of things, which are not only just consumers of things.

The Concept of Maker Education

Maker. Maker is a new term. Maker generally is regarded as a special man who tries to change ideas into realities by the technology of 3D and other kinds of hardwares. His goal is nonprofit. Maker Innovation is the kernel theory of maker. People generally think of makers are people who do not make profit - oriented, use 3D printing technology and all kinds of open source hardware, and try to turn all kinds of ideas into reality. Maker takes innovation as the core concept, is keen on creativity, design and manufacture, and has the will, vitality, enthusiasm and ability for himself. It also creates a better life for all mankind [2]. The role of a creator can be divided into the creative (the spirit of the creation), the designer (the wizard in the creation) and the executor (the swordsman in the creation).

Maker Education. There is not a definite definition for maker education. Professor Zhu Zhiting believes that in a broad sense, maker education should be a form of education oriented by cultivating the spirit of mass creation. In a narrow sense, maker education should be an educational mode oriented to cultivate learners, especially young learners[3]. Xie Zuoru and Wu Junjie and some other educators redefined the maker education at the first meeting of the Committee of experts on maker education in 2016. They gave a concept that maker education is the combination of maker culture and education. It adopts the method of object learning based on students' interesting by digital tools. It advocates creation and encourages sharing. It aims at cultivating the interdisciplinary problem solving ability, teamwork ability and innovation ability. It is a competence Education[4]. Maker education is the transformation based on scientific and technological education, innovative education and STEAM education. It is a new mode of education based on the creation of maker space after the maker movement. From this, it seems more abundant and more extensive. Maker education can create

maker space, promote maker learning, cultivate culture and spirit, cultivate talents, promote maker movement and enhance maker accomplishment. At the same time it promotes the development of students and promote education reform, foster innovation culture.

The Relationship of Maker Education and STEAM. There is a close connection between maker education and STEAM Education. STEAM education, which focuses on hands-on experience, comes from American creation. A lot of "maker centers" have been established, and STEAM education has emerged at the same time. More and more children are also involved in the ranks of maker. Based on project and problem learning, they practice and explore, do in playing, learn in doing, do in learning and create in doing. Both of them emphasize interdisciplinary learning (transboundary), pay attention to hands-on, practice and the process. On the other hand there is also difference between them. Course is the kernel of STEAM. Learning based on project is the major method of STEAM. However, maker education is presented in the form of activities. Its object is to cultivate students' creative ability, not only for the STEAM curriculum project learning. It is a kind of maker learning based on active exploration, practical, innovative design, cross-border integration, problem oriented in maker space. Maker education emphasizes on cultivating the students' innovation ability. Makers practice in the course and innovate in the activities. It integrates doing, learning, creation.

Development of Maker Education

Abroad. In recent years, "Maker" and "maker action" have gradually become a hot spot of global concern. According to the famous "Maker Faire" official website, about 215 thousand people took part in Maker Faire hosted at Bay area and New York in 2014. In the same year, 119 independent Maker Faire were held in the world, including Tokyo, Italy, Rome, Japan, Norway and China. USA regards himself as "A Nation of Makers". In June of 2014, the White House Maker Faire was held in White House. In his speech, President Obama pointed out that "the United States should stick to a path of discovery, experiment and innovation. Innovation is not only an important symbol of human progress, but also a standard for national progress. "He called for that it should release the American people's imagination, ensure that the United States is a country of creators and the next generation technology revolution takes place in the United States. He stressed that the students should be makers of things, which are not only just consumers of things.

In China. The development of domestic creation can be divided into three processes: introduction exploration, popular outbreak and rational development. The first period is introduction exploration. In our country, Li Dawei was known as the "father of Chinese culture of maker", and in 2010, the first Chinese new maker space "new workshop" was built in Shanghai. In 2011, Beijing held a "open source software week " and Shenzhen held Maker Faire. Then Shanghai and Beijing were held "maker carnival" activities. The second period is popular outbreak. Since Prime Minister Li Keqiang put forward in the 2015 government work report, let many makers stand out. When he inspected Shenzhen firewood maker space, he also pointed out that let many makers create free business and become a business. In recent years, the increasing enthusiasm for maker movements has also gradually aroused the thinking and resonance of the educational circles. The third period is rational development. In this period, it should also cause people's rational thinking at the backside of maker education and STEAM education. Will maker education and STEAM education be also in the concept of stir fry? Is it that many people are following in mind? Now maker movement is trickling down the earth. Maker education has gradually entered the school, gradually emerged a group engaged in creating education hit off, the establishment of a variety of distinctive makerspace. Makers consolidate and upgrade current knowledge through hands-on, inquiry learning activities, experience, creative design and finally achieve the goal which is learning in doing and creating in learning.

Concrete Measures to Carry Out Maker Education

Creating a School Robot Maker Space. Create a robot maker space oriented all teachers and students in the university. It provides a foundation platform for college students and the maker. It promotes the combination of higher education and science, technology, economy and society together. It also speeds up the cultivation of innovative and entrepreneurial talents with large scale, innovative spirit, and courage to devote themselves into practice. At the same time, it combines with various departments specialized courses teaching, strengthens the students' engineering quality training, pays attention to students' professional skills, practical ability and innovative thinking ability training, actively explores the teaching mode of STEAM in the application of practical teaching in our school, provide students with good maker platform and atmosphere.

Reforming Teaching Methods and Cultivating Students' Consciousness of Innovation and Design. Adopting "project teaching" mode to carry out innovative teaching in the teaching process, teachers make bold teaching plans and schedules. Students train by themselves. Teachers give some proper counseling and basic knowledge training. Teachers promote the students' professional quality through solving practical problems, guiding students to study basic knowledge, combining theory and practice. We can provide the necessary conditions for college graduation design, students' science and technology activities, innovative research projects. The robot with its advanced technology, comprehensive, development, practice and innovation training becomes interesting and comprehensive platform. College science and technology innovation based on robot is propitious to cultivate students' abilities of practice and innovation, self-learning ability, cooperation ability. We create suitable for our school practical talents training atmosphere and mode by introduction of advanced robot equipment and equipment based STEM personnel training system and project teaching method. It improves our school students' comprehensive engineering ability, innovation and entrepreneurship consciousness.

Promoting Innovation, Scientific Research, Learning and Training by Competition. With the development of intelligent technology, the concept of education is constantly updated. The technology of robot, as a comprehensive information technology, electronic engineering, mechanical engineering, control theory, sensor technology, artificial intelligence and other cutting-edge technology, contributes to the education reform. In order to promote the development of robot technology, the cultivation of students' innovative ability in the world, a series of successive robot contest is carried within the scope of the world, such as: RoboCup, Chinese robot contest, China University Robot contest. "To promote innovation by competition." Robot contest has a lot characters. Such as funny, appreciation, popular science. It provides a big platform for college students to display their abilities. It also provides a full stage for them to display scientific and technological thought and action. It cultivates their practical abilities, team cooperation abilities, improves innovation abilities to fully implement the central "science and education" strategy. Robot contest is the "education" strategy embodied and innovative initiatives. It has become a good stage to stimulate students' interest in learning, guide them to actively explore the unknown, and participate in international activities of science and technology.

Training the Teachers for the Teenagers and Serving the Society. Now many large and medium-sized cities, primary and secondary schools have opened robot maker space, and various social training institutions have also opened a large number of robot learning classes, interest classes, and badly need professional talents who know technology and understand teaching. In Baicheng, primary and middle school students is still out of reach of the robot, too profound to be understood of high-tech products. Maker teachers can be cultivated through the construction of robot maker space, which combined with the advantage of Teachers College, teachers and students in school organizations. Robot teaching resources are developed. At the same time, the maker space can instruct the information technology teachers in primary and middle school to carry out robot teaching. The maker space will assume the responsibility of the institutions of higher learning to serve the society.

Incubating the Entrepreneurial Atmosphere and Incubating the Industrial Project of the Robot. Combination with social needs, we should carry out robot application innovation. We should fully develop the creative thinking of teachers and students, and solve the actual needs of all sectors of the society as the starting point, and carry out robot application innovation. The robot echelon personnel training combined with the industrialization project in-depth research. Through the construction of the robot training room, it trains a group of professional talents in the field of robotics, artificial intelligence, automatic control and other fields, combined with the demand of industrialization. It can carry out in-depth scientific research projects.

Summary

The implementation of maker education promotes innovation of students, colleges, universities, country and social. It has its important practical significance and practical value. But because it is a new education method depending heavily on technology development and application, which directly relates with the community creation and production. It is also faced with the a series of problems to be solved. It need explore in practice.

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