

Research and Exploration on Teaching Methods of Creative Thinking Training

Hua Shang

Guangzhou Vocational and Technical University of Science and Technology
Guangzhou, China

Abstract—Creative thinking is closely related to creativity. All creation originates from human's exquisite creativity. Creativity is the core of intelligence. Creative thinking is the cornerstone of creativity cultivation. It breaks through the stereotype of conventional thinking. It can not only reveal the essence of objective things and their internal relations, but also produce new, original and meaningful thinking results. It is the advanced process of human thinking and the signifier of the development level of human consciousness. This paper makes a tentative study and exploration on how to train and enhance students' creative thinking ability.

Keywords—creative thinking training; teaching; research and exploration

I. INTRODUCTION

Wu Quanyu, a famous educationalist, says: "the two aspects of "creation" and "making" must be organically combined." The so-called "creation" is to break the conventions, and "making" is to produce something of unique significance on the basis of breaking the conventions. No breaking the conventions, no "creation". Creativity is a concept closely related to creation [1]. All creation originates from human's exquisite creativity. Creative thinking ability is composed of knowledge, intelligence, ability and excellent personality quality. Creativity is the ability to generate new ideas, discover and create new things. Creativity is also a series of complex high-level psychological activities. It requires a high degree of physical and intellectual tension, as well as creative thinking at the highest level. Therefore, creativity is the psychological quality necessary for successfully completing certain creative activities.

II. ANALYSIS OF THE COMPONENTS OF CREATIVE THINKING ABILITY

The basic factors of creative thinking ability include the ability to absorb, memorize and understand knowledge, consolidate knowledge, master practical operation technology, accumulate practical experience, expand the scope of knowledge, and apply knowledge analysis. Any creation can not be separated from knowledge. Rich knowledge is conducive to more and better put forward creative ideas. Scientific analysis, identification and simplification, adjustment and revision are conducive to the implementation and testing of creative programs.

The core factor of creative thinking ability is intelligence centered creativity. Intelligence is a combination of intelligence and multiple abilities, including unique and keen observation, highly focused attention, efficient and lasting memory and flexible execution, as well as the ability to master and apply creative principles, techniques and methods. This is the key element of creative thinking ability.

The physiological factors of creative thinking ability including personality, quality, will, sentiment and other aspects, on the basis of people's physical qualities, under certain social and historical conditions, through the formation and development of education and social practice, is the creative quality shown in the creative activities; good quality is the internal cause of the formation of creativity.

Personality factors of creative thinking ability. The results show that high creative people have the following personality characteristics: wide range of interests, fluent language, independent self-confidence, quick response, critical thinking, good memory, efficient work, less herd behavior, enthusiastic study of abstract issues, a large range of life, strong social skills, high level of ambition, frankness, a sense of humor, give people a romantic impression and so on. It is an important manifestation of creative thinking ability.

III. METHODS OF TRAINING AND TRAINING CREATIVE THINKING ABILITY

The cultivation of creative thinking ability can help develop the intelligence and wisdom of students majoring in art and design, to cultivate their keen observation and rich imagination, especially their creative imagination and ability to find and solve problems. It is of great significance to stimulate the desire for knowledge, cultivate healthy personality and inspire the spirit of innovation.

A. Quick Association: Training Students' Thinking Fluency

The fluency and agility of thinking can be trained and they have great potential for development [2]. American psychologists used the so-called quick association method to train students' thinking fluency. The so-called "sudden association" is facing the "signal" (topic), in a concentrated time to make a rapid, non-repetitive response to the signal, with a view to the signal related things, suddenly converged. The process of rapidly associating materials is the process of

expanding one's field of vision, then contracting, and then expanding according to the contracted point. Employing this method, the design work can be prevented from being general and stylized, showing a variety of new and strange features, generating a new and creative point of view. During the training, students are required to throw out some ideas quickly. There is no doubt on evaluation or considering the quality or quantity should be carried out until end of the training. The faster the more fluent, the more spoken the higher the fluency is. The free-association and rapid-reaction training are very helpful to the fluency of thinking, and it is possible to achieve "thinking for thousands of years, sight for thousands of miles". Quick thinking is just like a spring, it can promote students' thinking fluency.

Fluency is the basis of divergent thinking as well as the index of quantity. Since the fluency of thinking is based on the absolute number of "divergent" knowledge as an indicator, so as long as the problem is relevant, the more concepts expressed in a short time the better. It is often heard that a student's thinking is fluent and agile, which means that he can have a variety of solutions to the problems encountered in a short time. According to scientists using modern instruments, a person's thinking nerve impulse runs along nerve fibers at a speed of about 250 kilometers per hour. Different people are different in their fluency and agility.

Great importance is attached to cultivating students' creative thinking in the real sense in the teaching process, training them to reorganize and process creatively on the basis of the accumulation of original knowledge and experience, and producing new ideas and images in their minds. After several years of application practice, it is found that the students who have received this kind of training can react quickly and express more ideas in a short time, their thinking agility is greatly improved, and their thinking is more active. Thus a rich and colorful network of consciousness is formed, and finally a new form of thinking results is obtained.

B. Brainstorming: Training Students' Divergent Thinking

American psychologist Gilford once points out: "We should cultivate students' divergent thinking through teaching." The famous American creative scientist Osborne put forward "Brainstorming Method", also called collective creative thinking method. Its essence is to convene a special form of group meeting to gather talents, and everyone can produce products through the rapid association of the brain. Students should put forward as many ideas and suggestions as possible, put forward useful and effective knowledge, negotiate with each other, and resonate with each other so as to achieve intellectual complementarity. Therefore, it is easy to form a "brainstorming" in the group meeting to widely solicit ideas and suggestions, and then to fully discuss them, encourage ideas, and finally analyze and study and decision-making. For example, "tell me all you think of" or "list all you think of" on a question. What we should pay attention to in this classroom is that teachers should not evaluate students' answers at first, so that students can have a relaxed

environment to speak freely, express their views, and emphasize that everyone's views and ideas are equal and important. The training steps are as follows:

- First, divide the students into 10 groups, one host and 1 recorder.
- Second, at the beginning of the meeting, the chairman gives a brief explanation of the purpose of the meeting, the problems to be solved and the answers to be found.
- Third, allowing for a few minutes' preparation time, the teacher can provide some hints.
- Fourth, on the basis of paying attention to the development of students' personality, we should not only let everyone express their own opinions, but also allow one-sidedness and might as well be excessive. Respect outstanding, scientific, rational answers, but also inclusive of mediocre, absurd, eccentric ideas, do not blame. Ensure that everyone speaks and maintains a warm atmosphere.
- Fifth, after the recorder has recorded all the answers, people discuss what kinds of agreements they have and list them in the form of charts and other forms.
- Sixth, finally, concentrate on generalizations, formulate the best plan, and form the result of thinking.

The results of brainstorming are not always valuable; some of them may be wrong. These do not affect people's divergent thinking, because there are errors, valuable things can be verified by comparing with the worthless things [3]. If we deny divergent thinking because it is worthless or wrong, it will stifle the germination of innovation. Of course, on the basis of divergent thinking, its results should be concentrated on in time. The combination of divergent thinking and concentrative thinking will effectively improve the quality of thinking. It can be seen that the results of divergent thinking need sublimation of concentrated thinking.

C. Stereoscopic Thinking — Training Students' Breadth and Depth of Thinking

If people's habitual level of thinking as a plane level, then three-dimensional thinkers are standing on a higher level of thinking to see the plane level of the problem, so that three-dimensional thinkers' vision, the way to solve the problem is naturally much wider than the plane thinkers. Stereoscopic thinking itself is also a thinking concept. In the eyes of three-dimensional thinkers, there is no problem that exists in isolation, they are always used to stand at a certain height, the specific problems and many related factors are examined together.

Stereoscopic thinking, also known as "multi-dimensional thinking", "all-round thinking", "overall thinking", "spatial thinking" or "multi-dimensional thinking", refers to the way of thinking that jumps out of the limitations of point, line and plane and can think from top to bottom and from all

sides, that is, to "stand up and think". In fact, there are many things that jump out of the plane and extend into space. Stereoscopic thinking is to be good at looking at problems in a comprehensive way. Assuming that the problem is placed in a three-dimensional space, a comprehensive study can be conducted around the problem from multiple angles, multi-ways, multi-level, interdisciplinary, through this very effective visual art thinking training method, so that students can learn to observe all aspects of the problem, analyze all aspects of the problem, comprehensive and three-dimensional. Looking at problems, thinking boldly and comprehensively, sometimes conventions have to be broken through and it should transcend time and space, so as to grasp the key points and form new creative ideas.

The breadth of visual art thinking is manifested in the wide range of materials, creativity, modeling, combination and other aspects. From the vast macro world to the mysterious micro world, from the eastern and western cultural exchanges, from the integration of traditional ideas and modern consciousness, are all the contents of our visual art creation. In the modern visual art design, the breadth of thinking seems to be more important. When creating design works, researchers should not only rely on art theory to guide, but also get support from many other disciplines. For example, in industrial modeling design, designers should not only have artistic accomplishment, but also need powerful science, materials science, ergonomics, humanities, history, safety protection and other knowledge.

The depth of thinking means that when we think about problems, we should go deep into the true interior of objective things and grasp the key of the problem, that is, the essential part of things to think from far to near, from surface to interior, layer by layer and step by step. It can be described as a "layer bamboo shoots" method. In the process of visual art thinking, the depth of thinking is directly related to the success or failure of creative works. As a researcher, we should also be good at seeing the essence through phenomena, looking at problems objectively and dialectically, and not be confused by the superficial phenomena of things. Many successful examples illustrate this point. Visual art is to shape the image to achieve aesthetic pleasure as the main purpose, in the process of image shaping, not only lists some surface phenomena in reality, but should pay attention to the image of the spiritual outlook, artistic expression, ideological connotation and other aspects of expression, to these as the main thinking content of visual art creation. Only with a certain depth of design works, can the audience memorize endlessly, produce resonance, and taste the artistic charm. Generally speaking, if a work of art has a higher ideological, profound artistic connotation and better artistic expression, it shows that the author's thinking has a certain depth.

D. Drawing Inferences from Others' Inferences: Developing Students' Thinking and Adaptability

Inspirational thinking is a common form of thinking in visual arts. In the process of creation, ideas hidden deep in the soul are suddenly flashed out after repeated thinking, or some accidental factors stimulate a sudden understanding, to

achieve a leap in knowledge, a variety of new concepts, new images, new ideas, new discoveries suddenly come, which is inspiration. The emergence of inspiration is the unity of inevitability and contingency in the process of thinking, and it is the symbol of a new level of intelligence. Inspiration enables designers to expand their minds and creativity.

Bacon said: "Man must look at the opportunity like a thousand eyes before he begins to do something, and seize the opportunity like a thousand hands when he proceeds." Inspiration thinking is a form of activity hidden in the depth of people's thinking. There are many accidental factors that cannot be transferred by people's will. In teaching, teachers try to create conditions, consciously guide and stimulate, so that inspiration can emerge at any time. This requires understanding and mastering the law of inspiration thinking activities, such as the sudden nature of inspiration, inspiration in the thinking process of discontinuity, instability, jumping, crazy and many other characteristics, to strengthen the accumulation of knowledge in all aspects, diligent thinking, to create all conditions for the emergence of inspiration. At the same time, students are also taught to catch the fleeting spark of inspiration in a timely and accurate manner, without giving up any useful and desirable flash point, even if it is only a small Mars must be firmly grasped, this small Mars may be enough to start a prairie fire of wisdom.

Taking the training project "infer other things from one fact" as an example, each student is given a different graphics paradigm, requiring a new way to break through the traditional thinking set, according to the concept or form of the example diagram, given full play to creative inspiration, and design a number of other graphics, and ultimately choose the three best methods to submit, this training itself is a kind of new creation process.

E. Innovation: the Way of Training Students' Unique Thinking

The uniqueness of thinking refers to the thinking activities in which human beings to discover, create and advance on the basis of existing achievements. From one point of view, they can use the basic knowledge and theory they have learned to carry out radioactive association, pursue various methods of solving problems and find out the best one. It is very helpful to activate students' thinking, broaden their thinking, draw out the spark of students' thinking and train their thinking quality. Therefore, teachers should encourage students to solve any problem, do not find a solution to stop, to overcome the impetuous style of study, "try to stop, do not ask for much understanding," and guide them to try and to find more solutions to the problem, so that thinking in a multi-directional development, to develop a "root-seeking, excellence" of the good quality of learning.

Many students think that innovation and invention are natural things, and do not have confidence in themselves. In fact, although the average weight of the human brain is only about 1360 grams, but it has the most complex structure and function of the human body. There are about 100 billion [5] neurons in the human brain. Obviously, the potential of the

human brain is huge, but the utilization rate of brain capacity is very low, generally less than 10%, but 90% have not been exploited and wasted. Therefore, developing your brain rationally is a very important aspect of improving creativity. After understanding the principles of physiology, let students know that everyone has the potential of innovation and enhance their self-confidence.

In the teaching of graphic design creativity, through multi-angle deduction training, students are constantly making new discoveries. Graphic creation emphasizes constant innovation, and the style, connotation, form and expression of graphic art emphasize distinctiveness. It is the lifelong pursuit of graphic designers not to fall into conventions, but to be innovative and innovative. This is also in line with the characteristics of young students' innovative and differentiated thinking, to stimulate students' enthusiasm for multi-angle thinking, to deepen their understanding of knowledge, and to avoid the negative impact of simple repetition, so that students' creative thinking can be developed.

The innovation of graphics creation training is a very unique method. Teaching students to see, hear, and touch a variety of things, as far as possible to expand their thinking to the outside, so that thinking can beyond the conventions, to find out different views and ideas, give its latest nature and connotation, so that graphics works from the external form to the internal artistic conception of the author's unique artistic perspective. It is not advisable to comply with the established ideas, adopt flexible thinking and tactics, multi-directional, jumping from one thinking base point to another thinking base point. More than one basic point of thinking, more than one kind of innovative thinking requires students to find out the latest and best plan from a large number of ideas. To show another example: shaving blade as the shape, for positive and negative shape and in the form of classroom random training; each student in different forms of thinking independently, the same object to create, 20 minutes after drawing works are different, because everyone has their own unique spiritual feelings and aesthetic experience. These works represent the elements of students' vivid thinking. Each of them thinks independently in different ways. Although they have different styles, schools, colors, themes, materials and textures, they have their own unique personality characteristics, and do not become ordinary and unconventional. It embodies the vitality of artistic creation.

IV. CONCLUSION

To sum up, the long-term and organic integration of creative thinking training and training in art and design teaching can improve students' cognitive abilities, including sensitivity to problems, imagination, metaphorical thinking, the ability to discover missing information, the ability to evaluate, the ability to analyze details, and synthesis. Ability, intuition, memory, the ability to define problems well, the ability to predict results, and so on, provide an unlimited space for design teaching and artistic creation. To enable students to use their own unique thinking methods and modeling language, creative thinking as the main activity of artistic development, stimulate the subject to have

consciousness, feeling, spirit, will, impulse to carry out artistic design creation. Therefore, the cultivation of creative thinking ability is the core of art and design teaching must be consistent. It has great and far-reaching significance to improve learning strategies, and to improve the quality and effectiveness of learning, and to give full play to the creative potential of students, and cultivate creative talents with quick thinking and all-round development.

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