

# Research on 3D Technology in The Field of Education

-- How to Make up for The Shortcomings of Traditional Education

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**Abstract:** With the continuous development of science and technology, the continuous innovation of network and digital electronic culture has brought a huge impact on the traditional book culture, which makes the educational means and classroom mode in the field of education constantly change, and the future classroom will be more scientific and technological. Among them, 3D holographic projection is an embodiment. With the improvement of teaching requirements, 3D holographic projection technology will one day replace today's ordinary projector into the classroom and into the classroom, giving students strong visual shock and wonderful classroom effects.

**Keywords:** 3D technology, Holographic projection, Education model, Classroom education, Traditional education, Educational reform, Information data.

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## 1. Introduction

### 1.1. Research background of 3D holographic technology

Human eyes can see the world in the third dimension. With the gradual improvement of naked eye 3D technology and projection technology, people are no longer satisfied with capturing the picture in front of them. A kind of ubiquitous photo extraction projection technology emerges, which is 3D holographic projection technology. By using the external interference of laser and physical beam, with the help of air or particle dust as the propagation medium, the amplitude and phase of each point on the object light wave are disrupted to reproduce the specific scene of three-dimensional space.[1]

The emergence of 3D holographic technology aims to provide users with higher quality and high satisfaction service experience. The previous problems include: limited projection perspective, poor sound effect, and limited projection effect by the surrounding environment. Holographic projection starts from the problem and uses science and technology to make up for the deficiency of environmental conditions. The development of holographic technology in this process mainly appeared abroad. Hungarian scientist Gable once thought of using mercury lamp to record while disturbing light waves, but due to the scientific and technological conditions at that time, the recording effect was not ideal. Later, American scientists Les Benton used side-view radar and incandescent lamp respectively to improve the image quality of holographic projection step by step, making the technology really formed. In the following decades, with the continuous improvement of the accuracy of recording tools and the emergence of a large number of photographic interactive tools, the recording of holographic projection has been transformed from paper to electronic and information technology, which reduces the projection deviation and improves the quality of projection.

### 1.2. Research status of holographic projection technology

One of the most realistic and straightforward ways to measure the gold content of a technology is to look at how it works. Most technophiles and fans remember the technology in tech movies, with its steady images in the air, crisp sound, and high-braking touch mechanisms that slide like electronic screens, such as the hologram of an amusement park in the Iron Man movie. Good interaction function depends on stable transmission medium. In recent years, Chad. Dyne, a graduate student from Massachusetts Institute of Technology, has completed interactive projection imaging with high stability by means of airflow wall, which can be regarded as a milestone innovation of this technology in the leap to the future.

In addition, there are also scientific molecular achievements from Japan, the United Kingdom, Germany and other countries, which rely on the medium with high stability to achieve the effect of transient image in the air. In contrast, Chad. Dyne's research results temporarily reached a certain height, representing the height of 3D holographic projection technology, and no one broke it temporarily in the short term. [2]

However, this technology in our country is mainly used for artistic performance, exhibition and other functions, so there are some problems in the research direction and depth, and the foundation is relatively weak. There is still a certain gap between the projection of photos and real objects in dim light places and the holographic projection technology with high gold content.

## 2. Research Significance and Social Welfare

Portable image technology and interactive characteristics, greatly facilitate our military engineering, teaching documents, medical materials, to a certain extent, can effectively replace the original instruments, in the production cost and use of power has a great degree of improvement. In

addition, its efficient imaging, stable audio transmission effect, can solve many problems that could not be solved before. For example, in the military industry, it can simulate the sand table battlefield completely, clearly list the possible battlefield conditions, and simulate the weather conditions in the future for a period of time. Thus greatly improve the efficiency of march battle, increase the possibility of victory, reduce the soldiers' casualties.

Social welfare, mainly divided into education and entertainment two parts. In terms of entertainment, this high-tech projection technology facilitates the broadcast of network media, and has a great innovation in the broadcast form to meet the needs of the masses for authentic experience and sound and light effect. In the aspect of education, holographic projection is undoubtedly an upgrade of the previous simple projection instrument. Students can have a more three-dimensional and comprehensive understanding of the teaching objectives in class. Later, with the continuous improvement of technology, the decrease of production costs, and the continuous opening of the education system, everything in class has the opportunity to be transformed into the world of 3D holographic projection. Creating an interactive educational paradise.[3]

### **3. Basic Model and Reality Construction**

#### **3.1. Realistic model of holographic projection technology**

3D holographic projection technology has already entered our life, in our country, cinemas, museums, artistic performances and other forms of the stage common shadow of this kind of technology. The more famous ones are holographic runway performances, concert projection choruses and cultural relics display in museums. In the case that the original works are not convenient to be displayed, holographic projection which can be interactive and perfect reproduction naturally becomes the best substitute. [4]

However, from the perspective of technological depth and technology, these so-called projection technologies are fundamentally different from those in western countries, and the places where this technology is applied are also very different from high-tech sites. We should not be satisfied with the entertainment effect, we should make this technology bigger and stronger, put into education, medicine, military, national defense and other profound significance. A major breakthrough in technology will inevitably promote the great development of the society. In terms of the degree of social welfare, education is undoubtedly the most far-reaching and social service of the great project!

#### **3.2. Domestic technology development status and application**

Since its birth, 3D holographic projection technology has overcome the fatal forming conditions such as poor imaging effect, difficult recording and lack of stable media. Today in the 21st century, although relatively stable holographic projection has been born, it cannot fully meet the requirements of high conditions for practical application. Holographic projection technology urgently needs to break the ice, break the barriers of reality, and put into large-scale industrial manufacturing as soon as possible.

Cost and quality have become two of the biggest problems in getting technology to break the ice. Cost is related to

whether the technology can be promoted in a large scale and benefit more people. Quality really affects the final results of technology, which is the top priority. At present, the biggest technical challenge facing 3D holographic technology is that there are still major problems in the imaging effect, which need to be improved by new technology in the aspects of effect quality, color, temperature difference, image quality and so on. The two seem to have little to do with each other. In fact, there are checks and balances between them, and high quality results inevitably involve high costs.

In the educational enterprise at home and abroad, some holographic projection equipment is equipped to assist the classroom teaching to varying degrees. The domestic teaching is limited by the basic education system and the large population base of education, so there are some problems in the allocation of resources. An excellent case in this respect comes from the 3D projection model making of experimental teaching reform research project of Lanzhou Jiaotong University. The teacher first calculates the parameters through mathematical principles, and then modifies the preliminary data of the model according to the size of the projection screen. Next, HD display screen, aluminum-plastic plate, polyester, film and other common experimental materials are used to make 3D holographic projection teaching AIDS. After cutting and gluing the film, scaffolding is built to form a three-dimensional frame. Professional software is used to construct the basic model on the computer. Make a realistic holographic projection model, and finally use Unite 3D software widely used in virtual reality field to make holographic projection video, so that a basic holographic projection model is completed. By using professional holographic projection equipment, we can see a 3D holographic projection teaching AIDS with perfect structure and certain interactive functions. Such an attempt is undoubtedly a great success, which not only enriches the classroom of teachers, improves the learning efficiency of students, but also increases the interest of the classroom, and helps more students realize the importance of holographic projection technology and the importance of combining technology with the classroom.

To sum up, the defects and shortcomings of 3D holographic projection technology still exist, but in order to pursue high-quality new teaching methods and teaching models and improve the comprehensive quality of our students, it is inevitable to conquer this kind of technology. The only purpose is to ensure the quality of the technology and greatly reduce the production cost. Only when the production cost is reduced can the technology enter the circulation market, and then enter the education market, and truly enter every classroom.

#### **3.3. The development trend of 3D technology in educational practice**

Up to now, due to the limitation of technology cost, promotion cost and education system, the perfect combination of holographic projection and education cannot be realized worldwide. As a means of scientific and technological education, holographic projection exists in every special classroom. The concrete performance is the 3D printed model, and the objects projected in the classroom are projected scene by scene like slides. I have to admit that this is a technological innovation in the history of education, and it does have a good educational effect, improving the classroom environment, the convenience of teachers and student groups.

However, this is far from enough. Just as our country is

constrained by a cumbersome education system and a large base of educated people, cost and system have become the biggest limiting factors, and the short board has been formed. When it comes to future trends, how to solve the problem of weak links is the most important problem. Only by addressing these problems can we better face the future. In the future, this technology needs to be greatly improved in terms of stability and portability, greatly reducing the cost of use, so that it can be put into use on a large scale, so that this technology can truly benefit all students.

In the future that we expect, holographic projection technology can be used to convert all courseware into projection form, and 2D pictures or models in books can be "revived" and projected directly in front of students, so that students can observe the teaching model more intuitively. More importantly, the characteristics of high-performance interaction can help students debug and regulate the model conditions according to their own ideas, so as to solve each student's problems in a personalized way, and truly solve each student's difficulties and pain.

## 4. The Breakthrough of 3D Technology for Traditional Education

### 4.1. Domestic classroom education pain points

Today's classroom education, there are still many problems, such as early education period, children for text, plane understanding is far less profound than stereo painting. However, in the traditional teaching model, the teaching of a class usually depends on the textbook and the teacher's narration, often the teacher is on the platform, the students are asleep under the platform, it is difficult to cultivate innovative talents under this teaching model. In such a classroom mode, students' interest in learning is not high, and it is difficult for them to understand the knowledge points in the face of obscure questions, which has become a difficult point for domestic education to explore and breakthrough. [5]

### 4.2. The entry point of projection technology in classroom teaching

The application of 3D holographic projection technology in the field of education can break through this difficulty well. For example, in preschool education, 3D holographic projection technology can be used to display the real 3D images in the field of vision for preschool children. Animation conversion and good visual effects can improve the divergent thinking ability and attention of preschool children, so as to achieve better memory effect. In middle school and university education, holographic projection technology can break through the limited space and use dynamic, time and story virtual images to display history and culture, so that students can participate in the happy classroom atmosphere, and at the same time edutainment, greatly improving the teaching effect. 3D holographic projection technology for teaching can greatly overcome the limitations of traditional teaching, improve teachers' teaching ability, and cultivate students' innovative thinking ability, which has great potential advantages. Its introduction is conducive to students' subjective initiative in the classroom and reduce the workload of teachers.

Ocoee Middle School in the United States has introduced 3D technology for teaching. According to the teacher's feedback results, since the implementation of 3D teaching, children have become more focused in class, and they begin

to pay attention to the content told in class and have a more comprehensive understanding of knowledge points, which is an unprecedented breakthrough. During the course of the test, the children grasped the knowledge points taught in the 3D classroom more firmly and their scores improved greatly.

For teachers, 3D projection technology has also changed their teaching methods, allowing teachers to use a small amount of teaching elements to mobilize students' participation and excitement, so that children can naturally participate in the learning content. Teachers at Ocoee Middle School say that with the introduction of 3D technology, they no longer worry about students skipping classes, leaving early or losing concentration because every student is actively engaged and stays focused. Children's voluntary participation and lively discussion can also reduce the pressure on teachers.

In this innovative field of information technology, teachers can use advanced forms of media to create stimulating teaching situations and students can think freely and learn independently. Good interaction between teachers and students has been realized, and bilateral classroom activities of harmonious teaching and learning have been carried out, which is also an important embodiment of teachers' humanistic feelings.[6]

## 5. Conclusion

Of course, technology is ultimately a means, not an end. In the teaching process, we should still pay attention to the humanistic atmosphere of the classroom, properly use science and technology, pay attention to the way and method of use, avoid the results contrary to the teaching objectives. Therefore, basic principles should be formulated to ensure the perfect development of intelligent teaching in the application of these technology means in practice. In the book "Classroom Education in the Smart Age: From Knowledge Classroom to Wisdom Classroom" mentioned five basic principles: first, students should be the center, clear the main responsibility of education. Second, we should stimulate the motivation of students' independent inquiry learning. Third, we should teach students according to their aptitude, and make learning goals and plans according to different people. Fourthly, we should try our best to concentrate high-quality educational resources and recommend the best guides for students. Fifth, we should apply technology-oriented evaluation to the practice of intelligent teaching.[7] These five basic principles provide valuable reference and guidance for classroom

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