

## PROCEEDINGS ARTICLE

# Cultivating Innovative Talent in the Field of Art and Design With the Help of Digital Technology

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## ABSTRACT

This study explains the importance of cultivating students' innovation ability in the information age, analyzes the current situation of students' lack of innovation ability through in-depth investigation objectively, and discusses the relationship between digital technology and the cultivation of students' innovation spirit and ability and its methods on the basis of studying the application of digital technology in art and design courses.

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## 1. INTRODUCTION

Innovation is the core driving force for a nation's progress and the inexhaustible motivation for a country to thrive. Innovative talents are the power and source of national development. Building an innovative country and improving the capacity for independent innovation are very urgent strategic tasks for China at present. Therefore, to cultivate outstanding talents who keep pace with the times and meet the requirements of modernization and constantly open up new fields of scientific research is a century-old project concerning China's development prospects and international status. Facing the demand for innovative talents in China's modernization construction, educational reform and innovation has become the core of quality education, and innovation ability is the highest standard for evaluating talents. To enable students to adapt to the development of the times and grow into useful talents of the new era, it is necessary to focus on the cultivation of students' innovative spirit and ability.

## 2. DEFINITION OF INNOVATION AND INNOVATION SPIRIT

As early as the beginning of this century, the concept of "innovation" was mainly put forward by economists from the perspective of technology application. Innovation refers to the courage to break through old ideas and old models, and the idea and initiative to solve new problems, obtain new results and open up new situations. With the continuous development and change of society, the meaning of innovation is also expanding and deepening. Literally, it mainly includes all new things such as new discoveries and inventions, new ideas and concepts, new doctrines, technologies and methods. Innovative education is a theory and method of education based on the principle of innovation, aiming to cultivate students with a certain sense of innovation, innovative thinking, innovative ability and innovative personality. And then, students can firmly and systematically master the knowledge of the subject and develop their innovative abilities in practice.

The innovative spirit belongs to the category of scientific spirit and scientific thought, and is also a psychological characteristic that must be possessed to

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carry out innovative activities, including innovative consciousness, innovative interest, innovative boldness, innovative determination, and related thinking activities. Specific performances of innovative spirit are as follows. For example, people are not satisfied with existing acquaintance and constantly pursue new knowledge; people are not satisfied with existing ways of life and production, methods, tools, materials and objects, and constantly make reform and innovation according to actual needs or new situations; people don't stick to the old rules, dare to break the original framework and explore new laws and methods; people don't believe in books and authorities, but dare to follow facts and one's own thinking; people don't blindly follow others' ideas, sayings and practices; people insist on independent thinking and the pursuit of novelty, uniqueness, whimsy and difference; people do not become rigid and dull, but apply existing knowledge and abilities flexibly to solve problems, etc. Only with an innovative spirit can we continue to open up new horizons in future development.

### **3. THE SIGNIFICANCE OF CULTIVATING INNOVATIVE TALENTS**

According to the report of 19th Party Congress, "it is necessary to accelerate the building of an innovative country, innovation is the first driving force leading development, and it is suggested to train a large number of strategic scientific and technological talents, leading scientific and technological talents, young scientific and technological talents and high-level innovation teams of international standard". Meanwhile, the Party Central Committee has a timetable for building an innovative country. According to the "Outline of National Innovation-driven Development Strategy" published previously, China would enter the ranks of innovative countries in 2020, rank among top innovative countries by 2030, and become a world power in scientific and technological innovation and a major scientific center and innovation highland in the world by 2050.

In order to achieve this ambitious goal, educators have to take up the training of innovative talents. Since the driving force of innovation lies in education, it is education that determines the future of the nation. The competition in the 21st century is ultimately a competition for knowledge, a competition for talent, and especially a competition for innovative talent. In the views of some people, cultivating innovative talents means cultivating innovative talents of science and technology, but this view is not comprehensive enough. Scientific and technological innovation is the focus, but not the whole picture. Innovation is needed in all fields and disciplines, and

there are different levels of innovation. As long as there are inventions, discoveries and improvements, it belongs to the scope of innovation. The innovation people advocate is innovation for all human beings, all the time and everywhere. Innovation should be a culture, an atmosphere and a momentum that drives progress and development of society [1].

Art and design is an interdisciplinary discipline that integrates art, science and technology and economics. And it is also a discipline that uses science and technology as the basis for creating practical and aesthetic products in the form of art and design to meet a variety of material and spiritual needs of human beings and to serve human life. Art and design is no longer just a technology, or a simple combination of technology and art, but a culture. Art and design education is a special part of educational structure and is responsible for the training of creative talents. Therefore, it is necessary to adapt to the development needs of society and to change the educational concepts and modes of education that hinder the development of students' innovative spirit and innovative abilities. And it is of great and far-reaching significance to actively explore the cultivation of innovative talents by analyzing and understanding the current situation of students' lack of innovation ability and promoting the improvement of students' innovation ability.

### **4. ANALYSIS OF THE CURRENT SITUATION OF STUDENTS' LACK OF INNOVATIVE ABILITY**

According to the survey, the lack of innovation ability of undergraduate students in the specialty of art and design in China is mainly manifested in the following aspects.

#### **4.1. Inadequate Information Technology Skills**

Students pay too much attention to the vertical learning and training of art and design courses and performance techniques, but pay less attention to the mastery of information technology and the improvement of information literacy, and think that those are the affairs of engineering students. Besides, they believe that they are artists, they have solid basic art skills and unique artistic personality. However, they are complacent and arrogant, and they ignore the acquisition and collection of modern information, let alone processing and utilization, which hinders the horizontal development of innovation ability.

## **4.2. Inadequate Innovative Awareness and Lack of Innovative Thinking**

Influenced by the traditional teaching mode, university students have been suffering from a lack of innovative consciousness, the root of which is the lack of innovative thinking. The formation of an individual's "thinking" is influenced by three aspects: inheritance, acquired knowledge and life environment. Genetics determines the neurological system of the brain which varies from person to person, knowledge determines the individual's receptiveness and awareness of the outside world, and the living environment ultimately creates a harmonious and balanced outcome between the internal and external environment of the individual. Unfortunately, in primary and secondary education, the lack of the necessary initiation into innovation has led to a lack of 'innovation awareness' in the later learning of students [2].

## **4.3. Lack of Problem Awareness in Learning**

When encountering some difficult problems, psychological state of skeptical confusion, anxiety and exploration should have arisen, which should drive individuals to think positively and to keep asking questions and solving problems, but students have no question to ask, are afraid to ask and have no opportunity to ask. Traditional conclusive teaching is one in which the teacher speaks and the students listen, in which the teacher demonstrates and the students imitate, and in which the teacher is used to giving ready-made conclusions or answers. At the same time, Students' assignments, works and tests are also based on the principle that there is one question and only one correct answer. The result of such closed teaching is bound to make students never question the conclusions given by the teacher and the techniques taught, and students are unlikely to develop a sense of inquiry into multiple answers and methods when faced with questions that already have multiple answers.

## **4.4. Weak Knowledge Base and Poor Innovative Outcomes**

The first is weak innovative knowledge base. For example, there is unreasonable course design, knowledge repetition, insufficient interdisciplinary knowledge, insufficient innovative knowledge; knowledge is obsolete; students do not take the initiative to learn; there is closed teaching; teachers don't pay attention to the diffusion of knowledge and so on. The second is poor innovation results. For

instance, the innovation environment is not perfect; there is a high pressure of school running; there is little practical teaching environment; students do not pay attention to social practice; the innovation skills are not strong; there is a lack of design ability; and operation ability and expression ability are poor.

## **4.5. Being Inclined to Bookishness, Teacher-Oriented and Superstitious Belief in Authority**

Students regard existing book knowledge, teachers' narratives and the work of famous design masters as absolute truths, and are content with the memory of existing knowledge and the performance of techniques. Besides, they are insensitive to, lack interest in, and do little research on new developments and trends in the natural sciences, high technology, and art and design in the world today, especially on problems that are being explored but have not yet been solved, and are unable or afraid to use what they have learned to boldly propose and analyze new problems, let alone original new academic ideas and perspectives.

## **4.6. Too Much Emphasis on Professional Knowledge and Training of Technical Style**

Students pay more attention to art and design expression techniques and training in a certain design style. After graduation and entering society, when faced with a large number of innovative topics encountered in actual work, both the knowledge acquired at the university level and the abilities and qualities they possess are significantly inadequate and require a longer period of time for students to gradually adapt, and many of them also need special training for six months to a year before they can take up their jobs. Even for those students who enter postgraduate studies after graduating from undergraduate programs, due to the inherent deficiencies in innovative awareness and innovative ability at the undergraduate level, there are many problems, such as difficulty in selecting topics, slowness in scientific research, inactive research ideas, traditional research methods, lack of courage in climbing peaks, and lack of strength in pioneering and innovation. There are not many high-level dissertations, and even fewer academic achievements with international influence, thus failing to play a full role as the driving force of basic and applied basic research, etc.

## **5. WAYS AND METHODS TO CULTIVATE STUDENTS' INNOVATIVE ABILITIES WITH THE HELP OF DIGITAL TECHNOLOGY**

Digital technology is the basis of digital computers. Without digital technology, there would be no computers today. Digital technology is also the basis of multimedia technology, including digital, text, image, voice, virtual reality, and all kinds of information in the visual world. In short, the digital media can be used to represent all kinds of media and to describe the very different real world. The application of digital technology in art and design education is characterized by multi-media teaching materials, globalization of resources, individuation of teaching, autonomy of learning, task cooperation, automation of management and environment virtualization. With digital technology as the platform, it constructs the teaching mode of "four elements" such as students, teachers, teaching information and learning environment to achieve the ultimate goal of cultivating innovative talents. The teaching methods and main contents for cultivating students' innovative abilities are as follows.

### **5.1. Digital Technology Can Help to Improve the Overall Quality and Development Potential of Students**

The innovative talents required by the information society must first have strong information skills. According to calculations by James Martin, a British technology forecaster, human knowledge doubled every 50 years in the 19th century. However, it doubles every 12 months in today's information society. With this "information explosion", it requires the most efficient way to access and use all kinds of information and knowledge [3]. Clearly the traditional teaching model is not adapted to the information needs of a modern society in which knowledge grows and is rapidly updated. However, digital education, characterized by the use of the Internet, is the ideal environment for the development of this quality. The Internet is the world's largest repository of resources. Students are free to explore the information on the Internet, which undoubtedly cultivates their ability to access, analyze, process and utilize information.

With the unexpected outbreak of the new epidemic and its severe impact at the beginning 2020, traditional classroom teaching was completely blocked for a while, online education was brought directly to the forefront as an emergency education service system during the "pandemic", allowing students to take classes at home without having to leave their homes. All teaching and learning activities

were carried out around the Internet, where teachers taught, students learned, information flowed and knowledge was shaped, and students had access to the most up-to-date curricula online or on other teaching platforms, and could search for interesting learning materials, artistic inspiration and materials, so that they could adapt more quickly to the needs of the information society. Although online teaching has shown many problems, it is also a sign that Chinese education, especially higher art and design education, will reach a historic inflection point, that is, modern information technology based on the Internet will reshape the future development of higher education. No moment is more profound and urgent than now.

### **5.2. Digital Technology Can Effectively Stimulate Students' Innovative Thinking and Innovative Behavior**

The development of innovative abilities is an education that gives full play to human subjectivity, develops human intellectual potential and forms human innovative forces. In the teaching of art and design, digital technology enters the classroom, playing advantage of modern teaching technology tools. With the help of typical and creative resources in the information platform, teachers can directly present knowledge that is difficult to perceive and comprehend in a short time using digital teaching methods, stimulate students' interest in learning and arouse students' sense of participation and leadership. In this way, it not only enriches the content and broadens students' horizons, but also effectively inspires them to think creatively, to capture their own feelings, to integrate their own understanding and to express their own innovative designs. For example, when teaching the history of Chinese advertising in the course of creative advertising design, students can look up relevant information on the Internet, search independently for excellent advertisements of various periods, and classify, analyze and evaluate them to stimulate their creative inspiration. In this way, it will not only fully explore students' own potential and maximize their spirit of exploration and pioneering, but also allow them to freely expand their imagination and form bold and innovative behavior, laying the foundation for future artistic creation and even the formation of their own unique design style.

### **5.3. Digital Technology Can Prompt Students to Engage in Research and Exploration-Based Learning**

Research skills are an important competency for innovative people. As China's traditional education focuses on the inculcation of knowledge, the

innovative ability of students is greatly inhibited, thus resulting in a lack of backbone and research ability. Digital education is just the thing to promote students' ability to research on topics. Teachers have incorporated their own research topics into the creative design of green express packaging, and have conducted a great deal of research-based learning on the subject through the Internet. Students are enabled to access the latest information on express packaging design research in China and foreign countries through various information platforms, break the mystery of creation, and design a variety of express packaging designs with original features such as being detachable, reusable and inflatable, etc., exercising students' keen observation and analysis skills and pioneering thinking skills on real-life issues.

Exploratory learning helps students to develop divergent and innovative thinking and skills. Digital education, with its globalized resources, is suitable for students to carry out exploratory learning. This learning model has completely changed the passive acceptance of students in traditional teaching, and students are in an active position, which can effectively stimulate students' interest in learning and innovation.

#### **5.4. Digital Technology Facilitates Information Exchange, Teaching Interaction and Resource Sharing**

The computer enables the storage and reuse of design data, and all kinds of design materials can be stored and retrieved with the use of the data. And in this way, students' interest and motivation to learn would be triggered, and the subjectivity and initiative of learning would be stimulated, achieving the purpose of active thinking. What is even more valuable is that the data for each lesson is stored on the server and the data can be called up at any time, making it easier to share teaching information [4]. In addition, with the development of multimedia courseware, web technologies and distance learning, students have access to acquire more information knowledge and are allowed to carry out online learning between institutions through local area networks or the Internet. Some renowned professors can lecture for national art and design education institutions without leaving school, expanding the space in which art and design exists, bringing art and design to a wider digital platform, exposing students to a wealth of art and design information, and facilitating the formation of an open, forward-looking perspective.

For example, in the teaching of advertising planning, students are directed to websites about advertising

knowledge and advertising companies, and a wealth of knowledge and images are displayed in front of them, creating a lively and vivid learning context for students. In the classroom learning process, students can not only quickly grasp the essence, but also leave a broad space for innovative thinking, because visual perception drives imagination and thinking is extremely active. Innovative behavior has become an internal demand of students. It is also the key to increase the effectiveness of classroom teaching and stimulate students' innovative abilities.

#### **5.5. Digital Technology Can Stimulate Students' Artistic Creative Imagination**

Imagination is a very important innovative force. Einstein said that "imagination is a real factor in scientific research" and that "imagination is more important than knowledge because knowledge is limited, while imagination encapsulates everything in the world." It is clear that developing students' imagination is key to cultivating students' innovation abilities. The digital technology creates a fascinating teaching context. With the use of the advantages of multimedia such as realistic images, vividness, novelty and being not limited by time and space, all kinds of teaching information are integrated. With the use of time travel, time inversion, scene switching, montage and other techniques in film and television art in the courseware, it is conducive to developing ideas, stimulating imagination, making students' thinking highly active and sparking innovation. For example, with the broadcast of dynamic media such as 3D animation, video images and film and TV commercials, students have a sense of shock, novelty and mystery. At the same time, they have infinite reverie and desire to explore and innovate.

#### **5.6. Digital Technology Provides Personalized Teaching and Facilitates Personalized Learning**

In digital teaching, on the one hand, teachers can keep track of each student's learning process and stage, and assess the results to achieve a track of complete system and record storage. In this way, it is conducive to taking care of students' individual differences, controlling the difficulty of the teaching content, resolving the differences in understanding formed in the process of individual student's comprehension of knowledge, and keeping the progress of the course [5]. On the other hand, with the help of teaching and learning service system, teachers can make targeted and personalized learning advice and guidance

programs, etc. according to the individual learning situation and learning ability of students. Online education provides effective methods and conditions for personalized teaching.

Scientific research shows that an important factor in a person's success or failure is personal interest. Digital technologies make individualized education and personalized learning possible. Students with different preferences are free to choose their learning content and learning style through their personal computers and carry out independent learning based on their knowledge background. And then, personalized learning would be possible. Meanwhile, it is suggested to build environments that enable students to engage in the teaching process, stimulate students' interest and allow them to acquire knowledge and competencies through interaction with the innovative environment. This improvement is not only in the level of learning, but more importantly in the ability to use optimal educational resources to develop innovative skills.

### **5.7. Digital Technology Facilitates the Development of Students' Problem Awareness**

Problem awareness is the driving force of thinking and the cornerstone of innovation. Strengthening students' problem consciousness is the starting point for developing their innovative spirits [6]. Highly affirming and attaching importance to the cultivation of students' problem consciousness is a consensus among Chinese and foreign educators. Einstein said, "it is often more important to ask a question than to solve a problem. Solving a problem may be a mathematical experience or a practical skill, while posing new problems and new possibilities and looking at old problems from a new perspective require creative imagination." So, teachers don't worry about asking "weird" questions. The real worry should be that they have no questions to ask. Only by allowing students to dare to ask questions, to be good at asking questions, and to discuss and solve problems under the guidance of teachers, can we truly cultivate applied talents with the spirit of innovation and the ability to ask, analyze, and solve problems.

### **5.8. Digital Technology Facilitates Students' Memory, Coherence and Retention of Knowledge**

With the use of digital technology, teachers show students text, sound, graphs, video, animation, etc. in the form of online multimedia, in order to more vividly and intuitively show some data or a variety of scenes that cannot be seen in real life. On the one

hand, teachers can create vivid and diverse teaching materials to start teaching, improve students' interest in learning, and relieve the tiredness and dullness brought to students by traditional teaching methods. On the other hand, students can receive more rich teaching contents, better absorb knowledge and grow.

Digital teaching provides diversity of external stimuli, which facilitates the optimization of the teaching process and the acquisition and retention of knowledge, and broadens the space for students to develop their artistic creativity. Treicher, the experimental psychologist, made two famous psychological experiments, and one of which was on human access to information sources. His experiments confirmed that 83% of the information acquired by humans came from vision, 11% of that came from hearing, which added up to 94%. Besides, 3.5% of that came from smell, 1.5% of that came from touch, and 1% of that came from taste. Multimedia technology can be seen as well as heard and manipulated with the hands, and more information is acquired than by listening to a single lecture. Also, he made another experiment on knowledge retention, i.e., memory persistence. According to the results, people could remember 10% of what they read, 20% of what they heard, 30% of what they saw, 50% of what they heard and saw, and 70% of what they said in the communication. In other words, if one can both hear and see, and express it in one's own words during the discussion and communication process, the retention of knowledge will be much better than the effect of traditional teaching. In addition, information-based education is not only very conducive to knowledge acquisition, but also very conducive to knowledge retention, providing a solid foundation for the development of students' innovative abilities.

## **6. CONCLUSION**

To sum up, the application of digital technology not only meets the needs of hierarchical education, is closely related to the cultivation of students' innovation ability, and also brings vigorous vitality to art and design education. In the process of digital education, emphasis is placed on practice, teaching interaction. At the same time, it is suggested to carry out active exploration of effective ways and methods, reform the long-standing traditional teaching mode, and continuously promote the innovation of education mode. And then, students' comprehensive ability and innovation can be further developed. In order to accelerate China's modernization and realize the great rejuvenation of the Chinese nation, it is required to cultivate more high-quality and innovative talents in line with the requirements of the information age.

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