DEVELOPMENT OF A TEACHING MODEL FOR ENHANCING CREATIVE TEACHING SKILLS OF STUDENT TEACHERS IN GUANGXI NORMAL UNIVERSITY

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DEVELOPMENT OF A TEACHING MODEL FOR ENHANCING CREATIVE TEACHING SKILLS OF STUDENT TEACHERS IN GUANGXI NORMAL UNIVERSITY

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BY

FENG LIANG

HAS BEEN APPROVED BY THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY IN CURRICULUM RESEARCH AND DEVELOPMENT AT SRINAKHARINWIROT UNIVERSITY

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This research aimed to 1) develop a teaching model to enhance creative teaching skills of student teachers in Guangxi Normal University and 2) evaluate the effectiveness of this model. A research and development (R&D) approach was used to develop the model. The sample group consisted of 68 student teachers at Guangxi Normal University. The research results were as follows: 1. The developed model, named CEDM model, consists of principles, objectives, teaching steps, media and learning resources, measurement and evaluation. The teaching process involves four steps: 1 Concept exploration, 2 Experiential engagement, 3 Demonstration & Application, and 4 Meaning making. 2. The effectiveness evaluation of the CEDM model found that it met the effectiveness criteria. Student teachers demonstrated significantly higher creative teaching skills after using the model, with statistical significances at the .05 level.

Keyword : Creative teaching skills, Teaching models, Guangxi normal university

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INTRODUCTION

1.1 Background

The process of globalization requires outstanding international talents. The essence of education is innovative teaching and creative thinking. The curriculum standards in many countries, such as Germany, the United Kingdom, Thailand , China and so on, all point to the requirement of "creative ability". Nowadays, in university courses, it is necessary to cultivate creative teaching among teacher trainees, which is the highest manifestation of subjectivity development. Creating new teaching can be understood from two perspectives: the transmission of scientific and cultural knowledge and creative learning. The former is teaching students to "learn how to learn", while the latter refers to teaching with the core goal of cultivating students' creativity. The focus of creative teaching goals is always on cultivating students' creative personality: creative teaching is one of the main channels for cultivating students' creative thinking and creative personality, and is an important component of creative education, However, the current university education does not place enough emphasis on teacher trainees, and their various skills also need to be improved. There is currently relatively little research on the cultivation of creative teaching skills among university teacher trainees. Developing a new teaching skill training model for university normal students, and diagnosing, evaluating, and improving the education and teaching models.

Today, the development of human society is an era where knowledge and skills innovation lead the development of society. Creative teaching is also a requirement of the times for teaching, and cultivating talents with innovative thinking and skills is the key to education, playing a crucial role in teaching. As the most active factor in the production relationship, "The first priority for innovative resources is humanity, should be paid to cultivating, making good use of, and attracting talents to promote the development of talents." Reasonable flow, optimized allocation, and innovative talent training model. " Improving the training paths and accelerating the formation of a team of

innovative talents are the fundamentals of the transformation of innovation into development increments. Universities, to a certain extent, it is the primary resource of talent and the primary productive force of science and technology are an important intersection point, playing an irreplaceable role in this process(Zhang, Isola et al. 2018). In the face of such severe challenges brought about by technology, UNESCO released "Rethinking Education: A Theoretical Shift to a "Global Common Good" in 2016. (Vaccari and Gardinier 2019), focusing on what kind of education is needed in the 21st century, mainly discussing that human creativity is still an essential quality and an important condition for opening up the future . In addition, American sociologist Daniel H.Pink pointed out that we need to redefine industry classification, the creative industry(Pink 2002). We need more and more creative problem-solvers. Therefore, people expect themselves to be creative. This has almost become the common demand of the public. Faced with such a situation, many countries around the world are reorganizing and thinking about education. In 2006, the European Union passed the proposal of "core literacy" for the whole people, which includes initiative awareness and entrepreneurial spirit(Wang, Xu and Guo 2018). In 2007, the US government released the " 21st Century Skills Framework". This is the key skills and important qualities that future-oriented learners must possess, among which learning and innovation skills are particularly important. In December 2017, China officially released the core literacy system for the development of ordinary high school students and the new high school curriculum standard plan. Creativity becomes an important part of educational research, educational goals. Facing the ever-changing technology, people not only pay attention to technology, but also care about their own creativity. Fields including psychology, sociology, pedagogy, and management have paid close attention to issues related to creativity (Sternberg 2000). Because of this, the connection between technology and creativity is a topic of intense interest. "The Nation is in Crisis: Educational Reform Is Imperative" in the 1980s, countries have launched a new wave of educational reforms. In January 1999, the State Council of China approved the Ministry of Education's " China's eighth basic education curriculum reform officially kicked off. With the gradual

deepening of educational reforms worldwide, many problems and perplexities are presented to people, among which " innovative research on educational reforms " has attracted widespread attention. Some studies represented by the trilogy of the Holmes group in the United States have shown that teaching skills are very important in the process of student development(Group 2007). Ernest. L. Boyle , former chairman of the Carnegie Foundation for the Advancement of Teaching in the United States, also emphasized that "teachers play a leading role in educational reform." "National Commission on Teaching & America's Future (NCTAF) report that: 1) Teachers' subject knowledge and creative teaching skills directly affect students; 2) The key to reforming school education is to cultivate, select and retain excellent teachers; 3) Only when the university improves the teaching environment for teachers can the reform be successful. The lessons of practice and the development of educational theory research once again show that: Cultivating teachers, cultivating and strengthening the teaching skills of normal students in university is the answer to solving the problems of American education ."

China's Plan (2010-2020)" clearly states that quality education should focus on the cultivation of students' innovative ability and practical ability. The outline points out that students' innovative thinking should be cultivated in every process of education. Immediately afterwards, pointing out that all localities should actively explore new models that can help improve students' innovative awareness in education(Yan and Yang 2021). At present, China's development is changing from "Made in China" to "Made in China", which also promotes the cultivation of innovative thinking and the requirements of the times.

Knowledge economy focuses on the production, distribution and application of knowledge itself, and it belongs to innovation economy. Education needs to cultivate innovative talents. It is mentioned in the "Basic Education Curriculum Reform Outline (Trial)" that the goal of curriculum reform is to enable students to have a preliminary innovative spirit and practical ability. The fierce international competition is essentially the competition of innovative talents. Cultivating innovative talents is required by the

knowledge economy , it is the general trend of the world, and it is forced by the development situation. In order to effectively cultivate innovative talents, General Secretary Xi Jinping pointed "teachers should be the guides of students' innovative thinking" when he inspected Bayi university in Beijing: after 5 years, the comprehensive quality, professional level have been significantly improved. It pointed out that it is necessary to improve university evaluation, lead the professional development of teachers, and improve the level of education and teaching. China has made a major decision to implement the innovation-driven development strategy and has issued a series of institutional documents conducive to innovation. my country's technological innovation has taken place as a whole Sexual, overall, and historic changes. For example , in 2015, followed by the "Several Opinions of the State Council in 2016 " National Innovation-Driven Development Strategy Outline, these documents have become the programmatic documents of China's innovation-driven development.

2022, (EDUCAUSE) released the " 2022 Horizon Report: Teaching and Learning Edition", describing 15 macro trends, 6 key technology practices, 4 Future scenarios and expert views on 7 cases. " Teaching and Learning Edition" outlines the main trends and emerging technologies and practices that will affect future teaching and learning. From a global perspective, the teaching and learning curriculum standards of various countries and stages of education focus on cultivating students' creativity. For example, it is mentioned in the German middle school curriculum standards that one of the teaching goals of middle school teaching is to make students realize that a certain course is a vivid, beneficial and creative subject(Cao, Yu and Dong 2021). Key Stage 4 of the UK Foundation Curriculum 2007 states that teaching foundations is a creative discipline (Oates 2011). The Japanese high school curriculum standard highlights the overall goal of high school subjects in six aspects including "the foundation of creative ability" (Kubota 2010). China's vocational education reform pays more attention to innovative teaching. Development provides more opportunities and guarantees, that is, higher vocational teachers need to become high-quality "double-qualified" teachers. Therefore, vocational teachers and students are required to pay attention to

"professional teachers' literacy" and "professional development of vocational teachers". This shows that every stage of education in our country from elementary school to university focuses on cultivating creativity. However, compared with other stages of teaching, it is a fact that the cultivation of innovative teaching skills in universities is insufficient. Excessive course load seriously affects the enthusiasm of normal students in universities and the creativity of skills training. In order to adapt to the pace of education reform, in order to effectively implement the "three teaching reforms" (textbooks, teachers, and teaching methods) of vocational education, and to enable universities to play their role in the cultivation of top-notch innovative talents, develop innovative teaching skills training models It is imperative.

The requirements of policies, and the needs of education reform all point to the fact that teachers in vocational schools in the future must improve their innovative ability, and universities are the main positions for cultivating innovative talents. Carrying out the fundamental mission of cultivating people by virtue. The responsibility and development of universities(Xue and Li 2022). " proposes to develop top-notch innovative talents and explore ways to cultivate innovative talents throughout all levels of education. The State Council's overall plan to first-class disciplines clearly states that universities should focus on cultivating "all kinds of innovative, application-oriented (Li and Liu 2022). " How to further reform the talent training mode . Universities have unique advantages in cultivating innovative talents. A university is a palace of knowledge, an important bridge for the continuous inheritance of technology and civilization, and has gathered a large number of high-quality talents. Taking China as an example, more than 60% of high-level talents are gathered in institutions of higher learning, more than 60% of national basic research. All these provide an important foundation for cultivating innovative talents (On September 26. 2019).

Universities should connect with national strategies and cultivate innovative talents that meet the needs of society. The continuous reform of college education; attention to the innovation of talent training mode; as the cradle of cultivating modern new talents; universities should be in the reform of talent training mode; take Lide

Shuren as the educational goal; optimize teaching resources; innovate teaching mode; Promote the personalized development of college students; meet the needs of economic and social development; in the innovative practice of college talent training models; play the role of universities as the main front of education; cultivate new talents with good comprehensive quality. For example, the concept of simultaneous development of morality, intelligence, physical education, art and labor, and all-round development has not yet been truly established. Too much emphasis is placed on intellectual factors while ignoring the infiltration and development of non-intellectual factors such as attitude, emotion, and morality. Some classified training, personality education, making it difficult to adapt to Diversified social needs, "baton" of educational evaluation needs to be improved, still situations where only scores and papers are the only ones, and the cultivation of students' practical ability is not enough; attention is paid to curriculum reform and classroom teaching, and the guidance of innovative teaching development is not enough; The method is relatively single, and there are few diversified teaching methods. The quality characteristics of innovative talents require that in the process of cultivating talents, we must insist on equal emphasis on intelligence and non-intelligence, pay attention to individual independent experience, reflection and construction on the basis of knowledge, and at the same time carry out multi-dimensional comprehensive evaluation of such talents. This requires universities to innovate training methods, gradually establish a training mechanism suitable for top-notch innovative talents.

In short, there is a lot of room for cultivating normal students. Considering from a deep level, it is based on the deepened understanding, continuous improvement of teaching rules by teachers. Teaching creates new ideas, new methods, and new tools, which can use natural forces in a wider range and in a deeper degree, develop productivity, and then change the education and teaching. environment. Of course, any innovation can be regarded as a system. In addition to the factors of the creator itself, there must be the synergy of various factors, systems, mechanisms, human qualities, society and culture..

According to the data provided by China Guangxi Vocational Education Teacher Research Center, there is currently a shortage of about 14,000 full-time teachers in Guangxi secondary vocational schools in China. In 2016, there were 698,572 students in Guangxi secondary vocational schools, and 20,733 full-time teaching staff. The student-teacher ratio: 33.69: 1. Since 2005, four vocational teacher training bases have been established in Guangxi, China, to increase the training of vocational teachers. A seven-year survey of the employment destinations of graduates of vocational teaching classes in Guangxi Normal University in China found that the average proportion of students teaching in secondary vocational schools is less than 30%. The total enrollment of the four vocational teacher training bases in Guangxi, China was 7,183. It can be seen that the employment willingness of vocational teacher graduates is not strong, the lack of teaching skills of graduates is one of the important bottlenecks. It is urgent to explore new ways to improve the creative teaching skills of vocational teacher graduates in order to adapt to future employment requirements. Therefore, no matter from the perspective of international standards, domestic reforms , and teacher professional development that put higher demands on normal students, or from the perspective of the severe employment situation of normal students, it is important for every teacher to explore an effective way to promote the development of teacher creativity and teaching skills. Educator Professional Responsibilities.

1.2 Research Questions

1. What is the teaching model for normal university students to develop creative teaching skills?

2. What is the effectiveness of the research on teaching model of normal students' teaching skills?

1.3 Research objective

1. To development teaching models for normal university students to develop creative teaching skills.

2. To evaluate effectiveness of teaching models for normal students' creative teaching skills.

1.4 Significant of research

Our schools need to change to prepare students for a new century(Flanders 2019). Students are prepared for the future by acquiring 21st century skills, especially creativity (Kivunja 2015). As Cropley (2001) points out, Knowledge and skills are uncertain in the future, imparted as easily.It is also what they need to be successful throughout their working lives and beyond " (Ball 1994). College students' creative teaching skills through the method of logical speculation and empirical combination on the basis of drawing on the existing research results at somewhere. The research results will effectively promote the research progress of students' creative teaching skills in normal colleges in Guilin, Guangxi, China, and effectively guide the development and practice of creative teaching skills of students in other normal colleges.

1.4.1 Theoretical significance

Theoretical research significance of this study:

First, a study was conducted on the grounded theory of the development of innovative teaching competencies in teacher trainees

The structural model of creative teaching skills of university normal students is the orientation and basis for promoting the development of students' creative teaching skills. At present, there is no relatively perfect structural model of creative teaching skills of normal students. This study will build a structural model of creative teaching skills of normal students from two aspects of theoretical conception, and creative teaching skills of normal students.

Secondly, improve the evaluation system of creative teaching skills of university normal students. Due to the different influences of different countries on the evaluation system of creative teaching skills, and the evaluation system of creative teaching skills of normal university students in China is not perfect, there are subjectivity and other factors restricting the evaluation criteria.

Thirdly, promote the localized development of the theory of creative teaching skills.

At present, the theoretical research on the development of creative teaching skills of college students in my country is mostly the introduction and interpretation of foreign experience. Due to the differences in national conditions, cultural differences in various countries, and differences in students' early education, appropriate adjustments need to be made. On this research is mainly based on national conditions and regional characteristics, and carries out research mainly based on empirical research to promote regional research on the theory of Chinese students' creative teaching skills development.

This study sorts out the literature on the creative teaching skill structure, development model, influencing factors, decision-making and beliefs, and the nature of e-commerce teaching from two dimensions: diachronic and synchronic, to help pre-service e-commerce teacher educators understand the current research in this field The status quo provides a wealth of information resources; the "new framework for creative teaching skills" reconstructed based on theory and practice plays a complementary role in the development of professional disciplines of e-commerce majors and the teaching theory of vocational education.

1.4.2 Practical significance

Research Practice Insights:

First, it promotes the development of innovative teaching skills among general education students.This study analyzes the development status and development needs of university normal students, and will formulate a university talent training plan for China's normal colleges (undergraduates can choose courses according to the plan, have compulsory courses, elective courses, and general innovation and entrepreneurship courses, and study at the school for 4 years. -Complete the credits within 6 years, generally with a total score of 165 credits) to establish a more objective basis and effectively promote the coordinated development of university normal students.

Secondly, put forward the feasibility of cultivating the creative teaching thinking of university normal students

Skills cannot be separated from the guidance of theory, and it is difficult for normal students in our country to learn from foreign advanced experience, so it is difficult to guarantee its effectiveness. Based on the differences in the development of different classes provides a strong guarantee for the feasibility of cultivating creative teaching skills for university normal students.

Thirdly, promote the learning motivation and career awareness of college students .

In China's existing evaluation system for normal university students, there are few self-evaluation mechanisms, and students' high and low evaluations are easy to be attributed to the subjectivity and injustice of other evaluation subjects (such as managers, peers, students, etc.).

The evaluation index system for normal students majoring in e-commerce constructed in this research can not only be used to evaluate the e-commerce subject of pre-service normal students, but also has the same reference value for the evaluation of in-service e-commerce teachers; it is constructed on the basis of theoretical and empirical research. The EDMC (Experiential Engagement , Demonstration, Meaning Making, Creative Exploration) teaching mode can not only be used in e-commerce disciplines, but also has a radiation effect on other disciplines; through the investigation of the current situation of e-commerce disciplines through various means, we have a clear understanding of the current problems in the cultivation of college students in Guilin Normal Colleges in Guangxi, China , and put forward a factual reference basis for the future teaching reform.

1.5 Definition

Following the logic of "creativity-learning-creative teaching-creativity teaching skills-creativity teaching skills of vocational teachers' normal students", the "creativity teaching skills of vocational teachers' normal students" is obtained through layer-by-layer analysis this core concept.

1.5.1 The concept of creativity

This study defines "creativity" as: in order to achieve the goal, based on existing knowledge, experience or thinking, develop new products, new methods, new means, put forward new ideas or incorporate other people's products, methods, means, and educational ideas. Improve, update, and apply it to your own practice. The creativity studied in this thesis is mainly the creativity of the teaching process.

1.5.2 The concept of learning

Learning is a relatively permanent adaptive change in behavior or behavioral potential that occurs in humans and animals through the acquisition of experience over the course of their lives. Creative learning can be innovative behaviors and processes that arise through practice or repeated experiences in specific contexts.

1.5.3 The concept of creative teaching

Creative teaching is the process of activity in which teachers impart knowledge and students learn, digest and master it. The teacher uses creative classroom language, activity design and collaboration to enable students to develop their knowledge and emotional intelligence in a holistic manner. The use of creative methods enables students to learn with ease and comfort; to be able to improve and progress in a creative environment. For example, creative use of materials, creative use of teaching methods, etc.

1.5.4 The concept of creative teaching skills

Creativity teaching skills refer to the new problems that normal students may have in the future education and teaching. They can propose or use unique, novel and socially valuable new ideas in advance, and innovate teaching content, teaching methods, teaching models, methods and skills. Tools, teaching management, teaching environment, education and teaching innovation, and social services.

1.5.5 Vocational teachers' creative teaching skills of normal students

The teacher educators in this study will work in vocational schools after graduation. These teachers have both a practicing certificate and a professional teaching certificate. In vocational education, emphasis is placed on "learning by doing and learning by doing", and teacher trainees will be engaged in teaching to cultivate

skilled personnel in the future. According to the teaching characteristics of vocational education, the creative teaching skills of teacher trainees are sorted out as follows: teaching observation skills、 creative thinking、 Creative operational Skills.

1.6 Research scope

Population: The students in this study consisted of normal students from the third-year e-commerce class of the College of Vocational and Technical Teachers, Guangxi Normal University, China, total 71000 student,3000 teacher.

Sample: The object of this study is students majoring in e-commerce at the Vocational and Technical Normal College of Guangxi Normal University in Guilin, Guangxi, China. A total of 417 students participated in the "Teacher Professional Skills Training Course" in the second semester of the 2023 academic year. The selection of students majoring in e-commerce as research samples for innovative teaching skills is due to its solid professional knowledge, rich practical experience, advanced innovative thinking, high learning enthusiasm, and reliable feedback advantages in today's information age. In this study, the author served as a subject teacher in the same major, as a class teacher, conducted data research and collected evaluation materials, and obtained the consent of the subjects in advance. A total of 68 undergraduate students participated in this study, including 61 females and 7 males. Using simple random sampling techniques, two classrooms with different levels of student performance were selected, and a study was conducted using pre class tests, eight training units in class, and another test after class, pre class, in class, and post class. Teachers who are engaged in teaching the "Teacher Professional Skills Training" course in the second semester of the 2023-2024 academic year also participated in this study.

Independent variable: The learning model includes: EDMC learning model and reference learning model.

Dependent variables: Creative teaching skls: Observation skills, creative thinking skills, and Creative operational Skills(micro-course creation skills).

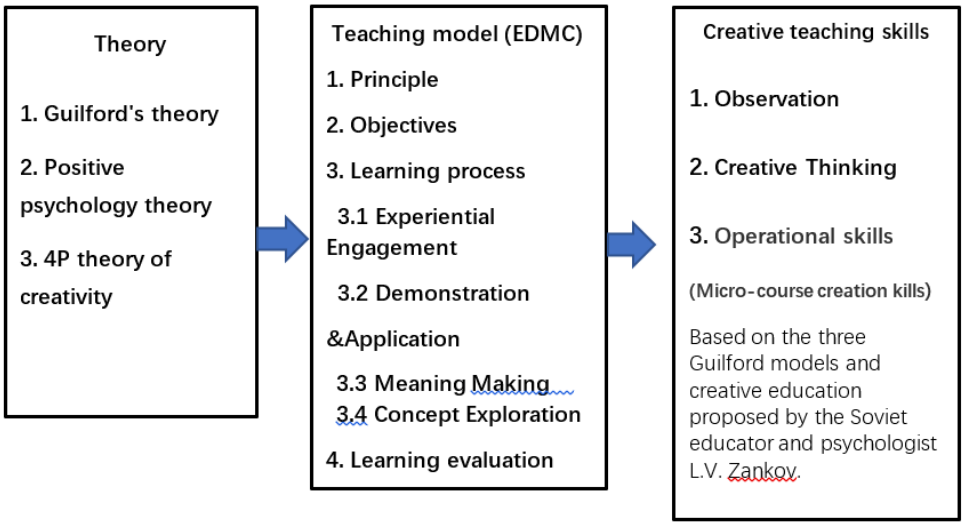


FIGURE 1 Research ideas and methods

Gilford theory

Ford is the founder of scientific creation psychology. He believes that the essence of creative talent is the combination of basic human abilities. Creative talent is closely related to personality factors. Gibson's theory on creative talent research embodies the charm of scientific methods such as hypothesis argumentation, factor analysis, and model operation. Guilford's theories and methods of creative talent research enabled him to create a new field of scientific creative psychology research.

Positive Mind Theory

Positive psychology is the study of positive emotions, positive personality, and positive society that emerged in the late 20th century. In the practice of creative teaching skills, it challenged behaviorism by moving from learned helplessness to learned optimism, finding that not only helplessness can be learned, but optimism can also be acquired through learning. Creative teaching skills can be carried out from optimism research theory and practice, emphasizing positive strengths and positive qualities. Research on teaching creativity that produces positive behaviors in teacher educators.

4P theory of Creativity

The study of creativity began before the 20th century, but the real scientific study of creativity began with Guilford's call for creativity research during his presidency of the American Psychological Association. In the face of tens of thousands of creativity studies, Rhodes proposed the 4P model of creativity to discuss (Rhodes, M. 1961). The 4P model divides all research on creativity into four aspects: the creator (Person), the creative process (Process), the creative result (Product) and the creative environment (Press).

Micro-video course

Because this study thinks that the micro-video course is the sum of the teaching content of a certain subject or a certain theme and the implementation of teaching activities through the teaching micro-video performance, the teaching content of the micro-video course is composed of several teaching micro-videos according to the teaching objectives and teaching objectives. Strategies, constituted in a certain structural order. Therefore, teaching micro-video is the main teaching content of micro-video course, and it is a very important concept.

Conceptual framework: Based on the theory and method of Guildford's creative skills research, on the basis of the three-dimensional structure of intelligence of Guildford's theory, and through the long-term educational experimental research of Soviet educator and psychologist Zankov, creative education tends to be systematic. Who believes that creative education should cultivate students' abilities in three aspects: observation, thinking and practice. This paper on creative teaching skills is organized into the following areas: teaching observation, creative thinking ability, and creative operational skills. By studying theories and sorting out problems, model development can be carried out to develop models that are conducive to creative teaching research, and the models can be evaluated.

CHAPTER 2
REVIEW OF THE LITERATURE

Overview

In the view of early Western qualitative researchers , researchers do not need to read the literature before entering the research site, but it is difficult to ignore the existing literature, enter the research site without any ideological background. Nowadays, it is feasible for modern qualitative researchers to conduct a certain literature review before collecting data, and compare the theoretical assumptions in the literature with the actual situation to further deepen the theory. Qualitative researchers need to pay attention to avoid literature review from polluting their own theoretical construction, and avoid conceptual frameworks from suggesting and guiding their own data collection and concept generation. This research involves multiple concepts. This chapter first defines the core concepts, then collects relevant literature materials according to the research topics, conducts a literature review on the relevant research content discussed in the current academic circle and the relevant research methods used by researchers, and further sorts out the relevant definitions of this study are established, thus laying the foundation for the follow-up research. Defining a clear operational concept is a prerequisite for in-depth research on the creative teaching skills of normal students. Since the creative teaching skills of normal students are the specific manifestation of conventional teaching skills in the field of normal students , understanding the concepts of general creativity, creative education and instructional design is of fundamental significance for defining the concept of creative teaching skills of normal students.

2.1 Creativity

2.1.1 Definition of Creation

Creativty — a word that is mostly translated as "creativity" in the Chinese context. Its etymology is in the Latin " Creatus ", which means to create, create, produce and bring about. In the English context, Creativty means "creative talent, the development of talent and intelligence", including the following meanings: creating or

having the ability to create (be able to create) , t o bring into being , produce (Productive); have or show imagination and artistic, inventive talent; stimulate the driving force of imagination and invention, etc.

Creativty in the Chinese context is more focused on its ability level, which is the ability to generate new ideas, that is, the ability to create behavioral achievements. The Chinese meaning of "creation" is: the founder , the beginning of the Chinese dictionary (Chinese etymology), and the meaning of ingenuity (the comprehensive dictionary of shape, sound and meaning). The modern Chinese dictionary defines creativity as: ideas and phenomena that strive to innovate.(Høyrup 2012) Webster's Dictionary's explanation is: it has the meaning of "endowing existence" and has the nature of "to bring into existence" or "for the first time"(Gove 1973) .

But there is disagreement and apparent consensus in the research community about the connotation of creation. What is creation? Richard B. Meyer summarized it in the last chapter of "Handbook of Creativity" . Be in two points: the one, novelty, the 2nd, usefulness. As can be seen from the chart below :

TABLE 1 Creates two defining characteristics

Author (chapter)	Feature 1 : Originality	Feature 2: Use
Gnuher & Wallace	Novelty	Value
Martindale	Original	Suitable
Lumsden	New	Important
Feist	Novelty	Adaptive
Lubart	Novelty	Nickerson
Valuable	Novelty	Utility

Source : Richard B. Meyer, The Creativity Handbook, Chapter 22, p370.

2.1.2 History of Creativity Research

In the eyes of most scholars represented by Boorstin (DJ), the earliest creation view can be traced back to the Bible story Creation in the Western Genesis. In the same way, we believe that the history of Chinese creation studies should begin with the legend of the beginning of chaos in Eastern culture and the creation of man by Nu Wa. Regardless of Eastern or Western culture, it started from the feats of heroes in the imagination. Since then, there has been the concept of people or gods creating people or things on the earth according to God or their own wishes. In the West, it was not until the end of the Middle Ages in Europe that this view of creation gradually faded away. In the East, this view had a more profound influence. The creative behavior of later generations is more manifested in the imitation of heroes and "Tian Dao" (laws), etc., and implants this imitation into the corresponding civilization. According to Boorstin , for the Indians (1500 BC - 900 BC), Confucius (551 BC - 479 BC) and Taoists, Buddhists, creativity is at most a discovery and imitation. Taoism and Buddhism, especially in the early days, emphasized natural cycles, yin and yang balance, etc. In this case, the idea of creating the present from scratch has no place in this culture of imitation and following(Boorstin 1993) . Just like Plato's generalization, the creation concept of human beings in the early stage "cannot have anything new " and lacks the core feature of modern creation concept , that is, originality.

Relatively speaking, while accepting the mystical power, the West appeared earlier about the concept of "genius," "inspiration" or "getting an idea" close to creation, in the traditions and beliefs of ancient Greece, Judaism, Christianity and Muslims. There are manifestations, and they believe that it is bestowed by a higher power. In the article by Roberts Albert and Mark A. Renke, creativity was originally associated with some mystical power, which early manifested as protection and good fortune. When the ancient Greeks emphasized the individual gods and demons (patron saints), the idea of genius became mundane and became associated with the individual's abilities and desires, both constructive and destructive. By the time of Aristotle, creativity had more to do with some kind of fanatical and foolish inspiration, a view that reappeared through

most of the 19th century and the first half of the 20th century. Among the Romans, there is another interesting point of view. They believed that genius was a creative ability that outstanding men could pass on to their offspring , and they regarded creativity as another male ability after fertility.(Roberts 2006)

Beginning with the Renaissance, the creative qualities of the individual were gradually transferred from the gods to the common man. After the Renaissance, the term "creation" was no longer used only for God, but also for human artists. In Europe, individual sources of inspiration and artistic expression were considered to be what differentiated man from other species. In addition, creativity began to combine and break through with human imagination, individual freedom, and social authority in human food.

The first important figure to recognize the importance of imagination in people's thinking and planning and how it is structured. The debate on "creative imagination " throughout the 18th century has made several generations of writers, philosophers, and artists exposed to this concept make extraordinary efforts, thus uncovering the complex definition of the concept of creativity. Studies on this period can be found in the literature of various contemporary researchers, such as Albert, R . S., 1980, Baer, J., 1995, Bloom, B.S., 1985, Runco, A.1986 and so on.

From the end of the 19th century, people began to discuss how to cultivate creativity (Craft 2001) . Until recently , there have been few professional articles and books on creativity (Feist and Runco 1993). In Chapter 2 of Sternberg's "Handbook of Creativity", the findings of Feist and Renke's 1993 article are cited(Sternberg 1999): Guilford's The most-cited content in the article— from 1920 to 1950, only 186 of the 121,000 articles listed in Psychological Abstracts were on creativity. Articles are less than two per thousand (0.2%). Recently we found that about 5 times as many people have recently studied creativity as before. The percentage of articles on creativity in Psychological Abstracts gradually increased from 0.002% around 1920 to 0.01% in 1980. From the late 1960s to 1991, almost 9,000 articles on creativity .(Feist and Runco 1993)

In order to explore the internal mechanism of creativity, many researchers have devoted themselves to it, and various views have emerged, and everyone has their own opinions. In summary, there are several representative views as follows: one is that it is natural to play with ideas The abilities of color, form and relationship are the most important things in creativity; secondly, children who seem to have a great interest in "game activities" show great adaptability and originality, and are more creative than those who lack this hobby. Children showed more new ideas, so they have higher creativity; third, they think that those special "non-professional" enthusiasts have great creative achievements, which shows the importance of hobbies in creative activities; fourth, they think that Many literaryly gifted teens enjoy imagining their imaginary friends and life partners as children, and their creativity manifests early on. (Keane 2013)

Marx believed that "the essence of history is the practical activity of man". The greatest significance of the continuous deepening of creativity research is to confirm that creation is the essential attribute of human beings. Starting from the fundamental point of view of practice, Marxism affirms that human creativity is the essential attribute of human beings, a form of existence of human beings, and an extension of human nature. (The Central Committee of the Communist Party of China, Marx, Engels, Lenin, Stalin Works Compilation Bureau, 2000)(Beecher and Fomichev 2006) .

According to Fromm and Cassirer, creation is a basic energy possessed by human beings, and also one of the basic attributes of human beings. Fromm pointed out that man is a spontaneously creative animal, he not only "can" create, but in order to live, he "must" create. In Cassirer's view, "spontaneity Creativity and creativity are the core of all human activities, it is the highest power of human beings, and it also marks the natural boundary between our human world and the natural world." Creation makes people human: Creation distinguishes human beings from all life in the world , It endows life with value and meaning, and is one of the basic driving forces for individual progress and development (Ernst Cassirer, 2004).

Although the research on the origin of creativity has long history , its systematic research began in the second half of the last century. Prior to this, early definitions of creativity can be divided into two categories, namely process definitions(Wallas 1926) and teaching materials (outcomes) definitions(Barron 1955). In 1950, JP Guilford's inaugural address when he became the president of the American Psychological Association is generally considered to be the beginning of scientific research creativity. In his speech, he reminded people to pay attention to a long-neglected but very important field- -creativity(Guilford 1950). So far, it has awakened people's attention to this once neglected field. With the emergence of some creativity research institutions, professional periodicals such as "Journal of Creative Behavior" and "Journal of Creativity Research" successively established a large number of famous scholars such as Guilford, Osborn, Torrance, Mackennon, Stanley Thunberg et al. used different methods to conduct research from different perspectives: research results were presented in the form of academic papers and monographs, and the influence of creativity research continued to expand(Niu 2006).

Before Gilford, the first person to systematically study creativity was the British psychologist and father of difference psychology, Francis Galton R. He focused on genius research R, followed by nearly a hundred researchers around this topic, who defined genius as the recognition of achievement in a wider field. Later the focus of research shifted from psychological to intellectual investigation, which was still prevalent into the 1920s. Creativity research in the 1950s was largely concentrated in the field of psychology.

In the early years of the 20th century, there was a wave of interest in the empirical investigation of creativity in the discipline of psychology. There are four main schools: psychoanalytic school; cognitive school; behaviorist school and humanist school.

By the 1950s, although some scholars' research included the investigation of creative intelligence , since then creativity research has mainly focused on the field of

psychology, and research on creativity has mainly focused on three aspects : personality Research, cognitive research and how to promote creativity research.

In the early 1980s, the famous American psychologist and educator Howard Gardner (Howard Gardner) put forward the theory of multiple intelligences. He distinguished seven forms of intelligence, namely language, logical mathematical, spatial relationship, musical, Somato-kinesthetic, interpersonal, and self-aware(intelligence). This theory has given many inspirations and references to the study of creativity. Since there are multiple forms of intelligence, there may also be multiple forms of creativity. If creativity is regarded as a psychological system with a unified static structure and dynamic structure, then it is a system that includes the purpose of creation, the process of creation, the materials of creation, the result of creation, and the cognitive and non-cognitive aspects of creativity. factors and many other complex psychological structures.

Since the 1950s, the research on creativity has gradually developed into an interdisciplinary research topic beyond the discipline of psychology. More and more, many intuitive results or benefits have been produced in advertising, media, marketing, news, industry, research and other organizations and their behaviors . The concept of creativity has been integrated into the subject context of related fields (Amabile 1988), that is, the expression of creativity in each field needs to have a solid and solid foundation of subject knowledge or theory , and creativity itself Recognition by the discipline in their field is also required. The academic research on creativity has attracted enough attention from the whole society, and the importance of creativity has surfaced.

Since the 1980s, with the continuous manifestation of the importance of creativity, new progress has been made in the research of creativity, and new developments have also appeared in the definition of creativity. Among them, the most representative one is Amabile . There are two definitions of creativity proposed in 1982, that is, the definition of creativity assessment consistency and the conceptual definition

of creativity(Han and Wang 2011). In addition, creative personality definitions have emerged(Gardner 1993).

There have always been two research lines for the research on creativity : one is to regard human creation as a special mental process, and focus on the exploration of the general laws of creative thinking; the other is to regard creation as a special ability of individuals Tendency, focusing on the research on the personality qualities or characteristics of creating individuals(Mowday and Sutton 1993). The latter is the direction we focus on in our research.

2.1.3 Creativity theory

"A logical starting point to study creativity is to define the meaning of creativity." (Rothenberg and Hausman 1976). Although different psychologists have different opinions on " The term "creativity" has different understandings. When we narrow the scope to the Chinese " creativity", at present, more research and opinions in China focus on the quality and ability of individuals.

Due to varied Chinese translations of "creativity" in English, differing orientations in Western creativity studies emerge. When "creativity" is translated as creativity, research emphasizes individual differences and cognitive education. In the last chapter of The Handbook of Creativity , Richard B. Meyer states: "Despite agreement on basic definitions, the authors of the chapters in the Handbook Qing's question is still answered differently , reflecting the diversity of the field. First, is creativity a human characteristic? A characteristic of the teaching material (outcome)? Or a characteristic of the process ?" (Sternberg 2000). The former focuses on individual differences in creativity, while those who hold an intermediate point of view focus on case studies of creative teaching materials (outcomes), while the latter believe that creativity is a cognitive process , so the research tends to focus on The teaching of creativity or creative cognition .

Throughout the past 60 years of creativity research in the West, its orientation is nothing more than the following four aspects: In 1970, McKinnon attributed it to 4P: Person (individual), Place (environment), Process (process) and Product (

Teaching materials (results)(MacKinnon 1970). Scholars who focus on "individuals" believe that creativity is a certain characteristic of individuals that can distinguish creative individuals from other individuals; "Scholars who focus on research mainly explore how the working environment affects the performance of individual creativity: scholars who focus on "process" regard the creative action as a special problem-solving process (process of creative problem), from the process of The important issues in creativity are studied from the perspective of creativity; researchers who discuss "teaching materials (outcomes)" study creativity from the output results of creation.

In domestic scholars' cognition of creativity theory, several representative viewpoints such as ability theory, sum theory and quality theory are more influential(Kozbelt, Beghetto and Runco 2010). Capability theory, that creativity is - a kind of ability. The sum theory holds that creativity is the sum of abilities and qualities. The quality theory holds that creativity is an intellectual quality.

2.1.4 Definition of Creativity

Creativity comes from the Latin creare (meaning to create, create, produce, bring about)(Tan and Lee 2004). It applies mostly to the arts, when creativity and artist are synonymous. Regarding creativity, there are different opinions, and there is no consensus. There are hundreds of definitions of creativity abroad(Sawyer and Henriksen 2024). The definition of creativity mainly revolves around individual characteristics, creative process, creative teaching materials (results), creative environment and other aspects(Garcês, Pocinho et al. 2016). For example, creativity is the ability to propose or produce work products with novelty(Lubart 1994). Creativity is the interaction of tendencies, processes and environments upon which individuals or groups create novel and useful visible teaching materials (results) recognized by society(Plucker, Beghetto and Dow 2004). For creativity, an influential definition in China is: according to a certain purpose, the ability to use existing knowledge to create some unique, novel, and socially valuable teaching materials (results) .

Creativity itself involves a wide range. Scholars have different definitions of creativity, and different scholars have different opinions and views based on their

research orientation and theoretical basis. In 1982, the Japan Creation Society solicited definitions of "creativity" from all members, and got 83 different definitions.

Guilford believes that creativity is common to all people —an ability that "nearly all human beings are capable of creative action, however subtle or rare it may be . People have more." (Glăveanu 2023)

Japanese physicist Hideki Yukawa said : "Creativity is not something that flies out of the sky. The question of creativity can ultimately be boiled down to where creativity hides and what means can be used to bring it out." (Sheldrake, McKenna and Abraham 2001)

Torrance believes that creation is a process, including perceiving problems, finding solutions, proposing solutions, testing and evaluating, and communicating results . Torrance also added that this process also includes initial ideas, different angles ideas, breakthroughs from existing models, reorganization of ideas, or discovery of new connections between ideas (Craft 2001).

Robert J. Sternberg believes in the article "The Concept of Creativity; Perspectives and Paradigms": " Creativity is a kind of proposing or output with novelty (that is, uniqueness and novelty, etc.) and appropriateness (That is, the ability to produce work products that are useful and suitable for specific needs(Sternberg, Grigorenko and Kidd 2005).

Japanese scholar Masahiko Nakagawa put forward in the book "I5 Kinds of Creativity": "Creativity is the thinking ability that can produce some new value and utility." (Simonton 2013)

Liu Daoyu, a Chinese scholar, pointed out in his "Knowledge, Intelligence, Creativity --Talking about Creativity Education": "Creativity is that people actively play the role of creative thinking to discover undiscovered things according to certain needs, goals and tasks. The comprehensive ability to obtain new knowledge, new concepts, new teaching materials (results), and new ideas by reprocessing, combining, deducing, and practicing new things or original knowledge, information, and experiences is called creation. power." (Von Krogh, Ichijo and Nonaka 2000). Most scholars believe:

“Creativity refers to the ability to solve problems in an original way, including the ability to generate new ideas, discover new problems, and create new things.” At present, in the mainland of China , a more consistent view is to define creativity as: according to a certain purpose, use all known information , Teaching materials (results) of the ability to produce teaching materials (results) that are novel, unique, and have social or personal value refer to both thinking and material results.

2.1.5 Creative education

Creativity education is education that develops the creativity of each individual or student. In other words, any education that is conducive to the educated to establish creative ambitions, cultivate creative spirits, increase creative talents, train creative thinking, and carry out creative activities can be called creative education. Creative education has a long history, but it has been nearly a hundred years since creative education was truly regarded as a specialized field. It is generally believed that the United States is the first country to carry out creative education. AE Osborn, known as the "father of creative engineering", carried out a lot of work to promote creative education in the 1940s and 1950s . He believes that the content of creative education mainly includes creative special courses, promoting the application of creative principles and methods in practical courses, and using creative teaching methods that can generate a lot of imagination in teaching(Lin, Li et al. 2007). Today, creative education has been born as an independent subject area, and the research issues include : creativity, creative thinking, creative talent training, creative education principles, creative teaching methods, creativity tests, creative teachers and creative schools management and many other fields.

The training goal of creative education is to cultivate a large number of creative students and creative talents. Creative talents are those who have excellent quality, outstanding intelligence, courage, strong will, full of creative consciousness, creative spirit, familiar with creative principles, master creative methods, and can use their own creative talents in various social practices.

Peacekeepers are people who work creatively to understand the world and transform it. Professor Lin Jinhui of Xiamen University has successively authored works such as "Creative Development and Education of College Students" (1995), "Theoretical Research on Creative Education in Colleges " (2007) . "The Development and Education of College Students' Creativity" is an earlier monograph on college students' creativity in my country. The whole book is devoted to constructing the basic theory and method of creative development of college students. Zhou Yaolie (2000) defined creation, thinking, and creativity, and introduced the principles of creation from three aspects: creative process, thinking type, and creative psychology ; at the same time, he also analyzed in detail creative thinking such as divergent thinking, imagination, and inspirational thinking. Thinking, lists some important creative techniques, including enumeration method, brainstorming method, questioning method, combination method, functional analysis method, seeking differences in the same and seeking similarities in the differences, category method, morphological analysis method and other methods . In the book "Theoretical Research on Creative Education in Colleges and Universities", the author further elaborates and demonstrates the theoretical system of creative education, and answers questions such as the nature, target orientation, talent training mode, management system, and guarantee mechanism of creative education in colleges and universities. In the fifth chapter of the book, he proposes that the content of creative education includes lesson preparation, classroom assignments, extracurricular assignments, tests and evaluations; he analyzes in detail the stimulation of creative motivation and the construction of creative teaching environment. He believes that creative talents are composed of intellectual support system and non-intellectual support system , in which the intellectual support system includes knowledge, ability and skills, and the non-intellectual support system includes moral character, courage and perseverance. He divides creation into narrow sense creation and broad sense creation, original creation and non-initiative creation, advanced creation and primary creation. Creation in the narrow sense is "the results produced are original and have social value for human society", but in the broad sense "the results

produced are novel only for the creator himself"; advanced creation is "scientifically New discoveries, new theories, new inventions in technology, new creations in the field of literature and art", primary creations are "reforms with general tools, improvements in working methods, and rationalization suggestions"(Pollitt 2003).

Mr. Duan Jiyang, a famous creative educator in China, has successively written works such as "General Theory of Creative Teaching" (1999) and "Exploring the Psychology of Creativity" (2000). In the book "Creative Psychology Exploration", he analyzed in detail the concept and nature of creativity, the relationship between knowledge, intelligence and creativity; The problems of brain mechanism and creativity training strategies are analyzed and discussed. He first proposed that creativity is a high-level psychological quality and a comprehensive ability. Invention, discovery, and creation all belong to creation. Creativity is a kind of psychological potential, and everyone has this potential, but the formation and development of its reality cannot be separated from acquired education and practice. Without the conscious training of schools and parents, and without personal learning practice, there will be no realistic creativity. Mr. Duan put forward 10 common traits of creative personality based on the results of various researches: ① Wide range of interests and strong desire for knowledge; ② Flexible thinking and quick response; ③Rich associations and fluent language ; Speculative precision; ④courageous and enterprising, eager to discover; ⑤firm self-confidence, persistent pursuit; ⑥tenacity and self- control , tireless work; Regarding the personality factors that affect the development of creativity, he proposed eight aspects: creative need , creative motivation, creative interest, creative ideal, creative enthusiasm, creative will, temperament, and personality. Zhou Mingxing (1999) analyzed in detail the connotation of creation, the connotation of creative education, and the relationship between creative education and quality education (Duan, J.Y., 2000). He believes that the content of creative education should include: creative philosophy education, creative consciousness and thinking education, creative skills education and training, subject education, situational education, etc. Zhou Mingxing believes that the characteristics of creative talents mainly include: the uniqueness of research style, the

novelty of cognitive perspective, the diversity of thinking methods, the eternity of the spirit of exploration, etc., and divides creative talents into generalists and specialists according to different perspectives , Speculative and cumulative, speculative and methodical, theoretical and experimental. The creative qualities of creative talents include lofty ideals, firm beliefs, scientific world outlook, reasonable knowledge structure, good thinking quality, high innovation ability, strong curiosity, strong interest, and deliberate pursuit. Individuals with creative thinking generally have the following characteristics : have a unique knowledge structure, actively seek solutions to things, have a keen insight into things, be good at creative imagination, and often have active inspiration (Zhou, M.X., 1999).

In addition to the above literature, Yan Liangshi (1997) published "Creative Education: The Main Theme of Educational Reform in China in the 21st Century" in "Journal of Hunan Normal University" and Zhang Wusheng (1999) published "Creative Education" in "Educational Research". Several theoretical and practical issues", He Qizong (2002) published "New Theory of Creative Education" in "Jiangxi Education and Research", all of which expounded the importance of creative education from different angles, and discussed some theoretical issues of creative education. comb. From the analysis of the above documents, it can be seen that at the end of the last century and the beginning of this century, the research on the nature and cultivation of creativity and creative education was a hot topic that Chinese domestic scholars paid more attention to. stage, a number of valuable research results have emerged, and basically reached a relatively consistent understanding of what is creativity, the characteristics of creative thinking, and the characteristics of creative talents, although different scholars have subtle differences in their expressions. There are relatively consistent views:

1. Creativity is a potential that everyone has, and it can be cultivated. Creative thinking is a kind of higher-order thinking ability ; 2. Creative talents have some common characteristics, such as: broad interests, Concentration, flexible thinking, imagination, perseverance, strong independence, etc.; 3. It is very necessary for universities and primary and secondary schools to carry out creative education.

In the past ten years, most domestic scholars have been keen on carrying out research on innovative education, often using the word "innovation" instead of "creation". Therefore, research on "creative education" has gradually shifted to "innovative education", "innovative talent training" and so on. field of research.

2.1.6 Influencing factors of creativity

Sternberg said : "Creativity can be cultivated and trained", then we must carefully study the composition of creativity, and then find the factors that can have a significant impact on the development of creativity.

Behavior stems from four factors: personality, situation, and beauty. Murdock and Puccio in 1993 proposed combining research on these dimensions to enhance generalizability, covering individual motivation, culture, traits, environment, and psychological interactions. Almost all aspects, including nine cases, are relevant.

A more representative theory is the creativity system theory proposed by Mihaly Csiksentmihalyi , a professor of psychology at the University of Chicago ; Sternberg and Lubart 's Investing in Creativity Theory; Howard Gardner's Interactive View of Creativity, etc.

From the perspective of evolution, Cikezentmihai proposed the three-pronged systems model of creativity of Person, Domain, and Filed. Creativity is generated from the interaction of the three elements that constitute the system. ; Among them, the individual factor of creativity (person) involves inborn acuity, information processing skills, and may also be related to early experience, such as birth order, social class or religious belief, etc. In addition, the acuity to discover problems Sexuality brings the individual closer to the realm of creation. (Csikszentmihalyi , M., 1996)

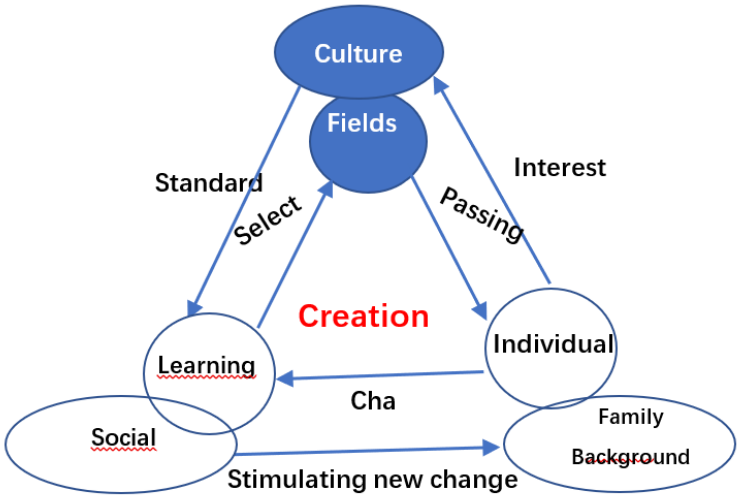


FIGURE 2 Csikszentmihalyi's system theory of creativity

Source: Csiksentmihalyi and Wolfe (2000. p.84)

2.1.7 Basic characteristics of creative skills

Guilford's identification of the basic characteristics of creative talent begins with the definition of its meaning. Before the mid-nineteenth century, creative talent was considered mysterious and unfathomable. Although Galton was the first to see creative talent as a measurable human characteristic, he attributed it to a genetic quality passed down from generation to generation. Freud believed that creative talent is the sublimation of sexual instinct fantasy, and noticed the relationship between personality, temperament and creative talent. But fundamentally speaking, what he emphasizes is mainly the biological instinct of human beings, ignoring human beings, and more importantly, their social essential attributes, so it is impossible to give a scientific explanation to the concept of creative ability. The anecdotal analysis school, represented by Wallace, put forward valuable descriptive views on the process of creative activities , but did not give a normative definition of creative talent. Guilford pointed out in his speech "On Creativity" in 1950: "Creativity refers to the various abilities that best represent the characteristics of creative characters." Later, he made a supplementary explanation of this definition: "Creativity determines the individual The

ability to display creative behavior at a significant level. Whether an individual possessing the requisite abilities is actually capable of producing results of a creative nature also depends on his motives and temperamental characteristics." Guilford's definition of creative talent research is of great significance. First of all, it makes people realize that creative talent is not an isolated and mysterious thing, but is composed of various basic abilities of the individual. Second, it emphasizes the significance of creative acts , which are relative. This makes people realize that creative talent is not a special gift of a creative character , and that all normal people have different degrees of creative talent. This principle of proximity makes possible a wider investigation of the creative talents of persons who are not necessarily distinguished. Third, the close relationship between the de facto individual personality, temperamental qualities, and creative talents is emphasized . However, this definition also has imperfections. It gives people an impression that creative ability is just the sum of various human abilities, and it seems that the improvement of various basic abilities will inevitably lead to the improvement of creative ability. After several years of research, Gilford overcame this shortcoming in his book "Creative Talent" published in 1986, and further proposed the basic principles of creative talent. The point of view that the essence is the way in which basic capabilities are organized. He said: "Creativity refers to the organization of various basic abilities . This organization is different with different ranges of creative activities. Each basic ability is a variable..." From the system During the inspection, we see that Guilford's final definition of creative talent and confirmation of its nature is based on his in-depth research on human intelligence. It was a popular view at the time that creative talent and intelligence were closely related. Because it is found that the IQs of outstanding figures in history are estimated to be very high; and based on the results measured using the Teman-Bina intelligence test scale: there is a positive correlation between IQ and creative ability. Guilford believes that the essence of this view is: intelligence is creative talent. The root of this view is that the main criterion used in the validity of intelligence tests is the performance of students in school. As experiential learning, these disciplines obviously do not necessarily require creative talent. Based on

this, Jishi produced the idea that "intelligence is composed of many abilities " . Guilford directed a research work called "Aptitude Research Program" at the University of Southern California for many years. In this study, many of the ability factors they hypothesized were confirmed by factor analysis experiments. In this context, Guilford proposed the famous "intellectual structure theory". He believes that there are five ways for people to manipulate information content, namely cognition, memory, divergent processing, convergent processing and evaluation; there are five types of processed information content, namely visual and auditory above), symbols, semantics, and behaviors; they then lead to six teaching materials (outcomes), namely, units, categories, relations, systems, transformations, and meanings. Therefore, there are as many as 6×5×5 basic human abilities. Guilford found in his aptitude research that many ability factors may be related to creative performance. In this way, he made the following distinction between intelligence and creative ability: "Intelligence is the systematic combination of abilities or functions to process different kinds of information in various forms" (P46); and "creativity refers to the combination of various basic abilities. Organization". While developing the idea that creative talent is made up of many basic abilities, Guilford also discovered that although inventors, writers, artists, etc. express their creative activities in different ways, they all share some common creative factors. Therefore, in his article "On Creativity", he assumes that creative talents have the characteristics of flexibility of thinking, sensitivity to problems, fluency and originality of ideas, and analysis and synthesis. In the later verification stage, through factor analysis experimental research, in addition to analysis and synthesis, he confirmed all other basic characteristics of creative talent in the above assumptions.

2.1.8 Creativity Teaching Skills

Creativity is the ability to provide original and socially meaningful products. It is a comprehensive ability realized at the highest level of human psychological activities. It is a very complex advanced ability . sign. Creativity teaching skills not only require teachers to exercise normal students' imagination, divergent and convergent thinking, intuitive and theoretical thinking in teaching , but also to carry out creative

coordination activities, character, belief and other personality psychological qualities are closely related . Creative teaching skills' formation and development stem from education, skill practice, school and parent training, and personal learning.

The development of creativity teaching skills of normal students plays an important role in the overall development of normal students. Today's colleges and universities are striving to become a learning and skill-oriented university, providing the best learning environment for normal students' personal development and deep integration of learning. Teacher students should actively develop their multifaceted abilities in the many activities and programs offered on campus. Clark believes that there are four most important abilities that deserve attention : essential academic skills, the ability to choose and pursue a career; the basic ability to fulfill their civic responsibilities; and creative interests and abilities.

The "Tracking Research on Chinese College Students' Learning and Development" project hosted by Tsinghua University divides students' teaching goals and acquisition into three levels : knowledge, ability, and values. There are some specific indicators under the above three dimensions, a total of 14 specific observation points (see TABLE 2), which provide us with a good research idea for improving creativity teaching skills (Su, L.Q., 2018).

TABLE 2 Teaching objectives and acquisition dimension index system

3D object	specific indicators
Knowledge goal	1. Widely involved in various fields of knowledge
	2. Deep professional knowledge and skills
Ability target	3. Good oral expression skills
	4. Good written expression skills
	5. Organizational Leadership
	6. Skilled use of information technology
	7. Critical Thinking
	8. Collaborate effectively with others
	9. Solve real-world complex problems

	10. Self-directed learning
	11. Know yourself
emotional attitude and	12. Establishment of personal outlook on life and values
Value goal	13. Define your future development plan
	14. Understand the culture and values of different groups

12 criteria for undergraduate graduation ability of Princeton undergraduates , at least 5 of which are related to emphasizing critical thinking, deep thinking and acquiring different disciplines of thinking. These include the ability to think and express oneself clearly, to reason systematically and critically, to formulate concepts and solve problems, to think independently, to innovate and to work independently, and familiarity with different ways of thinking way and so on.

TABLE 3 Ability Standards for Undergraduate Graduates of Princeton University

serial number	standard
1	Think, speak and write clearly
2	Reason systematically and critically
3	Form concepts and solve problems
4	Think independently
5	To dare to innovate and work independently
6	Ability to work with others
7	Have the ability to judge things thoroughly
8	Distinguish between the important and the trivial, the enduring and the fleeting
9	Familiarize yourself with different ways of thinking
1 0	Depth of knowledge in a field

1 1	Observe connections between different disciplines, cultures, and ideas
1 2	Capable of lifelong learning

The core literacy of American students emphasizes the development of key future skills, and puts forward the concept of "6C". The first one is creativity and imagination, and the other five are critical thinking and problem solving. communication, collaboration, character education, and citizenship.

2.2 Observational skill

The abilities and skills that observers should possess, including 1 Micro observation ability, positive attitude, ability to distinguish things, analytical and reasoning ability, multi angle observation skills, recording and organizing ability, comparison and contrast skills, and require observers to have patience and perseverance. The attitude of continuous learning is also very important for observation skills. Observers should maintain a continuous learning attitude, constantly acquiring new knowledge and skills, expanding their knowledge base, and enhancing the breadth and depth of their observations.

2.3 Creative teaching skill

2.3.1 The importance of creativity

MacKinnon (MacKinnon, 1978) believes: "The starting point, that is, the cornerstone of all creativity research, is to analyze creative teaching materials (outcomes) and determine what makes them different from other ordinary teaching materials (outcomes)". More than a decade later, Runco (1989a) suggested that analysis of creative instructional material (outcomes) might involve measurement problems arising from qualitative psychometric inconsistencies between divergent thinking tests and adult assessment scales. A large number of researchers and educators also believe in the importance of creative teaching materials (products) (Taylor, 1960; Treffinger & Poggio, 1972; Wallach, 1976).

Although the importance of creative instructional materials (outcomes) is generally recognized , and theoretical thinking about creative instructional materials

(outcomes) has been a common topic for decades (Besemer & Treffinger , 1981; Jackson & Messick, 1965; Ghiselin, 1963; Guilford, 1957), but psychometric research on the evaluation of creative instructional materials (outcomes) is surprisingly limited. Instructional material (outcome) analysis ranges from straightforward rating scales (Besemer & O'Quin, 1993; Treffinger, 1989) to conceptually sophisticated census measurement techniques (Amabile , 1983; Hennessey & Amabile, 1988a). The most commonly used methods of evaluating creative teaching materials (outcomes) use externally judged grades.

2.3.2 The importance of creative education

Implementing creative education and cultivating the creative teaching skills of normal students is an important guarantee for comprehensively promoting the implementation of quality education. Professor Liu Xianjun (2015) believes that cultivating the innovative ability of college students is a very important task in quality education in colleges and universities. Over the past 20 years , China's colleges and universities have made a series of theoretical and practical progress in promoting cultural quality education(Liu, X.X., 2015) .. However, some schools are still not clear enough in the definition of talent training objectives, and the operation is still not systematic enough. In fact, everyone has been thinking about a question for a long time. What is the most important quality for students to be cultivated by universities ? The economy is facing greater difficulties, and the pressure of employment is increasing. The employment rate of students (including postgraduate entrance examinations) and employment quality often become the primary criteria for the evaluation of departments. They tend to devote more energy to the cultivation of some vocational skills. From a technical point of view, this is understandable, but for the most important four years of university life, what should students pay attention to and learn most? What should be widely spread on campus? Fully develop The personality and characteristics of the students, try "adventure", try " collision ", try "whimsical", try to be a "good boy" in the traditional sense but full of passion and vitality, try to get along with different people,

these It is very valuable for students to step out of the ivory tower and enter the society and work creatively.

Creative education needs to reset the path of cultivating creative talents in the way of cultivating the creative teaching skills of normal students. At present, some colleges and universities have carried out some positive attempts, such as offering courses in creative psychology, implementing the "Excellent Talents Training Program", holding creative competitions, expanding the proportion of general education courses, strengthening practical teaching reforms, etc. Creativity does play a certain role, but the benefits for students are not enough. Creative education is to cultivate the creative consciousness, creative thinking and creative ability of all students. Its main position is in the classroom, and it depends on whether each teacher can organically integrate the ideas of creative education into subject teaching. Generally speaking, although the research on innovative thinking in our country started relatively late, it has a strong momentum and is developing rapidly. Since Tao Xingzhi advocated the concept of "innovative education" in education at the beginning of the last century, there has been a wave of research in the field of education since then.

In CNKI,110 dissertations (including doctoral dissertations and master's dissertations) can be screened out by searching with the keyword "creative teaching". It can be seen from FIGURE 4 that there has been a zigzag growth trend. Although the number of dissertations published in 2022 has decreased, there is still a good base, which shows that research is hot. The themes of the research mainly include the connotation of innovative thinking and the cultivation of innovative thinking, etc., which have played a great role in promoting the research of innovative thinking.

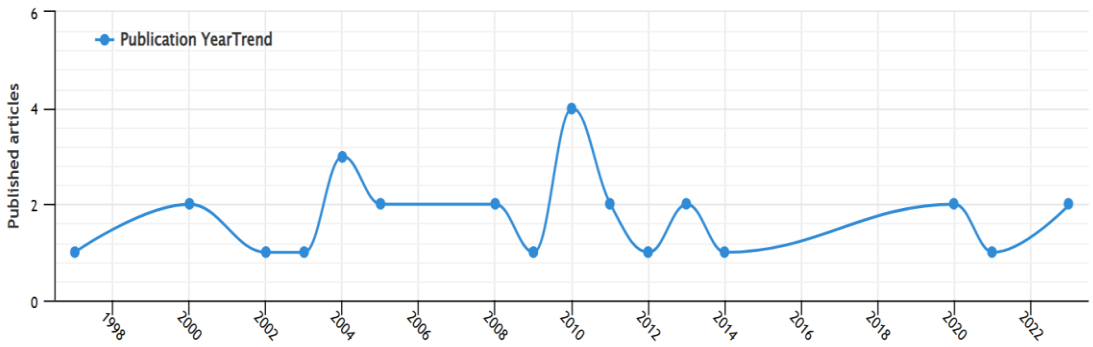
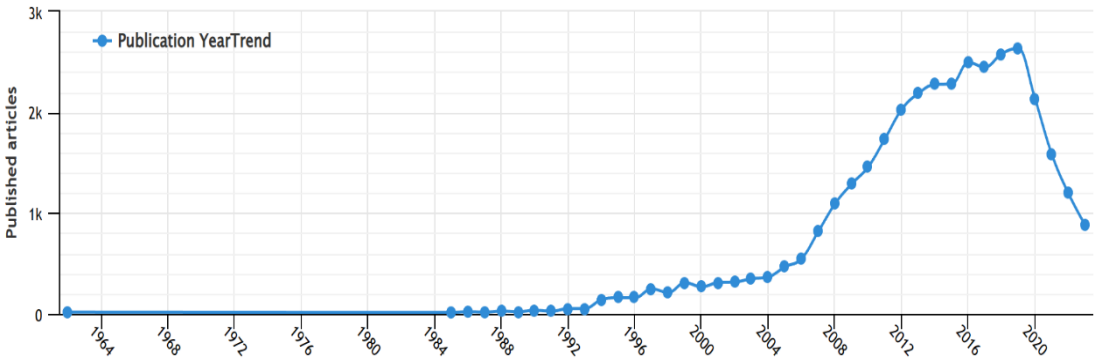


FIGURE 3 Distribution Trend of Main Articles Published in Creative Teaching Research

2.3.3 The importance of teaching skill

Teaching skills are the prerequisite for ordinary students to become good teachers and the basis for teachers' professional development. Therefore, in teacher education, it is very important to develop teaching skills. In the two ways of educational practice and micro-teaching, colleges are the cradle for training teachers. Normal students must not only have extensive professional knowledge, but also have teaching skills and practical abilities. Learning and practical ability cannot be obtained in the theoretical system, and must be continuously completed through practical activities. A future teacher must rely on the cultivation of professional skills in order to do a good job in teaching, and then rely on solid ability and teaching quality. The research on teaching skills in China is as follows:

In CNKI, 121 doctoral dissertations out of 110 and 2161 master's dissertations can be screened out by searching with "teaching skills" as the keyword. There are more and more articles on teaching skills research. As can be seen from FIGURE 5, there has been a zigzag growth trend in the past ten years. Although the number of dissertations published in 2020 has decreased, it still has a good base, it can be seen that research and teaching skills are getting more and more attention.



Skills

Research It can be seen from FIGURE 6 below that the data of " Teaching skill" occupies the first place, and the number of "Normal students" is second, which shows that "Teaching skills “and“ Normal students" has always been a hot research issue and has been deeply important in the education field is of great importance.

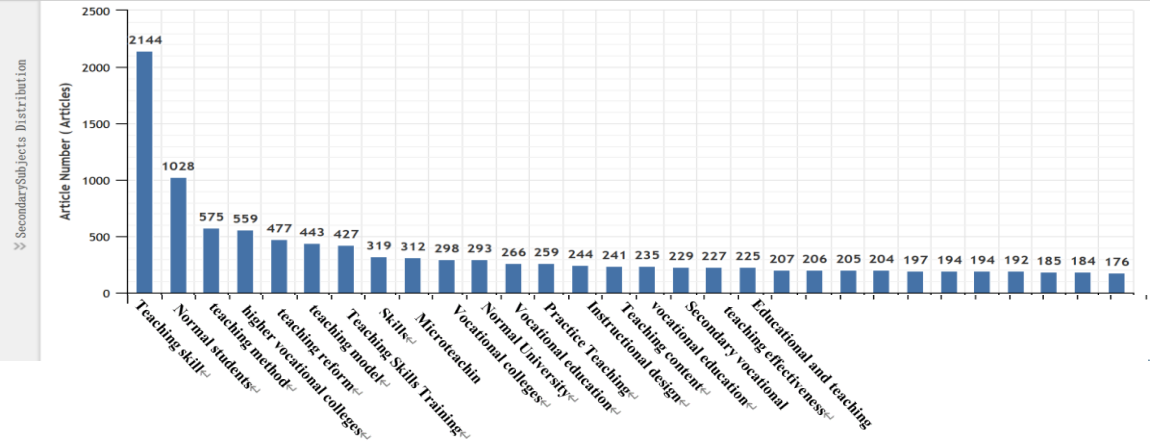


FIGURE 5 The distribution trend of the main subjects in the teaching skills research of normal students

The research on " teaching skills" includes vocational education, primary and secondary education, higher education, and theory and management. As shown in FIGURE 7, the distribution trend of the main disciplines of teaching skills research shows that higher education accounts for a large proportion. In higher education is the focus of research.

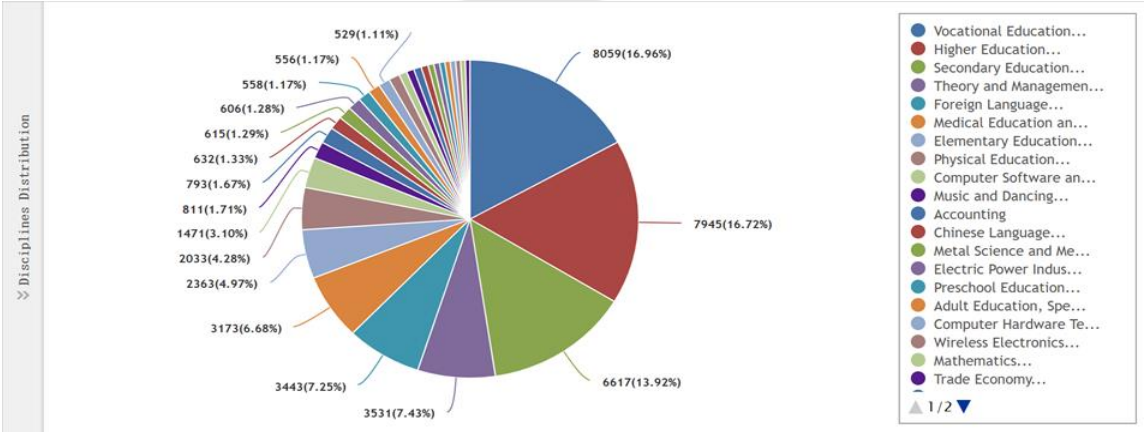


FIGURE 6 Distribution Trend of Main Subjects in Teaching Skills Research

2.3.4 The importance of creative teaching skills

China's increasing emphasis on the development of students' creative teaching skills emphasizes the importance of valuing. In the field of education, the research on how to cultivate students' innovative thinking ability and normal students' creative teaching skills in the field of education is mainly reflected in journal articles and master's and doctoral thesis. For example, He Kokang pointed out in his article "On Maker Education and Innovation Education" that the maker education in our country mainly cultivates students' innovative thinking through the use of technological means; Xu Qianlong, Zhu Zhi ting and others think that if you want to cultivate students' innovative ability, it is best to start from primary , and in "The Construction and Application of Primary and Secondary Schools' Innovation Laboratory for the Cultivation of Innovative Ability", it introduces the composition , current situation and existing problems of students' innovative ability, and constructs innovative Laboratory; Shen Junjie , Zhao Changlong, and Zhou Dunun, under the background of Maker teaching , put forward the "Cultivating Students' Innovative Ability: Based on Project Learning " with project learning as the core and the theme of "cultivating innovative consciousness, innovative thinking, and innovative skills". Theoretical Maker Curriculum Design Research(Junjie, S., Cheng ling, Z., & Feng ling, Z. 2018).) elevant studies have shown that innovative thinking can be effectively improved through training, should be integrated into course teaching. For example, for a specific problem, students can think and solve problems from multiple angles. In order to cultivate innovative thinking, in the teaching of graphic design, students are encouraged to "solve more than one question and think more about one question", and they can also train divergent thinking and collective thinking through a variety of questions in daily training. The concept is well implemented in education. In CNKI, the key word "creativity teaching" is searched. From FIGURE 8 below, it can be seen that the distribution trend of the main disciplines of creative teaching research shows that Elementary Education is the most used. Psychologist Piaget Said: "The primary purpose of education is to create innovation. According to Piaget's cognitive development theory, children's development is a

gradual process. Don't rush it. The best education should respect the laws of children's development. Education is a critical period of ability development; parents should help children find the "proximal development zone". Parents can set up some small games to help children transition smoothly when a certain ability of the child is about to come. Parents at all stages train children to create the focus of power can help children develop . Freud said in his iceberg theory that about 90% of any person's subconscious mind is hidden below the water surface, and only about 10% of his consciousness is revealed above the water surface. The cultivation of creative thinking in higher education is also very important.

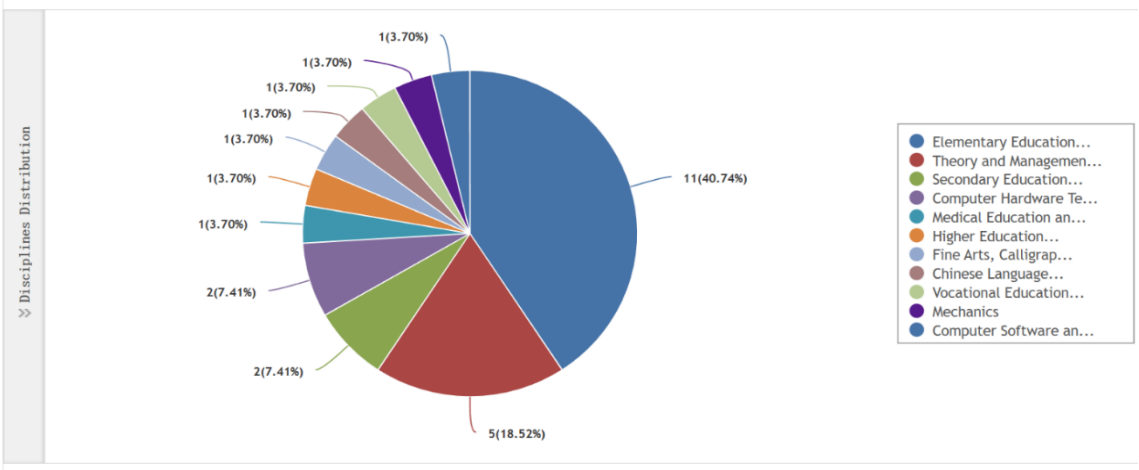


FIGURE 7 Distribution Trend of Main Subjects in Creative Teaching Research

2.4 Components of creative teaching skills

The culture of creative talent is urgent and important. university education should change from cultivating knowledge-based talents to cultivating creative talents. It is precisely because there are people with the ability to engage in inventions and creations that the glorious eras in history have been created one after another. However, human beings consciously pay attention to their own creative behaviors. If the British psychologist Galton published "Inherited Genius" in 1870, there is only a history of more than 100 years. The reason why people regard Galton's theoretical research on human creative skills as a milestone in the study of creative skills is based on the following reasons: Galton successfully applied the methods of statistics and empirical reasoning for the first time, and put creative talents into Research as an observable, measurable human characteristic; and the tradition of psychometrics he thus started continues to this day.

Domestic research on Guilford's theory is relatively weak, currently mainly limited to two isolated aspects of his three-dimensional structure of intelligence and creative thinking.

Domestic research on Guilford's theory is relatively weak, currently mainly limited to two isolated aspects of his three-dimensional structure of intelligence and creative thinking. Based on the structuralist methodology and the structural theory of general creativity, it integrates the advantages and disadvantages of the existing research on the structure of teaching creativity, and theoretically constructs the explicit structure of creative teaching skills on the basis of comprehensive speculation, so as to provide creative teaching for normal students. The education and training of skills provides a certain theoretical basis.

2.4.1 Components of creative

Creativity is a specific reflection of the human brain on the objective world. According to the concept and methodology of structuralism , since objective things are interrelated, creativity must have a certain structure. According to the construction method of creativity theory , RJ Sternberg and others put forward explicit theories (explicit theories) and implicit theories (implicit theories) of creativity in the 1980s. The

so-called explicit theory of creativity refers to the understanding of the structure, level and other aspects of creativity obtained by psychologists or experts in other fields through literature integration, large-scale surveys and rigorous confirmatory analysis. It is constructed externally , so it is called explicit theory. Explicit theory is a kind of theoretical construction, so it is relatively abstract and general, and people may not be able to store a complete explicit theory of creativity and extract it at any time to deal with practical problems. Implicit theory is people's personal theory about the causal nature and structure of mental events and behaviors, which allows people to judge their own and other people's creative behavior, and people usually use their own implicit theory to explain and judge creativity in daily life . Both approaches are useful and important in studying the nature and structure of creativity,

In fact, they complement each other, providing a broad understanding of the concepts and structures of creativity from different perspectives(Niu, W. & Sternberg, R., 2002).

Guilford (1967) proposed for the first time that the basic structure of creativity is the unity of creative personality and creative thinking. Creative personality, a characteristic exhibited as a result of behavior, and creative thinking, an operational cognitive or thinking characteristic, constitute the two main indicators of creativity. Among them, creative thinking mainly includes divergent thinking and converging thinking, which is the unity of the two kinds of thinking. Guilford places great emphasis on divergent thinking, believing it to be at the heart of creative thinking. At the same time, he also attached great importance to creative personality, including creative personality under the categories of ability tendency, interest, attitude and temperament, and pointed out that creative personality is manifested in creative behaviors, such as invention, design, composition and Activities like planning , and have the "results" of intellectual activity. People with these notable behaviors are recognized as creative people. Based on the three dimensions of intelligence (content, operation, and product), Guilford believes that the usual intelligence scale cannot fully measure creativity. Based on the theory of divergent thinking, he proposed six components of creativity: flexibility ,

Fluency, sensitivity, ingenuity, redefinition and insight. °Gilford's creativity structure theory created the foundation of psychological research on creativity, and had a profound impact on the theoretical research and education of creativity(Guilford, J. P., 1967).

The structural component model of creativity proposed by Amabile (Amabile, 1983, 1996). Based on the viewpoint of social psychology, she believes that creativity includes domain-relevant skills, creativity-relevant processes, task motivation and social environment (Amabile, T. M., 1983).. Domain-related skills are the knowledge and abilities related to a specific field, which are the basis and premise of creation in this field (Amabile, T. M.M., 1996).. These skills mainly depend on the individual's innate cognitive and perceptual abilities and the education received in the day after tomorrow; creativity-related skills are the key to people's creation in any field, which is manifested in people's unconventional cognition and has a close relationship with personality; task motivation is the driving force for creative activities, and it is closely related to the individual's attitude towards tasks; social environment Refers to the factors or atmosphere in the environment that promote or destroy creativity. Amabile's structural component model of creativity is a comprehensive structural framework of creativity, which has both individualistic and social generation orientations. This structural model has a great influence on the research of creativity, and many researchers have further promoted the structural research of creativity based on this model.

Sternberg's (1988) three-faceted model of creativity. On the basis of the triad theory of intelligence, Sternberg proposed a three-sided structure model of creativity, which is the trinity of intelligence, intellectual style, and personality. This model holds that creativity is the perfect unity of intelligence, cognition and personality, but not a simple addition. The aspect of intelligence refers to the use of intelligence in a creative way, including three aspects: internal correlation intelligence, external correlation intelligence and experience correlation intelligence. The aspect of intellectual style refers to the way intelligence is used in a person's thinking and activities, including management functions, forms, levels, scopes, and tendencies of psychological self-

management. It is a bridge connecting these two aspects of personality. Personality profiles are always associated with creative expression, including low tolerance for ambiguity , intrinsic motivation, willpower, and risk-taking. " (Sternberg, R. J., 1988).)On this basis , Sternberg put forward the investment theory of creativity, which believes that creativity includes six basic factors, namely knowledge, thinking process , motivation, personality traits and environmental cues. Thunberg's three-sided model of creativity has greatly promoted the progress of the research on the structure of creativity because it has fully absorbed the latest achievements in cognitive psychology.

Csikszentmihalyi (Csikszentmihalyi, 1999) proposed a system structure model of creativity. His view is that creativity arises as a psychological process, a cultural and social event.. Based on the "A System Perspective" (A System Perspective), he proposed a system model of creativity, and believed that creativity is similar to the genetic change process that leads to biological evolution. This model emphasizes the interaction among personal background, society and culture, and believes that creativity is the result of the interaction of individual, field and field(Csikszentmihalyi, M. 1999C).

Chinese scholar Dong Qi (1993) categorized the dynamic structure of creativity into the ability to acquire, store and activate information. The point of view describes the dynamic process of creativity from germination to formation, and believes that the formation of creativity can only be realized through the entire process of information processing(Dong, Qi., 1993)).

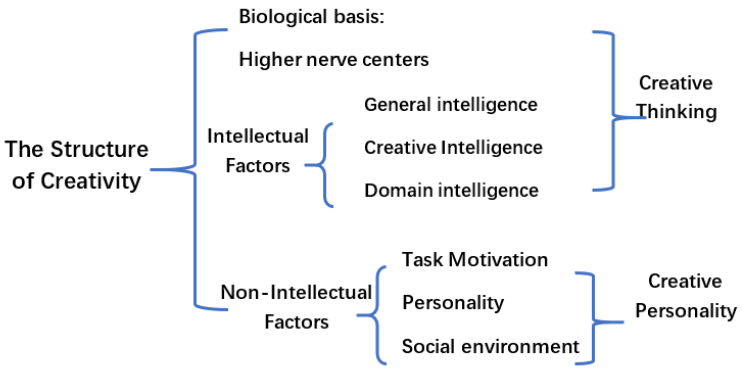


FIGURE 8 Structural elements of creativity

2.4.2 Components of creative teaching skill

Today, cultivating innovative teachers plays a role in promoting social development. Innovative teaching skills play an important role in the cultivation of normal students. The work of teachers is the use of comprehensive intelligence. Innovative teachers must have keen and meticulous observation Therefore , in the training of normal students, improving the observation ability of normal students is also one of the aspects of innovative teaching skills; in the training of normal students, positive thinking must be done after observation. Watching movies or TV dramas in life, the plot of the work often makes us feel a lot of emotions. We can write down the feelings in our hearts through words and write an after-view review. Thinking is messy and needs to be sorted out by writing after-views. Gardner's multiple intelligences explained that human intelligence activities contain at least seven intelligent elements that can change fate. These elements are all after making full use of sensory observations. Learners must have creative thinking before they can learn further. The display of learning results requires operational practice, so creative operational skills are also an important part of the creative teaching skills of normal students.

2.4.2.1 Observation Skills

In the United Kingdom, a professor of medical university said to his students on the first day of class: "The most important thing to be a doctor is to be bold and careful." into the cup of urine, and then put his fingers into his own mouth to suck. The students looked at the professor in amazement. Unexpectedly, the professor then handed the cup to the students and asked each student to do as he did. The students fought back their nausea and stuck their fingers in the urine and then into their mouths like a professor. The professor was very proud of seeing the students in distress, and finally he smiled and said: "Haha, yes, yes, each of you is bold enough." Then, the professor said solemnly: "It's a pity that you are not careful enough. Didn’t notice that I put my index finger into the urine cup, but I put my middle finger into my mouth!” After reading the above story, do you think the professor is very bad? In fact, the professor's original intention was to demonstrate the detailed observation method to the students. When it comes to observation, please don’t think that it’s just a trivial thing to watch and

listen to. If you look through the history of human development, you will find that human's intellectual activities start from observation, and observation is the gateway to intelligence. A person with strong observation ability can discover miracles from events that most people think are commonplace. On the contrary, even if a person with weak observation ability enters Baoshan, he may return empty-handed. Apples falling to the ground and the lid of the kettle on the stove being lifted by water vapor are all very familiar phenomena. Commodities are the most common and ordinary things in capitalist society, they are the economic cells of capitalism, and they are things that everyone contacts all day long. However, Marx discovered the theory of surplus value from it with a keen eye, and revealed for the first time The secret of capitalist exploitation lays the cornerstone of Marxist economic theory. Although these great discoveries and inventions are not so simple, strong observation is indeed the factor of their success. Rodin once warned his students on the key to learning: "Observe, there is nothing but observation!" So, what is observation? Observation is a purposeful, planned, and step-by-step perceptual activity. It is a psychological process of knowing the surrounding things purposefully through actions such as seeing, hearing, smelling, and touching. Among them, vision plays an important role, and 90% of external information enters the human brain through vision. What is power of observation? Observation refers to the ability of the human brain to consciously, plan, and purposefully capture the perceptual activities with essential external characteristics in things through sensory organs. Think about it carefully, do you usually notice the eyes of others? Do you often notice a small movement of students? This method of observing from a small place is the method of detailed observation. Using the detailed observation method can often find problems that others cannot find. It is said that the Eskimos living in the Arctic have a detailed distinction on white. The world that is white in our eyes has rich layers and colors in their eyes. They can observe the differences that we ignore with naked eyes, such as the whiteness under the sun and the whiteness in the shade. They can see things that we don't see, mainly because they see things that we don't pay attention to through long-term and careful observation. If you want to acquire knowledge and develop

intelligence, it is best to start by strengthening and improving your own observation ability. In fact, everyone's level of observation is different, even those poets and writers who are good at observing things are no exception. If you feel that your observation ability is not very good, don't be discouraged. You may wish to refer to the methods and methods of cultivating observation ability, try to practice, as long as you persist, it will be of great benefit. The method of cultivating observation skills this time uses the following behavioral indicators .

(1) There must be a clear observation task

Observing with a task is nothing more than to strengthen the attention of observation. For students in practice training, carefully observing the teacher's operation demonstration is a shortcut to quickly improve the level of professional operation skills. If each student regards observing the teacher's every move as the main task of listening to the class, and actively observes the details of the experiment and training carefully, then his learning efficiency will definitely be improved quickly. In the same way, if everything you do is carefully observed with a definite task, you will definitely get a lot of gains. The weightings are clear goals, generally clear goals, and unclear goals.

(2) Rely on certain knowledge, experience and skills

As the saying goes: "The one who knows the most sees the most." An experienced old welder can discover the advantages and disadvantages of the operator from an ordinary weld, but a layman often knows nothing. Therefore, it can be said that observation requires conditions. The preconditions required for observation mainly come from studying more at ordinary times and accumulating more knowledge, experience and skills. To a certain extent, the success of observation mainly depends on certain knowledge, experience and skills . In terms of degree, it can be divided into five aspects: not basically mastered, basically mastered, fully mastered, proficiently mastered, and reached the level of automation

(3) Observations should be carried out sequentially and systematically

Generally, it is carried out in a simple, complex, step-by-step, step-by-step manner. we can see the connection between the various parts of things, so as not to miss some important features.

(4) Pay more attention to details

The writer George Sand said : "All the secrets of nature research are hidden in learning how to use human eyes." Observation requires you to actively perceive things around you, to understand the principles you don't understand, and to perceive the details you don't understand. Strong observation means that you can see what others cannot see; you can see more deeply and thoroughly what others can see; you can see from multiple angles when others see it from one angle.

(5) Try to involve more sensory organs in observation activities

Numerous facts have proved that there is very little to be gained by observing the movements with the ears and eyes. If you add notes to the observation or practice the training movements on the ground, there will be greater gains. For students, watching more, practicing more, and participating in observation and operation with multiple sensory organs will always be a shortcut for them to improve their professional operation skills.

(6) Records should be made at any time during observation

This can not only enhance the actual effect of your observation, but more importantly, it is convenient for your future review and reference.

(7) Observe with curiosity

Dr. Li Zhengdao, a well-known contemporary physicist, said: "Curiosity is very important, and science cannot be separated from curiosity. The reason is very simple. Only curiosity can ask questions and solve problems. The terrible thing is that you can't ask questions and take the first step." step." Indeed, the stronger a person's curiosity about various things, the more he has a vision of exploration. It is impossible to discover new things if one is blind to the things around him. Only by being

good at observing and observing carefully, can new discoveries be made and opportunities for invention and creation be captured.

2.4.2.2 Creative Thinking Skills

Creative thinking is an advanced psychological activity based on various abilities. It explores new understanding and creates achievements. Its features are comprehensiveness, exploration, and novelty. Achieving its results requires exploration, research, and overcoming setbacks. Skills are acquired through knowledge accumulation and quality training. It's linked to reasoning, imagination, association, and intuition. H. Dr. Gardner, an American educator and psychologist, proposed the theory of multiple intelligences as a new human intelligence structure.

(1) Ability to give two and more examples of teaching and learning (associative and executive skills)

At the same time, the synergistic effect of idea generation and selection ultimately leads to creative activity or achievement (i.e., real-life creativity, RLC). In this process, the ability to give two and more examples of teaching and learning through individual or teamwork is a behavioral indicator in this study.

(2) Ability to come up with ideas that are different from others (knowledge and imagination)

The starting point of many papers is the discussion of the boundaries and foundations of knowledge systems, with the goal of revealing the "real-life world" as an original ontological domain. The "world of facts" refers to the basic features and logic of knowledge systems. A comparative reading of the works of Marx, Kant and Wittgenstein is the method of our discussion. In this discussion, we can delve into a number of important issues in the philosophies of these philosophers, such as the split between fact and value, the discourse of language-picture theory, the relationship between imagination, temporal schemata and purely intellectual categories, the connotations of class existence and sensibility, and the critique of ideology and nihilism. In the texts of Wittgenstein and Kant, we can find some turning points where the boundaries of the "world of facts" can be digested. In the social and historical existence

elaborated by Marx, we can find the meaning and the basis of the "world of facts". The primordial sphere that is the basis of the "world of facts" exists in the tension between the earth, which is the primordial emergence of sensibility, and the sociality, which is a primordial force that can form configurations from knowledge and imagination. Dewey's classification of the three kinds of imagination in Psychology (1887) is less convincing. From the lowest to the highest stage, the three kinds of imagination are mechanical imagination, fantasy and creative imagination. Later Dewey abandoned this threefold division of imagination (replacing it with a dichotomy between imagination and fantasy). The relevant pedagogical approach of George H. Mead, William James, John Fiske, Samuel Taylor Coleridge and the French psychologist Théodule Armand Ribot was object teaching, the key to object teaching being that it should promote the formation of "images". Dewey - the imagination from the point of view of logic (in the broad sense of "logic"). The key words are "dramatic rehearsal" and "thoughtfulness". He emphasizes the anticipatory function of the imagination in the process of reflective thinking or inquiry. He highlights the purpose, direction, and control of the imagination. Dramatic rehearsal" is a story structure. A related teaching method is storytelling. A story is a description or simulation of an experience. The ability to tell a story is the ability to communicate an experience. The secret of the effectiveness of storytelling lies in its ability to evoke the emotional involvement of the listener or reader. On the one hand, emotion is the driving force of imagination; on the other hand, when imagination is at work, it can direct emotion. In other words, imagination has a powerful emotional appeal. Dewey interpreted imagination from an aesthetic or artistic perspective. He emphasized the universality of imagination. Dewey insisted that every conscious experience necessarily has some degree of imaginative quality, that is, an aesthetic quality. In discussing imagination in this period, Dewey placed the greatest emphasis on immediacy, wholeness, and perceptiveness. During this period, Dewey's view of imagination was heavily influenced by Coleridge (Coleridge is back). A teaching method closely related to the development of immediacy and perception of aesthetic experience is nature education. Nature education is a good training for individual aesthetic sensitivity. It can

also provide a source of human creativity. In addition, Dewey had a special view on creativity. In Dewey's view, creativity is not production-led but process-led. Dewey insisted that the significance of creative activity lies not in its objective social value, but in the exercise it provides for the individual intellect. Imagination arises from experience. Second, imagination (and experience) must be understood in terms of the principle of completeness (or Humpty Dumpty). Third, a healthy imagination has an innate tendency to put itself into action or expression. Only action or expression marks the imagination's achievement. Then, the ability to come up with ideas that are different from others in action is an internalization of knowledge, which in this study mainly refers to the ability to come up with at least 2 different ideas.

(3) Ability to create original works that intrigue people within a specified time (curiosity)

Curiosity is a mental state and personality trait that can express the creator. Curiosity is a stronger motivational driver for humans in various exploratory behaviors, and it can be a fruitful way to explain emotional and cognitive reactions and enrich knowledge and proficiency. Well-designed work is closely related to the development of individual learning and creativity, and maintaining curiosity and planning the presentation of results is a driving force for invention. The great physicist Albert Einstein (1879-1955) said, "I have no special talent, I just have a strong curiosity." He believed that we are "surprised" when the concepts we already have in our minds conflict with things and phenomena we encounter in the real world, and that the development of our understanding is curiosity about such things, and that curiosity is an important moderating factor in students' willingness to learn. Curiosity should be considered as the main focus. In order to bridge this gap, an integrated model based on the stimulus-biology-response (S-O-R) model and the elaborated likelihood model (ELM) had been proposed. The current study focuses on a semester-long study in which students are able to personally create an intriguing micro-course work that allows different viewers to experience the different feelings expressed by the work.

(4) Be able to create at least one micro-course work independently

The theory of copyright law allows for coupling, and two authors who independently and simultaneously or individually produce the same or substantially similar work can be protected by copyright law. Originality in the context of this thesis refers to the ability of a teacher-training student to use relevant information and tools to complete an individually or team-owned work after the above observation and training in creative thinking, and originality is a condition that must be present for a work to be a work. Originality in the sense of copyright law is characterized by two elements: one is the requirement of "independent creation, originating from oneself", although independent creation does not mean single creation, but also collaborative creation; the other is the requirement of "minimum degree of creativity". The second is the "minimum degree of creativity" requirement, the minimum degree of creativity being judged more leniently.

In this study, we mainly focus on the micro-lessons that embody comprehensive skills. The originality of micro-lessons has two main forms of expression: first, the creation of micro-lessons from scratch. a micro-lesson, etc.; the second is to create on others' existing works, i.e., deductive works as referred to in the copyright law. Generally speaking, the originality requirement for interpreted works is higher than that for ordinary works.In research, the rule of "contact + substantial similarity" is often applied to determine whether a work is plagiarized. However, in the scope of this study, each student, even if they chose the same topic.

Behaviorindicators
1. Clear Observational Tasks
2.Possess certain relevant knowledge, experience and skills
3.Sequential and systematic (follow the simple first, then complex, step-by-step, step-by-step approach)
4. Pay more attention to details

TABLE 4 Components of Creative teaching skills

In summary, according to Christensen et al, the "father of disruptive innovation", human innovation is only a small part of the talent (25-40%), and most of it can be acquired through training. In the book "The Innovator's Gene," Christensen et al. describe five skills that can improve an individual's ability to innovate: connecting, asking questions, observing, communicating, and experimenting. The observation, creative thinking skills and operational skills (micro-video production) studied in the thesis can be developed from their own orientation - theoretical premises - benchmarking role models - analyzing role models - imitating role models - adding

creativity - forming a style - to develop the creative teaching skills of teacher trainees so that they can adapt more quickly when they go into the workplace in the future.2.4 Development of creative teaching skills.

2.3.2.3 Micro Learning Resource

FIGURE 9 Chinese college students record micro lesson scenes in the recording room

Micro courses (micro video online courses) are called "micro courses". It is an online video course resource designed and developed for a certain subject knowledge point,, with micro teaching videos as the main carrier, and supports multiple learning methods.

To determine the topic, video recording, choose computer screen software recording, video camera tool recording, recording classroom. For video recording and video recording tools, you can choose cell phones, digital cameras, DV camcorders, video cameras and other devices with recording functions. When using screen recording, use the mouse to click and drag with the narration, and use the brush function appropriately. The teacher should not explain the knowledge points and topics from the text, but should express his own opinion. Post-production: The recorded video is edited and beautified and saved, including the removal of the blank part of the video credits and end credits, and the video credits and end credits, with background music, etc. Finally, export MP4 or FLV HD video format settings are generated to ensure that the video screen is not distorted after export.

The content of the micro-course must be concise, and the content, text, pictures and sound must be accurate; the language of the micro-course must be easy to understand, in-depth, detailed and appropriate; if courseware is used in the lecture, the PowerPoint should be as simple and beautiful as possible; the picture quality of the video should be clear, and small scenes such as mid-view, close-up and close-up should be used. The video quality is clear, with more medium, close up and close-ups and other small scenes, and more fixed shots to ensure the quality of the video.

2.5 Creative teaching skills cultivation teaching

2.5.1 Cultivation of creativity

The most prominent measure in the United States to promote the cultivation of students' innovative abilities through teaching models is the implementation of the "independent enrollment and multiple admission" system in university admissions.The United States advocates Gardner's theory of multiple intelligences, and believes that human intelligence is multiple, and everyone has their own best intelligence unit. Teachers should not use a unified, single standard to evaluate all students , but should protect everyone's opportunity to get the best development in different aspects, so as to benefit outstanding talents or even so-called "partial talents" and "weird talents" Ken bain mentioned in the book "what the best college teachers do" (2004), "The main purpose of evaluation is to help students learn to think about their own way of thinking, so that they can use discipline or professional standards to recognize shortcomings. They change their way of reasoning when they think; the standard is not to rank students with high and low scores, and the scoring method of the grade distribution curve is completely meaningless." NSSE (National Survey of Student Engagement, referred to as NSSE, National College Student Learning Engagement Survey) In the research and investigation, it emphatically reflects the professionalism of the students and the key requirements of the course work: hours of academic activities per week, small articles and reports, classroom questions, demonstrations and discussions, extracurricular practice, participation in teacher scientific research, etc.

The Quality Assurance Agency for Higher Education (QAA) put forward one of the most important principles for evaluating students' academic performance in the "subject beno hmark statements" (subject beno hmark statements, 2012), which is "to provide sufficient opportunities for outstanding students to The performance shows outstanding innovation and reform capabilities." In fact, the United Kingdom began to reform university examinations in the 1970s. They criticized the end-of-year examinations in colleges and universities, believing that such examinations are out of touch with the learning process and are not conducive to Students develop new perspectives and originality.

French university teaching mainly cultivates the innovation ability of college students through strong foundation, elimination system, credit system, and emphasis on research. It has high standards and strict requirements in student academic evaluation, emphasizing comprehensive literacy.

Germany was the first country to advocate the cultivation of scientific and innovative talents. German universities place great emphasis on the practical training of students , as well as the freedom of teaching and learning. However, Germany has stricter requirements for examinations, so that Paulsen said in the book "The German universities and university study" (1902) , "Examinations allow those who have pure subject interests, and have the ability and ambition to find their own academic path. The truly active thinkers of the school are at a disadvantage, while those students who have adapted to rote learning and learn passively occupy an advantageous position."

Systematic research on promoting the cultivation of normal students' creative ability in reforming the teaching model is even rarer. In terms of works, there is mainly the book "Multiple Evaluation: Effective Mechanism of Innovative Education" by Pan Yongqing (2004). The claim applies to colleges and universities as well. In addition, Zhang Hongwei (2017) edited the book "Reforming Academic Evaluation and Inspiring Creative Thinking" (volume 1 and 2), which systematically introduced the practice of Sichuan University's reform of academic evaluation to stimulate students' creative thinking over the years, and summarized many exams. Theses and test questions are

important practical research results on reforming academic evaluation and promoting creativity. Lin Jinhui (2007) in his book "Theoretical Research on Creative Education in Higher Education" repeatedly proposed to reform the existing academic evaluation system of colleges and universities, especially the comprehensive evaluation system. Other scholars such as Zhang Chuting, Liu Daoyu, Qian Yingyi and other professors have discussed the reform of academic evaluation and the promotion of creativity in many papers or books , but they did not propose a specific reform plan, but only put forward the reform plan. Ideas and main ideas. It can be seen that the existing results of academic evaluation reform to promote creativity cultivation, both theoretical research and practical research, are relatively poor and weak. Although some research results have been published on the promotion of creativity by training teaching skills. The research on the behavioral influencing factors of creative education theory includes (situation, motivation and thinking) give us useful enlightenment; the viewpoint of multi-evaluation theory is helpful for us to comprehensively and scientifically develop teaching skills and teaching models The reform to promote the cultivation of creativity has an important reference significance; teaching skills training is not only a link in the learning process, but also plays a guiding role, and it is an important situation in itself. Stimulate individual creative desire and creative inspiration. In particular, American scholar James C. Kaufman's views on creativity cultivation, such as focusing on subject teaching, students' internal motivation, classroom practice and daily life, and teacher-student relationship are of great value to the cultivation of creativity. Has a supporting role. Taking the above-mentioned important points of view as the logical starting point of the research, more in-depth research can be carried out to explore the mechanism and realization path of the influence of teaching skills training on the development of creativity.

2.5.2 Training of teaching skills

Actively grasping the innovation of teaching skills training methods for normal students is an important strategic measure to conscientiously implement the priority development of education and education fairness , the key to cultivating a large

number of outstanding teachers and future educators. We must fully understand the importance of cultivating the teaching skills of normal students; strive to grasp the teaching design skills, classroom teaching operation skills, teaching reflection, education and teaching research skills in our country; actively innovate training methods: reform free normal education The course setting of student teacher education should be improved, the teaching skills training center should be established, the cooperation between universities and practice bases should be strengthened, the teaching practice link should be reformed, and the combination of students' independent training and volunteer guidance should be tried.

2.5.3 Cultivation of creativity teaching skills

Innovation training is an important content of college students' education in the new era(Liu, H. M. 2008)). She analyzed the factors of college students' innovation training, including both personal factors and environmental factors. He believes that the individual factors that affect the innovation of college students include intelligence factors, knowledge factors, ways of thinking, motivation factors, personality factors, and gender factors; environmental factors include family environment, school environment, cultural environment, economic and political environment and other factors. Taking economics and management majors as an example, he believes : performance of innovative activities of college students majoring in economics can be judged from five indicators: publications, papers, social practice, various academic and literary competitions, and participation in academic conferences. To evaluate students' innovative performance. " Professor Xia Min is the author of the book "University Knowledge Creation Ability: Evaluation and Management" (2010). The elements of university creative education include creative teaching environment, creative teachers, students and creative education implementation system. The task of creative education includes cultivating students' Creation awareness, persevering creative perseverance, training students' creative thinking and helping students to establish a reasonable structure, relaxation and orderly intelligent structure. He believes that the knowledge creation ability of college students can be obtained from knowledge creation quality,

knowledge creation potential, knowledge creation strength and the four aspects of knowledge creation influence are used to evaluate and inspect, among which creative quality includes creative thinking and creative personality. Zhu Ruifu (2013) analyzed the concepts olinnovation and creation, the characteristics of innovative talents mainly include: rich innovative knowledge, Valuable innovative qualities, tenacious will to innovate, advanced innovative thinking, keen innovative observations, and scientific innovative practices. The training methods for innovative talents include : focusing on cultivating students' interest in learning, implementing problem-based teaching, guiding students to learn Carry out knowledge synthesis, guide students to learn "combination" and "transformation", and encourage students to use of the following ten characteristics: novelty, breakthrough, multi-directional, sudden, agile , image, profundity, independence, risk and synthesis . Regarding the cultivation of innovative thinking, Professor Zhu pointed out that the desire and impulse to create are the motives of creation, and innovative thinking is a sharp weapon in the creation of conquering cities. Both of them need to be cultivated and trained consciously , needs appropriate external environmental stimuli to be stimulated. "

In terms of theoretical research and practical research on the cultivation of creativity, there are a large number of landmark achievements, both at home and abroad, and the research is relatively mature. Many scholars have conducted in-depth research on the characteristics of creative thinking, the influencing factors of creative behavior, and the characteristics of creative personality tendencies. The weakness of the research is that, first, how to accurately measure the creativity level of children and adults is still a question to be explored, although many researchers have developed a series of creativity test scales or other methods, but some scholars have questioned that those who claim to measure creativity do not actually measure creativity itself, but may be some kind of expertise. The measurement of creativity level of ordinary people is extremely complicated. Ability tests are primarily developed for exceptional individuals or special populations. Another weakness of the research is that in terms of cultivating students' creativity, many people believe that specialized creative skills training will help

individual creativity. Classes such as rewards, competitions, exams, and punishments practice is not optimal for creativity", "creativity in everyday life is important", "mentors and environment are important for creativity, partnerships that educators form in the Cultivation is crucial" and other points of view have not attracted enough attention from subsequent researchers. Therefore, there is still a lot of room for exploration on how to cultivate students' creativity.

2.6 Measurement of creative teaching skills

The earliest scientific literature on the psychology of creativity in the world is the book "Inherited Genius" published by F. Galton in 1869 , which marks the beginning of scientific research on creativity. In 1950, Guilford delivered a speech titled "Creativity" at the annual meeting of the American Psychological Association, which made the research on creativity arouse widespread attention from all walks of life and set off a climax of creativity research. In the 25 years since Guilford's call, creativity has been extensively studied. Considering that it is generally believed that creativity is not definable and Dominance has been surprising (Callahan, 1991 & Khatena, 1982). Studies explaining the effects of psychometrics have generally focused on similarities between the development of creativity studies and the development of intelligence studies (Gardner , 1988b, 1993a).

Although psychometric techniques have advantages in studying both structures , this similarity has been greatly exaggerated. The main reason for the predominance of the psychometric view may be that the earliest researchers who became interested in creativity used psychometric methods to deal with other cognitive phenomena, and continued to apply the research methods they were accustomed to to their creativity research (Cramond , 1993; Gardner , 1993a). In foreign countries, the systematic educational evaluation theory was born in the United States at the end of the 19th century. In the 1980s, Gube and Lincoln put forward the "four stages" of modern educational evaluation in their book "The Fourth Generation Evaluation", which are measurement, description, judgment and construction. Gube and Lincoln believed that the previous three generations of evaluation had disadvantages such as the tendency of

controlism, single value orientation, and over-reliance on the scientific paradigm . psychological construction" and form an evaluation process with the clue of "response-co-construction-negotiation". They believe that the starting point of evaluation is response, the essence is joint construction, and the way is consultation. Negotiation is the process of continuously generating new consensus on the focus issues of common concern through dialogue and communication in a natural state .

American scholar Eisner (1994) believed that the new evaluation should contain 8 characteristics: the evaluation task should reflect the problems students encountered in the real world outside the school, and should not be limited to the homework in the school; the evaluation should not only draw a Conclusion, through the process of students completing the evaluation task, reveal how students solve it; the evaluation task should reflect the overall concept of the intellectual community it proposes; the evaluation can be completed by students individually or cooperatively; the answers to the evaluation questions should be diverse rather than the only one; the assessed work should be curriculum-appropriate and reveal students' ability to use what they have learned at a principle level; the assessed assignment or task should demonstrate a student's sensitivity to structure and the whole rather than simply perceiving discrete parts; Students are allowed to freely choose the form of evaluation results presentation . Herman (2002) and others believe that the view of learning and evaluation has shifted from behaviorism to cognitivism; from pen and paper tests to authenticity evaluation; emphasizing the basic role of growth record bags in evaluation; from single evaluation to multi-dimensional Evaluation; from emphasizing the evaluation of individuals to the evaluation of cooperation results .

2.6.1 Measurement of the training process of creative teaching skills

The measurement of the training process of creative teaching skills is mainly the measurement of the cognitive process and the development of teaching skills related to creativity. Divergent thinking tests that are widely used in the field of creativity include Guilford's (1967) Structure of the Intellect, Torrance's (1972) Torrance Tests of

Creative Thinking (TTCT), The creativity measurement tool developed by Runco and colleagues (Runco creativity assessment battery, CAB) and so on.

2.6.2 Measurement of Individual Creative Teaching Skills

Of individual creative teaching skills mainly includes the measurement of personal characteristics related to creativity , such as personality, motivation, interest and attitude. The original creative personality test mainly takes highly creative individuals as the research object, A personality test for creativity was compiled by summarizing the personality characteristics of individuals, and tested on ordinary individuals to evaluate their creative personality characteristics.

There are also researchers who comprehensively use a variety of measurement methods to conduct research. (Luo Yanhong, Shi Wendian, and Wang used three methods to measure the creativity of college students from various majors: writing stories based on pictures, listing hobbies, and creative personality scale. Consensus assessment was used to evaluate the creativity of college students' stories and listed hobbies Technology. It was found that the three creativity measurement results of the subjects were all significantly positively correlated with the dimension scores measured by the scale; in addition, individuals with high dimension scores had high scores on the creativity scale; while individuals with low dimension scores, The score of the story assessment is high. And the creativity of the subjects is measured by four means, such as the divergent thinking test, the creative behavior biography scale, the self-assessment level of the subjects' creativity, and the Beverly II art scale . It shows that there is a significant correlation between the dimension score and the four creativity measurement results, and the multiple regression results show that the big five personality traits can explain the variation of divergent thinking.

Sun Haozhe (2013) pointed out that college students with innovative ability generally show the following characteristics: creative way of thinking(Zhu, R.F., 2013). Mr. Sun tried to construct an innovative quality training model, and proposed that the foundation of innovation is the general education system, the guidance of innovation is the career planning of students, the platform of innovation is the employability of college

students, the experience of innovation is entrepreneurship education, and the skills of innovation are In practice, the power of cultivation and innovation is self-management and self-education, the leadership of innovation is the innovative teacher team, and the control of innovation is the evaluation and evaluation system. He also introduced in detail the innovative quality training evaluation system and its empirical application. There are mainly methods to establish the evaluation system, such as analytic hierarchy process, fuzzy evaluation method, SVM method of support vector machine. In the Analytic Hierarchy Process, it can be seen that 10 primary indicators and 99 secondary indicators are constructed as a dynamic evaluation system for students' comprehensive quality and innovation ability.

The 10 primary indicators are academic performance, publication of articles, foreign language proficiency, and other skill reward programs. In the fuzzy evaluation method, the book takes the undergraduate students' comprehensive quality and innovation ability evaluation system of the Capital University of Economics and Business as an example to illustrate how to use the fuzzy evaluation method to evaluate the students' innovation ability. The university's undergraduate comprehensive quality and innovation ability evaluation system includes three first-level indicators of intellectual education quality, comprehensive evaluation, and practical innovation ability. There are 10 second-level indicators under it, namely: intellectual education quality, political quality, moral conduct, Behavioral norms, academic performance , practical innovation, physical and mental health, practical activities, academic activities, skill levels, etc. In the case, the author points out that the transmission of knowledge in the school classroom is of great significance in the cultivation of students' innovative ability ; while academic activities, skill levels and practical activities are more important than other factors such as ideology and morality.

Chinese scholar Zhou Ming xing pointed out that creativity is an ability different from intelligence. Individual creativity is a multi-dimensional and multi-layered structure, which can be described and tested from different angles. In the test questions

of creativity content, It is also mainly based on open-ended topics. He further generalized performance methods for measuring and evaluating creativity.

One is through a projective test and a non-projective test. Such as providing incomplete sentences or stories and allowing the child to supplement freely ; providing some vague ink drawings for the child to explain; giving some simple line frames and allowing the child to draw a complete picture, etc. Projective tests, while they are mostly used for personality tests, can also be used for creativity tests. Non-projective tests are divided into verbal tests and operant tests.

The second is the creativity experiment method, which allows the subjects to solve problems in a certain problem situation and change some experimental variables when necessary.

The third is the work analysis method, which explains the creativity level of the testee by evaluating a certain work of the testee. The fourth is the subjective evaluation method, in which experts evaluate the creativity of the testees according to certain standards. In addition, tools for creativity testing include the Male California University Test (developed on the basis of intelligence tests), the Torrance Creative Thinking Test, the University of Chicago Creativity Test, and so on (Zhou, M.X.,1999). .

In specific course teaching , it may not even be necessary for teachers to adopt very rigorous and professional technical means to evaluate creativity. To conduct an objective and accurate measurement of students' creativity, it is necessary to choose appropriate tools, appropriate assessors, and objectively interpret the results. Due to individual differences, different assessors may have different evaluation results on the creativity of the same individual. Some indicators of creativity can be measured by tools, such as creative thinking, creative personality tendency, etc., but some are not easy to measure directly, such as creative motivation and creative consciousness. Wang Jie (2013) integrated the research results of domestic and foreign scholars, and divided the evaluation of college students' creativity into 3 secondary indicators and 11 tertiary indicators (Wang, J.,2013.

TABLE 5 Creativity Evaluation Index System

Level 1 indicators	Secondary indicators	Level 3 indicators
college student creativity	creative thinking ability	flexibility of thinking
		thinking fluency
		Unique thinking of college students
	creative personality orientation	college adventure
		college student curiosity
		college student imagination
		college students challenging
	creative capacity	The ability of college students to explore
		The ability of college students to analyze
		Problem Solving Ability of College Students
		Creative Outcomes of College Students

Normal students' creative teaching skills can properly evaluate students' creativity in subject teaching or management and education work . In subject teaching, on the one hand, through classroom questions, extracurricular small Homework, course completion examinations, etc., appropriately increase the content of examining students' personalized understanding and innovative application of subject knowledge; second, in written and oral evaluations, actively evaluate students' critical thinking ability and divergent thinking ability. As well as affirming groundbreaking ideas, students are encouraged to question and innovate. According to the point of view of positive psychology, "advantage education" should be carried out to actively help students discover their own advantages and positively affirm students' creativity. If the teacher only praises the students for their ability to accurately retell or memorize certain factual materials , the students will feel that the teacher's evaluation of his ability is nothing more than that. Third, develop information-based teaching methods to train students to learn online and offline blended In the subsequent study, more creative thinking of normal students will be tapped, so as to improve the creative teaching skills of normal students.

Creativity is a comprehensive expression of individual abilities in many aspects. To have creative actions, a person must have a broad knowledge base and an innovative personality ; Sudden epiphany, the flash of creative thinking; not only the wisdom of the group, but also the independent thinking of the individual; that is, the drive of external motivation, but also the internal motivation and original creative impulse. Creative thinking is characterized by uniqueness, multi-directional divergence, illogicality, linkage, and comprehensiveness. It is not only the unity of memory thinking and manifest thinking, the unity of intuitive thinking and reasoning thinking, but also the unity of divergent thinking and convergent thinking. Therefore, the cultivation, formation and development of teachers' creative teaching skills also have a certain process, not simply accomplished overnight. Everyone has different performance characteristics and growth cycles, and has its own laws. The teaching and training of creativity can not only be solved by opening the courses of principles of creation or techniques of creation. The scientific and effective evaluation of students' creative consciousness, creative skills and creative achievements is an important part of college students' academic evaluation.

2.6.3 Measurement of Creative Teaching Achievements

Creative achievements can generally be divided into two types, one is the creative achievements achieved in real life ; the other is to let the subjects produce creative achievements by giving them the task of teaching design or transformation . The creativity achievement test can be said to be a representative test of the orientation of creativity teaching materials (outcomes). Teaching materials (results) design or transformation tasks are generally applied in the research of evaluating students' creativity (Bechtoldt , De Dreu , & Choi, 2010; Zhang Jing huan, Liu Xin, Ren Fei fei, Sun Xiang wei, Yu Qi, 2016). Specifically, by giving students a task of teaching creativity skills, such as teaching observation (in and out of class), creative teaching thinking ability and creative practical operation skills , and then aiming at the novelty of "creating teaching materials (results)" produced by the subjects and suitability evaluation. However , the validity of measuring creative thinking by dividing it into several

dimensions has been gradually criticized (Amabile, 1996). The focus of criticism is that some special tests (based on Cuilford 's hypothesis) are only a verification of the rationality of the construction of divergent thinking measurement theory, but no external measurement research on innovative ability has ever been carried out. Brown (1989) pointed out that "the usual creativity test has only explicit construct validity but no criterion validity, which is the basic problem of its existence". Beyond that, the paper-and-pencil divergent thinking test fails to capture real-life instances of larger, more complex endeavors. For example, Guilford 's (1967b) SOI (Structure of Intellect) divergent teaching material (outcome) test established the structural factors of creativity as fluency, flexibility, originality and refinement. The most widely used TTCT test to date establishes the structural factors of creativity as fluency, ingenuity, and flexibility. All divergence tests are based on the work of Guilford (Guilford, 1967, 1973, 1977). Due to its limitations and imperfect development, the divergent thinking test has been criticized and questioned by researchers or test reviewers in the process of its continuous development and application. Some reviewers have criticized the test-retest and replica reliability of the divergent thinking score as too low. The limited reliability of the replicas will cause the so-called parallel tests to be actually not parallel, so they are not suitable for pre-test and post-test research at all. Furthermore, it is questionable whether divergent thinking skills really equate to creativity. This may be one of the reasons why its predictive validity is not high, at least it is very unstable. In addition, it is uncertain whether the scores of the various factors in the divergent thinking test really represent different abilities. The obvious weakness of the divergent thinking test , as well as the drawbacks of relying on different theoretical structures of creativity often lead to different test objects prompt people to rethink the evaluation methods of creativity. " Most psychologists now agree that "creativity is the ability to create instructional material (results) that are both novel (original, unexpected) and appropriate (within the constraints of existing conditions) and the teaching materials (results) are useful)"(Sternberg, R. J. Ed. 1999). That is to say, the evaluation of creativity must ultimately depend on the evaluation of its fruits (creative teaching materials (results)). Recognized.

Because a person's creative ability, as a potential trait, is always exposed through creative activities, and is often solidified in the activity teaching materials (achievements).Some researchers provide little additional guidance when asking experts to evaluate the inventiveness of a work. This method was improved by Elman Bell and developed into a consensus assessment technique (CAT)(MacKinnon, D. W. 1962).

2.6.4 Measurement of creative teaching environment

Social psychologists tend to examine the situations in which creativity occurs. By studying and analyzing environmental factors related to creativity, researchers hope to create an atmosphere. Among them, the more representative measurement tools for creative teaching environment are: KEYS by Amabile and her colleagues (Amabile, Conti, Coon, Lazenby, & Herron, 1996), compiled by West , the revised TCI scale (Team Climate Inventory) (West & Richter, 2007), the "Organizational Innovation Climate" scale compiled by Zheng Jianjun, Jin Shenghua and Ma Guoyi (2009).

Amabile (1983), other researchers and theorists have proposed more inclusive systems theories of creativity development. On this basis, the psychometric approach to creativity research continues to grow. Specific aspects of psychometric application to the study of creativity primarily include the study of the creative process, personality and behavioral traits associated with creativity, characteristics of creative instructional materials (outcomes), and attributes of environments that foster creativity.

In the measurement and evaluation of creativity, researchers have proposed hundreds of creativity testing tools and evaluation scales. Among them, the creative thinking test is one of the most widely used tools (Kim, K. H. 2006). Further evidence of the differing nature of the various studies on psychometric measures of creativity can be found in the frequent critiques of divergent thinking tests by proponents of other psychometrics. For example, Amabile (Amabile, 1982) and Baer (Baer, 1993b, 1994c) criticized the lack of validity of divergent measurement; Cramond (Cramond , 1994) suggested using different creativity measurement techniques at the same time. The

definition of empathy actually implies the assumption that people know what creativity is. This assumption is supported to a certain extent by the "implicit theory of creativity. The theoretical basis of CAT is Sternberg's implicit theory of creativity". Although people's definitions of creativity may not be exactly the same, people, especially in the same field Experts have basically the same opinion on the same work, which means that consensus can be the basis for evaluating creativity.

Professor Lin Jinhui (2007) of Xiamen University analyzed in detail the case of reforming the academic evaluation of college students at the Central South Branch of Wuhan University, and pointed out that “use management functions to give appropriate appreciation and evaluation to creative college students. Whether the comprehensive quality evaluation of college students is good or bad is directly It plays a guiding role in the development of their creativity. The current "quality evaluation" index system obviously has a tendency to ignore the creativity index." "How to accurately reflect the creativity of college students in the evaluation index is a complicated and difficult task. The problem must be studied and solved in depth. Professor Xiao Chuan (1999) pointed out that innovative education is essentially a shift in the sense of educational philosophy—from conservative and maintenance education to innovative education, and from emphasizing the cultural inheritance function of education to cultural Innovation function(Lin, J. H., 2007.). This turn involves in-depth reforms in many aspects such as educational goals, content, principles and methods, and evaluation standards.

In conclusion, there is an incredible diversity in the measurement of creative teaching skills, which is still in a state of contention. Even so, divergent thinking tests dominate as commonly used tests of creative process and potential, all of which rely on a theory of the structure of creativity. For a long time since the 1960s, work on creativity measurement has been dominated by Guilford (Guilford , 1956, 1959, 1960, 1986) creative thinking mainly includes divergent thinking factors (including fluency, flexibility, refinement Influenced by the hypothesis of "nature, originality " , this divergent thinking factor exists along with several other factors in Guilford's intellectual structure model (Guilford, 1967).

CHAPTER 3
METHODOLOGY

3.1 Basic information study

3.1.1 Objectives

1. What is the status quo of teacher training students' creativity teaching skills training?

2.What are the constituent elements of teachers' creative teaching skills?

3.1.2 Methodology

Creativity-related skills refer to the knowledge and skills required to generate new ideas and ways of working (including: appropriate cognitive style - heuristic implicit or tacit knowledge to generate novel ideas - beneficial working style) . Task motivation refers to intrinsic and extrinsic motivation for tasks (including: attitude towards tasks - the perception of one's motivation to undertake tasks). As an external factor affecting normal students' creative teaching skills , the working environment mainly acts on the internal components. After a systematic literature review, based on a better study of the components of normal students' creative teaching skills and the interaction between elements, this study first cited the relevant scales of previous researchers as a reference, and made an infusion on the measurement of normal students. related scales for creative skills and will use several well-established scales that are already available. Combining literature and research data, a new model for improving the innovative teaching skills of normal students is constructed on the basis of previous models.

3.1.3 Instruments

Document analysis method , questionnaire survey method, interview method

The subjects of this study were students majoring in e-commerce in the class of 2023 at Guangxi Normal University in Guilin, Guangxi, China, of which 68 were selected for the qualitative study. The relevant situation will be explained to the subject before the interview and questionnaire, and then conducted with the consent of the subject. The interviews involved in this study will be conducted in the university conference room and the questionnaires will be conducted in the university classroom.

Qualitative research employs various data collection methods in natural contexts to explore social phenomena as a whole. In this study, induction method was used to analyze data and form theories, and explanatory understanding was obtained through interaction with the research subjects to construct their behavior and meaning. Non structured interviews were conducted with the teaching teachers in this study, and open-ended questions were designed. Frequency analysis was used to

comprehensively and deeply understand the students in this study, emphasizing the role of the researcher in the research process. A questionnaire format was used for 68 students. Among the participants, 10 were selected for the preliminary study, all of whom were third year e-commerce students from Guangxi Normal University. The reason for the selection was that the researcher was a teaching teacher, and third year students had studied basic courses in their first year and professional courses in their second year, and could integrate various courses for learning. In their third year, creative teaching skills could be well trained and learned, and e-commerce was also the most contemporary major in the global networked development, highlighting the trend of networked management.

During the process, notes, photos, and videos are strictly confidential. The personal information of the subjects will not appear in the paper , presented in the form of a single code. For example, the teacher will appear with one character, and 68 students will only appear with a numerical code without a specific name. The photo information can only appear in the form of consent to take photos, and verbal consent is sufficient.

Each research activity is completed during the school's teaching hours, with the consent of the dean of the college and the signing of the teaching calendar, agreeing to start classes and conduct research. Guangxi Normal University provides a safe venue (with real-time monitoring) and controls the time (with unified universitybell reminders). The participants are also monitored throughout the journey and security personnel conduct real-time patrols. During the research process, researchers will call attendance 5 minutes before class to ensure that all participants are present. During teaching, also known as attendance, if there are special circumstances, they will apply in the school's academic affairs system three days in advance and obtain the consent of the college dean before making any changes. Therefore, this study can only be conducted after submitting the application letter, teaching outline, teaching calendar, teaching plan, and lesson plan. Ensure the safety of participants and avoid risks.

Implemented within the school, there is a complete set of security measures and monitoring within the school.

3.1.4 Data collection

The subjects of this study are students majoring in e-commerce from the Vocational and Technical Normal College of Guilin Guangxi Normal University in China in 2020. The study was conducted during their university years, with 44 and 24 students in two classes, respectively. There were 68 undergraduate students participating in the research , including 61 females and 7 males . During the second semester of the school's 2022-2023 school year, teachers engaged in the teaching of "Teachers' Professional Skills Training" participated in this research. Research Design The research design chosen for this study is a pretest-posttest control group design.

3.1.5 Data Analysis and Citation Scale

The scales cited in this study include : Nooraini 0thma's Creative Personality Scale; Frenzel et al's Teacher Emotion Scale ; There are two subscales of the pressure scale, among which, the perceived innovation ability scale adopts Lisa DaVia Rubenstein, D.'s teacher self-efficacy scale; the perceived innovation pressure scale adopts Cao Yan's innovation pressure perception scale; the innovation motivation scale adopts The Innovation Motivation Scale developed by Amabile. Among them, "observation scale", "creative teaching thinking scale" and "micro-class production evaluation scale" .

3.1.6 Micro-video Course Evaluation Scale

Interview survey refers to a survey method in which certain survey objects are selected according to the research purpose, and interviews, conversations, etc. Intended to understand the current research status and collect data on relevant issues. The following are the applications of micro videos in teaching and learning, research on cultivating creative teaching skills, learners' profound understanding and perception, as a supplement to the questionnaire survey results. The design of the interview outline mainly comes from the creative teaching skills of normal university students. To understand the problems in the teaching and learning of creativity, the interview outline is mainly designed based on the attitude towards micro-video production and learning

motivation, and simple adjustments can also be made according to the interview situation during the interview.

TABLE 6 Micro-course experimental creative works evaluation criteria (specific)

Level 1 indicators	Secondary indicators	Indicator description
1. Teaching design 20%	Teaching objectives	Set reasonable teaching goals. Including: knowledge positioning, grade positioning, scene positioning, object positioning. Topic selection, to achieve teaching goals, topic selection forms include: knowledge points, cases, sample questions, experimental activities, etc.
	Ethically correct	Pass on the correct world outlook. In various ways such as case, scene, sound, picture, language, style, etc.
	Route design	Based on the teaching objectives, the teaching objectives are achieved by lecture, calculation, analysis, reasoning, answering The objectives are achieved through lecture, calculation, analysis, reasoning, answering questions, appreciation and other teaching methods. The work will be applied to classroom teaching, students' self-study and extra-curricular learning.
	Scientific rigor	he teaching content is rigorous and there are no scientific errors. The organization and arrangement of the content conforms to the logic and cognitive laws.
2. Innova-tion and creativity 30%	Topic innova-tion	The topic selection angle is novel, or the method is novel, or the process is novel, or it can reflect the latest development of the subject, etc.
	Original content	Including but not limited to: original materials, original content, original templates, original methods, etc. In principle, dubbing and outbound characters are team members.
	Style innova-tion	Teaching styles can be diversified (including but not limited to natural affinity, unrestrained enthusiasm, equal communication, rational authority, witty humor, etc.), teaching students in accordance with their aptitude, non-traditional classroom .
	Collabora-tive innova-tion	Encourage interdisciplinary multi-person teams, and the division of labor within the team is reasonable, and the collaboration is effective. They cooperate closely in the on-site defense or demonstration video, and the display effect is good.
3. Technolo gy applicatio n 20%	Techinque level	Make full use of advanced and appropriate means of computer information technology to reflect teaching needs.
	Specificatio ns	Micro-classes : The work is complete and can be used independently. The length of the micro-lecture video is between 300-600 seconds, the video quality is generally set to 72 0*576, 1280*720, 1920*1080, the video format is

		MP4, WMV, etc., and the size is controlled within 500MB. Requirements: Accurate and standardized subtitles, clear video quality, stable image, clear sound, and synchronization of sound and picture.
	Image processing Interactive Design	Micro-classes : Proper use of acquisition and post-processing audio-visual processing technology, computer-generated graphics, animation, sound, video and other works are of great help in improving the quality.
4. Teaching effect 20%	Reach the goal	Focusing on the established teaching objectives, effectively solve practical teaching problems, and promote the improvement of students' thinking and ability.
	Overall effect	Works should have reasonable cuts, natural transitions, overall coordination, fascinating, endless aftertaste, and complete and standardized elements .
	Effect verification	Put the works into actual teaching or experiments, and iterate the works according to the experimental results. The experimental data and the iterative process of the work must be objective and true.
5. Work presentation 10%	Curriculum Specification	Works in this category (especially non-scientific and technological works) must adopt the same position and viewpoint as the current nationally recognized textbooks, especially those involving primary and secondary schools; Remarks: If the key expressions of non-scientific and technological works are inconsistent with the teaching materials, it may lead to awards for the works Levels are reduced until there are no associated awards.
	Document quality	Review the quality of basic documents and category documents, including formal specifications such as: writing specifications, hierarchical structure, text expression, graphic and text matching, etc.;
	Pronunciation Standard	and appealing voice (if any) , no special reason, all content should be in Mandarin.
	Live defense	The effect of PPT is good, the answers to questions are smooth and correct, and the coordination of team members is good

3.1.7 Expert Consultation Questionnaire Design

The part of the expert questionnaire used in this study is as follows :

Expert Advisory Letter on Elements of Creativity Teaching Skills for Normal Students

(1)Your basic information

TABLE 7 Expert Information Sheet

Name	Workplace	Professional Position	Instruments
Feng Qiang (fengyansi@126.com)	Shandong Qingdao University	Professor of Writing	Teaching Consistency and Effectiveness Checklist
Ju wen Liu (187211632@qq.com)	Guangxi Normal University	Associate Professor of Foreign Literature	Teaching Consistency and Effectiveness Checklist
Zhaokun Lu (zhaokun1218@126.com)	Shandong University	Associate Professor of Education	Teaching Consistency and Effectiveness Checklist
Bo Tao (2444733579@qq.com)	Guangxi Normal University	Associate Professor of Education	Teaching Consistency and Effectiveness Checklist
Yanlin Li (1208410954@qq.com)	Guangxi Normal University	Associate Professor of Education	Teaching Consistency and Effectiveness Checklist

(2) Elements of Teacher's Students' Creativity Teaching Skills

TABLE 8 Appendix Table of Elements of Creativity Teaching Skills of Normal Students

	level one index	Secondary index	Very reasonable	Reasonable	Generally	Unreasonable	Completely unreasonable	Suggestion
Elements of creative teaching skills of normal students	Observation	observation task						
		knowledge, experience and skills						
		orderly, systematic						
		Pay more attention to details						
		Sensory organs participate in observation activities						
		Observe and record at any time						
		observe with curiosity						
	creativity thinking	Can give two or more teaching cases						

		Can come up with different ideas from others
		Able to create original and curious works within a specified time
		Knowledge content is short, easy to understand and meaningful
micro video make		The language design is generous and decent, and the interface design is clear
		Reasonable selection of video production technology

3.2 Teaching model design

3.2.1 Objectives

To development teaching models for normal university students to develop creative teaching skills.

3.2.2 Methodology

C Creativity involves four factors: person (the personality traits or traits of a creative person), process (elements of motivation, perception, learning, thinking, and communication), product (ideas transformed into tangible form), and pressure (the interaction between humans and their environment). Relationship). Among them, the research on innovative individuals mainly explores the personal reasons for innovation differences, including individual personality characteristics, temperament characteristics, emotional characteristics, attitude characteristics and intellectual factors (Rhodes, 1961). Person is related to creative personality in order to identify differential variables that determine which types of people are more creative than others (Simonton , 1988). The research on the innovation process mainly explores the psychological process of innovation. The process involves the issues of "motivation, perception ,

learning, thinking and communication". Researchers pay more attention to the thinking of creative individuals in the innovation process. Research on innovative products mainly explores new ideas or new discoveries generated by individuals. The product is a judgment on the end result of the creative process. Research on innovation pressure mainly explores the interaction between individuals and the environment, explores the surrounding environment that promotes or hinders the creator's work, and tries to find out what kind of pressure sources in the environment can lead to individual innovation behavior (Simonton, 1988) . Based on the 4P theoretical model of creativity, the observation power of the three first-level indicators involved in this study is classified as the "subject element", the teaching creative thinking is classified as the "process element", and the micro- video production is the "result element". The result of increased creativity . Combined with this model, the EDMC learning model is developed , which is developed from four creative behavior quadrants: Experiential Engagement, Demonstration & Application , Meaning Making, and Concept Exploration .

3.2.3 Instruments

According to the previous literature review and the current educational practice of innovative teaching skills for normal students, there are two types of research sites as follows: one is only the lecturer’s online or offline explanations and cases are introduced, and students learn to imitate production through case studies Micro-video; the second is experiential learning for normal students, online and offline synchronous classroom training in which normal students and teachers collaborate to teach. Students use EDMC learning mode to make micro-video courses and use them as evaluation methods by giving full play to their personal imagination and creativity .

3.2.4 Data collection

3.2.4.1 Object Selection

Teacher selection: This study adopts non-probability "subjective sampling" method to select consulting experts. After considering the researcher's own resources, subject areas and the degree of participation of experts, on the basis of ensuring the credibility of the results and not affecting the significance, The experts involved in the research consultation are controlled in a team of 5 experts whose overall

creative skill level is relatively high. Members of the expert team have long been concerned about issues in the fields of creative teaching, teacher education, and vocational school education, and can give professional guidance from the perspectives of different disciplines such as pedagogy, psychology, e-commerce education, and teacher education, and aim at the structure of innovative teaching skills for normal students Provide targeted suggestions for system construction.

Student selection: Two classes of third-year university students studying 2022 academic year of the 2020-level e-commerce major in the Vocational and Technical Teachers College of Guangxi Normal University, China. There are 68 undergraduate students participating in the research , including 61 females and 7 males

3.2.4.2 Research process and tools

This research is divided into two phases.

The first stage is mainly to initially form the ability elements and skill elements of the innovative teaching skills of normal students through literature analysis, determine their expression and connotation, and compile the Solicitation Form for the Structural System of Innovative Teaching Skills of Normal Students (see Appendix 13) . The questionnaire consists of two parts, the instruction and the main body of the questionnaire. The instruction part covers the research background of this study, the requirements for filling out the opinion form, and a brief introduction of some knowledge closely related to this study; the main part of the questionnaire mainly adopts 5 For subscales, experts are invited to assign values to the reasonableness of the first-level indicators and the second-level indicators. At the same time, experts can merge, add and modify indicators in the "remarks column", and modify the connotation of indicators.

The second stage is mainly to consult the expert team to build a structural system of innovative teaching skills for normal students. In the first round, 5 experts were consulted on "the rationality of the first-level indicators and second-level indicators of the innovative teaching skills of secondary school students", and through the statistics of the experts' assignment results and the sorting out of the experts' revision opinions, the first-level Relevant statistics and revision opinions of indicators

and secondary indicators, and based on this, compile the "Second Round Opinion Solicitation Form for Normal Students' Innovative Teaching Skills Structure System". The second round continued to distribute expert consultation forms to 5 experts. The basic structure, scoring method and opinion giving method of the questionnaire were the same as the first round of questionnaire. After sorting out the results of the second round of questionnaires,

The third stage is based on the performance of creative teaching skills in normal students' courses, and from the content analysis of micro-video works produced by normal students, to analyze the cultivation of operational skills micro-video production skills in creative teaching skills of normal students.

3.3 Teaching model implementation

3.3.1 Objectives

To evaluate effectiveness of teaching models for normal students' creative teaching skills.

3.3.2 Methodology

Content Analysis

Using the micro-lecture works of students in the courses "Vocational Education Curriculum and Teaching Theory" and "Teacher Vocational Skills Training II" as the source of analysis materials, the content analysis of 68 e-commerce biographical materials was carried out to identify the creative teaching skills of normal students. key components.

Questionnaire

First of all, the questionnaire is designed, and the students and teachers are investigated through different questionnaires to understand the current situation of the cultivation of students' creative skills and the teaching effect after teaching practice, as well as to understand the thoughts of teachers.

3.3.3 Instruments

To solve problem 1, a questionnaire survey was conducted among 417 students to assess the early skills of 68 outstanding teachers and students.In order to

solve problem 2, five experts were invited to judge the rationality and import. ance of the key components of the creative teaching skills of normal students , and on this basis, the structural system of creative teaching skills of normal students was constructed.

At the same time, based on the 4P model of creativity, the theoretical model EDMC of the structural system of creative teaching skills of normal students is constructed . (See FIGURE 11 for details)

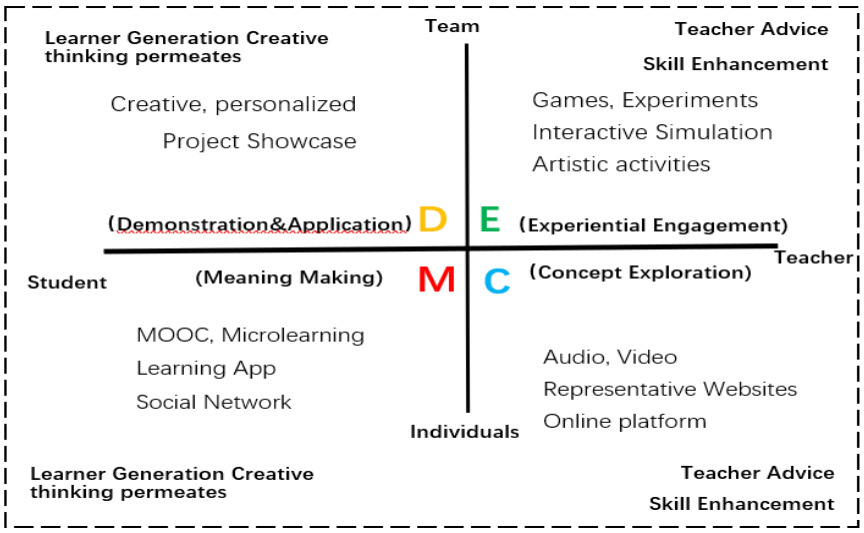


FIGURE 10 EDMC theoretical model

In order to solve problem 3, based on positive psychology theory and other theories, the mechanism of action between the main elements and the process mechanism between the process elements are ascertained.

To address question 4, Ford is the founder of the psychology of scientific creation. Creative skills are closely related to personality factors. Gibson's theory on creative skills research embodies the charm of scientific methods such as hypothesis argumentation, factor analysis, and model operation. In Guilford's theory and method of creative skills research , based on the three-dimensional structure of intelligence in Guilford's theory, through long-term educational experimental research by Soviet educator and psychologist LV Zankov, creative education tends to be systematic He believes that creative education should develop students' abilities in three aspects:

observation ability, thinking ability and practical operation ability. The creative teaching skills of normal students to be studied in this thesis are sorted out as 1. teaching observation ability 2. creative thinking ability 3. creative operation skills. Taking the students of EDMC learning mode as the research object , whether different prior knowledge levels can improve the creative teaching skills of normal students.

3.3.4 Data collection and analysis

According to the observation sheet, creativity scale

3.4 Teaching model improvement

(1) Focus on the "creative teaching skills" of normal students.

(2) Diversified skills training, divided into modules and multi-modes, and comprehensively train skills throughout the process

(3) Pay special attention to the formation of " creative teaching skills" of normal students .

We have mainly made improvements in the above three aspects and will continue to optimize the model in subsequent experiments.

CHAPTER 4
RESEARCH RESULT

4.1 Results of Basic information study

4.1.1 Results of research on related to creative teaching skills.

Through combing relevant literature, we found that research on creative teaching from different disciplines such as philosophy, psychology, education, etc. Chapter 2 gave a detailed explanation and summary of the components of creative teaching from different disciplines:

TABLE 9 Research on Creative Teaching in Three Different Disciplines

Vision threshold	Overview of research findings on creative teaching
Philosophy	Rational sublimation of innovation and practical skills to solve new problems.
Psychology	People carry out innovative activities in creative teaching, rely on innovative thinking, use innovative techniques, carry out innovative practices, solve problems in an original way, and produce creative results.
Pedagogy	Subordinate to the purpose of "cultivating people", the specific concept is students' ability to produce appropriate and individually novel products in the process of solving problems .

Search relevant literature content through domestic and foreign literature platforms. During my study in Thailand, I searched for information on the literature retrieval platform of Srinakharinwiro University Library, and on the " Science Direnct " Search for peer-reviewed journal articles and books recommended by the professor. chapters (including open access content) , and search for relevant literature on platforms such as “Google ” and “S ci-hub ”. While in China, through the CNKI, VIP, Wan fang, Hong Kong and Macao academic literature database platforms, we searched the academic research databases in the libraries of the three campuses of Guangxi Normal University in Guilin, Guangxi, China: Wang cheng, Yucai and Yan shan: use academic search engines , such as Google Scholar, PubMed or PsycINFO, and search with keywords such as "Creativity", "Creative teaching", "Creative teaching skills", "Observation", "Innovative thinking", etc. There are specific data in Chapter 2, in which the keyword "Creative Teaching" was searched in China Knowledge Network and found 1,038 Academic Journals, 108 Master's Theses, 7 Doctoral Dissertations, 47 China Conferences, 4 International Conferences, 4 Yearbooks, and 4 International Conferences, and 4 International Conferences and Yearbooks. China Conferences 47, International Conferences 4, Yearbooks 11 books.

At the same time, relevant literature on research on creative teaching skills at home and abroad was obtained. Summarized from two aspects: research on the structural elements of creative teaching skills:

(1) Components and results of creative teaching skills.

MI theory for short, is a brand-new theory of human intelligence structure (Gardner 2020). Advanced psychological activities require people to put in mental labor (Gardner and Hatch 1989).

Erford overcame this shortcoming in his book "Creative Talents" published in 1986, and further proposed that the essence of creative talents lies in the organization of basic abilities. He said: "Creativity refers to the organization of various basic abilities. This organization varies with different ranges of creative activities. Each basic ability is a variable... " Nowadays, cultivating innovative teachers plays a role in promoting social development. Innovative teaching skills play an important role in the

training of normal students. Teachers' work is the use of comprehensive intelligence. Innovative teachers especially must have keen and meticulous observation . and creative thinking ability , etc (Cropley 1992). Therefore, in the training of normal students, based on the Guilford Three Model and the creative education proposed by the Soviet educator and psychologist LV Zankov , the structure of creativity teaching skills is summarized. The elements are teaching Observation Skills, Creative thinking and Creative Operational Skills(Zankov 1937).

(2) Literature results of research on the cultivation model of creative teaching skills.

The relevant literature mentioned above provides us with a comprehensive perspective on the theoretical basis, practical strategies and latest research on creative teaching skills.

The research that this paper follows is from the logical advancement idea of "Creativity - learning - creative teaching --- Creativity teaching skills --- Vocaional teacher training students' creativity teaching skills". Through layer-by-layer analysis, the "Vocational teachers training skills" are obtained the core concept of "Creative teaching skills". From the literature review in Chapter 2, it was found that the main terms that constitute the elements of cultivating creative teaching skills include: "creativity", " creative teaching ", " factors affecting creativity ", etc. Which of these elements are the key components of the cultivation of creative teaching skills among Chinese vocational education college students? Existing studies lack in-depth and detailed analysis on this. Since excellent teachers have creative experience, studying their learning and growth is conducive to establishing key components that are consistent with the cultivation of Chinese students' creative teaching skills. In view of this, with the help of Guilford's theory, Kolb's learning cycle theory and the 4P theory of creativity, this part of the research is carried out based on the analysis of the citation scale and the curriculum creative teaching skills scale. According to the research steps, the study cases of Chinese vocational teaching college students were sorted out in detail, and the analysis focused on the creative teaching skills of normal college students. First, keywords related to cultivating the creative teaching skills of Chinese vocational teaching college

normal students were extracted. , and then classify and analyze the keywords to establish a teaching model CEDM (Concept Exploration , Experiential Engagement, Demonstration & Application , Meaning Making), suitable for cultivating college students' creative teaching skills. Based on the Guilford three-dimensional model and the creative education proposed by Soviet educator and psychologist LV Zan ko, it was finally identified that the key to cultivating the creative teaching skills of normal students in China's vocational teaching universities is Teaching observation ability, creative thinking ability and operational skills (micro-course creation skills).

The above research topics and possible research results related to creative teaching skills can help you gain an in-depth understanding of the latest developments in this field:

The results may indicate that teachers trained in creative education are more likely to apply creative teaching strategies and encourage students' creative thinking and expression.

The impact of creative teaching on student learning outcomes: Research can compare the impact of traditional teaching methods and creative teaching methods on student learning outcomes. The results may show, creative teaching methods can improve students' learning motivation, problem-solving skills and innovative thinking, and promote their learning outcomes and lifelong learning abilities.

Students’ attitudes and experiences towards creative teaching: Research can explore students’ attitudes, perceptions and experiences towards creative teaching. The results may reveal how students prefer creative teaching methods, as well as their engagement, confidence, and sense of achievement in creative teaching environments.

Integration of creative teaching and subject teaching: Research can explore how creative teaching skills can be integrated into the teaching of different subjects. The results may indicate that applying creative teaching strategies in various subject areas can stimulate students' subject interests, innovative thinking, and problem-solving abilities.

The results may show that positive evaluation and specific feedback can motivate students' creative performance and promote their further development.

Literature studies on creative teaching skills have contributed a lot to this study. Related concepts are widely discussed in the field of education and have been the subject of numerous studies.

The development of creative teaching skills begins with the development of teacher-student relationships, and research has shown that positive. When students feel safe, respected, and encouraged, they are more likely to take risks, explore new ideas, and think creatively. Developing observational skills in college students during the learning process and using an inquiry-based learning approach that emphasizes questioning, investigation, and problem solving have been found to enhance students' creative thinking skills. By encouraging curiosity and independent thinking, teachers can stimulate creativity in the classroom. Creative pedagogical thinking enables university teacher educators to generate multiple ideas or problem-solving skills. Research has shown that providing open-ended tasks, brainstorming sessions, and encouraging students to explore different perspectives can enhance their creative pedagogical thinking skills. As educators, we play an important role in fostering creativity by providing a favorable learning environment for our students. Flexible learning spaces, access to resources, and opportunities for collaboration and self-expression can stimulate students' creative thinking. The integration of intellectual skills with creativity and the incorporation of arts-based activities such as music, visual arts, drama, and storytelling into the curriculum has been shown to stimulate creativity in students. These activities provide opportunities for self-expression, imagination, and problem solving. Emphasizing the medium of learning is also the most prominent strength of the e-commerce students selected for the sample of this study, and the study emphasizes the importance of providing students with professional development opportunities to enhance their own creative teaching skills. Focusing on training in teaching strategies, creative problem solving, and innovative methods can enable

Guangxi Normal University students to have good creative teaching skills in the classroom and even in the future when they go on to work as teachers.

As new literature may emerge in the future, I will continue to study and consult academic databases, journals, and educational research organizations to obtain the latest research on creative teaching skills and to make a sustained effort to contribute to this research.

4.1.2 Results of Informal interview with creative teaching skills subject teaching method teachers

Through online and offline methods, the theme is based on the creative teaching skills teaching experience of subject teaching method teachers. Teaching plans, teaching methods, teaching evaluation, etc. are the main directions of interviews. The use of creative teaching skills in subject textbooks and in teaching and mentoring competitions is analyzed. Interviewed 10 subject teachers. The interviews were conducted based on the expert teaching skills development syllabus. The age, working experience, academic qualifications and interview methods of the 10 teachers interviewed are as follows:

TABLE 10 Information for teachers participating in the Interview Pedagogy

Number	Name	Age	Degree	Teaching years
1	Teacher Deng	41	Doctoral Associate Professor	12
2	Teacher Liu	40	Doctoral Associate Professor	10
3	Teacher Li	46	Doctoral Associate Professor	14
4	Teacher Wu	45	Doctoral Associate Professor	15
5	Teacher Liu	40	Doctoral Associate Professor	10
6	Teacher Gao	41	Doctoral Associate Professor	8

Number	Name	Age	Degree	Teaching years
7	Teacher Tao	53	Master's degree	26
o	Teacher Lu	50	Master's degree	25
9	Teacher Tao	53	Master's degree	28
10	Teacher Lu	55	Master's degree	33

According to the research steps, the importance of collecting data for the paper. For the rigor and accuracy of the research, interviewees are very important. They will affect the quality of the data and the final conclusion. In the context of the driving environment for innovative teaching, it is necessary to select experts who are relatively familiar with the field of cultivating innovative talents and must have relevant teaching experience. Therefore, the interview subjects in the study were mainly experts with innovative teaching experience in professional fields related to education. These experts should have a certain say in the research and talent cultivation of creative teaching and be able to provide a relatively large amount of information. By conducting semi-structured interviews with respondents through a combination of online and offline methods, the mechanism of talent cultivation in the cultivation of creative teaching skills in an innovative teaching environment was clarified, and a relatively reasonable questionnaire was formed.

Because of the limitations of time, space, geography and other practical conditions, in the specific operation, the researchers conducted " Offline + Online " interviews with the interviewees. Prior to this, the researcher needs to develop a simple interview outline based on the research questions and purpose. In the actual process of interviewing the target, the questions listed in the interview outline are interviewed, but it is not necessary to follow the outline in detail, it is only a rough reference. For researchers, corresponding adjustments can be made according to the actual situation. At the same time, interviewees need time to think and express relevant issues. Therefore, interviewers need to have more precise control over the interview time. From

this point of view, the optimal interview time for this study needs to be controlled at about one hour. Since all interviews are respondent-centered, on the premise of fully respecting the wishes of the interviewee, preliminary communication with the respondent is required before the one-on-one interview, and the time and format of the interview are determined with the respondent. , which allows the interviewee to reasonably arrange the time and form of the interview, minimize possible interference during the interview, and prevent the interview from being interrupted. The interviewee can also participate in the interview in a relaxed and happy mood. In addition, the interviewer can inform the interview topic, purpose and precautions in advance so that the interviewee has a general understanding of the interview questions and thinks about relevant issues in advance to promote the efficient and smooth conduct of the interview. In order to protect the privacy of the interviewees and the harmony of the entire interview process, the entire interview was based on the principle of voluntariness and confidentiality. After obtaining their consent, the interview content was recorded to a certain extent to form text materials. This will facilitate subsequent analysis of relevant content. The semi-structured interview outline is shown in TABLE 13. Finally, this study interviewed 5 interviewees to form textual materials.

TABLE 11 Open Citation Scale Coding

Conclusion of interview	Original interview transcript (representative sentences)	Open coding	Frequency
1	There are many elective courses to choose from in Chinese universities, and there are many teachers who teach them with flexible teaching methods.	General education	5

Conclusion of interview	Original interview transcript (representative sentences)	Open coding	Frequency
2	Creative teaching can be applied to many majors and disciplines and is highly practical. Many instructors lead students to participate in innovation such as "Internet +", and instructors learn and grow with normal students.	Create synergy	8
3	Many teachers and colleagues will participate in online and offline international student and young scholar forums, academic reports, etc., providing a lot of learning experience in creative teaching, especially online teaching.	Interna-tional training	4
4	Regarding teaching design for student learning, I participated in the "Tian Jiabing Teaching Skills Competition" with university normal students. From professional courses to teacher education courses, the integration of disciplines was enhanced.	Creative thinking	8
5	Whether it is subject teaching or club activities, innovation and responsibility are the main elements in the current education process. Combining current affairs and politics, we should build and promote innovative	Innova-tive attitude	3

	culture and technology.		
Conclusion of interview	Original interview transcript (representative sentences)	Open coding	Frequency
6	Competitive competition activities can actually inspire the fighting spirit of school students. After the campus life and innovative teaching of university schools are carried out, students will be more active in returning to textbooks. There are many every year. The implementation at the school level is in place and the students are very active.	Innovat-ion motivat-ion	5
7	University normal students participate in various voluntary activities, such as education internships, going to the countryside to teach, setting up winter and summer classes for rural children, and supporting teaching groups and students' families to carry out various innovative teaching activities to form correct educational concepts for children.	Innovat-ion attitudes and emotions	2

Conclusion of interview	Original interview transcript (representative sentences)	Open coding	Frequency
8	When we were students, we also participated in some activities. The ones that impressed me most were the hundreds of people going to the countryside, doing charity during holidays, and going to relevant institutions to care for left-behind children. Using different ways to experience education reminded me of my own childhood. The children were moved by their innocent expressions and gained a deeper understanding and appreciation of creative educational tasks and projects.	Creativity percep-tion	2
9	There are bound to be difficulties in learning and teaching, and the requirements for teachers themselves will be very high. In the innovative era of artificial intelligence and big data, we must first start with ourselves so that we can continue to learn and observe. Only by following up on innovative teaching thinking and improving teaching skills and levels can we better help normal college students and serve as a role model.	Creative thinking and skills	8

Conclusion of interview	Original interview transcript (representative sentences)	Open coding	Frequency
10	The implementation of creative teaching skills is indispensable for every student. For example, observing in social activities and serving the community are very meaningful.	Practical teaching	4
11	Although the teaching position is ordinary, my dream since I was a child is to treat diseases and save people or teach and educate people in my position. After more than ten years of study career, I have not only learned empirical knowledge and skills, but also formed my own teaching style. , there are constantly new goals and new breakthroughs in teaching.	Creative personality	7
12	"To touch people's hearts, it is love first" is the biggest feeling I have had since I started teaching. Emotion is the driving force for learning. Both internal and external factors for students' innovation or innovation require teachers to motivate them, thereby inducing students' inner emotional motivation.	Innova-tive attitude Emot-ions and Motiva-tion	8

Conclusion of interview	Original interview transcript (representative sentences)	Open coding	Frequency
13	I have taken related courses before, including Python. After I started working, it became relatively easy for me to work. I discovered how improving knowledge and skills can help teachers in creative teaching.	Know-ledge and skills	11
14	Participate in or guide various competitions, especially the Innovation Cup. People who complete PPT or teaching videos with high quality and efficiency will be quite outstanding when time is tight. I will encourage students to be familiar with the process and key points of the project. The logic of the PPT is very clear.	Synthesis ability	4
15	A knowledgeable person is not necessarily a literate person. So I feel that in the process of innovation, what I do best is to have solid theoretical knowledge, which is very clear when it comes to scientific research or career development. Encourage students to observe more, think more, and practice more.	Creative learning process	8

From the above TABLE 14, In the first interview with the teaching staff, we selected representative sentences from the following 15 dimensions: General education 、 Create synergy、 International training、 Creative thinking、 Innovative attitude、 Innovation motivation、 Innovation attitudes and emotions(Choi, Sung et al. 2011)、 Creativity perception、 Creative thinking and skills、 Practical teaching、 Creative personality、 Innovative attitude、 Emotions and Motivation、 Know-edge and skills 、 Synthesis ability、 Creative learning process and included them in the table(Han 2010), We call these 15 dimensions open coding, and teachers answer based on their own experience. Due to limited teacher data, the results of this interview are only based on the results of this school, Can see that the frequency of " Know-ledge and skills " is the highest, It has been mentioned as many as 11 times, very teacher mentioned it, and some teachers mentioned it twice, while for "Innovation attitudes and emotions Creativity perception" has the lowest frequency, only 2 times, which means that it was mentioned less frequently in this first interview. There has been a significant lack of attention given to creative emotions and perceptions of creativity.

4.1.3 Results of on Preliminary survey scale for the composition of creative teaching skills

The cited scales used in this study include: innovative personality scale; teacher emotion scale; the stress scale has two subscales, among which the perceived innovation ability scale uses Lisa DaVia Rubenstein(Rubenstein, Ridgley et al. 2018), D.'s teacher self-efficacy scale; The perceived innovation pressure scale uses the Cao Yan Innovation Pressure Perceived Scale(Shen, Xiao et al. 2023); the innovation motivation scale uses the innovation motivation scale developed by Amabile(Amabile 1988). The developed scales include "Observation Scale", "Creative Teaching Thinking Scale" and "Micro Course Production Evaluation Scale". These three tables are the main measurement scales. In this measurement, the people participating in the measurement were the Vocational and Technical College of Guangxi Normal University. There are 68

students majoring in e-commerce in Grade 2021 of Normal College. The following is divided into two points to explain:

(1) Survey results citing the scale

The citation scale is a tool used to study creative teaching skills. By looking at the cited scales, we found the following creative personality scale: This scale evaluates aspects such as openness to teachers ' creative traits(Silvia, Wigert et al. 2012). Emotion scales are used to measure teachers' emotional experiences during the teaching process, such as happiness, excitement, anxiety, etc. Teacher emotions have an important impact on future students' creativity and learning performance. The innovation attitude scale refers to teachers' attitudes and tendencies toward innovation(Albirini 2006). Teacher Self-Efficacy Scale, used to assess teachers' perceptions and confidence levels in their own innovative abilities(Evers, Brouwers and Tomic 2002). The Perceived Innovation Stress Scale is used to assess the level of stress teachers feel during the innovative teaching process. The innovation motivation scale is used to evaluate the level of innovation motivation of university teachers in the future teaching process, etc(Lai, Hsiao and Hsieh 2018).

These scales are the tools used in this related study. They can help this researcher understand the innovation ability, emotional experience, self-efficacy, innovation pressure perception and innovation motivation of teachers themselves and college normal students before entering the teaching profession(Evers, Brouwers and Tomic 2002). aspect. The analysis of the results of these scales involves relevant interpretations to reveal the relationship between creative teaching skills and other variables of teachers and university normal students(Kunter, Klusmann et al. 2013). The creative teaching skills of teachers and university normal students (quasi-teachers) are also to cultivate the self-learning and confidence level of university normal students' creative teaching skills.

The following are the reference results of the scale obtained through research:

TABLE 12 Citation scale related results and assessment content

Scale name	Developer	Development time	Assessment content
Creative Personality Inventory			
Amabile's Creative Personality Scale	Teresa Amabile	1983	Designed to measure creative personality traits such as openness, confidence, curiosity and imagination.
Kirton's Adaption-Innovation Inventory	Michael Kirton	1976	Assess individual tendencies in problem solving and innovative thinking, distinguishing between adaptive thinking and innovative thinking.
Epstein's Creative Personality Inventory	Robert Epstein	1991	Measures individual tendencies in creative traits, including autonomy, confidence, innovativeness, flexibility, and openness.
CPS .Creative Personality Scale	Ruth Richards	1990	Assess individual traits in creative thinking, curiosity, risk-taking, imagination, etc.
Creative Personality Questionnaire, CPQ	Stephen Guđjónsson on Robert Ress	2002	Assess the personality traits of creative individuals, including openness, independence, risk-taking, self-confidence, etc.
Creative Thinking Scale	Michael Kirpatrick	2010	Assess an individual's creative thinking tendencies, including problem-solving abilities, flexibility, originality, etc.

Scale name	Developer	Development time	Assessment content
Teacher emotion scale			
TMS, Teacher Mood Scale	Jeffrey J. Merritt	2010	Assess teachers' different emotional states at work, such as happiness, anxiety, stress and fatigue.
Teacher Emotion Questionnaire	Peter Kellison and Linda Noviello	2005	Evaluate teachers' emotional state during the teaching process, including happiness, depression, anxiety, etc.
Teacher Emotion Inventory	Alice Juckerman Seth Brown	2007	Assess teachers' emotional experiences at work, including positive emotions (such as joy, pride) and negative emotions (such as anxiety, exhaustion).
Teachers' Perception of Their Emotional Experiences	Catherine Jones	2013	Assess teachers' emotional experiences at work, including positive emotions (such as joy, satisfaction) and negative emotions (such as stress, frustration).
Teacher Mood Scale	Robert P. Abidin	1990	Assessing teachers' emotional experiences during teaching. It includes teachers' positive emotions (such as happiness, satisfaction) and negative emotions (such as anxiety, anger) in the classroom environment.
Innovation attitude scale			
ITA, Innovation Attitude Scale	Jeffrey J. Merritt	2011	Statements about innovative attitudes that teachers need to rate based on their own opinions
TIS, Teacher Innovation Scale	Jerome Hall Linda Herman	1981	Evaluate teachers' attitudes and tendencies toward innovation, including their acceptance of new teaching methods, teaching resources, and educational technologies
TIS, Teacher Innovative Behavior Scale	Alister Smith Gary Keynes	1999	Evaluate teachers' innovative behaviors in practice, including changes in teaching strategies, innovation in curriculum design, and application of educational technology.

Scale name	Developer	Development time	Assessment content
Teacher knowledge scale			
Teacher Knowledge Scale, TKS	Jon Ashman Peter K. Smith	1990	Evaluate teachers' knowledge level in subject knowledge, teaching methods and teaching evaluation.
Teacher Professional Knowledge Assessment Scale, TPKAS	Chen Zhufang, Liu Dongmei	2013	Evaluate teachers' professional knowledge level in subject knowledge, teaching strategies, teaching evaluation, etc.
Teacher Professional Knowledge and Skills Survey , TPKSS	Scott Martin	2009	Evaluate teachers' professional knowledge and abilities in subject knowledge, curriculum design, teaching skills, etc.
Knowledge and skills scale			
Teacher Knowledge and Skills Scale	Scott Martin	2012	Evaluate teachers' knowledge and skill levels in subject knowledge, curriculum design, teaching skills, etc.
Teacher Knowledge Questionnaire	Tim Monehan	1991	Evaluate teachers' knowledge level in subject knowledge, teaching strategies and teaching evaluation. The questionnaire contains a series of teaching-related questions that teachers need to answer based on their knowledge and experience.
Teacher self-efficacy scale			
Teacher Self-Efficacy Scale	Sandra Woolfolk	1990	Includes a series of statements that teachers are asked to indicate on a rating scale how well they feel and believe. These statements may relate to teaching skills, student management, classroom organization, etc.
Innovation pressure perception scale			
Perceived Stress Scale	Sheldon Cohen	1983	It includes a series of statements, and the assessee needs to express his/her degree to each statement within a rating range based on his or her subjective feelings. These statements involve feelings and perceptions of different situations in life, such as work pressure, interpersonal relationships, time management, etc.

Scale name	Developer	Development time	Assessment content
Innovation motivation scale			
Innovation Motivation Scale	Pinder	1998	Assess an individual's level of motivation to engage in innovative activities. The scale includes a series of statements, and the assessee needs to express his/her degree or opinion on each statement within a rating range based on his/her subjective feelings. These statements may involve aspects such as the individual's source of motivation for innovation, attraction to innovative tasks, and expectations for innovation results.
Innovation Motivation Scale	Amabile	1996	Assess individual motivation levels in innovative activities. The scale includes a series of statements, and the assessee needs to express his/her degree or opinion on each statement within a rating range based on his/her subjective feelings. These statements typically relate to aspects such as interest, challenge, autonomy, recognition, and sense of accomplishment in creative tasks.
Learning process scale			
Learning Strategies Questionnaire	Pintrich and De Groot	1990	Evaluate the different strategies used by learners during the learning process, such as memory strategies, organizational strategies, monitoring strategies, etc.
Motivated Strategies for Learning Questionnaire MSLQ	Pintrich , Smith, Garcia Mckeachie	1991	Assess learners' learning motivation and learning strategies. It includes multiple subscales covering aspects such as self-regulation, metacognition, goal orientation, motivation, and emotion.
Motivation for Learning Questionnaire, MLQ	Corno and Harackiewicz	1992	Assess learners' willingness and motivation for learning, including academic goal orientation, social goal orientation, and task orientation.
Learning Strategy Use Scale	Midgley, Maehr and Urdan	1995	Evaluate the frequency and extent to which learners adopt different learning strategies during their learning process.

Scale name	Developer	Development time	Assessment content
Creative thinking scale			
Innovative Thinking Scale	Janssen and Van Yperen	2004	Assess an individual's tendencies and abilities in innovative thinking. The scale includes a series of statements, and the assessee needs to express his/her degree or opinion on each statement within a rating range based on his/her subjective feelings. These statements may involve aspects such as an individual's innovativeness, risk-taking, flexibility, originality, and receptiveness to new ideas in problem solving.
Creative Thinking Scale	Torrance	1966	Assess an individual's tendencies and abilities in creative thinking. This scale focuses on an individual's creative thinking and problem-solving abilities.
Creative Thinking Scale	Kaufman and Baer	2004	Assess an individual's tendencies and abilities in creative thinking. The scale includes a series of statements, and the assessee needs to express his/her degree or opinion on each statement within a rating range based on his/her subjective feelings. These statements may involve aspects such as an individual's imagination, ability to think independently, innovativeness of problem-solving strategies, flexibility, and receptiveness to new ideas.
Innovation Thinking Scale	Kim and Kang	2010	Assess an individual's divergent and logical thinking tendencies in innovative thinking. The scale includes a series of statements, and the assessee needs to express his/her degree or opinion on each statement within a rating range based on his/her subjective feelings. These statements may involve aspects such as individual creative thinking, flexible thinking, critical thinking, and logical reasoning abilities.

Scale name	Developer	Development time	Assessment content
Teaching Innovation Scale			
Teaching Innovation Scale	Chiu, Hong and Chen	2014	Evaluate teachers' innovative behavior and ability in the teaching process. The scale includes a series of statements, and the assesses needs to express his/her degree or opinion on each statement within a rating range based on his/her subjective feelings. These statements may involve teachers' teaching design innovation, teaching method innovation, teaching resource innovation, teaching evaluation innovation, etc.
Teaching Creativity Scale	Amabile	1996	Evaluate teachers' creative performance and creative abilities in the teaching process. This scale focuses on assessing teachers' creative thinking, creative teaching strategies, and innovative teaching environments.
Teaching Innovation Evaluation Scale	Zhang Yuling et al.	2013	Evaluate teachers' actual performance in teaching innovation. This scale includes a series of items covering teachers' innovative thinking, innovation strategies, innovative practices and innovation effects in the teaching process.
Teaching Innovation Intention Scale	Liu Xiaoli et al.	2015	Assessing teachers' willingness to innovate in teaching. The scale includes a series of items covering aspects such as teachers' attitudes, motivations, beliefs, and behavioral intentions toward teaching innovation.
Teaching Innovation Ability Scale	Wang Shancai	2016	Evaluate teachers' teaching innovation ability. The scale includes a series of items covering teachers' innovation in teaching design, teaching methods, teaching resources, and teaching evaluation.

Scale name	Developer	Development time	Assessment content
Social service ability scale			
Social Service Competence Scale	Chen and Tsui	2007	Evaluate individual abilities and performance in social service areas. The scale includes a series of statements, and the assessee needs to express his/her degree or opinion on each statement within a rating range based on his/her subjective feelings.
Social Service Competence Assessment Scale	Matsui and Oka	2014	Evaluate individual abilities and performance in social service areas. The scale includes a series of items covering an individual's communication skills.
Social Service Skills Assessment Scale	Kang and Kim	2011	Evaluate individuals' professional skills and abilities in social service work. The scale includes a series of items covering aspects such as individual communication skills, collaboration abilities, problem-solving abilities, and cultural sensitivity.
Self-assessment Scale of Social Service Competence	Wu and Liu	2012	Individuals self-assess their abilities and qualities in the field of social services. This scale includes a series of items covering an individual's communication skills, interpersonal skills, organizational skills, leadership skills, etc.

Based on the learning and organization of the scales studied by previousresearchers, the following points have been summarized in this study: Creative Personality Inventory、Teacher emotion scale、Innovation attitude scale、Teacher knowledge scale、Knowledge and skills scale、Teacher self-efficacy scale、Innovation pressure perception scale、Innovation motivation scale、Learning process scale、Creative thinking scale、Teaching Innovation Scale、Social service ability scale. Starting from the above points, a preliminary survey was conducted on the sample students of creative teaching skills instructors for the second time. The specific survey table is shown in Annex 1-Annex 11. Teachers were asked to conduct secondary

interviews from 11 aspects, and the following relevant data were obtained. Starting from the above points, a second survey will be conducted on the teachers of creative teaching skills in this project. The specific survey table is shown in Annex 1 to Annex 11. Teachers will be asked to conduct a second interview from 11 aspects, and the following relevant data will be obtained. As shown in TABLE 16 below:

TABLE 13 Survey results of pre citation scales for creative teaching skills research

Level 1 index	Secondary indicators	Teacher		Student _	
		M	SD	M	SD
Innovation Personality	bravery	4.80	0.40	4.80	0.40
	openness	4.60	0.49	4.80	0.40
	Responsibility	5.00	0.00	4.60	0.49
	leadership	5.00	0.00	4.60	0.49
Innovation mood	happiness	4.60	0.49	5.00	0.00
	anxiety	4.60	0.49	4.80	0.40
Innovation manner	to creativity cognition	5.00	0.00	5.00	0.00
	Teaching innovation behavioral tendencies	4.80	0.40	4.60	0.49
intelligence	combinatorial intelligence	5.00	0.00	4.60	0.49
	experiential intelligence	5.00	0.00	4.20	
	adaptive intelligence	5.00	0.00	4.60	0.49
Innovation thinking	divergent thinking	4.80	0.40	4.80	0.40
	logical thinking	4.80	0.40	4.60	0.49
	intuitive thinking	4.80	0.40	4.60	0.49
	Analytical thinking	5.00	0.00	4.60	0.49
Knowledge with skills	educate Knowledge and skills	5.00	0.00	4.60	0.49
	Innovation Knowledge and skills	4.80	0.40	4.60	0.49

Level 1 index	Secondary indicators	Teacher		Student _	
		M	SD	M	SD
Innovation Perception	Perception Creativity	5.00	0.00	4.60	0.49
	Perception pressure to innovate	5.00	0.00	4.60	0.49
Innovation motivation	intrinsic motivation	4.60	0.49	4.80	0.40
	extrinsic motivation	5.00	0.00	5.00	0.00
Innovation study	Learning Resources	5.00	0.00	4.60	0.49
	learning process	4.60	0.49	4.80	0.40
	learning method	4.60	0.49	4.80	0.40
Innovation Performance	Teaching innovation	4.80	0.40	4.60	0.49
	scientific research and innovation	4.80	0.40	4.60	0.49
	social service	5.00	0.00	4.80	0.40
Innovation environment	school environment	4.60	0.49	4.60	0.49
	family environment	5.00	0.00	5.00	0.00
	social environment	4.60	0.49	4.60	0.49

From TABLE 16 that leadership, anger, teachers' cognition of creativity, cognition of creativity teaching skills, innovative behavioral tendencies in mathematics teaching, combinatorial intelligence, experiential intelligence, adaptive intelligence, intuitive thinking, "Intelligence" indicators "experiential," "adaptive" too broad, vague. Delete recommended. "Innovative thinking" secondary indicator "intuition" doubtful, delete suggested. "Analytical thinking" needs improvement. "Innovative knowledge and skills" secondary doubtful, delete suggested. "General educational knowledge and skills" vague, replace with "educational," "scientific research," "social service." "Innovation perception" secondary "innovative self," change "sense of efficacy" to "perceived innovation ability." "Social motivation" may overlap "extrinsic motivation," delete suggested. "Innovative learning" overlaps "learning resources," "process," "methods," adjust according to process. "Family," "social environment" secondary doubtful, delete

suggested. Survey of teachers, students before creative teaching skills training guides future surveys.

(2) Survey results on creative teaching skills

Survey results of the observation scale:

By using Goodwin's three elements of the process of observation: coding, highlighting, and production and articulation of graphic representations, this study in the field of teacher education proposes that university normal education is the key to observation. It refers to the ability to learn to use subject knowledge and subject teaching knowledge to observe and explain important interactive events in the classroom, and divides teachers' professional observation process into selective noticing and knowledge-based reasoning. Two sub-processes. Selective attention means that a professional teacher needs to effectively identify some key incidents (key incidents) that determine effective classroom teaching in a classroom teaching situation where a large number of teaching and learning behaviors occur simultaneously. Pay equal attention to all events; knowledge-based reasoning refers to the process of teachers analyzing and interpreting observed classroom events. It is the process of thinking about key classroom events in a logical way. The reasoning process determines the teacher's final teaching decision. . In terms of reasoning ability, expert teachers have more complex cognitive structures that can help them effectively interpret and judge events that occur in the classroom and make effective teaching decisions, while novice teachers tend to describe classroom events in chronological order. . It can be seen that teachers' observation ability is not innate, but is continuously developed in teaching practice. Therefore, in this research interview, it was found that on the basis of theoretical knowledge, the ability to flexibly apply professional knowledge according to specific classroom situations was discovered. In this sense, learning to observe is an important part of the development of creative teaching skills for university normal

students, an essential ability to grow into expert teachers, and an important teaching expertise that can be cultivated in teacher education.

Based on the above results, combined with the research in Chapter 2 and Chapter 3, this study focuses on the three observational skills, creative thinking, and creative operation skills of creative teaching skills:

Picture1 (Observational skills)

Observation skills can be cultivated through various methods. This study uses role-playing, on-site research, literature analysis, questionnaires, case studies, and interviews to implement, reflect, and improve innovative teaching skills research and reform teacher trainee training with "cycle experience-inspired teaching" and "platform and growth". The "cycle-experience-inspired teaching" reforms teacher training, while "platform and growth" combines course competencies with student situations to enhance project teaching effectiveness.

The research path of the reform of the career-perception curriculum from the upper-level design problem to the lower-level problem. The reform of the teacher education curriculum system needs to first determine the training objectives of the profession and extract the innovative teaching skills of the students, set up the corresponding practical links according to the requirements of the course syllabus, promote the cross-fertilization of disciplines, and promote the reform of practical teaching. Plan - Act - Reflect - Plan again.

This research study is supported by the practice of the previous courses, and the research on the innovative teaching skills cultivation mode with the "Teacher Vocational Skills Training" course as the platform formally began with the 2021 undergraduate students of Vocational Teaching Teachers at the Vocational and Technical Teacher Training College of Guangxi Normal University. A total of 411 Vocational Teacher Education undergraduates in 10 majors, including Accounting, Logistics Management, Secretarial Science, Pre-school Education, Tourism

Management, and Arts and Crafts, undertook the course of Teacher Vocational Skills Training.

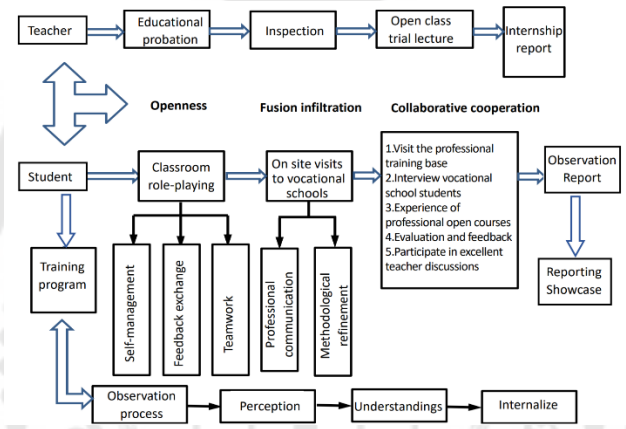


FIGURE 11 Structural diagram of the implementation of observation skills in the composition of creative teaching skills

Picture2 (Creative thinking)

The cultivation of innovative new thinking is a long-term process, affected by multiple factors, and it is a difficult thing to improve in a short period of time. In this study, we use guided learning, which guides students in the process of previewing, thinking and preparing before the beginning of the course. It stimulates students' interest and advance knowledge to lay the foundation for classroom learning.

Cultivating Innovative Thinking Begins with Perception, Gardner's Multiple Intelligences (Huo Liyan. Multiple Intelligence Theory and Its Implications for Us[J]. Education Research, 2000 (9): 71-76.), the process of perceiving and cognizing external things through the senses. In teaching, teachers can help students better understand and accept knowledge by using a variety of sensory modes, so as to

cultivate students' creative thinking and apply it to creative teaching skills. The specific implementation diagram is shown below:

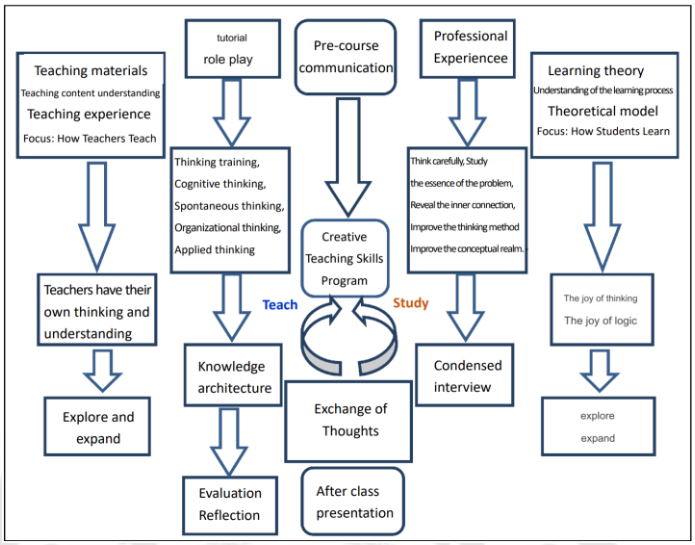


FIGURE 12 Creative Thinking Implementation for Creative Teaching Skill Components

Picture3 (Creative operation skills)

Phase I: Teaching Preparation

(1) Teachers release teaching materials like task sheets, videos, lessons, practice and discussion questions for online learning and testing.

(2) Learning tasks are posted weekly on the platform. Teachers/assistants can review students' videos, courseware, practice and discussion through background management.

(3) Before class, teacher prepares lesson online, identifies key points, selects exercises, questionnaires, and discussion questions, and releases them in first session.

Stage 2: Teaching implementation

Using the networked management platform, online and offline learning is combined, and classroom teaching is carried out in the form of classroom pair division.

The specific implementation steps are shown in the figure below:

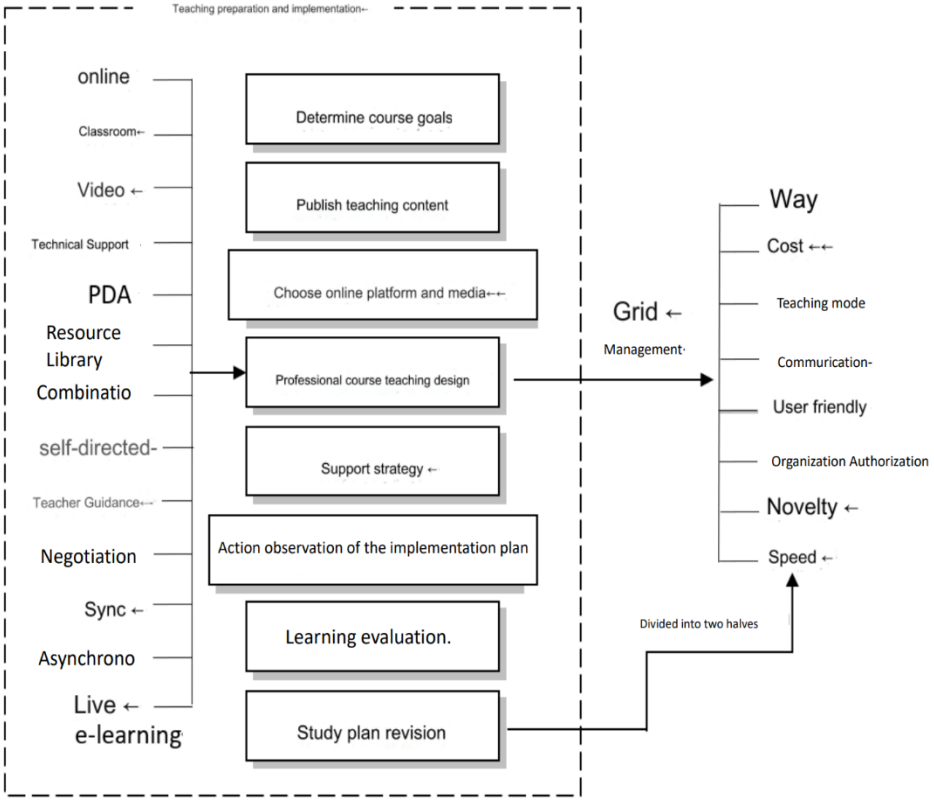


FIGURE 13 Creative Operational Skills Implementation Outcome Chart for the Creative Teaching Skills Component

4.2 Results of Teaching model design

4.2.1 Result of teaching model design

The object sample of this teaching model research is Guangxi Normal University in Guilin, Guangxi, China. When designing an innovative teaching skills training teaching model at Guangxi Normal University, it mainly focuses on cultivating students' observational skills、 creative thinking、 creative operation skills from three dimensions. The setting is to stimulate students' innovative thinking, cultivate students' cooperation ability, and provide practice and experience opportunities, emphasizing interdisciplinary and comprehensive learning, providing feedback and evaluation mechanisms, cultivating students' independent learning abilities, and promoting continuous learning and professional development goals:

Cultivate students' independent observation and learning abilities: Innovative teaching models should cultivate students' independent learning observation abilities and motivation for learning and observation. Students should be able to actively explore and learn, think independently and solve problems. Model design can include inspiring learning tasks, personal research and inquiry learning to cultivate students' Observation skills for independent learning.

Stimulate students' innovative thinking: The teaching model should be designed to stimulate students' innovative thinking abilities. Students should be able to develop skills for independent thinking, problem solving and creative expression. Model design can include challenging learning tasks, open-ended questions and projects, and opportunities to encourage students to come up with novel ideas and solutions.

Develop students’ collaboration skills: Innovation often requires teamwork and collaboration. The teaching model should encourage students to work in groups or teams to explore and solve problems together. Model design can include group projects, role-playing and discussion activities to promote students' cooperation skills and teamwork spirit.

Provide opportunities for practice and experience: The cultivation of innovative capabilities requires practice and experience. The teaching model should provide students with opportunities to participate in practical activities such as actual projects, experiments, and surveys. Through practical operations and first-hand experience, students can better understand and apply innovative thinking and methods.

Emphasis on interdisciplinary and integrated learning: Innovation often involves knowledge and skills across disciplines. The teaching model should encourage students to learn across disciplines and integrate knowledge from different disciplines into innovative activities. Model design can include interdisciplinary projects, case studies, and comprehensive assessments to develop students' comprehensive thinking and abilities.

Provide opportunities for practice and experience: The cultivation of innovative capabilities requires practice and experience. The teaching model should provide students with opportunities to participate in practical activities such as actual projects, experiments, and surveys. Through practical operations and first-hand experience, students can better understand and apply innovative thinking and methods.

By setting the above goals and combining them with specific teaching methods and strategies, an effective teaching model for cultivating innovative teaching skills is designed to help students develop innovative abilities and become learners and future professionals with creative thinking and innovative spirit.

Since the founding of Guangxi Normal University in 1932, the teaching of the course "Professional Skills Training for Teachers" has been a mandatory course for the training of teacher trainees, so that college students can give full play to their personal initiative, highlighting from the vocational perception, integrating innovative thinking, cultivating high-quality talents in basic education, advocating the teaching concept of "autonomy, cooperation and innovation", developing in autonomy, learning to take responsibility, exploring in cooperation, cultivating innovative qualities, teaching in perception, integrating character education, based on the research of creative teaching skills training mode in this study, designed as follows:1.Teaching skills, 2.Import skills,

3.Observation and explanation skills, 4.Teaching method design and selection, 5.Teaching activity design skills, 6.Teaching and questioning skills, 7.Information-based teaching methods, 8. Micro course skills.

For the university students of Guangxi Normal University teacher training, this study designed the following eight teaching topics, according to the course syllabus and the consistency of teacher training courses, this study of creative teaching ability research from the following eight topics, the topic name for the following eight Topics, the main content of each topic and the objectives to be achieved are listed in sub-points, in line with the graduation requirements of the students, the lecture time for each Topic is five hours, the specifics are shown in TABLE 17 below:

TABLE 14 Researching course topics, meeting objectives and lesson times

Serial number	Topic	Content	Time (hour)
1	Teaching skills	1. Understand the meaning, characteristics and classification of teaching skills. 2. Master the general rules for the formation of teaching skills. 3. Through task-driven, learn to divide the three categories of teaching skills. 4. Master the construction methods of teaching skills through situation creation.	5

Serial number	Topic	Content	Time (hour)
2	Import skills	1. Ability to analyze problems: Discuss the relevant educational issues raised in the book "Suhomlinsky on Education" , " How does teaching attract students' attention? Arouse learning motivation? Clarify learning direction and establish knowledge connections? " Based on the learning tasks and goal development faced by students , we use operational scientific methods to make value judgments through academic analysis and method selection to promote students' self-development and teaching improvement. Let students participate in discussions and conduct think. 2.Problem-solving ability: Learn from the meaning, requirements and methods of introducing new courses, understand the role of introducing new courses, discover breakthroughs in introducing design from actual teaching cases, and cultivate students' problem-solving abilities. 3. Independent learning ability: From the perspective of skill practice and skill improvement, new courses are introduced in an advanced manner, and micro-training camps are used to stimulate students' learning passion and interest and improve their independent learning ability.	5

Serial number	Topic	Content	Time (hour)
3	Observat-ion and explanat-ion skills	1. Provide accurate descriptions: The primary goal of observation and explanation is to provide accurate descriptions. Through careful observation and attention to detail, the explainer should be able to provide precise, detailed descriptions of an object's appearance, characteristics, behavior, or the occurrence of a phenomenon. Accurate descriptions can help the audience form an accurate impression of the object being observed. 2. Explain the principles and mechanisms behind it: One of the goals of observation and explanation is to explain the principles and mechanisms behind the observed objects. Through in-depth research and understanding, the explainer should be able to explain the reasons, principles, related scientific concepts or scientific principles behind the observed object. Such explanations can help the audience develop a deeper understanding of the object being observed. 3. Emphasize key features and important details: The goal of observation and explanation is to emphasize key features and important details of the object being observed. The explainer should be able to identify and highlight the most representative and important features or details to help the audience better understand and recognize the object of observation. 4. Provide examples and comparisons: The goal of observation and explanation is to provide examples and comparisons to help the audience better understand the object of	5

		observation. By providing similar examples, analogies, or comparisons with other related objects, the narrator can connect the object of observation to the audience's existing knowledge and experience and promote their understanding of the object of observation. 5. Establish connections and associations: The goal of observation and explanation is to help the audience establish connections and connections between the observed object and other concepts, phenomena or fields. By explaining the relationship between the observation and relevant background knowledge, disciplines, or practical applications, the explainer can help the audience better understand the importance and significance of the observation. 6. Raise questions and trigger thinking: The goal of observation and explanation is to raise questions and trigger the audience's thinking. By arousing the audience's curiosity and asking thought-provoking questions, the presenter can stimulate the audience to think about different aspects of the observation, possible causes or potential effects, thereby promoting their learning and thinking development.	
4	Teaching method design and selection	1. Understand the new vocational training teaching curriculum system. 2. Familiar with action-oriented teaching methods . 3. Understand the three major teaching methods commonly used in vocational education. 4. Problem analysis ability: start with the teaching design framework , learn teaching methods, participate in discussions and think. 5. Problem -solving ability: Guide students	5

		to learn relevant knowledge about action-oriented teaching methods, understand how to use action-oriented teaching methods in teaching design, and cultivate students' problem-solving abilities. 6. Independent learning ability: Starting from the case teaching method used in TCP flow control in the teaching content , we explain and discuss from multiple angles to stimulate students' learning passion and interest and improve their independent learning ability. 7. Emotional resonance: through information - based teaching scoring sheet , put forward skill elements closely related to students' teaching design and arouse emotional resonance. 8. Professional sentiment: Establish a firm goal for normal school students and build students ' sense of professional pride and mission.	
5	Teaching activity design skills	1. Understand the connotation of teaching activity design. 2. Be familiar with the principles of designing vocational education teaching activities. 3. Master the methods of designing teaching activities for vocational education. 4. Problem analysis ability: Courses are introduced through brainstorming questions and answers and videos, students participate in discussions and think, and analyze the connotation of the design of vocational education teaching activities . 5. Problem-solving ability: Guide students to develop their problem-solving ability through relevant knowledge of teaching activity design, such as goals, basis, essence and support, etc. 6. Independent learning ability: Use case analysis of vocational education teaching	5

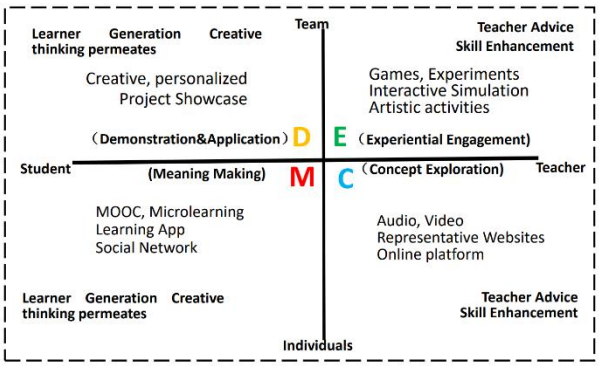
		activities, introduce first-line materials to explain and discuss, stimulate students' learning passion and interest, and improve independent learning ability. 7. Emotional resonance: Introduce the "Backlash Movement" through activity cases in middle school courses, propose the material development in students' growth process, and cultivate students' sense of patriotic responsibility. 8. Professional sentiment: Establish a firm goal of learning and build students ' sense of professional pride and mission. 9. Moral and intellectual development: Students should focus on both moral and professional development, putting morality first and integrating knowledge and action.	
6	Teaching and questioning skills	1. Problem analysis ability: Let students participate in discussions and think by introducing " Do you know Socrates' " Midwifery " ? " 2. Problem-solving ability: Guide the question types, methods and requirements, and answer methods, and explain them one by one to cultivate students' problem-solving ability. 3.Independent learning ability: Practical training by asking questions, explaining and discussing from multiple angles, stimulating students' learning passion and interest, and improving independent learning ability.	5
7	Information-based teaching methods	1. Understand the purpose of using information-based teaching methods; 2. Understand the basic paradigm of information-based teaching design; 3. Master the search skills of information-based teaching methods; 4. Understand the purpose of using information-based teaching methods through task drive; 5. Master the use of information-based	5

		teaching methods through situation creation; 6. Be able to use static information-based teaching methods to transform theoretical knowledge into dynamic information-based teaching methods, stimulate self-learning ability, establish a correct and positive learning attitude, and insist on cultivating people with moral character as the central link; 7. Strengthen the ability of independent creation and cultivate a sense of teamwork and mutual assistance .	
8	Micro course skills	1. Understand the concept of micro-course; 2. Name the types and methods of micro-courses. 3. Innovate micro-course skills and convert existing teaching designs into micro-courses 4. Selection and application of micro - course templates. 5. Be able to use the theoretical knowledge of static micro-courses to transform the emotional attitude of dynamic micro-courses, strengthen the ability of independent creation, and cultivate a sense of team mutual assistance. 6. Strengthen the ability of independent creation and cultivate a sense of teamwork and mutual assistance. 7. Continuously stimulate learning motivation in the fun of inquiry- turn passive learning into self-needs and stimulate students' creative thinking. 8. Strengthen the ability of independent creation and cultivate a sense of teamwork and mutual assistance .	5
Total			40

For example: The goal in Topic 3 "Observation and Explanation Skills" is to enable the audience to have a deeper understanding of the observed objects, phenomena or events through careful observation and detailed explanations. Here are some common goals for observation and explanation: By achieving these goals, observation and explanation can help audiences more fully understand the objects being observed and develop their observation, analytical, and critical thinking skills.

The purpose of this study was to gain insight into teacher college students' understanding of creativity and how they implement the development of creative teaching skills. The target group is the third-year e-commerce majors of Guangxi Normal University Vocational and Technical Normal College in Guilin, Guangxi, China, as well as the two classes of e-commerce majors of Guangxi Normal University Vocational and Technical College in 2020 and China Technical Normal University. There are 44 students in Class 1 and 24 in Class 2. A total of 68 undergraduate students participated in this study, including 61 female students and 7 male students. Teachers who were engaged in teaching "Teacher Professional Skills Training" in the 2022-2023 school year participated in this study. Research Design The research design chosen for this study was a pretest posttest control group design. The research results show that the developed model is based on Guilford theory, positive psychology theory and 4P theory of creativity, and the learning process consists of four steps: "concept exploration", "experience participation", "demonstration and application" and "creativity" . Electric Power Development". This model is called the " EDMC Model" , which emphasizes the experiential learning cycle model with the operation process as the content . The " EDMC" model is based on three main theories and empirical participatory development cycles. The resulting model Evaluations of effectiveness demonstrated that students' creative teaching skills met standards throughout the evaluation period of the model's implementation.

The learning process of the experiential learning cycle model to enhance creativity and creative teaching skills research consists of 4 steps, the complexity of which is flexible depending on the learner, as shown below.



Components of teaching model

1. Principles

Creative teaching skills are critical skills in today's world. Therefore, the experiential learning cycle model cultivates the creative teaching abilities of university normal students.

The first is the principle of stages.

In the experiential learning cycle teaching process, specific teaching content should be screened according to the cognitive level and psychological characteristics of students of different ages. The design of teaching activities must meet the students' real needs and actual abilities to ensure that students can improve their current knowledge level. Complete the experiential learning cycle under the application and build a more complete knowledge system.

The second is the principle of operability.

First of all, the experiential learning cycle teaching should be acceptable to students and realistically operable in content selection. The experiential learning cycle teaching should follow the principle of from point to point, from shallow to deep, gradually cultivate students' interest in learning, and let students Gain a sense of happiness and accomplishment in the learning process, thereby increasing students' interest in learning history. On the contrary, if the teaching content is beyond the students' acceptance range, it will make students unable to start, or even resist such teaching methods, then this experiential learning cycle teaching is ineffective.

The third is the principle of effectiveness.

The purpose of the experience is to allow students to actively participate in an experiential way, build their own knowledge system, master systematic knowledge and skills, and develop their own thinking patterns through continuous exploration and learning. Students can better complete teaching plans and consolidate learning results through different types of experiential learning methods, thereby improving comprehensive abilities.

The fourth is the principle of controllability.

Controllability is an important prerequisite for the orderly conduct of classroom teaching activities. For example, when students speak independently in class and explain a certain knowledge point, teachers must check the historical materials they consulted and explain the content one by one to guide students to form correct values and historical views, and ensure the authenticity and authenticity of the content . Scientific content.

Fifth, democratic principles.

Classroom democracy not only reflects the dominant position of students, but is also an important prerequisite for the effective implementation of experiential learning cycle teaching. They can independently choose effective learning methods in classroom learning and reasonably arrange role-playing activities according to the characteristics of historical figures. In addition, we also attach great importance to the democratic nature of group evaluation, and adopt a two-way evaluation method of self-evaluation and other evaluation to promptly discover and reflect on problems existing in experiential learning.

Sixth is the principle of openness.

The openness of the experiential learning cycle teaching is combined with the flexibility of high school students' thinking, using experiential learning methods to generate new knowledge, new ideas, new methods and new problems. In classroom research activities, students generate sparks of ideological collision through discussions

and debates, which effectively stimulates students' desire for knowledge. Its outstanding advantage is that students can choose diversified learning methods to understand and master classroom teaching content based on their own characteristics and interests. Therefore, the experiential learning cycle teaching method gives students more space for independent learning and independent choices, and better promotes students' self-improvement and all-round development.

2. Objectives

Cultivation of creative teaching skills for university normal students. Design objectives of teaching model for innovative teaching skills training for normal students of Guangxi Normal University.

3. Teaching steps

The learning process of the experiential learning cycle model to enhance creativity and creative teaching skills research consists of 4 steps , the complexity of which is flexible depending on the learner, as shown below .

Step 1: Concept Exploration

Creative teaching skills require normal college students to unify professional knowledge and teaching knowledge, and encourage normal college students to ask questions, decide the direction of inquiry, organize inquiry, and collect data during the inquiry learning process. Following the logic of "creativity-learning-creative teaching-creative teaching skills-vocational normal school students' creative teaching skills", the core concept of "vocational normal school students' creative teaching skills" is obtained through layer-by-layer analysis. Then, after analyzing the problems that may arise in the development of creative teaching skills, learners can evaluate the accuracy of their own concepts or collaborate to find more accurate concepts (for example, using definitions from expert monographs) and learn them through various audio and video, Represents the exploration and publishing of concepts on websites and online platforms, cultivating the creative teaching ability of normal students to understand concepts, using a variety of methods to make concepts clear and understandable, and being able to explore the concepts of texts from texts. From

the perspective of cultural influence, we explore the innovations in understanding concepts by students with different learning styles and how they help the overall teaching. These are all vividly displayed in the form of mind maps, bringing teaching styles and concepts into teaching .

Step 2: Experiential Engagement

Games, experiments, interactive simulations and art activities are carried out in the classroom , and methods such as collection and sharing of competition works, simulation and experiential participation in topic learning can be used. Proceed to step 3.

Step 3: Demonstration and Application

Based on the knowledge acquired in step 2, develop innovative abilities in explaining and demonstrating professional skills . The presentation and application of innovative skills differs from traditional ideas and methods. Teachers encourage students to use their personal creativity, encourage individualization, complete project demonstrations, advance demonstrations and applications step by step, clarify teaching plans, and produce teaching design and demonstration PPTs. Learning is a cycle of innovation and development, including four steps: planning, implementation, inspection, and reflection. The theory and practice of the dual internship model can be proposed and discussed from the perspectives of teacher education internship and educational practice . In this way, each step can have the following substantive development .

Step 4: Meaning Making

Must demonstrate creative teaching skills. After passing the above steps 1, 2, and 3, all knowledge will be used to cultivate circular innovation teaching skills. The plan includes selecting subjects and clarifying teaching objectives. Teaching focus, difficulty, selection of teaching methods, design of teaching process, preparation of teaching equipment (software and hardware, etc.) and teaching evaluation. Then, with the help of online and offline teaching methods, through MOOC, micro-learning learning applications and social networks, the works of university normal

students can form meaning, combine theoretical significance and practical significance, and evaluate the possibility and value. Plan implementation status. Normal students rely on the publishing platform to innovate. At the same time as the work is released, whether it is possible to conduct personal self-evaluation, group evaluation and teacher comments on the relevant materials . Normal students try their own innovations, publish personal works in a planned manner , and check and analyze the data collected by big data to check and evaluate whether their creative teaching abilities have been improved . In teaching reflection , multi-dimensional reflection can be used to maintain advantages, correct deficiencies, and repeatedly revise the previous content . If there are major problems during implementation, such as failure to achieve teaching goals, failure to break through key and difficult teaching points, problems in the implementation of teaching methods, etc., it is necessary to return to concept exploration and practice.

4. Media & Resources

Media and learning resources suitable for creative teaching and improvement of university normal students, as well as experts, online media or others. For example, the most commonly used learning media and resources in China now include various software and hardware, platforms, and APPs . Teachers assist normal college students in selecting media, guide normal college students in finding or directly provide visual resources to model cities to install software. The visual resources section is organized as follows:

TABLE 15 Domestic knowledge visualization literature statistics table and current research status of some visualization tools

Key words	Academic journals	Paper	PhD thesis	All
Knowledge visualization	5685	Chapter 596	46	6327
Mind Mapping	6687	2413	9	9109
Concept map	2380	2816	103	5299
Cognitive map	Chapter 534	Chapter 421	63	1018
Semantic Web	2512	Chapter 1359	212	4083
Mind Mapping	62	112	3	177
V- shaped diagram	4	4	3	11
Micro lesson video	2319	214	1	2534
Virtual Reality	910	38	1	949

5. Learning evaluation

Evaluate classroom activities with university normal students. Observing classroom performance and group cooperation (15%), classroom assignments and demonstration presentations (15%), classroom simulation lectures (70%), timely feedback and encouragement from teachers in class, and enhancing student confidence. Classroom simulation lectures are scored by inviting frontline vocational high schools to give live lectures (the entire process is DV recorded, including 15 minutes of trial lectures and 5 minutes of structured interview Q&A), Through data organization, the evaluation data can be made more accurate and clear.

4.2.2 Result of Expert checking the quality of Teaching model

By inviting experts to conduct discussions and conduct face-to-face interviews, and continue to distribute evaluation forms online after the interviews, the subject teaching method teachers' teaching skills teaching experience were used as the

theme. Teaching plans, teaching methods, teaching evaluation, etc. were used as the main direction of the interview. Subject teaching materials and sources were analyzed. Five subject teachers were interviewed. Interviews were conducted using outlines for expert teaching skill development. The invited experts are all people with many years of teaching experience and rich research results. The information of the 5 interviewers is as follows:

TABLE 16 Specialist Information

Number	Name	Age	Degree	Teaching years
1	Teacher Feng	42	Doctoral Associate Professor	10
2	Teacher Liu	43	Doctoral Associate Professor	8
3	Teacher Lu	41	Doctoral Associate Professor	10
4	Teacher Tao	53	Master's degree	25
5	Teacher Li	54	Master's degree	30

Through the study of this course model, normal college students at Guangxi Normal University can master the teaching skills of the classroom teaching process and classroom teaching scenes. Through training, students can initially choose and apply appropriate teaching methods and techniques to carry out professional teaching practical activities. Systematic teacher professional skills training is provided to normal school students, with the purpose of guiding students to transform the knowledge and skills they have learned into specific professional behaviors of teaching. Students understand the structure, goals and methods of the classroom teaching skills system and master teaching skills while forming a certain teaching style and standardizing it.

Students can learn to use the theory of creative teaching skills as a guide, fully refine the creative new teaching experience in this professional course, and incorporate creative elements in teaching through teaching organization design, diverse artistic teaching methods, and teaching cases that integrate professional characteristics. Integrated into the educational teaching design process, teachers can help students shape correct creative teaching concepts and acquire the skills to be innovative teachers in the future, thereby achieving the goal of cultivating innovative teaching skills.

Through this study, students will achieve the following goals:

Firstly, Course moral goals

(1) Firmly adhere to the position of cultivating people with moral integrity, abide by professional ethics, possess humanistic heritage and scientific literacy, and have the professional ideals and professional beliefs of teachers who love education and students. [Graduation requirements 1/2 teacher ethics/educational feelings]

(2) Establish quality awareness, service awareness, responsibility awareness and innovation awareness. Striving for excellence. Have the awareness of whole-process and all-round education, master the physical and mental development and educational rules of students in secondary vocational schools, and be able to organically combine professional teaching to carry out peer-to-peer education activities. [Graduation requirements 3/8 craftsman spirit/comprehensive education]

(3) Have communication skills and teamwork spirit, and be able to develop a serious, realistic, diligent and good scientific research spirit and study style. [Graduation Requirement 11 Communication and Cooperation]

Secondly, Knowledge goals

(1) Master the basic theories and basic knowledge necessary for this major. Understand professional industry background knowledge. Master the basic technical skills, necessary methods and related knowledge of the profession. Master the curriculum teaching knowledge of vocational education. Have the preliminary ability to

engage in practical work and research work in this major. [Graduation Requirement 4 Professional Knowledge and Abilities]

(2) Be familiar with the professional standards corresponding to the major, master the formation rules of technical skills, have relatively proficient practical skills, and initially have the ability to teach technical skills and assess and evaluate technical skills. [Graduation Requirement 5 Professional Practical Ability]

Thirdly, Capability goals

(1) Master the basic laws of education and teaching and the growth of technical and skilled personnel. Understand teaching standards. I Have certain teaching and research capabilities. [Graduation Requirement 6 Teaching Ability]

(2) Awareness of and attitude toward lifelong learning and professional development, with tailored learning plans and career plans for self or others. Understand the reform and development trends of vocational education at home and abroad. Preliminarily master reflection methods and skills, have a certain sense of innovation and critical thinking, and learn to analyze and solve educational and teaching problems. [Graduation Requirement 10: Learn to Reflect]

TABLE 17 Graduation indicator points corresponding to course objectives

Target	Supporting Graduation Requirements	Supporting graduation requirement indicator points
Course Morality ethics Target	Teacher ethics (H)	1-1 Deeply understand the thought of socialism with Chinese characteristics in the new era. 1-2 Love the Party and country, be able to implement the Party's education policy, and establish the educational ideal of educating people for the Party and educating talents for the country.
	Educational sentiment (H)	1-3 Understand laws and regulations such as Vocational Education Law, Teachers Law, Professional Ethics Code for Teachers in Vocational Schools, etc., be able to strictly demand yourself, and have the awareness to teach according to the law.

		1-4 Understand the rules and characteristics of vocational education teachers 'ethics and professional growth, and be able to continuously improve their educational realm on the basis of determined to become a good teacher in vocational education.
		2-1 Recognize the unique and important value of vocational education to students and society, have positive emotions, correct attitudes, and correct values for vocational education, be willing to engage in the teaching profession, and constantly improve themselves to become excellent secondary vocational teachers. Prepare. 2-2 Have humanistic heritage and scientific spirit, have a persistent pursuit of knowledge in related fields required for future education, and have the belief and sentiment of continuous self-improvement. 2-3 Establish the educational belief of educating people, respect students' personality, be caring and responsible, be determined to be the guide for students' growth, and make active preparations on their path.
	Craftsmanship (H)	3-3 In the practice of education and teaching, we should adhere to the teaching concept of effective teaching, focus on improving the quality of education and teaching, and promote the realization of students' perfect education. 3-4 In this major and educational practice, consciously carry forward the trend of the times that labor is glorious and skills are valuable, and use practical results to write new glory for workers in the new era.
	Comprehensive education (M)	4-1 Deeply understand the physical and mental development, pay attention to the ideological and political curriculum, and be able to organically combine professional teaching with educational activities. 4-2 Understand the educational connotation and methods of vocational school culture, corporate culture and educational activities.
	Communication and	5-1 Understand students, communicate with students on an equal footing, and establish a good teacher-student

	cooperation (H)	relationship. 5-2 Cooperate and communicate with colleagues, share experience and resources, and develop together. 5-3 Communicate and cooperate with parents to jointly promote student development. 5-4 Cooperate and promote the establishment of cooperative and mutual-help relationships between schools, enterprises and communities, promote school-enterprise cooperation, and provide social services.
Knowledge Target 1	Professional knowledge and abilities (H)	6-1 Have a solid foundation in natural sciences and a good foundation in humanities, arts and social sciences. 6-2 Have solid professional knowledge necessary for this major, and understand the current development status and trends of this major. 6-3 Have good word processing ability, master a foreign language, have strong ability to listen, speak and read foreign language documents in the major, and have the ability to write professional technical reports.
Knowledge Target 2	Professional practical operation ability (H)	7-1 Be familiar with the professional standards for secondary vocational school teachers corresponding to this major. 7-2 Have strong professional practical operation ability and master the basic operating skills of relevant equipment and facilities in this major . 7-3 Graduation must obtain intermediate and senior professional qualification certificates related to this major.
Ability Target 1	Teaching ability (H)	8-1 Understand the "learner-centered" educational concept and the connotation of the core competencies and curriculum standards of vocational education. 8-2 Understand the rules and characteristics of students' cognition and development, and be able to use teaching-related theories to design, implement and evaluate curriculum teaching in secondary vocational schools. 8-3 Be able to use education and teaching knowledge and

		information technology to design, implement of secondary vocational teachers, teaching materials and teaching methods , and proactively implement the "three education reforms" of vocational education in teaching design and practice. 8-5 Acquire basic teaching and education management experience, master basic teaching skills, and have certain teaching and research capabilities.
Ability Target 2	Learn to reflect (H)	9-1 Have the consciousness and attitude of lifelong learning and professional development, understand the reform and development trends of vocational education at home. 9-2 Master reflection methods and skills, be able to conduct self-reflection, diagnosis and improvement, and use critical thinking and methods to analyze and solve educational and teaching problems.

According to TABLE 20 Specific information of interviewers, it can be seen from the table that the experts in this study are all over 40 years old and under 60 years old, they are professors with many years of teaching experience. Dewey once said that education is life, and these experts have a strong voice in terms of education and experience. This quality inspection has already been conducted during the summer vacation. Thank you very much to the experts for their patient and meticulous guidance and evaluation. From the research on the teaching model of creative teaching skills.

The eight topics are based on the development of courses that emphasize observation, creative thinking, and creative manipulative skills based on a model of creative teaching skills development for university-based teacher trainees. For students teachers are accustomed to have individual topics designed for learning, emphasizing the organization of various learning modules in which students can see, think, and do through the development of Gardner's Multiple Intelligences, and can actually learn through hands-on practice, this design provides students with the opportunity to practice, and gain learning opportunities for creative teaching skills.

In the first draft of the quality assessment of the course, the assessment is based on the syllabus of the course, with the level of indicators of graduation of students as the level of opinion. Five experts were formed to study the teaching curriculum, measurement and assessment, and the researchers of this creative teaching skills gave the draft of the course to the experts. It was first considered and recommendations were made. The experts recommended the order of the content of the different units and the time used to organize the activities. The researcher then made adjustments based on the recommendations. Then the experts were asked to assess the quality of the first draft of the curriculum, which resulted in the following ratings of the appropriateness of the curriculum: TABLE 21 Results of the experts' evaluation of the quality level of the first draft of the curriculum.

TABLE 18 Results of the Expert evaluation teaching model quality inspection

Topic	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	M	SD	Level
Teaching model background and basic teaching concepts	5	5	4	5	5	4.80	0.40	Highest
Basic concepts and teaching objectives of teaching model	5	4	5	4	5	4.60	0.49	Highest
Basic concepts of teaching model and learning activities	5	5	5	4	4	4.60	0.49	Highest
Teaching objectives and teaching content	5	5	5	4	5	4.80	0.40	Highest

Topic	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	M	SD	Level
Teaching objectives and learning activities	5	5	5	5	4	4.80	0.40	Highest
Teaching content and learning activities	5	4	5	5	5	4.60	0.49	Highest
Teaching content and learning materials	5	5	5	5	5	5.00	0.00	Highest
Teaching content and learning resources	5	4	5	5	5	4.60	0.49	Highest
Teaching content and study time	5	5	5	4	4	4.60	0.49	Highest
Teaching evaluation and teaching goals	5	5	5	5	5	5.00	0.00	Highest
		Average				4.74	0.36	

Based on the results of the expert evaluation for teaching model quality inspection, the table shows the ratings given by different experts for various aspects of the teaching model. The table also includes the mean (M), standard deviation (SD), and level of each aspect.

Teaching aspects rated highly by experts:

* Objectives & activities: 4.80 (mean), 0.40 (SD), highest level.
* Content & activities: 4.60 (mean), 0.49 (SD), highest level.
* Content & materials: 5.00 (mean), 0.00 (SD), highest level.
* Content & resources: 4.60 (mean), 0.49 (SD), highest level.
* Content & study time: 4.60 (mean), 0.49 (SD), highest level.

* Evaluation & goals: 5.00 (mean), 0.00 (SD), highest level.

Overall rating: 4.74 (mean), 0.36 (SD).

Course details: 10 items, avg. score > 4.60. Offered for 10 years at Guangxi Normal University. Teaching outline is complete. Thanks to creative teaching skills research team. Scores meet curriculum standards.This article designed a teaching plan for creative teaching skills and carried out preliminary rationality research on students studying the training model. The materials read by experts (teaching syllabus, teaching model, teaching plan) are the teaching plans of our "Teacher Professional Skills Training" teaching model, which requires students to design teaching, implement and evaluate, and form a report. Before the teaching we design is implemented, experts evaluate the effectiveness of the teaching design and teaching model. Only after passing the teaching can the teaching be implemented and make corresponding evaluations. The analysis results are as follows:

TABLE 19 Experts' analysis of the rationality of the teaching plan to improve college students' creative teaching skills

Teaching plan	Topic	Evaluation results					Average	SD	Level
		Expert 1	Expert 2	Expert 3	Expert 4	Expert 5			
1	Teaching skills	5	5	4	5	5	4.80	0.40	Highest
2	Import skills	5	5	5	5	5	5.00	0.00	Highest
3	Observation and explanation skills	5	5	5	4	4	4.60	0.49	Highest
4	Teaching method design and selection	5	5	5	4	5	4.80	0.40	Highest

Teaching plan	Topic	Evaluation results					Average	SD	Level
		Expert 1	Expert 2	Expert 3	Expert 4	Expert 5			
5	Teaching activity design skills	5	5	5	5	4	4.80	0.40	Highest
6	Teaching and questioning skills	5	4	5	5	5	4.60	0.49	Highest
7	Information-based teaching methods	5	5	5	4	4	4.60	0.49	Highest
8	Micro course skills	5	5	5	5	5	5.00	0.00	Highest
	Average Value						4.78	0.33	

Based on the experts' analysis of the rationality of the teaching plan to improve college students' creative teaching skills, the table displays the evaluation results provided by different experts for various aspects of the teaching plan. The table also includes the average value, standard deviation (SD), and level for each aspect.

Here is a breakdown of the results:

Observation & explanation: Most experts 5, Expert 4&5 4, avg 4.60, SD 0.49, highest level.

Teaching method design: Most 5, Expert 4 4, avg 4.80, SD 0.40, highest level.

Teaching activity design: Most 5, Expert 5 4, avg 4.80, SD 0.40, highest level.

Teaching & questioning: Most 5, Expert 2 4, avg 4.60, SD 0.49, highest level.

Info-based teaching: Most 5, Expert 4&5 4, avg 4.60, SD 0.49, highest level.

Micro course skills: All 5, avg 5.00, SD 0.00, highest level.

Information-based teaching methods: Most experts gave a score of 5 for this aspect, except for Expert 4 and Expert 5 who gave it scores of 4. The average score is 4.60, and the standard deviation is 0.49. The level is the highest.

Micro course skills: All experts rated this aspect with a score of 5. The average score is 5.00, and the standard deviation is 0.00. The level is the highest.

The average value for all aspects of the teaching plan is 4.78, with a standard deviation of 0.33.Judging from the evaluation results of the rationality of the teaching plan to improve college students' creative teaching skills by 5 experts, the average value is 4.78, which means that the experts believe that the rationality of the teaching plan to improve college students' creative teaching skills is very good.

4.2.3 Results of instrument for data collection development

The results of the development of tools to evaluate the quality of learning design based on the cultivation of creative teaching skills at Guangxi Normal University are as follows: 1) The researcher's inspection opinions on the elements of learning design. The consistency of a total of 5 experts is then searched for the Index of Consistency (IOC),.

TABLE 20 Checklist for the content validity of the structure system for improving college students' creative teaching skills

First level indicator	Secondary indicators	Experts' Evaluation results					IOC
		5	4	3	2	1	
1. Observation Skill	● Observation task	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● Knowledge, experience and skills	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● Sequential and systematic	+ 1	+ 1	0	+ 1	+ 1	0.8
	● Pay more attention to details	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● Sense organs participate in observation activities	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● Observe and record at any time	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● Observe with curiosity	+ 1	+ 1	+ 1	+ 1	+ 1	1

First level indicator	Secondary indicators	Experts' Evaluation results					IOC
		5	4	3	2	1	
2. Creative thinking	● Can cite two or more teaching cases	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● Able to come up with ideas that are different from others	0	+ 1	+ 1	+ 1	+ 1	0.8
	● Able to create original and curious works within a specified time	+ 1	+ 1	+ 1	+ 1	+ 1	1
3. Creative operational Skills	● Meet teaching objectives	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● Academically correct	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● Suitable for target group	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● The knowledge content is short, easy to understand and meaningful	0	+ 1	+ 1	+ 1	+ 1	0.8
	● Interesting and feasible	+ 1	+ 1	+ 1	+ 1	0	0.8
	● The language design is generous and decent	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● The interface design of the work is clear	+ 1	+ 1	+ 1	+ 1	+ 1	1
	● Operable	+ 1	+ 1	+ 1	+ 1	+ 1	1

The table presents a checklist for the content validity of the structure system designed to improve college students' creative teaching skills. The checklist consists of first-level indicators and their corresponding secondary indicators, along with the evaluation results provided by experts. The experts used a rating scale of 5 (strongly agree) to 1 (strongly disagree) to assess each indicator. The table also includes the Index of Observed Agreement (IOC) for each indicator.

Here is a breakdown of the checklist and evaluation results:

Observation Skill: Experts rated Observation task, Knowledge, experience, skills, Pay attention to details, Sense organs participate, Observe & record, Observe with curiosity all +1. IOC: 1. Sequential & systematic: Most +1, one 0. IOC: 0.8.

Creative Thinking: Experts rated Can cite cases, Able to come up with ideas, Able to create works all +1. IOC: 1. Able to come up with ideas: Most +1, one 0. IOC: 0.8.

Creative Operational Skills:

* Meet objectives: +1, IOC: 1

* Academically correct: +1, IOC: 1

* Suitable for target group: +1, IOC: 1

* Knowledge content: short, easy, meaningful; +1 (most), 0 (one); IOC: 0.8

* Interesting & feasible: +1 (most), 0 (one); IOC: 0.8

* Language design: generous & decent; +1, IOC: 1

* Interface design: clear; +1, IOC: 1

Operable: All experts rated it with a score of +1. IOC: 1.

The Index of Observed Agreement (IOC) indicates the level of agreement among the experts for each indicator. The average IOC for all indicators is 0.93, suggesting a high level of agreement among the experts in their evaluation results.

The expert inspection results found that each consistency index is higher than the prescribed standard of 0.6, and the experts believe that the test questions can be adjusted in the cultivation of creative teaching skills at Guangxi Normal University without adjustment. However, for the following: the third item "Sequential and systematic" in "View inspect force" is 0.8, in "Creativity"， the "Able to come up with ideas that are different from others" in "thinking" is 0.8, while the fourth and fifth in "Creative operational skills" are 0.8, with a certain difference from 1. However, it was found that the Expert Consistency Index (IOC) range for each interview question is 0.8-1. Afterwards, the teaching mode for cultivating creative teaching skills was interviewed in the first semester of the 2023 academic year, targeting students majoring in E-commerce in the Vocational and Technical Teachers College of Guangxi Normal University, Class 2021. In order to have a large student base, all 68 people (68 samples, with female students being the majority, 57 female students, and 11 male students) participated. The time was from September 2023 to November 2023, and theoretical and practical training courses were divided into different locations, Experiments were

conducted on third year college students majoring in e-commerce in the teaching building and micro laboratory.

The assessment form of Creative Teaching Skills is crucial for the learners of Guangxi Normal University to distill Observation Skill, Creative thinking and Creative operational Skills to measure the students' creative teaching skills in the teacher education program in a continuous improvement and training The process allows experts to better in the examination of the indicators of creative skills and competencies possessed by the researchers action guidelines are as follows: Examine documents on creative skills in academia and research. For example Beer & Sue (2013); Ministry of Education (2009); Griffith (2011); Piirto (2011); Sung Khamphu (2014); Marut Patphol (2016) demonstrated the elements of creativity. Through the analysis of the first and second chapters, combined with the interview conclusions, the rationality of the structural system for improving college students' creative teaching skills is checked according to the secondary index method, and expert opinions are collected online and offline to improve the creative teaching of Chinese normal college students. The rationality of the skill structure system is shown in TABLE 24:

The current study, inspired by the 4P theory and previous studies, is organized as follows:

(1) Possessing Observation Skill, the ability to perceive and understand the surroundings and details keenly. This cognitive skill is of great significance to an individual's study, work and life. By clarifying Observation task, paying attention, practicing detailed observation, multi-sensory participation, cultivating curiosity, reflecting and recording, diversifying observation objects, continuous learning, etc., you can gradually improve your Observation Skill through continuous practice and cultivation. This will enable you to observe the world more keenly and meticulously, so that you can better cope with the challenges in your study, work and life.

(2) Have Creative thinking, Can cite two or more teaching cases, Able to come up with ideas that are different from others, Able to create original and curious.

(3) Creative operational Skills, Since the design of operational skills is very broad in terms of the aspects, so in this study, the micro-teaching production is mainly used as the research direction of creative operational skills development, from Meet teaching objectives, Academically correct, Suitable for target group, The knowledge content is short, easy to understand and meaningful, Interesting and feasible, The language design is generous and decent. language design is generous and decent, The interface design of the work is clear and has strong operability.

TABLE 21 Checklist for the appropriate of the structure system for improving college students' creative teaching skills

Creative teaching components	Creative teaching skills indicators	Expert evaluation(5 people)					M	SD	Level
		Expert1	Expert2	Expert 3	Expert4	Expert 5			
1. Observation Skill	● Observation task	5	5	4	5	5	4.80	0.40	Highest
	● Knowledge, experience and skills	4	5	5	5	5	4.80	0.40	Highest
	● Sequential and systematic	5	5	5	4	4	4.60	0.49	Highest
	● Pay more attention to details	4	4	4	4	5	4.20	0.40	Highest
	● Sense organs participate in observation activities	5	5	5	5	4	4.80	0.40	Highest
	● Observe and record at any time	5	4	5	4	5	4.60	0.49	Highest
	● Observe with curiosity	3	5	5	4	4	4.80	0.40	Highest

Creative teaching components	Creative teaching skills indicators	Expert evaluation(5 people)					M	SD	Level
		Expert1	Expert2	Expert 3	Expert4	Expert5			
2. Creative thinking	● Can cite two or more teaching cases	5	5	5	5	5	4.80	0.40	Highest
	● Able to come up with ideas that are different from others	5	5	5	5	3	4.80	0.40	Highest
	● Able to create original and curious works within a specified time	5	5	5	3	5	4.80	0.40	Highest
3. Creative operational Skills	● Meet teaching objectives	5	5	5	4	5	4.80	0.40	Highest
	● Academically correct	5	5	5	5	5	5.00	0.00	Highest
	● Suitable for target group	5	5	5	5	5	5.00	0.00	Highest
	● The knowledge content is short, easy to understand and meaningful	5	4	5	5	5	4.80	0.40	Highest
	● Interesting and feasible	5	5	4	4	4	4.80	0.40	Highest
	● The language design is generous and decent	4	5	5	5	4	4.60	0.49	Highest
	● The interface design of the work is clear	5	5	5	5	5	5.00	0.00	Highest
	● Operable	4	5	4	4	4	4.80	0.40	Highest

The table presents a checklist for assessing the appropriateness of a structure system designed to improve college students' creative teaching skills. The checklist includes three categories of creative teaching components, corresponding creative teaching skills indicators, and the evaluation results provided by five experts. The evaluation results include the ratings given by each expert, as well as the mean (M), standard deviation (SD), and the level of the evaluation.

Here is a breakdown of the checklist and evaluation results:

Observation Skill:

Observation task: Experts rated 5/5. Mean: 4.80, SD: 0.40, Level: Highest.

Knowledge, experience, skills: Experts rated 4-5/5. Mean: 4.80, SD: 0.40, Level: Highest.

Sequential, systematic: Ratings 4-5/5. Mean: 4.60, SD: 0.49, Level: Highest.

Attention to details: Ratings 4-5/5. Mean: 4.20, SD: 0.40, Level: Highest.

Sense organs in observation: Ratings 4-5/5. Mean: 4.80, SD: 0.40, Level: Highest.

Observe, record anytime: Ratings 4-5/5. Mean: 4.60, SD: 0.49, Level: Highest.

Observe with curiosity: Ratings 3-5/5. Mean: 4.80, SD: 0.40, Level: Highest.

Creative Thinking:

Can cite two or more teaching cases: All five experts rated it with a score of 5. Mean: 4.80, SD: 0.40. Level: Highest.

Able to come up with ideas that are different from others: Ratings varied between 3 and 5 across the experts. Mean: 4.80, SD: 0.40. Level: Highest.

Able to create original and curious works within a specified time: Ratings varied between 3 and 5 across the experts. Mean: 4.80, SD: 0.40. Level: Highest.

Creative Operational Skills:

Meet objectives: Experts rated 4-5 (Mean: 4.80, SD: 0.40), Highest level.

Academically correct: All experts rated 5 (Mean: 5.00, SD: 0.00), Highest level.

Suitable for target group: All experts rated 5 (Mean: 5.00, SD: 0.00), Highest level.

Knowledge content: Experts rated 4-5 (Mean: 4.80, SD: 0.40), Highest level.

Interesting & feasible: Experts rated 4-5 (Mean: 4.80, SD: 0.40), Highest level.

Language design: Experts rated 4-5 (Mean: 4.60, SD: 0.49), Highest level.

Interface design: All experts rated 5 (Mean: 5.00, SD: 0.00), Highest level.

Operable: Experts rated 4-5 (Mean: 4.80, SD: 0.40), Highest level.

The evaluation results indicate that all indicators in the checklist received high ratings from the experts, with the majority of indicators achieving the highest level of appropriateness. The mean ratings and low standard deviations suggest a high level of agreement among the experts in their evaluation results

From the results of the consideration of the level of accreditation the experts found that all 3 domains (18 elements in total) have a level of quality of 4.00 and above, or have an indicated level of 4.00 and above. Through this study, it can be understood that creative teaching skills do not exist alone, but require the support and assistance of several skills, including Observation Skill, Creative thinking and Creative operational Skills, and the comprehensive table of the elements of the indicative creative operational skills obtained in this study Used to create assessment items in TABLE 24 above Observation Behavior allows the assessor to observe the learner's behavior, i.e., scores or levels The behavioral qualities demonstrated by the above indicators are manifestations of creative teaching skills.

In the process of this experiment using creative teaching skills assessment form is Guangxi Normal University Vocational and Technical Teachers College of e-commerce students in the third year of the university course, according to different topics in different teachers, such as observation skills will go to the front-line classroom, to the intermediate level students classroom in Guilin Institute of Technology in Guangxi to allow students to conduct a professional apprenticeship, field observation, interviews, listening to a professional open class, creative thinking skills is in the microgrid Lab was done, Creative operational Skills was done in the machine room. The non-sample group

of 68 students. During the first semester of the 2023 academic year, from September 2023 to November 2023, the researcher used the Creative Teaching Skills Assessment Form to assess this period. Students' learning activities in the training course, students' pre-research and assignments in the course, and end-of-semester assessment to reach three major evaluations:

(1) Before teaching - diagnostic evaluation: the teacher's evaluation before teaching.

(2) During Teaching - Formative Evaluation: Evaluation of teaching implemented during the teaching process.

(3) At the end of teaching - Summative Evaluation: the evaluation of teaching carried out at the end of teaching. The scores obtained were then used to find confidence values for the Creative Teaching Skills Assessment Scale.

4.2.4 Result of teaching model pilot study

Results from the implementation of instructional models may vary based on a variety of factors, including the quality of implementation, educational environment, student characteristics, and more. Therefore, various factors should be considered comprehensively when evaluating the implementation results of the teaching model, and multiple evaluation methods and data sources should be used for comprehensive analysis.

TABLE 22 Data from 10 e-commerce majors at Guangxi Normal University

Student ID	Name	Gender	Nationality	Age	Class
202013204047	Xie Mingxi	female	Han nationality	21	E-commerce class 2
202013204048	Chen Siyu	female	Yao people	20	E-commerce class 2
202013204049	Li Danni	female	Han nationality	22	E-commerce class 2
202013204051	Li Wanyi	female	Han nationality	22	E-commerce class 2
202013204052	Long Yan	female	Miao	21	E-commerce class 2
202013204053	Tang Xiaolu	male	Han nationality	22	E-commerce class 2

202013204054	Zhou Zhijie	female	Han nationality	21	E-commerce class 2

Student ID	Name	Gender	Nationality	Age	Class
202013204055	Mo Guiyun	female	Zhuang	21	E-commerce class 2
202013204056	Wei Chunyuan	female	Zhuang	22	E-commerce class 2
202013204057	He Meiqiao	female	Zhuang	21	E-commerce class 2

TABLE 23 Creative teaching skills of student after pilot study (10 students)

Serial number	Student name	Gender	Post-test			
			Observation	Creative Thinking	Operational skills	Sum
1	Xie Mingxi	female	2	3	1	6
2	Chen Siyu	female	2	3	1	6
3	Li Danni	female	2	3	3	8
4	Li Wanyi	female	2	2	2	6
5	Long Yan	female	3	3	2	8
6	Tang Xiaolu	male	2	3	2	7
7	Zhou Zhijie	female	2	3	2	7
8	Mo Guiyun	female	4	2	1	7
9	Wei Chunyuan	female	2	3	2	7
10	He Meiqiao	female	3	3	1	7
	M		2.4	2.8	1.7	
	SD		0.70	0.42	0.67	

Ten students, nine girls and one boy, from e-commerce class 2 were selected, and all 10 students were from Guangxi. Five of the students were from ethnic minorities, which is very common in Guangxi, which is a place where ethnic minorities gather, and there are 56 minorities in China.

The table displays the creative teaching skills of 10 students after a pilot study. The students' names, gender, and scores in three categories of creative teaching skills (Observation, Creative Thinking, and Operational Skills) are provided. Additionally, the table includes the mean (M) and standard deviation (SD) for each category.

Here is a breakdown of the table:

Observation Skills:

The scores range from 2 to 4.

The mean score is 2.4, and the standard deviation is 0.70.

Creative Thinking:

The scores range from 2 to 3.

The mean score is 2.8, and the standard deviation is 0.42.

Operational Skills:

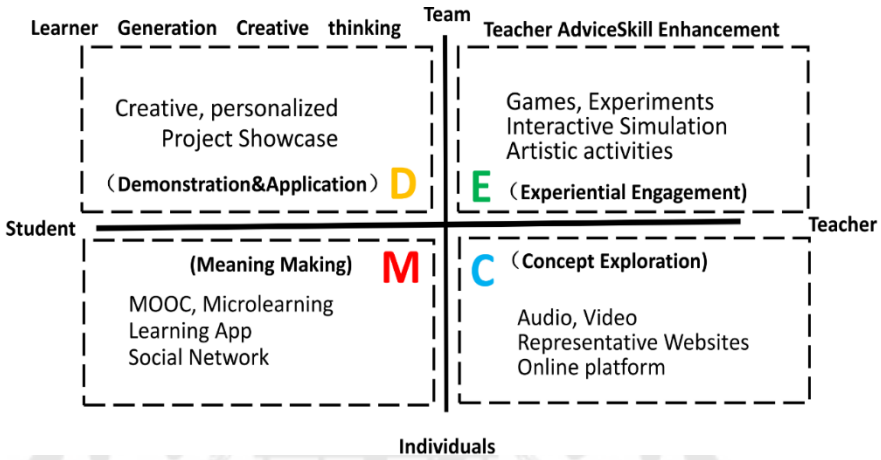
The scores range from 1 to 3.

The mean score is 1.7, and the standard deviation is 0.67.

The mean scores indicate the average performance of the students in each category. The standard deviations provide a measure of the variability or dispersion of scores within each category.

Overall, the students' performance in creative teaching skills varied across the categories. Creative Thinking received the highest mean score (2.8), followed by Observation (2.4), and Operational Skills (1.7). The standard deviations indicate that there was relatively less variability in Creative Thinking (0.42) compared to Observation (0.70) and Operational Skills (0.67).

Summarize the results of pilot study and improve the teaching model， Modify the model to individual intervals as shown below:



Following the experiential cycle learning model, we can organize the following 4 major areas.

Quadrant 1: Concept Exploration

Pre-work in learning is very important, and we encourage students to utilize resources such as online platforms, representational websites, audio and video to explore concepts in learning can provide rich learning materials and diverse learning styles.

(1)Watch educational videos: Many online platforms and websites provide a wide range of educational video resources covering a variety of disciplines and topics. You can search for relevant concepts or topics and watch expert presentations, academic lectures or instructional videos to gain a deeper understanding and explore specific concepts.

(2)Participate in online courses: There are many online education platforms such as Coursera, edX, Udemy, etc. that offer a variety of free or paid online courses. These courses usually contain video lectures, exercises, quizzes and

discussion forums that can help you learn and explore various concepts in a systematic manner.

(3)Listening to podcasts and audio courses: By subscribing to podcasts or audio courses on related topics, you can utilize fragmented time in your daily life for learning. These resources are usually provided by professionals or experts in the field and offer in-depth explanations and discussions on specific topics or concepts.

(4)Read blogs and online articles: Many domain experts, academics and educational institutions maintain blogs or online articles to share their insights and knowledge. By searching for blogs or columns on related topics, you can read in-depth conceptual explorations and analysis of ideas.

(5)Participate in online discussions and communities: Join relevant online discussion forums, social media groups or learning communities to share and discuss concepts with other learners and experts. These platforms provide an interactive and collaborative environment that can facilitate conceptual exploration and in-depth understanding.

(6)Utilize online libraries and academic databases: Visit online libraries and academic databases to search for scholarly papers, research reports, and professional publications related to the concepts you are interested in. These resources often provide in-depth scholarly information and theoretical background that can help you explore concepts in depth.

(7)Utilize online learning tools and applications: There are a number of online learning tools and applications available, such as Quizlet, Khan Academy, and others. These tools offer a variety of learning resources, practice questions and interactive activities that can help you consolidate and apply concepts.

Whichever you choose before class, staying curious, actively exploring, and combining different resources and learning styles to gain a comprehensive conceptual understanding and knowledge buildup can be very helpful for creative learning later on.

Quadrant 2: Experiential Engagement

Experiential engagement can be applied to various contexts, including games, experiments, interactive simulations, and artistic activities. Let's explore each of these areas:

(1) Games: Experiential engagement is often utilized in the design of games to create immersive and interactive experiences. Games provide players with opportunities to actively participate, make decisions, and engage with virtual worlds or narratives. By incorporating elements like storytelling, problem-solving, and collaboration, games can offer engaging and meaningful experiences that captivate players and keep them invested in the gameplay.

(2) Experiments: Experiential engagement can be leveraged in experimental settings to enhance participation and data collection. By designing experiments that involve participants in interactive tasks or scenarios, researchers can create a more engaging and immersive environment. This can lead to increased participant interest, motivation, and more accurate data collection.

(3) Interactive Simulation: Experiential engagement is particularly effective in interactive simulations. These simulations allow individuals to actively engage with virtual environments that replicate real-world scenarios or systems. For example, flight simulators provide pilots with hands-on training in a simulated aircraft environment. By interacting with the system and experiencing realistic feedback, participants can develop skills, gain insights, and make decisions within a safe and controlled setting.

(4) Artistic Activities: Experiential engagement can also be found in various artistic activities, such as interactive installations, performances, or exhibitions. These activities aim to create immersive and participatory experiences where viewers or participants become an integral part of the artwork. By engaging with the artwork through their senses, emotions, or physical interactions, individuals can have a more profound and personal connection with the artistic expression.

In all these contexts, experiential engagement focuses on providing individuals with active, participatory, and immersive experiences. By involving

participants on multiple levels—cognitive, emotional, sensory—these approaches aim to create memorable and impactful engagements that go beyond passive observation or interaction.

Quadrant 3: Demonstration & Application

Demonstration and application, when combined with a focus on creativity, personalization, and project showcasing, can create powerful and engaging experiences. Let's delve into each aspect:

(1) Creative: Demonstrations and applications that incorporate creativity can captivate the audience and make the experience more memorable. This can involve innovative presentation techniques, the use of multimedia elements, interactive storytelling, or the integration of art and design. By infusing creativity into the demonstration and application process, project showcases can inspire curiosity, spark imagination, and create a unique and immersive experience for participants.

(2) Personalized: Personalization adds a layer of individualization to the demonstration and application of a project. It involves tailoring the experience to the specific needs, interests, or characteristics of the participants. By catering to the individual, project showcases can enhance engagement, create a sense of ownership,.

(3) Project Showcase: The purpose of demonstration and application in a project showcase is to effectively present and highlight the features, benefits, and outcomes of a project. A project showcase provides an opportunity to exhibit the project's achievements, innovations, and real-world applications. By integrating creative and personalized elements into the showcase, such as interactive displays, hands-on experiences, or personalized narratives, the audience can actively engage with the project and gain a deeper understanding of its significance and impact.

When combined, these three aspects—creativity, personalization, and project showcasing—can elevate the demonstration and application of a project. By creating a dynamic, personalized, and immersive experience, project showcases can effectively communicate the project's value, engage the audience at a deeper level, and leave a lasting impression.

Quadrant 4: Meaning Making

The final part of the creative teaching skills model is the display of results, which can be achieved through many platforms Creative teaching skills, including meaning making, can be applied to various educational approaches and technologies such as MOOCs (Massive Open Online Courses), microlearning, learning apps, and social networks. Let's explore how these elements contribute to meaning making in education:

(1) MOOC: MOOC are online courses that allow learners to access educational content from renowned institutions and instructors worldwide. Creative teaching skills can be employed in the design and delivery of MOOCs to engage learners in meaningful ways. This can involve incorporating interactive elements, such as quizzes, discussions, and multimedia resources, to promote active learning and knowledge construction. Additionally, instructors can encourage critical thinking and reflection through assignments.

(2) Microlearning: Microlearning refers to the delivery of bite-sized learning content that can be accessed and consumed in short bursts. Creative teaching skills can be employed to ensure that microlearning experiences are engaging and promote meaning making. This can involve designing concise and focused learning modules that address specific learning objectives. By incorporating interactive elements, such as gamification, quizzes, or simulations, microlearning can provide learners with opportunities to actively engage with the content and reinforce their understanding.

(3) Learning Apps: Learning apps are mobile applications designed to facilitate learning and provide educational experiences. Creative teaching skills can be leveraged in the development of learning apps to promote meaning making. This can involve designing interactive and immersive learning experiences that encourage exploration, problem-solving, and collaboration. Learning apps can incorporate gamification elements, personalized learning pathways, and real-time feedback to engage learners and enhance their understanding and retention of the subject matter.

(4) Social Networks: Social networks can serve as platforms for collaborative and interactive learning experiences. Creative teaching skills can be applied within social networks to foster meaning making through discussions, knowledge sharing, and collaborative activities. Instructors can design learning tasks that require learners to engage in critical thinking, analysis, and reflection within the social network environment. By facilitating peer-to-peer interactions and providing opportunities for dialogue and feedback, social networks can support meaningful learning and knowledge construction.

In all of these educational approaches and technologies, the emphasis is on leveraging creative teaching skills to promote meaning making. By incorporating interactive elements, encouraging active engagement, educators can create rich and meaningful educational experiences that enhance understanding, retention, and application of knowledge.

4.3 Results of teaching model implementation

4.3.1 Mean score of each lesson

Guangxi Normal University has nearly 50000 college students and over 4000 teachers on campus. Its main focus is on cultivating talents who will be engaged in teaching positions in the future. These talents not only need to teach, but also need to serve as class teachers and other moral work. In this research on the teaching mode of cultivating creative teaching skills, the selected course is "Teacher Vocational Skills Training", which is offered by the entire Leilei major of normal universities. The course has been changed from the original 90 hours to the current 68 hours, mainly focusing on practical training. The specific courses for this research are as follows:In this study on the teaching model of cultivating creative teaching skills, the eight teaching topics of "" in the course were selected for research, and the results obtained through testing:

In this study on the teaching model of cultivating creative teaching skills, the eight teaching topics of "" in the course were selected for research, and the results obtained through testing as following:

TABLE 24 Mean score of each lesson of 68 students

Lesson	Topic	Observation skills (Full score =5)		Creative thinking (Full score =5)		Operational skills (Full score =5)		Total	
		$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
1	Teaching skills	2.28	0.73	2.96	0.74	1.87	0.60	**2.37**	**0.69**
2	Import skills	1.74	0.75	2.40	0.99	1.99	0.78	**2.04**	**0.84**
3	Observation and explanation skills	1.84	0.66	2.22	0.79	2.06	0.86	**2.04**	**0.77**
4	Teaching method design and selection	2.44	0.66	2.51	0.53	2.25	0.89	**2.40**	**0.69**
5	Teaching activity design skills	2.74	0.91	3.04	0.58	3.19	0.80	**2.99**	**0.76**
6	Teaching and questioning skills	2.41	0.58	2.53	0.61	2.49	0.76	**2.48**	**0.65**
7	Information-based teaching methods	3.04	0.61	2.62	0.49	2.93	0.85	**2.86**	**0.65**
8	Micro course skills	3.71	0.75	2.66	0.59	3.85	0.74	**3.41**	**0.69**

Based on the data in the table above. The course to cultivate the creative teaching skills of university normal students has selected 8 teaching segments. Each teaching segment is scored from the three dimensions of observation skills , creative

thinking and operational skills . The scores are as shown in the table above. From the above Expand analysis in three dimensions:

(1) Observation skills :

The Observation skills score for Lesson 1 " Teaching skills " has a mean ($\bar{X}$) of 2.28 and a standard deviation (SD) of 0.73 .Observation skills scores for various teaching skills are as follows: Import skills: Mean = 1.74, SD = 0.75, Observation and explanation skills: Mean = 1.84, SD = 0.66, Teaching method design and selection

(2) Creative thinking

Creative thinking scores for Teaching skills: mean 2.96, SD 0.74.

Import skills: mean 2.40, SD 0.99.

Observation and explanation: mean 2.22, SD 0.79.

Teaching method design and selection: mean 2.51, SD 0.53.

Teaching activity design: mean 3.04, SD 0.58.

Teaching and questioning: mean 2.53, SD 0.61.

Information-based teaching: mean 2.62, SD 0.49.

Micro course skills: mean 2.66, SD 0.59.

(3) Creative operational Skills

Teaching skills score has a mean of 1.87 and SD of 0.60. Import skills score has a mean of 1.99 and SD of 0.78. Observation and explanation skills score has a mean of 2.06 and SD of 0.86. Teaching method design and selection score has a mean of 2.25 and SD of 0.89. Teaching activity design skills score has a mean of 3.19 and SD of 0.80. Teaching and questioning skills score has a mean of 2.49 and SD of 0.76. Information-based teaching methods score has a mean of 2.93 and SD of 0.85. Micro course skills score has a mean of 3.85 and SD of 0.74. These values reflect student performance and score variability in observational skills.

For example, a mean score ($\bar{X}$) of 2.37 indicates that students scored 2.37 in observation skills overall, while a standard deviation (SD) of 0.69 indicates that there is some degree of variability in students' scores on observation skills around the mean.

The analysis of total scores can help assess overall student performance in observation skills and provide information about differences in student performance across courses. In addition, total scores can be compared to scores in other courses to provide information about the relative performance of students in different areas of observational skills.

These scores help you understand how each skill performs in terms of observation skills, creative thinking, and operational skills. Please note that these scores are based on the results of these eight course assessments or surveys, which measure the level of different skills. Each skill is scored on a scale of 1 to 5, with higher scores indicating higher skill levels. From the above scores, it can be seen that the level of the eighth test is higher than that of the first time. In the middle tests, the level has increased a lot. Only the level of the fifth test of " Teaching activity design skills " has some fluctuations. According to the implementation of teaching It was found that the fifth course mainly used action-oriented teaching, which gave full play to students' creative thinking and put students in an active position. The eighth course also received inspiration from the previous courses and helped the students. In summary, through the CEDM experiential cycle innovative teaching skills training teaching model, students' observation skills , creative thinking and operational skills have been improved, and students' initiative has also been brought into play in learning, and the entire training is in a positive direction Expand.

4.3.2 Compare mean score of pre-test and post-test

In this study, a survey of 68 students in the e-commerce class of Guangxi Normal University was conducted to verify the impact of the teaching model based on the development of innovative teaching skills in the CEDM experiential cycle on the effectiveness of teaching and learning, and the following charts can be derived from the SPSS analysis:

TABLE 25 2021 e-commerce class teaching effectiveness pre-test and post-test paired samples t-tests

Creative teaching components	Test	Mean	S.D	t	df	P-value
Observation skills	Pre-test	2.06	0.73	-14.048	67	.000
	Post-test	3.74	0.77			
Creative thinking	Pre-test	2.84	0.44	-1.816	67	.074
	Post-test	3.03	0.81			
Creative operational Skills	Pre-test	2.06	0.51	-20.539	67	.000
	Post-test	3.97	0.75			
Total	Pre-test	2.32	0.56	-20.539	67	.025
	Post-test	3.58	0.78			

Based on the above test results, here are the mean score (Mean), standard deviation (SD), t- value, degrees of freedom (df) and p -value (P-value) for each test:

(1) Observation skills:

Pre-test is 2.06and the standard deviation is 0.73 .

Post-test is 3.74 and the standard deviation is 0.77 .

The t -value is -14.048 , the degrees of freedom are 67 , and the p -value is highly significant (.000).

(2) Creative thinking:

Pre-test is 2.84 and the standard deviation is 0.44 .

the post-test is 3.03 and the standard deviation is 0.81 .

The t -value is -1.82 , the degrees of freedom are 67 , and the p -value is .074 . The p -value is greater than the common significance level of 0.05 and is therefore not statistically significant.

(3) Operational skills:

Pre-test is 2.06 and the standard deviation is 0.51 .

the post-test is and the standard deviation is 0.75

The t -value is -20.54 , the degrees of freedom are 67 , and the p -value is highly significant (.000).significant differences between pretest and posttest in terms of observation skills and manipulation skills , indicating that the test subjects improved in

these two skills. However, in terms of creative thinking, the difference between the pretest and posttest was not significant, which means that the test subjects' scores in creative thinking did not significantly improve.

(4) Total

Pre-test mean: 2.32,Pre-test standard deviation: 0.56,Post-test mean: 3.58

t-value: -20.54,Degrees of freedom (df): 67,p-value: 0.025 (indicating a statistically significant difference between pre-test and post-test scores),The t-value represents the magnitude of the difference between the pre-test and post-test means, while the p-value indicates the statistical significance of that difference. A p-value below the chosen significance level (usually 0.05) suggests that the difference is statistically significant. It should be noted from the above data that these results are only based on the test data of this study. For other studies, more information about the test background, specific experimental design, or other relevant information may be needed. In terms of students' creative thinking, it is difficult to improve in eight courses and two months, although many methods can help test subjects improve their creative thinking abilities. However, creative thinking is a complex process, related to many factors, and requires time (long-term time) and practice (long-term persistence and continuous practice) to develop and improve. (The last questionnaire is posted here.)

4.4 Results of effectiveness evaluation and improvement

The teaching model for cultivating innovative teaching skills based on the CEDM experiential cycle was carried out i with a sample group of 68 e-commerce students.

The experiment of the CEDM experiential cycle innovative teaching skills training teaching model will be from September~ Novembe , 8 topic , 5 hours. Evaluating the effectiveness and consistency of the teaching model is based on the teaching design of this course "Teacher Vocational Skills Training". The implementation of the effectiveness standards and teaching model has greatly helped the improvement of innovative teaching skills of normal college students , and passed..

4.4.1 Results of effectiveness evaluation

Effectiveness criteria	Result	In conclusion
Normal students' creative teaching skills is higher than before implementation the model	Normal students' creative teaching skill after implement teaching model higher than before statistical significant at .05.	Pass

From table show that the teaching model for creative teaching skill meet the effectiveness criteria.Improvement of teaching models can produce various positive outcomes that benefit both educators and students. This improvement is mainly Principles, Teaching steps, Media & Resources, and Evaluation of this dimension, Objective is set according to the graduation requirements in the talent training program of Guangxi Normal University, so in the improvement, the goal is kept the same. Through the previous graduate students, the teaching model added three research dimensions of innovative teaching skills: Observation Skill, Creative thinking and Creative

Operational Skills,In the four steps of the teaching model, incorporating the innovative teaching skills, the improvement of the teaching model is specifically organized as shown in TABLE 30 below:

TABLE 26 Teaching model improvement

Teaching model		Improvement
1. Principles	stages	Clear learning objectives Personalized instruction Adaptive assessment: Guidance and support Feedback and reflection
	operability	Interdisciplinary Integration Increase practical opportunities Feedback and assessment Diversified learning resources Cooperative learning

Teaching model	Improvement
effectiveness	Student Needs Orientation
	Diversified learning experiences
	Encourage innovation and exploration
	Reflection and Adjustment
	Provide training and support
	Provision of resources and tools
operability	Designing instructional plans and activities
	Feedback and assessment
	Collaboration and sharing
	Student Needs Orientation
effectiveness	Diversified learning experiences
	Encourage innovation and exploration
	Reflection and Adjustment
	Provide training and support
	Provision of resources and tools
experiences	Designing instructional plans and activities
	Feedback and assessment
	Collaboration and sharing
	Continuous professional development:
openness	Student participation and feedback

	Collaboration and sharing between teachers and students Support from school leadership Interdisciplinary cooperation Teaching Research and Practice:
2. Objective	Targets maintained at the original standard
3. Teaching steps	The inclusion of Observation Skills, Creative Thinking and Creative Operational Skills as inner loops of the model is a meaningful extension. These skills enhance the model's ability to approach problems, generate ideas and implement solutions.

Teaching model	Improvement
4. Media & Resources	Use big data and platforms to translate knowledge and skills into visualizations used in the organization, making it easier for students to understand.
5. Evaluation	Clearly define evaluation criteria Develop diverse evaluation methods Engage expert educators Incorporate qualitative assessment Long-term evaluation Collaborative evaluation Iterative improvement

4.4.2 Results of teaching model improvement

As a result of the above research, the current innovative teaching skills were further improved from a four-quadrant teaching model to the following teaching model that emphasizes the innovative teaching skills even more:

FIGURE 16 The 3rd version of teaching model

Components of teaching model (Final version)

This study improved the instructional model based on the above interview research and data analysis as follows:

1.Principles

Creative teaching skills are critical skills in today's world. Therefore, the experiential learning cycle model cultivates the creative teaching abilities of university normal students and provides a reference for future career development.

The first is the principle of stages.

Improvement measures：

(1) Clear learning objectives: Ensure that clear learning objectives are clearly set at each stage of learning. Learning objectives should be specific, quantifiable and matched to students' actual needs and backgrounds. This helps students to know exactly what they are expected to learn and provides a clear direction for learning.

(2) Personalized instruction: Understand students' different cognitive levels and learning styles and tailor instruction to their individual needs. Different learning resources and supports are provided at each stage to meet students' individual differences.

(3) Adaptive assessment: Assessments are conducted at each stage to understand students' learning progress and level of understanding. Based on the assessment results, teaching strategies and resources are adapted to ensure that students' learning at the next stage builds on the foundation of the previous stage.

(4) Guidance and support: Provide students with the necessary guidance and support at each stage to help them understand and apply what they have learned. Teachers can use teaching methods such as prompts, examples, explanations and illustrations to guide pupils in exploring and discovering knowledge.

(5) Feedback and reflection: Students are provided with timely feedback and opportunities to reflect. Teachers can give students feedback, either verbally or in writing, pointing out their strengths and directions for improvement. At the same time, students are encouraged to reflect on their own learning processes and outcomes to help them think deeply and improve their learning.

(6) Interdisciplinary Integration: Interdisciplinary integration is attempted at each stage to organically combine knowledge and skills from different disciplines. This helps students to build up a more comprehensive and integrated body of knowledge and facilitates the transfer and application of knowledge.

With these improvements, the stage-by-stage principles of the experiential learning cycle can be better implemented to enhance students' learning outcomes and learning experiences.

The second is the principle of operability.

Improvement measures ：

(1) Increase practical opportunities: Provide adequate practical opportunities for hands-on participation, practical exercises and application of acquired knowledge and skills. This can be achieved through experiments, simulated situations, case studies, role plays, etc. Practice can deepen students' understanding of knowledge, improve their skill levels, and promote the development of independent learning and problem-solving skills.

(2) Feedback and assessment: Provide timely, specific and targeted feedback and assessment to help students understand whether their actions and performance meet expectations. Feedback should point out students' strengths and directions for improvement, along with specific advice and support. Assessment can help students realize their progress and motivate them to continue their efforts.

(3) Diversified learning resources: Provide diversified learning resources, including books, online resources, multimedia materials, physical samples, etc. This can meet students' different learning needs and learning styles, and give them more choices and possibilities to acquire information and knowledge.

(4) Cooperative learning: Cooperative learning and teamwork among students are encouraged. Through group activities and cooperative projects, share experiences and knowledge, and solve problems together. Cooperative learning fosters students' ability to cooperate, communicate, and promotes mutual learning and growth.

The third is the principle of effectiveness.

Improvement measures：

(1) Student Needs Orientation: Places student needs and interests at the center of instruction. design content and strategies based on students' needs. Ensure that instruction is aligned with students' realities and learning goals to increase student engagement and motivation.

(2) Diversified learning experiences: Provide students with diversified learning experiences and create a rich teaching and learning environment.

(3) Encourage innovation and exploration: create a teaching atmosphere that encourages innovation and exploration. Encourage students to ask questions, come up with solutions, and try out new methods and strategies. Teachers can set up open-ended problems and tasks to stimulate students' creative thinking and problem-solving abilities. Students should also be given full autonomy and a balance of power and responsibility, so that they have the opportunity to explore and express themselves independently.

(4) Reflection and Adjustment: Teachers and students need to continuously reflect and adjust to improve innovative teaching skills. Teachers and students can learn about the effectiveness of teaching and directions for improvement

through course evaluations, assessment of learning and teaching, and partner collaboration.

The fourth is the principle of controllability.

Improvement measures ：

(1) Provide training and support: Provide teachers with relevant training and support to enable them to acquire innovative teaching skills. This can take the form of specialized training courses, workshops, teaching demonstrations, etc. Teachers are systematically trained to understand and learn innovative teaching skills to improve their manageability and implementation.

(2) Provision of resources and tools: Teachers are provided with the necessary resources and tools to support their implementation of innovative teaching. This can cover teaching and learning materials, technical equipment, and teaching software. Teachers can choose the appropriate resources and tools according to their pedagogical needs and innovative ideas so that they can better control the teaching and learning process.

(3) Designing instructional plans and activities: Teachers can develop detailed instructional plans and activities to ensure that innovative teaching is manageable. The plans and activities should include clear learning objectives, teaching strategies, and assessment methods. Through careful design and organization, teachers can better control the teaching process and ensure the implementation of innovative teaching.

(4) Feedback and assessment: Provide teachers with feedback and assessment mechanisms to help them understand their teaching performance and directions for improvement. Assessment can be done through peer review, student evaluation, observation records, etc. Through timely feedback and assessment, teachers can better adjust and improve their innovative teaching practices and enhance controllability.

(5) Collaboration and sharing: Collaboration and sharing among teachers are encouraged to promote the controllability of innovative teaching. Teachers

can exchange experiences, share teaching resources and practices with each other, and jointly explore innovative teaching methods and strategies. Such collaboration and sharing can help teachers better understand and apply innovative teaching skills to improve manageability.

(6) Continuous professional development: Teachers should actively participate in continuous professional development activities to update and enhance innovative teaching skills. This may include participation in educational seminars, professional forums, pedagogical research, and so on. Through continuous learning and professional development, teachers can increase their understanding and application of innovative teaching skills and improve manageability.Fifth, democratic principles.

Sixth is the principle of openness.

Improvement measures ：

(1) Student participation and feedback: Students are encouraged to participate in the teaching and learning process and provide their feedback. Students can participate in discussions and decisions on teaching decisions, course design, assessment methods, etc., thus increasing their control and initiative in learning.

(2) Collaboration and sharing between teachers and students: Facilitating collaboration and sharing between teachers and students encourages them to explore innovative teaching methods and strategies together. This can take the form of establishing teacher-student communities, working groups, etc., so that teachers and students can communicate more with each other about their experiences, share teaching resources and practices, and gain inspiration and support from them.

(3) Support from school leadership: School leadership should provide support and encouragement to facilitate the development of innovative teaching and learning. They can provide resources, establish relevant policies and guidelines to support and safeguard teacher innovation. At the same time, school leaders should also encourage teachers to try new teaching methods and strategies to create an innovative teaching culture.

(4) Interdisciplinary cooperation: Encourage interdisciplinary cooperation between teachers and students to promote communication and integration between different disciplines. Through interdisciplinary collaboration, teachers can work together to design and implement innovative teaching and learning programs, provide richer learning experiences and opportunities, and increase student control and inter-disciplinary relevance.

(5) Teaching Research and Practice: Advocacy: Teachers are encouraged to conduct teaching research and practice advocacy with students to promote the development of innovative teaching. Teachers can encourage students to participate in teaching research projects, write teaching practice papers, etc., and share their research results and innovative practice experiences.

2.Objectives

Cultivation of creative teaching skills for university normal students . Design objectives of teaching model for innovative teaching skills training for normal students of Guangxi Normal University.

3.Teaching steps

The learning process of the experiential learning cycle model to enhance creativity and creative teaching skills research consists of 4 steps , the complexity of which is flexible depending on the learner, as shown below .

Step 1: Concept Exploration

Creative teaching skills require normal college students to unify professional knowledge and teaching knowledge, and encourage normal college students to ask questions, decide the direction of inquiry, organize inquiry, and collect data during the inquiry learning process. Following the logic of "creativity-learning-creative teaching-creative teaching skills-vocational normal school students' creative teaching skills", the core concept of "vocational normal school students' creative teaching skills" is obtained through layer-by-layer analysis. Then, after analyzing the problems that may arise in the development of creative teaching skills, learners can evaluate the accuracy of their own concepts or collaborate to find more accurate concepts (for example, using definitions from expert monographs) and learn them

through various audio and video, Represents the exploration and publishing of concepts on websites and online platforms, cultivating the creative teaching ability of normal students to understand concepts, using a variety of methods to make concepts clear and understandable, and being able to explore the concepts of texts from texts. From the perspective of cultural influence, we explore the innovations in understanding concepts by students with different learning styles and how they help the overall teaching. These are all vividly displayed in the form of mind maps, bringing teaching styles and concepts into teaching .

Step 2: Experiential Engagement

Games, experiments, interactive simulations and art activities are carried out in the classroom , and methods such as collection and sharing of competition works, simulation and experiential participation in topic learning can be used. Then proceed to step 3.

Step 3: Demonstration and Application

Based on the knowledge acquired in step 2, develop innovative abilities in explaining and demonstrating professional skills . The presentation and application of innovative skills differs from traditional ideas and methods. Teachers encourage students to use their personal creativity, encourage individualization, complete project demonstrations, advance demonstrations and applications step by step, clarify teaching plans, and produce teaching design and demonstration PPTs. Learning is a cycle of innovation and development, including four steps: planning, implementation, inspection, and reflection. The theory and practice of the dual internship model can be proposed and discussed from the perspectives of teacher education internship and educational practice . In this way, each step can have the following substantive development .

Step 4: Meaning Making

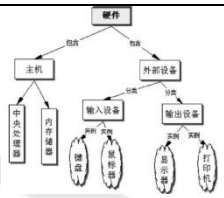
Must demonstrate creative teaching skills. After passing the above steps 1, 2, and 3, all knowledge will be used to cultivate circular innovation teaching skills. The plan includes selecting subjects and clarifying teaching objectives. Teaching focus, difficulty, selection of teaching methods, design of teaching process, preparation of teaching equipment (software and hardware, etc.) and teaching evaluation. Then, with the help of online and offline teaching methods, through MOOC, micro-learning learning applications and social networks, the works of university normal students can form meaning, combine theoretical significance and practical significance, and evaluate the possibility and value. Plan implementation status. Normal students rely on the publishing platform to innovate. At the same time as the work is released, whether it is possible to conduct personal self-evaluation, group evaluation and teacher comments on the relevant materials . Normal students try their own innovations, publish personal works in a planned manner , and check and analyze the data collected by big data to check and evaluate whether their creative teaching abilities have been improved . In teaching reflection , multi-dimensional reflection can be used to maintain advantages, correct deficiencies, and repeatedly revise the previous content . If there are major problems during implementation, such as failure to achieve teaching goals, failure to break through key and difficult teaching points, problems in the implementation of teaching methods, etc., it is necessary to return to concept exploration and practice. A new round of process.

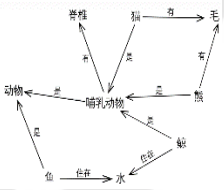
4.Media & Resources

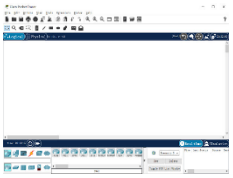
Media and learning resources suitable for creative teaching and improvement of university normal students , as well as experts, online media or others . For example, the most commonly used learning media and resources in China now include various software and hardware, platforms, and APPs . Teachers assist normal college students in selecting media, guide normal college students in finding or directly provide visual resources to model cities to install software. The visual resources section is organized as follows:

Improvements i.e. more visualization, concretization, use of big data and major platforms to actually organize the tools used.

TABLE 27 Summary of commonly used visualization tool

Name	Recommended time	Influence	Example (Chinese)	Visualization software/platform
Concept map	1970	Express knowledge levels Helps with creative thinking		MindManager MindMapper IHMC CmapTools MindManager
Mind Mapping	1960s	Divergent thinking, strengthen memory and thinking		X-mind MindMaster iMindMap GitMind X-Mind

Name	Recommended time	Influence	Example (Chinese)	Visualization software/platform
Semantic Web	1968	Clustering related concepts		Gephi Gephi
Cognitive map	1948	Enlighten the soul and externalize knowledge		
Flash animation	Year 1999	Dynamic display of program knowledge Comprehensive display of teaching objects		Flash 8.0

Micro lesson video	Year 2008	Dynamic display of program knowledge Enlarge operation process		 Camtasia
Virtual Realit y	1990s	Provide real experimental scenarios Simulate experimental operations		 Cisco 6.2

Overall, improving a teaching model can lead to enhanced student learning, increased engagement, improved differentiation, effective use of technology, professional growth for educators, data-informed decision making, and culturally responsive teaching. These outcomes contribute to a more effective and student-centered educational experience, ultimately benefiting the overall success and well-being of students.

5. Evaluation

Improving the evaluation of a Creative Teaching Skills model requires considering several factors. Here are some suggestions to enhance the evaluation process:

(1) Clearly define evaluation criteria: Establish clear and measurable criteria for assessing creative teaching skills. This could include factors such as the ability to foster student creativity, promote critical thinking, encourage innovative problem-solving, and create an engaging learning environment. Well-defined criteria provide a framework for assessing the model's effectiveness.

(2) Develop diverse evaluation methods: Use various methods like classroom observations, student feedback, teacher self-assessments, peer evaluations, and analysis of student work to capture diverse aspects of creative teaching skills. Multiple methods offer a more comprehensive and balanced view of performance.

(3) Engage expert educators: Involve experienced and knowledgeable educators who specialize in creative teaching in the evaluation process. Their expertise can contribute valuable insights and ensure the evaluation aligns with best practices in creative teaching. Expert educators can assess the model's effectiveness, provide feedback, and suggest improvements based on their professional experience.

(4) Incorporate qualitative assessment: While quantitative data is valuable, qualitative assessment methods can offer deeper insights into the impact of creative teaching skills. Conduct interviews or focus groups with teachers, students, and other stakeholders to gather their perceptions, experiences, and opinions regarding the model's effectiveness. Qualitative feedback can provide valuable context and help identify areas for improvement.

(5) Creative teaching skills may require time to develop and manifest in students' learning outcomes. Follow up with students and teachers over an extended period to gauge the long-term effects on creativity, critical thinking.

(6) Collaborative evaluation: Foster collaboration among educators, researchers, and policymakers to evaluate the model collectively. By involving multiple perspectives, the evaluation process can benefit from a broader range of expertise and insights. Collaborative evaluation also promotes knowledge sharing and the development of best practices in creative teaching.

(7) Iterative improvement: Use evaluation findings to refine the model. Regularly review results, identify enhancements, and make adjustments. Continuous refinement ensures model effectiveness and relevance. Enhancing evaluation leads to improved Creative Teaching Skills model.

CHAPTER 5
CONCLUSION DISCUSSION AND SUGGESTIONS

5.1 Conclusion

Through the above research, the current innovative teaching skills have been further improved from the four quadrant teaching mode to a teaching mode that emphasizes more on innovative teaching skills, What is the teaching model for normal university students to develop creative teaching skills , What is the effectiveness of the research on teaching model of normal students' teaching skills?

In response to these two issues,To development teaching models for normal university students to develop creative teaching skills and to evaluate effectiveness of teaching models for normal students' creative teaching skills.

Based on the above interview research and data analysis, this study has improved the teaching mode, starting from the implementation steps of principles, objectives, and four models. The learning process of the experiential learning cycle model to enhance creativity and creative teaching skills research considerations of 4 steps, which is flexible dependent on the learner, From 4. Media&Resources, how to improve the evaluation of a Creative Teaching Skills model requires consideration of several factors, at last ,give some suggestions to enhance the evaluation process.

5.2 Discussion

The innovative teaching skills model of this study is mainly implemented at Guangxi Normal University in Guilin, Guangxi. After three rounds of optimization, I am very grateful for the cooperation , support from the teacher and classmates. I have also received support from Guangxi University and other sister universities. I am also looking forward to applying it to other normal universities.

5.2.1 Develop teaching models for normal university students to enhance creative teaching skills

To development teaching models for normal university students to develop creative teaching skills. In today's education field, with the continuous progress of society and the rapid development of technology, the requirements for teachers' creativity and teaching skills are also increasing. Especially for students in normal schools, as the backbone of future education, practical abilities. Therefore, it is particularly important to develop teaching models for students in normal schools to cultivate their creative teaching skills.

1.Background and significance

In the wave of educational reform, traditional teaching models are no longer able to meet the needs of modern society. Traditional 'cramming' teaching not only fails to stimulate students' interest in learning, but may also inhibit their innovative and critical thinking abilities. Creative teaching emphasizes students' subjectivity and participation, guiding them to actively explore and think through diverse teaching methods and techniques, thereby cultivating their innovative thinking and practical abilities. Therefore, the development of teaching models for normal university students aims to provide them with a scientific, systematic, and practical teaching skill training system, so that they can better cope with various challenges in future educational practices.

2. Design and Implementation of Teaching Models

In order to cultivate the creative teaching skills of normal university students, we can start from the following aspects and design and implement corresponding teaching models:

1. Theoretical foundation construction: Firstly, we need to clarify the theoretical foundation of creative teaching, including educational theories such as constructivism and humanism. These theories provide us with profound insights into student learning and teacher teaching, helping us understand the essence and connotation of creative teaching. At the same time, we also need to pay attention to the research trends and practical experience of creative teaching at home and abroad, so as to absorb and learn from its essence.

2. Curriculum design and teaching content: In terms of curriculum design, we can focus on the cultivation goals of creative teaching skills and set up a series of related courses, such as teaching design, curriculum development, teaching evaluation, etc. In terms of teaching content, we should not only focus on imparting theoretical knowledge, but also on cultivating practical abilities. Through various teaching activities such as case analysis, group discussions, and simulated teaching, students can master creative teaching methods and techniques in practice.

3. Teaching methods and tools: In terms of teaching methods and tools, we should focus on innovation and practicality. For example, modern teaching methods such as flipped classroom and project-based learning can be used to enhance students' problem-solving abilities through active exploration and collaborative learning.

4. Practice platform and opportunities: In order to enable students to better apply their learned knowledge to practice, we need to provide them with sufficient practice platforms and opportunities. For example, internship or practical training bases can be established both on and off campus to provide students with opportunities to participate in real teaching activities; Various teaching competitions or exhibition activities can also be organized to allow students to exercise their teaching skills and showcase their teaching achievements during the competitions.

3. Implementation effect and evaluation

In the process of implementing teaching models, we need to closely monitor their implementation effectiveness and conduct regular evaluations. The evaluation content can include aspects such as students' learning outcomes, teachers' teaching effectiveness, and the feasibility and applicability of teaching models. Through feedback and analysis of evaluation results, we can promptly identify problems and take corresponding improvement measures to improve the teaching model.

In short, developing teaching models for normal university students to cultivate their creative teaching skills is a long-term and arduous task. However, as long as we adhere to the student-centered teaching philosophy and improve teaching models, we will definitely be able to cultivate more outstanding teachers with innovative spirit and practical ability to make greater contributions to China's education cause. We also look forward to more educators and researchers joining this field to jointly promote the prosperity and development of the education industry.

5.2.2 Evaluating teaching models' effectiveness in developing normal students' creative teaching skills.

To evaluate effectiveness of teaching models for normal students' creative teaching skills.

When exploring in depth the effectiveness of teaching models for evaluating the creative teaching skills of ordinary students, we first need to clarify several core concepts and their importance in the field of education. Creative teaching skills, as an indispensable part of education in the new era, not only relate to the comprehensive development of students, but also directly affect their future innovation ability and competitiveness in society. The teaching model is the sum of a series of teaching strategies, methods, and activities adopted by teachers to achieve specific teaching objectives.

With the deepening of global education reform, cultivating students' creative thinking and practical abilities has become a consensus in the education systems of various countries. In this context, how to construct and evaluate effective teaching

models to promote the improvement of students' creative teaching skills has become an urgent problem to be solved. Creative teaching skills not only require students to have a solid knowledge foundation, but also require them to possess critical thinking, innovative thinking, and the ability to apply theoretical knowledge to practice.

The diversity of teaching models. Currently, various teaching models have emerged in the field of education aimed at enhancing students' creative teaching skills, such as project-based learning (PBL), flipped classroom, inquiry based learning, etc. These models each have their own characteristics, but they all emphasize student-centered approach, cultivating students' creative thinking and practical abilities through guiding them to actively participate, collaborate on exploration, and solve problems. Project Based Learning (PBL): This model uses real-world project tasks to enable students to learn new knowledge, develop problem-solving skills, and foster teamwork spirit while solving problems. Research has shown that PBL can significantly improve students' creative and critical thinking abilities.- Students complete knowledge learning through watching instructional videos, reading materials, and other means outside of class, while the classroom becomes a place for interaction, discussion, and problem-solving between teachers, students, and students. This teaching model helps to stimulate students' interest and initiative in learning, and promote the development of their creative teaching skills.

Exploratory learning: Exploratory learning encourages students to actively explore unknown fields through steps such as asking questions, designing experiments, collecting data, analyzing and explaining, just like scientists. This learning method can cultivate students' curiosity, exploratory spirit, and innovative ability.Evaluation methods and standards.In order to comprehensively and objectively evaluate the effectiveness of teaching models on the creative teaching skills of ordinary students, we need to establish a scientific and reasonable evaluation system. This includes the following aspects:1. Student performance evaluation: By observing students' performance in the classroom, such as participation, cooperation ability, innovative thinking, etc., evaluate their improvement in creative teaching skills. Meanwhile, self-evaluation and peer

evaluation of students can be collected through methods such as questionnaire surveys and interviews.2. Achievement display and evaluation: Encourage students to showcase their learning achievements in the form of project reports, speeches, exhibitions, etc., and evaluate them through expert review, peer evaluation, and other methods. This not only tests students' creative teaching skills, but also exercises their expression ability and confidence.3. Statistical analysis: Using statistical methods to quantitatively analyze the collected data. For example, after implementing the PBL teaching model in a certain middle school, students' creative thinking scores significantly improved, and the quality of project completion received unanimous praise from teachers and students. In addition, the university also held multiple student innovation exhibitions, showcasing students' innovative works in science, art, technology and other fields, further proving the positive role of PBL teaching model in enhancing students' creative teaching skills.

In summary, evaluating the effectiveness of teaching models on the creative teaching skills of ordinary students is a complex and important task. By constructing a scientifically reasonable evaluation system, combining diverse teaching models and empirical research cases, we can have a more comprehensive understanding of the actual effects of teaching models and provide strong support for educational reform.

Pretest score: 2.06, SD: 0.73. Post-test score: 3.74, SD: 0.77. Observation skills post-test significantly higher ($t=-14.048$, $p<0.001$).

Pretest score for creative thinking: 2.84, SD: 0.44. Post-test score: 3.03, SD: 0.81. Slightly higher but not significant ($t=-1.816$, $p=0.074$).

Pretest score for creative operational skill: 2.06, SD: 0.51. Post-test score: 3.97, SD: 0.75. Significantly higher ($t=-20.539$, $p<0.001$).

Overall score post-test significantly higher ($t=-20.539$, $p<0.001$).

Conclusions: Creative teaching improved observation skills significantly. No significant impact on creative thinking. Improved creative operational skills and overall creativity significantly.

The model has been strengthened three times.

The four areas were rearranged and the quadrants of the mathematical cross were modified.

Change the order of the four directions from counterclockwise to clockwise

Simplified the external structure of the model and added the core part of the model, which are also the three elements for cultivating creative teaching skills.

5.2.3 Students' creative teaching

Innovative teaching skills in Chinese university normal schools are crucial for cultivating innovative and adaptable teachers, stimulating students' interest in learning, and cultivating their innovative abilities. Teachers will play an important role in achieving educational modernization and promoting the comprehensive development of students, which is of great significance for their development future career. The creation of new teaching skills in Chinese university normal schools is crucial for teacher development, for the following reasons:

(1) Cultivating innovative teachers: Creating new teaching skills can cultivate innovative teachers, enabling them to design and implement creative and innovative teaching strategies. These teachers can stimulate students' creativity and innovative thinking through creative methods and resources, and cultivate their ability to creatively solve problems.

(2) Adapting to the needs of modern education: Modern education is facing rapid and constantly changing challenges, which require teachers to create new teaching skills to adapt to these changes. Creating new teaching skills can help teachers better cope with the development of information technology, diverse learning needs of students, and changes in society and careers.

(3) Stimulating students' interest in learning: Creating new teaching skills can stimulate their learning interest and enthusiasm through innovative teaching methods and strategies. Teachers can creatively apply new teaching techniques to design interesting, interactive, and participatory teaching activities, thereby improving students' learning motivation and participation.

(4) Developing, creating new teaching skills focuses on cultivating students' critical innovative thinking. Creating new teaching skills encourages college students to develop innovative thinking and problem-solving abilities. They need to think about how to present teaching content in new and creative ways, and how to respond to various learning needs and challenges of students. This development enables them to provide innovative solutions to complex problems in their future careers. Teachers can design challenging and inspiring learning tasks, encourage students to think and ask questions, and cultivate their critical thinking, judgment, and innovation abilities through guidance and support.

(5) Developing leadership skills: Creating new teaching skills can cultivate leadership skills in college students. By designing and implementing innovative teaching strategies, college students can play a leadership role in guiding and motivating other students to participate in learning activities. This leadership skill is crucial for future career development and teamwork.

(6) Improving communication and expression skills: Creating new teaching skills requires college students to effectively communicate and express their ideas with others. By designing innovative teaching activities, college students need to communicate and collaborate with classmates, teachers, and other relevant personnel. This helps to improve their oral and written communication skills and cultivate the ability to express ideas clearly.

(7) Improving assessment skills: Creating new teaching skills requires college students to possess critical thinking and assessment skills. They need to evaluate the effectiveness and applicability of different teaching methods, and make adjustments and improvements based on feedback and data. This ability is crucial for evaluating and improving the quality of education in the field of education.

(8) Promoting educational innovation and reform: Creating new teaching skills can provide impetus for educational reform and innovation. By adopting innovative teaching methods and strategies, teachers can bring new ideas and practices to the education system and teaching practice, promoting continuous improvement and

innovation in education. Creating new teaching skills to enable college students to become promoters of educational innovation and reform. They can bring new ideas and practices to the field of education through innovative teaching practices and research. This helps to promote education system reform and innovation, improve education quality and student learning outcomes.

In summary, the creation of new teaching skills for Chinese university normal students is of great significance for their personal development and future career. These skills cultivate their leadership skills, communication and expression abilities, innovative thinking and problem-solving abilities, critical thinking and evaluation abilities, making them drivers of educational innovation and reform.

5.2.4 Expert Evaluation

The teaching model quality inspection results require five experts to review the teaching model background and basic teaching concepts.

We have evaluated the teaching mode, objectives, content, and learning activity material resource time, and obtained the following data::

(1) The consistency of the teaching model is good .

As a result, the four experts' evaluations all included 10 items , 8 of which were continuous (+ 1), and 2 of which were uncertain (0). , which can be compared with the standard standard , there are a total of 10 items above, and the average score for each item is above 4.60. As this course has been offered at the Vocational and Technical Teachers College of Guangxi Normal University for 10 years and the teaching outline is relatively complete, I am very grateful for the support of the creative teaching skills research team. In some projects, the score is above 4.60, which also meets the curriculum standards .

(2) The rationality of the teaching plan for cultivating creative teaching skills .

Based on experts' analysis of the rationality of the teaching plan for improving college students' creative teaching abilities, the table shows the evaluation

results provided by different experts on various aspects of the teaching plan. The table also includes the mean, standard deviation (SD), and level for each aspect.

Unit 1 Teaching Skills: Except for Expert 3 who gave 4 points, all experts rated this aspect as 5 points. The mean score for this aspect is 4.80, with a standard deviation of 0.40. The level is the highest.

Unit 2 Import Skills: All experts rated this aspect 5 points. The mean score is 5.00 and the standard deviation is 0.00. The level is the highest.

Unit 3 Observation and Interpretation Ability: Most experts rated this aspect as 5 points, except for Expert 4 and Expert 5 who gave 4 points. The mean score is 4.60 and the standard deviation is 0.49. The level is the highest.

Unit 4 Teaching Method Design and Selection: Except for Expert 4 who gave 4 points, most experts rated this aspect as 5 points. The mean score is 4.80 and the standard deviation is 0.40. The level is the highest.

Unit 5 Teaching Activity Design Skills: Except for Expert 5 who gave 4 points, most experts rated this aspect as 5 points. The mean score is 4.80 and the standard deviation is 0.40. The level is the highest.

Unit 6 Teaching and Questioning Skills: Most experts rated this area 5 points, except Expert 2 who rated it 4 points. The mean score is 4.60 and the standard deviation is 0.49. The level is the highest.

Unit 7 Information-Based Teaching Methods: Except for Expert 4 and Expert 5 who gave 4 points, most experts rated this aspect as 5 points. The mean score is 4.60 and the standard deviation is 0.49. The level is the highest.

Unit 8 Micro-course Skills: All experts scored 5 points on this aspect, with an average score of 5.00 and a standard deviation of 0.00. The level is the highest.

The mean value of all aspects of the teaching plan is 4.78, with a standard deviation of 0.33. Judging from the evaluation results of the rationality of the teaching plan to improve college students' creative teaching skills by 5 experts, the average value is 4.78, which means that the experts believe that the rationality skills of

the teaching plan to improve college students' creative teaching skills are very good. After being trained by teachers with innovative and creative skills, students are above the threshold, with statistical significance reaching the 0.05 level.

(3) The innovative teaching skills improvement structure system has high content validity.

This study consists of three dimensions of first-level indicators (Observation Skills, Creative thinking and Creative Operational Skills) and 18 corresponding second-level indicators, and the evaluation results provided by experts. Experts rated each metric on a scale of 5 (strongly agree) to 1 (strongly disagree). The table also includes the Index of Observation Consistency (IOC) for each metric. From observation: most experts gave it +1, while one expert gave it 0. IOC: 0.8. Creative thinking: Ability to cite two or more teaching cases: most experts gave it +1, while one expert gave it 0. IOC: 0.8. Creative operations skills: Most experts rated it +1, and a few rated it 0. IOC: 0.8. The Index of Observational Agreement (IOC) indicates the degree of agreement between experts for each metric. The average IOC of all indicators is 0.93, indicating a high consistency of expert assessment results. The expert inspection results found that all consistency indicators were higher than the prescribed standard of 0.6. Experts believed that the test questions for the creative teaching skills training of Guangxi Normal University can be adjusted and no adjustment is needed. However, for the following cases: the third item "sequential and systematic" in "observation" is 0.8, the "ability to come up with ideas that are different from others" in "creativity" is 0.8, and the "creative operation skills" The fourth and fifth items in are 0.8, which is far from 1. However, the expert index of agreement (IOC) for each interview question was found to range from 0.8-1. Subsequently, in the first semester of the 2023 academic year, interviews were conducted with the 2020 e-commerce major students of Guangxi Normal University Vocational and Technical Normal College on the teaching model for cultivating innovative teaching skills. A total of 68 students (68 samples, with girls accounting for the majority, including 57 girls and 11 boys) participated. The time is from September 2023 to November 2023. The theoretical and practical training courses

are divided into different locations, and experiments are conducted on third-year students majoring in e-commerce in teaching buildings and micro laboratories.

The assessment form of Creative Teaching Skills is crucial for the learners of Guangxi Normal University to distill Observation Skill, Creative thinking and Creative operational Skills to measure the students' creative teaching skills in the teacher education program in a continuous improvement and training The process allows experts to better in the examination of the indicators of creative skills and competencies possessed by the researchers action guidelines are as follows: Examine documents on creative skills in academia and research. For example Beer & Sue (2013); Ministry of Education (2009); Griffith (2011); Piirto (2011); Sung Khamphu (2014); Marut Patphol (2016) demonstrated the elements of creativity. Through the analysis of the first and second chapters, combined with the interview conclusions, the rationality of the structural system for improving college students' creative teaching skills is checked according to the secondary index method, and expert opinions are collected online and offline to improve the creative teaching of Chinese normal college students.

5.3 Suggestions

5.3.1 Suggestions for application

Suggestions for the Creative Teaching Skills Model

Creative teaching skills have become an essential core competency for teachers. This article aims to explore the creative teaching skills model in depth, and provide teachers with a more comprehensive, vivid, and practical teaching guide by adding rich details, examples, references, statistical data, and empirical research.

Creative teaching, in short, refers to a teaching model that incorporates innovative elements into teaching, with the goal of stimulating students' imagination and creativity. It requires teachers to have an open mindset, flexible teaching strategies, and profound professional knowledge. With the deepening of education reform, more and more studies have shown that creative teaching can significantly enhance students' learning interest, grades, and future career development potential.

1. Core elements of creative teaching skills model**

(1) Situational creation

Creative teaching first requires an engaging learning environment. Teachers can attract students' attention and stimulate their curiosity by creating learning situations that are close to their daily lives, interesting, and challenging. For example, in history class, teachers can organize a "time travel" where students play historical figures and experience historical events firsthand through role-playing, thereby deepening their understanding of historical knowledge.

(2) Problem oriented approach

The problem is the driving force behind creative teaching. Teachers should be good at posing open-ended and multi-level questions, guiding students to think actively and explore collaboratively. These questions should be challenging. Teachers should encourage students to raise their own questions and cultivate their critical thinking and innovative abilities. According to research, problem oriented teaching methods can significantly improve students' learning motivation and problem-solving abilities.

2. Multidimensional evaluation

Traditional evaluation methods often focus on students' knowledge mastery, while neglecting their creativity, teamwork ability, and emotional attitude. Creative teaching emphasizes multiple evaluations, that is, evaluating students' learning outcomes through various methods and dimensions. This includes self-evaluation, peer evaluation, teacher evaluation, as well as parental and societal evaluation. Multivariate evaluation helps to comprehensively understand students' learning situation and promote their all-round development.

3. Implementation strategy and case analysis

(1) Interdisciplinary integration

Interdisciplinary integration is one of the important strategies for creative teaching. By breaking down disciplinary barriers and integrating knowledge and skills from different disciplines, a richer and more enjoyable learning experience

can be created. For example, incorporating elements such as music and art into Chinese language teaching can allow students to express their feelings and understanding through painting, singing, and other means while appreciating literary works.

(2) Project based learning

Encourage students to engage in project-based learning, a student-centered teaching model, and encourage students to explore, practice, and demonstrate around a specific project or task. In project-based learning, students can independently choose research topics, develop research plans, collect data, analyze data, and draw conclusions. This learning method can greatly stimulate students' creativity and teamwork spirit. For example, in science class, teachers can have students design and create an eco-friendly device to solve environmental problems around them.

In short, the creative teaching skills model is a complex and rich system that requires teachers to possess solid professional knowledge, an open mindset, and the courage to innovate. Through the implementation of core elements such as situational creation, problem orientation, and multi-dimensional evaluation, as well as the use of interdisciplinary integration and project-based learning strategies, we can create a dynamic and creative learning environment for students. In this process, teachers are not only transmitters of knowledge, but also guides and partners for students' growth. Promote the development of creative teaching and cultivate college students with innovative spirit and practical ability.

5.3.2 Suggestions for future research

Through interviews, the interview results are summarized as follows from two dimensions: teachers themselves and cultivating students:

1.On the creative teaching skills of teachers themselves

University teachers themselves also need to possess creative teaching skills, providing opportunities and resources for them to develop and apply

creative teaching methods and strategies. Here are some possible cultivation approaches and methods:

(1) Training and professional development: Universities can organize teacher training courses, seminars, and workshops to introduce and explore the theory and practice of creative teaching. These trainings can be conducted by internal education experts or external professionals, covering topics such as how to stimulate student creativity, cultivate innovative thinking, and design creative tasks.

(2) Teaching Community and Collaboration: Universities can encourage teachers to participate in teaching communities, such as teaching seminars, teaching roundtables, etc., so that teachers can share experiences, perspectives, and teaching practices with each other. This cooperation can promote the exchange and development of innovative and creative teaching methods.

(3) Interdisciplinary collaboration: Universities can encourage teachers to seek opportunities for interdisciplinary collaboration in their teaching. By collaborating with teachers from other disciplines, teachers can gain new teaching perspectives and concepts, providing students with more interdisciplinary learning opportunities.

(4) Technology and digital teaching tools: Universities can provide teacher training and support to help them become familiar with and apply technologies and digital teaching tools related to creative teaching. These tools can promote students' creative thinking and expression abilities, and provide a platform for implementing more creative projects and tasks.

(5) Teaching evaluation and feedback: Universities can establish effective teaching evaluation mechanisms, including peer review, student evaluation and feedback, to help teachers understand the effectiveness of their creative teaching practices and provide targeted suggestions and support.

(6) Encourage innovative projects and research: Universities can establish innovative teaching projects and reward mechanisms to encourage teachers

to carry out innovative teaching practices and educational research. These projects and mechanisms can provide opportunities and resources for teachers to implement creative teaching, promoting their professional growth and development.

In short, universities can provide support and promotion for the cultivation of creative teaching skills among teachers through training, cooperation, technical support, evaluation feedback, and encouraging innovative projects, thereby improving the teaching effectiveness of teachers and the learning experience and skills of students in creative teaching.

2.On Cultivating Creative Teaching Skills for Chinese College Students

Cultivating students' creative teaching ability is an important task for university teachers. Here are some methods and strategies that can help university teachers cultivate students' creative teaching skills:

(1) Provide an motivational learning environment: Creative teaching requires a learning environment that encourages exploration and innovation. Teachers can promote students' creative thinking by creating an open learning atmosphere, providing challenging learning tasks and questions, and encouraging students to put forward their own opinions and solutions.

(2) Stimulating interest and curiosity: Interest and curiosity are important driving forces for cultivating creative teaching skills. Teachers introduce novel topics, examples, and questions to stimulate students' interest and curiosity, stimulate their enthusiasm for knowledge and learning, and thus promote their creative thinking and learning motivation.

(3) Encourage self-directed learning and active participation: Students need to exercise their initiative and self-learning ability in creative teaching. Teachers can provide appropriate guidance and support, encourage students to actively participate in the learning process, and cultivate their ability to think independently, solve problems, and express creativity.

(4) Provide diverse learning experiences: Creative teaching can stimulate students' creativity through diverse learning experiences. Teachers can utilize

different teaching methods and resources, such as group collaboration, role-playing, practical projects, and field visits, to provide students with diverse learning opportunities, stimulate their innovative thinking and creative expression.

(5) Supporting student exploration and practice: Creative teaching emphasizes student exploration and practice. Teachers can provide appropriate guidance and support to encourage students to engage in practical learning activities, such as experiments, research, and project design. Meanwhile, teachers can also provide feedback and evaluation to help students continuously improve and enhance their creative performance.

(6)Encourage collaboration and communication: Collaboration and communication are important components of creative teaching. Teachers can organize collaborative projects and group discussions among students, encouraging them to share and exchange their ideas and ideas. Through cooperation and communication, students can inspire and motivate each other, cultivate creative thinking and teamwork skills.

(7) Provide positive evaluation and recognition: Teachers can provide students with positive evaluation and recognition to encourage their creative performance. By affirming the efforts, thinking, and creativity of students, teachers enhance their confidence and enthusiasm, and promote their active participation and performance in creative teaching.

Based on interviews with expert teachers, university teachers can effectively cultivate students' creative teaching skills through the comprehensive application of creative teaching methods in education, helping them become innovative and creative learners and future professionals.

3.Suggestions for three dimensions of creative teaching skills:

Firstly, Suggestions for cultivating observation skills

When it comes to observation techniques, here are some additional suggestions and information:

(1) Developing the habit of systematic observation: Systematic observation refers to consciously adopting organized methods to observe things. You can use the "5W1H" (What, When, Where, Why, Who, How) method to think and answer these questions, to help you observe and understand things comprehensively.

(2) Practice spatial perception: Spatial perception refers to the ability to accurately perceive the position, shape, and relationship of the environment and objects in space. You can practice observing and memorizing the relative position, direction, and distance of objects. For example, when walking outdoors, try to observe the spatial layout of buildings, trees, roads, etc.

(3) Observing people's nonverbal signals: People's facial expressions, postures, eye contact, body language, and other nonverbal signals often convey rich information. Developing the ability to observe and interpret these signals can help you improve your understanding of the emotions and intentions of others.

(4) Challenge your observation skills: Try some challenging observation exercises, such as observing busy streets and recording as many details as possible, or observing a complex artwork and trying to understand its subtleties. These exercises can cultivate your observation and concentration abilities.

(5) Learning scientific observation methods: There is a systematic observation method in scientific research that can help researchers accurately record and analyze observed phenomena. Understanding the basic principles and methods of scientific observation can provide an organized and objective way to observe and understand the world.

(6) Developing intuition and insight: In addition to careful observation, cultivating intuition and insight is also key to improving observation skills. This means understanding and grasping the essence and relationships of things through experience and intuition, rather than relying solely on superficial observations.

(7) Practice mind mapping: A mind map is a tool that represents thoughts and observations in a graphical way. Mind maps help organize and deepen your observations by visualizing the objects, details, and relationships observed.

Observation is a skill that can be improved through continuous practice and cultivation. Practice and apply these methods as much as possible, applying them to various subjects and aspects of life. Dewey said that education originates from life. The founder of teaching theory, Comenius, also said that education is the art of entrusting everything to everyone, gradually cultivating a more acute and comprehensive observation ability among university normal students.

Secondly, Suggestions for cultivating creative thinking

Creative thinking is the ability to generate new and innovative ideas, establish connections between seemingly unrelated concepts, and approach problems or situations from non-traditional perspectives. It involves breaking traditional thinking patterns and exploring new possibilities.

Here are some key aspects and techniques related to creative thinking:

(1) Open mindedness: Open mindedness can consider different perspectives, accept different ideas, and challenge existing assumptions. It involves pausing judgment and accepting new possibilities.

(2) Curiosity and questioning: Cultivating curiosity, asking thought-provoking questions, can stimulate creative thinking. Questioning the current situation, seeking alternative solutions, and exploring different perspectives can bring new insights and ideas.

(3) Divergent thinking: Divergent thinking is the ability to generate multiple ideas, possibilities, or solutions. It involves exploring a wide range of choices without making judgments or criticisms. Brainstorming, mind mapping, and free association techniques can help stimulate divergent thinking.

(4) Associative thinking: Associative thinking involves establishing connections and seeking connections between seemingly unrelated concepts or ideas. It involves exploring analogies, metaphors, and patterns to generate new insights and perspectives.

(5) Embrace ambiguity and uncertainty: Creative thinking often needs to adapt to ambiguity and uncertainty. It involves a willingness to explore unknown fields and tolerate a certain degree of uncertainty to discover new possibilities.

(6) Mindfulness and Reflection: Practicing mindfulness and reflection can enhance creative thinking. This includes living completely in the present, observing your thoughts and experiences without judgment, and reflecting to gain deeper insights and generate novel ideas.

(7) Collaboration and diverse perspectives: Participating in collaborative activities and seeking diverse perspectives can stimulate creativity. Interacting with people from different backgrounds, disciplines, and experiences can expand your thinking and stimulate new ideas through the exchange of ideas and perspectives.

(8) Embrace failure and iteration: Creative thinking often involves taking risks and embracing the possibility of failure. It needs to be willing to learn, iterate, and refine ideas from mistakes. Failure can be seen as an opportunity for growth and a stepping stone to success.

Creative thinking is a skill that can be cultivated and developed through practice. By consciously integrating these aspects and technologies into your thinking process, you can enhance your creative thinking skills and tackle challenges with fresh perspectives and innovative solutions.

Thirdly, Suggestions for cultivating operational skills

In terms of cultivating creative operational skills, the following suggestions are proposed:

(1) Provide practical opportunities: Creative operational skills need to be cultivated and developed through practice. Provide students with sufficient

practical opportunities to implement various tasks and projects. Practical courses and projects can be designed, requiring students to apply creative thinking and skills to solve problems in practical situations.

(2) Encourage diverse solutions: The development of creative operational skills should encourage students to propose diverse solutions. Guide students to think about different methods and approaches to solving problems, and encourage them to try innovative and unique solutions. By providing rich cases and examples, stimulate students' creativity and imagination.

(3) Emphasis on practical application: The cultivation of creative operational skills should emphasize the ability to apply and solve practical problems in practice. Enable students to immerse themselves in real-life situations and face real challenges and problems. Encourage students to apply the knowledge and skills they have learned to real-life situations .

(4) Providing feedback and guidance: Timely feedback and guidance are crucial for cultivating creative operational skills. Provide students with specific feedback on their strengths and areas for improvement. We provide them with necessary guidance to help them improve their operational skills and creative thinking abilities.

(5) Encourage cooperation and communication: Through cooperation and communication, the development of creative operational skills can be promoted. Encourage student teams to work together to solve problems and complete projects. Through cooperation, students can inspire and learn from each other, cultivate creative thinking and operational abilities.

(6) Provide resources and tool support: Provide students with necessary resources and tool support to promote the development of creative operational skills. This may include providing laboratory equipment, computer software, creative tools, etc. Ensure that students can fully utilize these resources and tools to unleash their creative potential.

(7) Stimulating interest and motivation: The development of creative operational skills requires stimulating students' interest and motivation. By introducing interesting and challenging tasks, helping them maintain a positive learning attitude and motivation, stimulate students' enthusiasm for learning. Encourage students to set goals and pursue self transcendence.

In addition, continuous learning, understanding, and researching relevant educational theories and practices can also help better guide the cultivation of creative operational skills.

These suggestions can serve as references for cultivating creative operational skills. We can flexibly adjust and adjust these suggestions based on specific educational backgrounds and student characteristics.

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APPPPENDIX

APPENDIX A.

Expert Information Table

Basic information of experts

Name	Workplace	Professional Position	Instruments
Feng Qiang (fengyansi@126.com)	Shandong Qingdao University	Professor of Writing	Teaching Consistency and Effectiveness Checklist
Ju wen Liu （187211632@qq.com）	Guangxi Normal University	Associate Professor of Foreign Literature	Teaching Consistency and Effectiveness Checklist
Zhaokun Lu （zhaokun1218@126.com）	Shandong University	Associate Professor of Education	Teaching Consistency and Effectiveness Checklist
Bo Tao （2444733579@qq.com）	Guangxi Normal University	Associate Professor of Education	Teaching Consistency and Effectiveness Checklist
Yanlin Li （1208410954@qq.com）	Guangxi Normal University	Associate Professor of Education	Teaching Consistency and Effectiveness Checklist

APPENDIX B

Survey Questionnaire

Interview outline in the study

Interview outline
After entering a normal university, it is particularly important to cultivate excellent teachers with creative teaching skills. Chinese college students emphasize the all-round development of students and combine classroom teaching with creative teaching teaching models. The content is derived from teaching materials but is not limited to teaching materials, making it more lively and colorful in form. At the same time, in the national innovation-driven strategy, more and more attention is paid to the cultivation of innovative talents. Therefore, the theme of the entire interview is "the role of innovative new teaching skills in cultivating innovative talents." During the interview, we will record relevant important information and, with your consent, the conversation will be audio-recorded. All information is used for scientific research only, and your personal privacy is strictly protected.
Basic information: name, age, professional field, teaching subjects Introduce yourself and your educational background. Question 1: What is your understanding of creative teaching? Question 2: What benefits do you think creative teaching brings to college students? Question 3: How do you stimulate students' creativity in teaching? Question 4: What specific teaching methods or strategies do you use to develop students' creative thinking? Question 5: How do you encourage students to explore and trial and error in teaching? Question 6: How do you provide support and guidance to students in creative teaching projects? Question 7: How do you evaluate student performance on creative tasks or projects? Question 8. Have you ever encountered challenges or difficulties in teaching? How did you cope? Question 9: In what ways do you think teachers can continue to improve their creative teaching skills? Question 10: What are your expectations and prospects for the cultivation and development of creative teaching skills in the future?

Observation Power Scale

1. What aspects do you usually focus on during classroom observations? (Multiple choice possible) [Multiple choice questions]

A. Student concentration and engagement

B. Interaction and cooperation among students

C. Students' emotions and emotional expressions

D. Students' learning motivation and learning strategies

E. Student Performance and Achievement

2. What tools or techniques do you use when observing students? [Multiple choice questions]

A. Observation record sheet

B. Video recording

C. Audio recording

D. Student Questionnaire

E. Teacher peer review

3. Do you notice students' nonverbal behaviors during classroom observations? [Single choice question]

A. Yes

B. No

4. Do you positively evaluate student engagement and performance? [Single choice question]

A. Yes

B. No

5. How important do you think teachers' observation skills are to teaching? [Single choice question]

A. Very important

B. important

C. Generally important

D. It doesn't matter

E. Not important

6. What factors do you think will affect teachers' observation skills? (Multiple choice possible) [Multiple choice questions]

A. Teacher's personal emotional state

B. Teacher's biases or assumptions about students

C. Teacher's professional knowledge and teaching experience

D. The relationship between teachers and students

E. Teacher's physical condition and health status

7. What methods do you think can help improve teachers' observation skills? (Multiple choice possible) [Multiple choice questions]

A. Attend teacher professional development courses

B. Observe the classes of outstanding teachers

C. Reflect on and record your own observation experiences

D. Communicate and share observations with colleagues

E. Conduct teacher teaching observation and mutual aid group activities

8. What teacher behaviors do you notice during classroom observations? (Multiple choice possible) [Multiple choice questions]

A. Teacher's teaching content and methods

B. Teacher's words and expressions

C. Teachers' attention and response to students

D. Teacher's classroom management and order maintenance

E. Teachers' Emotions and Emotional Expressions

9. What difficulties and challenges do you encounter when conducting teaching observations? (Multiple choice possible) [Multiple choice questions]

A. The student's performance is inauthentic or staged.

B. Subjective bias during observation

C. Objectivity and accuracy of observation records

D. Influence of teaching environment

E. Time and energy constraints

10. In what areas do you think you need to further improve your observation skills? (Multiple choice possible) [Multiple choice questions]

A. Increase sensitivity to students' nonverbal behavior

B. Improve the ability to observe changes in the teaching environment

C. Improve the ability to observe students' learning motivation and emotional state

D. Improve the ability to observe teachers' own behavior

E. Improve the ability to observe students' learning outcomes and performance

Student preliminary questionnaire content

Questionnaire on Cultivating Creative Teaching Skills

Dear classmates

Hello! Thank you very much for taking the time out of your busy schedule to support our survey. This questionnaire aims to investigate the research status of cultivating creative teaching skills among vocational teachers and capital students. It is conducted anonymously, and the survey results are only used for academic research. There is no right or wrong answer, please answer carefully according to your actual situation. Thank you again for your support.

The research group for "DEVELOPment A TEACHING MODEL FOR ENHANCING NORMAL UNIVERSITY STUENTS"

Basic information: Please choose and fill in according to your actual situation.

1. Gender:

A. Male B. Female

2. The grade is:

A. Freshman year

B. Sophomore year

C. Junior year

D. Senior year

3. The family's place of residence is:

A. City

B. County and town

C. Rural area

4.The type of university is:

A. Normal university B. Comprehensive university

5.Choosing the Vocational Education Teacher Program is:

A. Personal interest

B. Parental (or significant other) advice

C Professional adjustment

D. Feel free to 细 in the form

6.Advancement to undergraduate programs is:

A. Ordinary college entrance examination

B. Secondary to undergraduate

C. Specialist to undergraduate

7.The professional orientation is:

A. Tourism services

B. Processing and manufacturing

C. Culture and Art

D. Instance and common

E. Information technology

F. Public administrators and services (for example: secretarial science)

G. Chil engineering and construction

H. Agriculture, forestry, animal husbandry and fishery

8.Participation in educational apprenticeships is:

A. participated in

B. Never participated

9.Would you like to be a secondary vocational education teacher in the future: .

A. Willing

B. Unwilling

C. Uncertain

10.Do you understand classroom instructional design?

A. Relatively knowledgeable

B. Know a little bit

C. Unknown

11.(Multiple choice) What you think needs to be strengthened and improved in the school's training of VET teacher trainees are: [Multiple Choice Questions]

A. Class schedule

B. Professional internship

C. Educational Practice

D. Professional Values Education

E Professional ability development

F. Corresponding employment guidance

G. Others (please fall in)

I2. What is the teaching theme for implementing your creative teaching skills?

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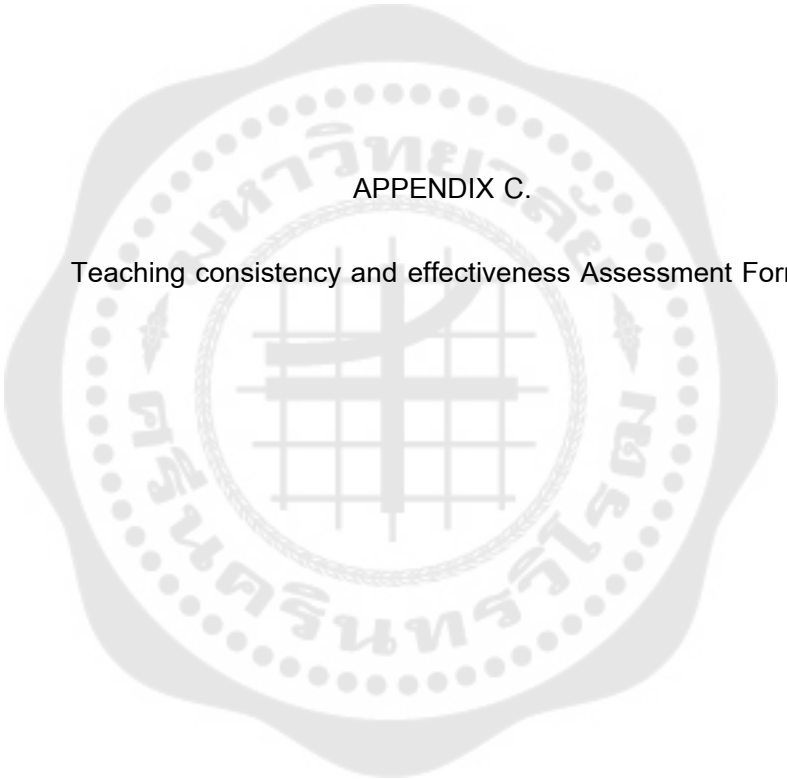


APPENDIX C.

Teaching consistency and effectiveness Assessment Form

Dear experts:

Thank you for taking time out of your busy schedule to help us! We are a research team on creative teaching skills, and I am one of the students studying the creative teaching skills training model. The materials you are reading (teaching syllabus, teaching model, teaching plan) are a brief example of our "Teacher Vocational Skills Training" teaching model, which requires students to design teaching, implement and evaluate, and form a report. Before the teaching we design is implemented, we need to ask experts to evaluate the effectiveness of the teaching design and teaching model . Only after passing the qualification can we implement the teaching . Please read our materials and complete the consistency and effectiveness check list below. Leave your review.

Sincerely thank you again!

Research leader : Liang Feng

2 August 3 , 2023

1. Checklist to improve the consistency of teaching model for college students' creative teaching skills

"√" on the corresponding evaluation result based on your judgment .

Serial number	Project	Evaluation results		
		Consistent (+1)	Uncertain (0)	Inconsistent (-1)
1	Teaching model background and basic teaching concepts			
2	Basic concepts and teaching objectives of teaching model			
3	Basic concepts of teaching model and learning activities			
4	Teaching objectives and teaching content			
5	Teaching objectives and learning activities			
6	Teaching content and learning activities			
7	Teaching content and learning materials			
8	Teaching content and learning resources			
9	Teaching content and study time			
10	Teaching evaluation and teaching goals			

2. Checklist for the rationality of the teaching model to improve college students' creative teaching skills

Please mark " " on the corresponding evaluation results based on your opinions √

Dimensio	project	Evaluation results

ns		5	4	3	2	1
Teaching model principles	Principled rationality					
	The basic teaching concepts are supported by theory					
	Can guide practice					
Teaching model goals	Clear and specific goals					
	Clear steps					
	Suitable for target group					
Teaching mode steps	Meet teaching objectives					
	Academically correct					
	Suitable for target group					
	Can be measured and evaluated					
Teaching mode experience	Meet teaching objectives					
	Suitable for target group					
	Interesting and feasible					
	Experience demos and applications					
Teaching model resources	In line with learning activities					
	Suitable for target group					
	Interesting and feasible					
Teaching model evaluation	Meet teaching objectives					
	Suitable for target group					
	Operable					

3. Checklist for teaching plan consistency to improve college students' creative teaching skills

"√"on the corresponding evaluation result based on your judgment .

Serial	Project	Evaluation results

number		consistent (+1)	uncertain (0)	inconsistent (-1)
1	Teaching plan background and basic teaching concepts			
2	Basic concepts and teaching objectives of the teaching plan			
3	Basic concepts and learning activities of teaching plan			
4	Teaching objectives and teaching content			
5	Teaching objectives and learning activities			
6	Teaching content and learning activities			
7	Teaching content and learning materials			
8	Teaching content and learning resources			
9	Teaching content and study time			
10	Teaching evaluation and teaching goals			

4. Checklist for rationality of teaching plan to improve college students' creative teaching skills

Please mark " " on the corresponding evaluation results based on your opinions √.

Dimensions	project	Evaluation results				
		5	4	3	2	1

Basic teaching concepts	Rationality					
	The basic teaching concepts are supported by theory					
	Can guide practice					
Teaching objectives	Clear, specific					
	Can be measured and evaluated					
	Suitable for target group					
Important and difficult points in teaching	Clear, specific					
	Can be measured and evaluated					
	Suitable for target group					
Teaching content	Meet teaching objectives					
	Academically correct					
	Suitable for target group					
Learning steps activities	Meet teaching objectives					
	Suitable for target group					
	The steps are clear and feasible					
	Interesting and feasible					
Education resources	In line with learning activities					
	Suitable for target group					
	Interesting and feasible					
Teaching Evaluation	Meet teaching objectives					
	Suitable for target group					
	Operable					

5. Checklist to improve the structural system consistency of creative teaching skills for college students

"√" on the corresponding evaluation result based on your judgment .

Serial	Project	Evaluation results

number		consistent (+1)	uncertain (0)	inconsistent (-1)
1	Teaching background and basic teaching concepts			
2	Basic teaching concepts and teaching objectives			
3	Basic teaching concepts and learning activities			
4	Teaching objectives and teaching content			
5	Teaching objectives and learning activities			
6	Teaching content and learning activities			
7	Teaching content and learning materials			
8	Teaching content and learning resources			
9	Teaching content and study time			
10	Teaching evaluation and teaching goals			

6. Checklist for the rationality of the structure system to improve college students' creative teaching skills

Please mark " " on the corresponding evaluation results based on your opinions √.

First level indicator	Secondary indicators	Evaluation results				
		5	4	3	2	1
Viewinspect	Observation task					

force	Knowledge, experience and skills					
	Sequential and systematic					
	Pay more attention to details					
	Sense organs participate in observation activities					
	Observe and record at any time					
	Observe with curiosity					
Creativity thinking	Can cite two or more teaching cases					
	Able to come up with ideas that are different from others					
	Able to create original and curious works within a specified time					
Micro video production skills	Meet teaching objectives					
	Academically correct					
	Suitable for target group					
	The knowledge content is short, easy to understand and meaningful					
	Interesting and feasible					
	The language design is generous and decent					
	Clear interface design					
	Operable					

suggestion:

sign: date:

APPENDIX D

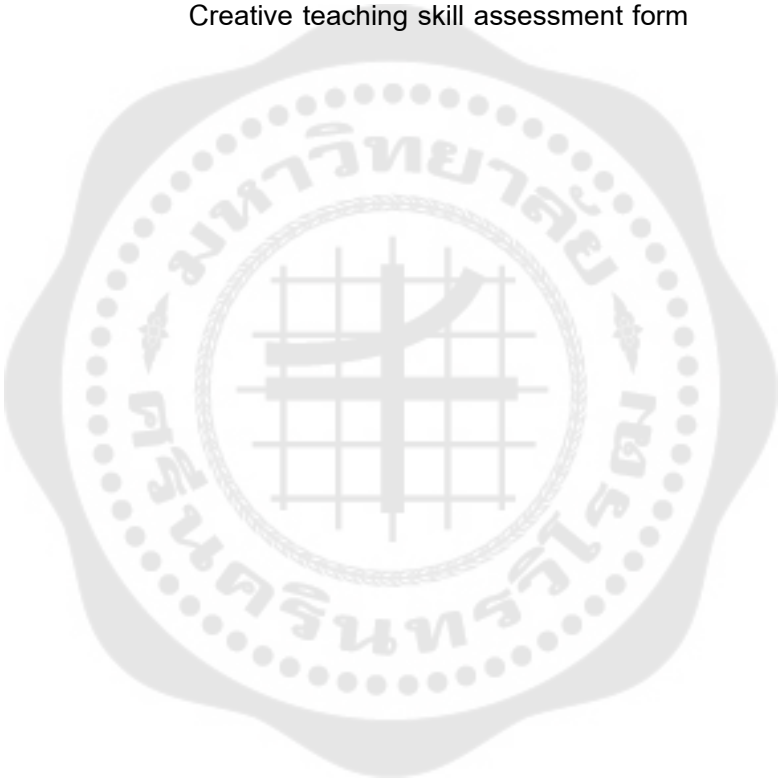
Expert consultation on 5 components of creative teaching skills

Level 1 index	Secondary indicators	Very Reasonable	Rea sonable	generally	Unrea sonable	completely unreasonable	Sugg estion
Innovation Personality	Bravery						
	Openness						
	Responsibility						
	leadership						

Innovation mood	happiness						
	anxiety						
Innovation manner	To creativity cognition						
	Teaching innovation						
intelligence	combinatorial intelligence						
	Experiential intelligence						
	Adaptive intelligence						
Innovation thinking	Divergent thinking						
	logical thinking						
	Intuitive thinking						
	Analytical thinking						
Knowledge with skills	Educate Knowledge and skills						
	Innovation Knowledge and skills						
Innovation Perception	Perception Creativity						
	Perception pressure to innovate						
Innovation motivation	Intrinsic motivation						
	Extrinsic motivation						
Innovation study	Learning Resources						
	Learning process						
	Learning method						
Innovation Performance	Teaching innovation						
	social service						

APPENDIX E

Creative teaching skill assessment form



1. Please list three innovative solutions that differ from traditional methods to solve a real-life problem.
2. How do you encourage team members to come up with innovative ideas and participate in the innovation process?
3. Describe a time when you successfully applied innovative thinking to solve a problem, and explain how you thought and acted.

4. When faced with a complex problem, how do you usually use innovative thinking to find a solution?
5. Please describe a valuable lesson you learned from a failure and explain how you can apply these lessons to drive innovation in the future.
6. When you face a new task or challenge, how do you guide your innovative thinking process?
7. Please list three areas that you believe have potential for innovation and explain why you chose them.
8. In your work or study, how do you collaborate with others to promote innovative thinking and innovative actions?
9. Describe a difficulty or obstacle you encountered in the innovation process and explain how you overcame them.
10. What factors do you think are crucial to stimulating and cultivating innovative thinking? Why?
11. Divergent thinking: Please list as many uses or application scenarios as possible, you can use an ordinary pencil.
12. Logical thinking: Please explain what causality is and provide a specific example.
13. Divergent Thinking: Can you think of three different ways to solve a common problem, such as how to manage time better?
14. Logical thinking: Please describe the rules of the following sequence: 1, 3, 6, 10, 15,...
15. Divergent thinking: Suppose you are the manager of a coffee shop, can you think of five innovative ways to attract more customers?
16. Logical thinking: If "A is a subset of B, and B is a subset of C", then what is A of C?
17. Divergent thinking: Please list five different ways to improve the city's traffic congestion problem.
18. Logical thinking: Please explain what probability is and how to calculate the probability of an event.
19. Divergent Thinking: Can you think of three different design concepts that could improve existing smartphones?
20. Logical thinking: Please explain what deductive reasoning and inductive reasoning are and provide an example.

Classroom Scoring Form for Creative Teaching Skills Test

List	Student Number	Student Name	Single Score			Total Score	Autograph
			Teaching design achievement	Courseware production results	Simulation board book scores		

一、 Teaching design scoring standards

Comment content	Evaluation standard	Score
Goal design 4points	Teaching objectives are clear, specific, easy to understand, easy to implement, Behavioral verbs are used correctly, and specification	
	conforms to the requirements of the curriculum, subject characteristics and student reality	
Content analysis 3points	Knowledge point relationship, status, role description is accurate before and after teaching content, focus, difficult analysis is clear	
Academic analysis 2points	Student's; cognitive characteristics and levels are properly expressed, learning habits and abilities are reasonable	
Teaching process design 16points	Teaching mainline description is clear, teaching content processing in line with curriculum standards, with strong systematic and logical	
	Teaching focus is prominent, point-to-point combination, depth is moderate, difficulties are clear, grasp accurate, difficult, handling is clear and appropriate	
	teaching methods are clear and appropriate, in line with the requirements of teaching objects, conducive to the completion of teaching content, difficult solutions and focus	
	teaching methods are clear and appropriate, in line with the requirements of teaching objects, conducive to the completion of teaching content, difficult solutions and focus	
	content to enrich the essence, suitable for the level of students; Focus on formative evaluation and generative problem solving and use	

	Pay attention to formative evaluation and the solution and utilization of generative problems	
Extended design 3points	The allocation of lessons is scientific and reasonable, the setting of tutoring and answer questions is reasonable, exercise, homework, discussion arrangement is in line with teaching objectives, and helps to strengthen student's; reflection, understanding and problem solving	
Document specifications 3points	The text, symbols, units and formulas conform to the standard specifications; the language is concise and clear, the fonts and diagrams are used appropriately; the document structure is complete, the layout is reasonable, and the format is beautiful	
Design innovation 4points	The overall design of the teaching plan is innovative, which better reflects the concepts and requirements of the curriculum reform; the selection of teaching methods is appropriate, and the teaching process design has outstanding characteristics	
Total		

二、 Multimedia courseware production grading standard

Comment content	Evaluation standard	Score
Scientific5 points	Courseware is suitable, content science, correct and standardized	
	Courseware demonstration in line with modern educational concepts	
Educational 8 points	The courseware design is novel and can embody the teaching design idea, and the knowledge point structure is clear, which can mobilize student's; enthusiasm for learning	
Technical 4 points	The proper use of multimedia effects in the production and use of courseware	
	Easy to operate, fast, easy to communicate, suitable for teaching	
Artistic 3 points	Screen design has a higher artistic, the overall style is relatively unified	
Total		

APPENDIX F

Teaching Design

Lesson 1 TOPIC: Teaching Skills

Teaning topics	Teaching skills	
Teaching time	3 hours + 3 hours	
Learning objectives		
Knowledge and Skills Goals	11. Understand the meaning, characteristics and classification of teaching skills; 2. Grasp the general law of the formation of teaching skills.	
Process and Method Objectives	1.Through task-driven, learn to divide the three categories of teaching skills; 2.Through the creation of situations, master the construction method of teaching skills formation.	
Emotional attitudes and values	1.Be able to use the theoretical knowledge of static teaching skills to transform the expression of dynamic teaching skills, stimulate emotions, establish a correct attitude, and insist on cultivating people through morality as the central link; 2.Strengthen the ability of independent creation and cultivate the awareness of teamwork and mutual assistance.	
Ideological goals	1.Adhere to people-oriented , continuously stimulate learning motivation in the fun of inquiry—turn passive learning into self-needs, and stimulate students' creative thinking. 2. Establish a standard of teacher ethics, cultivate educational feelings, strive for excellence, and cultivate the spirit of craftsmanship. 3. Strengthen the ability of independent creation and cultivate the awareness of teamwork and mutual assistance.	
Difficulties in teaching		
Project	Content	Strategy
Focus	1.The meaning, characteristics and classification of	1.Through teaching video analysis, let students have a preliminary understanding of teaching behavior; initiate challenging exercises to students: imitate teaching

	teaching skills; General laws and construction methods of teaching skills formation.	skills, and play a role model; 2.Through imitation, students are allowed to preliminarily formulate externalization forms suitable for individuality; 3.Through practice, learn the general law of skill formation, construct from reflection, and improve the overall quality of normal students.
Difficulty	1.How to highlight one's own advantages and "express" new ideas in teaching skills; 2.Evaluation of teaching skills.	1.Through the comparison of various teaching skills videos, cognitively distinguish the differences in their display effects; through self-repetitive exercises, students can deepen their understanding of teaching skills. 2.Through the teacher's demonstration of on-site teaching skills acquired in a certain cultural context, demonstrate the correct and wrong teaching skills, grasp the accuracy from the content, and obtain correct guidance from the skills training.

VITA