

How to Integrate Traditional Culture into STEM Teaching

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Abstract: *STEM education (Science, Technology, Engineering and Mathematics) has become a hot topic in education today. Its goal is to bring students into a more practical and complete approach to learning by focusing on practical, real-world problems, real-life situations, and applying knowledge to solve real-world problems. The transplantation of traditional culture plays a key role in STEM education. This paper will focus on how to integrate traditional culture with STEM education and why this is an excellent approach to education.*

Keywords: *STEM Education; Traditional Culture*

1. Introduction

In today's fast-changing world, STEM has become a global consensus educational philosophy that encompasses science, technology, engineering, and mathematics and aims at cultivate students' practical skills and innovative thinking. However, traditional culture is also our precious treasure, and its rich connotation and profound wisdom are important for deepening STEM education and promoting innovative development. Therefore, integrating traditional culture into STEM education has become an important task before us.

2. STEM Philosophy

STEM concept, which stands for Science, Technology, Engineering and Mathematics, is an interdisciplinary approach to education that aims at at developing students' innovation, problem-solving and teamwork skills through practice, inquiry and solving real-world problems, helping them to master applied technology and problem-solving skills in a hands-on manner. For example, designing a simple circuit, building a small robot, or even building a functioning small airplane. Students learn how to apply theoretical knowledge to real life by participating in hands-on activities to enhance teamwork, problem-solving and creativity skills, etc. This can enhance students' interest in learning and creativity.

STEM teaching focuses on student interaction and cooperative learning, emphasizes hands-on operations and experimental investigations, and promotes the development of students' innovation, thinking and practical skills through a variety of educational methods and approaches [1].

The concept of STEM education was introduced to meet the challenges brought by the knowledge economy in the 21st century. The rapid development of modern technology has led to the emergence of new needs in the profession, and yes, STEM education has become the most popular direction of education.STEM education allows students to learn knowledge and skills in an interactive and hands-on environment, developing their problem-solving thinking skills and competitiveness.

Notably, in the practice of STEM education, encouraging girls to participate in fields such as science, technology, engineering, and mathematics feels particularly important, as science and technology fields are often considered male occupations and STEM education can help girls break gender stereotypes and inequalities and achieve self-development.

In summary, STEM education is an educational philosophy that covers four fields and aims at empower students with knowledge in each area and interdisciplinary problem-solving skills to meet the needs of the future workplace and to develop study habits and creativity.

3. Why there is a need to integrate traditional culture into STEM education

STEM education is a new type of education that focuses on the fields of science, technology, engineering and mathematics. Countries are actively promoting STEM education. However, while promoting STEM education, the advantages of combining culture and STEM education should be considered for maximum value. The organic integration of traditional culture and STEM education can open up more dimensions for students' paths of inquiry, which is why we should integrate traditional culture into STEM education.

Traditional culture refers to various cultural achievements that have been developed, accumulated and inherited by national culture rooted in social life since ancient times, including cultural accumulation, historical culture, artistic culture, scientific and technological culture, etc. Traditional culture contains profound ideas, wisdom and values, and is a kind of the spiritual wealth of the country and the nation. Traditional culture is the source of people's understanding of the world, perception of life, shaping of self, expression of emotions, and concern for spirituality, etc. It has an intricate relationship with STEM and can be used to achieve the values and basic goals of STEM education.

Integrating traditional culture into STEM education is essential because traditional culture is the spiritual wealth of our nation, representing not only our nation's cultural heritage, but also the philosophy and wisdom that guides our people to the right way of life. STEM education is an important curriculum system in modern education that aims to teach a variety of knowledge and applied skills in science, technology, engineering, and mathematics. Integrating traditional culture into STEM education can help students better understand and apply these knowledge and skills. By incorporating traditional cultural elements into the STEM curriculum to enrich the teaching and learning content to help students better understand and appreciate traditional cultural values, while increasing the fun and appeal of STEM teaching and learning, it promotes students' overall development and personal qualities. At the same time, incorporating the wisdom and concepts of traditional culture can help students better understand the meaning and value of science and technology and improve their sense of social responsibility and cultural literacy. This helps to form a globally competitive pool of talented people and to pass on and promote the excellent traditional culture of the Chinese nation[2].

In short, the organic combination of traditional culture and STEM education can make education more intelligent, deeper and thicker, not only advocate "national education", but also gather the essence of life, so that students can benefit for life. Such an educational approach is the future trend of STEM education, and it is also one of the important ways to promote the excellent Chinese traditional culture.

4. The connection between traditional culture and STEM education

Traditional culture and STEM education are two very different concepts; STEM education focuses on knowledge and skills in science, technology, engineering, and mathematics, while traditional culture emphasizes values, beliefs, literature, arts, and humanities. Although they are different, their integration can lead to a richer and more holistic education for students [3].

The connection between traditional culture and STEM education is not direct. Some students may think that they are not connected, but in modern society, there are inextricable links between traditional culture and STEM education.

First, traditional culture provides a lot of valuable materials for STEM education. Traditional crafts such as weaving, knitting, casting, and ceramics cannot be replaced even by modern technology. These skills are beautiful and exquisite, and contain infinite wisdom and aesthetics, which provides the basis and inspiration for STEM education in practice. For example, the Chinese abacus, ancient geodesics, Japanese origami, etc. Through the understanding of traditional culture, students can inspire their creativity and enhance their practical skills and divergent thinking ability.

Secondly, the connotation of traditional culture is also a good match for STEM education. STEM education is also about problem solving, so learning about traditional culture can help students develop their thinking, logic and innovation skills. Learning about traditional culture and understanding the wisdom of those who came before us can help students explore new areas of knowledge, which is one of the core elements of STEM education.

Finally, behind the promotion of traditional culture is the love and aspiration for nature and the crystallization of human wisdom. This is also closely related to STEM education, which cultivates children's ability to explore, practice, and create, allowing them to think and explore repeatedly as they

learn about nature and respond to social issues. The spirit and methods embedded in traditional culture is the very philosophy and connotation of STEM education.

In today's rapidly developing world, traditional culture is the anchor of people's hearts and minds and an important foundation for STEM education. Traditional culture has a special value for the development of STEM education that distinguishes it from other cultures. By studying traditional culture in depth to discover the deeper connection and inspiration, we can help STEM education better achieve its set goals.

In summary, although traditional culture and STEM education may seem different, there is a real connection between the two. Integrating traditional culture and STEM education in education can provide students with more comprehensive and diverse content and a broader range of skills and knowledge for their future careers.

5. The path of integrating traditional culture into STEM teaching

Integrating traditional culture into STEM instruction can help students better understand and appreciate traditional cultural values while increasing the fun and appeal of STEM instruction. Integrating traditional Chinese culture with STEM concepts can be considered in the following ways.

5.1 Links between scientific and technological inventions and traditional culture.

There is an inextricable link between scientific and technological inventions and traditional culture. Although the purpose of scientific and technological inventions is to promote the progress and development of human society, the inspiration and ideas of many scientific and technological inventions originate from traditional culture, while traditional culture also provides valuable historical and cultural resources for scientific and technological inventions.

Students will learn about the relationship between culture and technology, recognize the importance of traditional culture, and understand the use and development of ancient technology in the modern technological field. An example is the history of Chinese characters and the abacus. Students will learn to use the abacus and explore the fun in mathematics made up of Chinese characters. They will also learn about chemical reactions and thermodynamic principles through the process of making traditional Chinese pastries. In addition to this traditional culture has stories related to technological inventions such as the invention of gunpowder, the compass, printing, etc. These can be used to stimulate students' interest in learning about STEM, while students can gain a deeper understanding of the scientific principles and technology of these inventions through the STEM approach to learning. This is one way to integrate traditional culture in STEM courses, which can be learned through group discussions, demonstrations and experiments[4].

The intermingling of scientific and technological inventions and traditional culture can not only promote the inheritance and innovation of traditional culture, but also promote the development and innovation of scientific and technological inventions.

In a word, the connection between scientific and technological inventions and traditional culture is inseparable. As the spiritual wealth of a nation, traditional culture provides rich historical and cultural resources for scientific and technological inventions, and is also an important source of scientific and technological inventions. Therefore, we should better explore the achievements of scientific and technological inventions in traditional culture, promote the inheritance and innovation of traditional culture, and provide a richer and more valuable historical and cultural foundation for the development and innovation of scientific and technological inventions.

5.2 Application of traditional process and STEM technology

Traditional craft is a craft that has been passed down for centuries. Traditional crafts have their own unique characteristics and advantages, and they are a cultural treasure formed by virtue of historical and cultural backgrounds, through repeated practice and inheritance. Many of the techniques and crafts in traditional crafts are irreplaceable, and these crafts are also widely used in modern production. For example, traditional crafts such as weaving, knitting, carving, ceramics, and lacquerware are all important components of modern design and manufacturing.

We should better explore the techniques and crafts in traditional crafts and promote the inheritance

and innovation of traditional crafts, and we should also strengthen the application and development of STEM technologies and improve the application level and innovation ability of STEM technologies, so as to better promote the development and upgrade of modern industry. The following are some examples of specific applications of combining traditional crafts and STEM technologies:

Using STEM technology to automate traditional manual manufacturing processes, thus improving production efficiency and production quality. For example, in the textile industry, automated equipment such as smart weaving machines can be used to automate the manual weaving process, thereby improving the productivity and quality of textiles.

Using STEM technology, the traditional manual manufacturing process can be digitally designed and manufactured, thus improving production efficiency and production quality. For example, in the ceramic manufacturing industry, 3D printing technology can be used to digitally design and manufacture, thus improving the production efficiency and quality of ceramic products.

Using STEM technology, traditional craftsmanship and modern design can be combined to create more artistic and fashionable works. For example, in the lacquer manufacturing industry, traditional lacquer craftsmanship and modern design concepts can be combined to create more fashionable and artistic lacquerware products.

Use STEM technology to preserve and inherit traditional crafts. For example, in the field of cultural relics conservation, 3D scanning technology can be used to digitally protect cultural relics so as to better protect and inherit traditional crafts.

To sum up, the combination between traditional crafts and STEM technologies can achieve innovation and efficiency in many aspects. We should strengthen the research and development of traditional crafts and STEM technologies, and better explore and apply the connections and commonalities between them, so as to promote the development and innovation of modern industry.

5.3 The balance of scientific and technological innovation and cultural heritage

With the continuous development and innovation of technology, our life has become more and more convenient and efficient, and people's living standard has also been greatly improved. However, the problems brought by technological development are also becoming more and more obvious, such as the rapid updating and obsolescence of technology leading to the waste of resources, the digital lifestyle making people more and more alienated from the real world, and also bringing problems in cultural inheritance. Therefore, how to strike a balance between technological innovation and cultural inheritance has become an important issue.

5.3.1 Technological innovation should try to avoid destroying cultural heritage

The design and promotion of technology products need to take into account the characteristics and traditions of local culture and avoid destroying or misinterpreting traditional culture. For example, artificial intelligence and virtual reality technologies can be used to recreate historical scenes and cultural heritage in order to better transmit and promote culture. Meanwhile, digital technology can also be used to collect and preserve traditional culture, such as digital archives and documents collection and arrangement, which is conducive to better preservation and inheritance of culture.

5.3.2 Scientific and technological innovation can be promoted and applied with the help of cultural heritage

Cultural heritage can provide sources and inspiration for science and technology innovation, for example, traditional handicrafts can provide inspiration for industrial design, while ancient literature can provide material for science fiction. In addition, traditional culture can also provide the basis and background for the promotion of science and technology products, for example, the integration of traditional cultural elements can add cultural connotation to the products, making them more easily accepted and loved by consumers.

5.3.3 Scientific and technological innovation and cultural heritage should promote and support each other

Technological innovation can provide new means and methods for cultural inheritance, such as virtual reality technology can provide a better way for the protection and inheritance of cultural heritage. And cultural heritage can also provide feedback and support for scientific and technological innovation, for example, the protection of local traditional culture can provide help for the promotion

of technological products in the local market.

Science and technology innovation and cultural heritage are interdependent, and they should promote and support each other in a balance. Science and technology innovation need to follow local cultural traditions and characteristics to avoid destroying traditional culture, and at the same time, traditional culture can be used to promote and apply new technologies. Cultural heritage can provide the source and inspiration for science and technology innovation, and at the same time provide the basis and background for the promotion of science and technology products, while also providing feedback and support for science and technology innovation. In practice, the government, enterprises and society should work together to develop appropriate policies and measures to strengthen cooperation and communication between scientific and technological innovation and cultural heritage, and provide support and guarantee to achieve a balance between scientific and technological innovation and cultural heritage.

First, the government can improve the influence and capacity of cultural heritage by funding and supporting cultural heritage. For example, the government can fund the preservation and restoration of cultural heritage, support the transmission and promotion of traditional handicrafts, and encourage the creation and development of traditional arts such as literature, music, and dance. At the same time, the government can also strengthen cooperation with science and technology enterprises to promote the combination of scientific and technological innovation and cultural heritage, and improve the technological content and competitiveness of cultural industries.

Second, enterprises can give unique cultural connotations to science and technology products by integrating traditional cultural elements. For example, enterprises can develop games, software, music and other products that integrate traditional cultural elements to provide consumers with products that have more cultural value and meaning. At the same time, enterprises can also develop technology products for cultural inheritance, such as restoring historical scenes and cultural heritage with virtual reality technology to provide a better way to protect and pass on cultural heritage.

Finally, society should strengthen its attention to and support for technological innovation and cultural heritage. For example, the public can understand and learn about traditional culture by visiting museums, cultural sites, and exhibitions of traditional handicrafts, as well as support the cultural innovation of enterprises by purchasing and using products that incorporate traditional cultural elements. In addition, society should also pay attention to the development in the field of cultural heritage and technological innovation, actively participate in related activities and discussions, and promote the cooperation and exchange between technological innovation and cultural heritage.

To sum up, the balance between scientific and technological innovation and cultural heritage is a long-term and complex process that requires the joint efforts of government, enterprises and society. In practice, we should focus on the combination of scientific and technological innovation and cultural heritage to avoid the destruction and misinterpretation of traditional culture, and also make full use of the resources and values of traditional culture to provide the source and inspiration for scientific and technological innovation. Only in the balance of scientific and technological innovation and cultural heritage can we better promote the development and progress of society and create a better future.

5.4 Combination of Gamified STEM Mode and Traditional Culture

To enhance the fun of education, STEM models can be gamified to allow students to experience traditional culture as they conduct their STEM curriculum exploration. For example, in a collaborative multi-player game, the concept of traditional culture is integrated with limited material resources to enhance teamwork to advance the progress of practical research. Integrating traditional culture in the STEM model is an educational approach to help students integrate their knowledge structures, understand the historical evolution of cultural backgrounds and technological applications, better understand the historical process of advancing human civilization, and enhance their scientific and cultural literacy and moral character[5].

6. Conclusion

In summary, the integration of traditional culture into STEM model teaching helps students deepen their understanding of both scientific and technological knowledge and the history of human civilization development. Building on the accumulation and development of traditional culture, exploring and developing it in conjunction with STEM teaching can improve students' overall quality

and deepen their understanding and memory of Chinese culture. It also helps students understand the nature of culture and the importance of cultural progress in a more comprehensive way, promoting STEM to take root as it continues to progress.

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