DEVELOPMENT OF SCAFFOLDING TEACHING MODEL FOR ENHANCING INDEPENDENT LEARNING ABILITY OF UNDERGRADUATE STUDENTS IN CHINA

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การพัฒนารูปแบบการสอน scaffolding เพื่อพัฒนาทักษะการเรียนรู้ด้วยตนเองของนักศึกษาระดับปริญญาตรีในประเทศจีน

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DEVELOPMENT OF SCAFFOLDING TEACHING MODEL FOR ENHANCING INDEPENDENT LEARNING ABILITY OF UNDERGRADUATE STUDENTS IN CHINA

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DEVELOPMENT OF SCAFFOLDING TEACHING MODEL FOR ENHANCING INDEPENDENT LEARNING ABILITY OF UNDERGRADUATE STUDENTS IN CHINA

BY

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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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Chinese universities attach great importance to quality education, and relevant policies emphasize the importance of independent learning ability. On the basis of analyzing the causes of lack of independent learning ability of students and the benefits of scaffolding teaching, the purpose and significance of this study are expounded. This thesis solves this problem by developing a scaffolding teaching model to help undergraduates improve their independent learning ability. Firstly, 31 students were selected from 511 undergraduate students in the Fine Arts Department of Huanggang Normal University as the experimental group by simple random sampling and stratified sampling. Secondly, questionnaires for students and teachers were carried out, and the scaffolding teaching model of woodcut prints is designed. Finally, a quasi-experiment was conducted to verify the effectiveness of the scaffolding teaching model through a pre-test, a post-test and the t-test method. The scaffolding teaching model significantly improves independent learning ability, which verifies the research hypothesis. This study developed a procedural scaffolding teaching model. Through the five steps, students improved their independent learning ability in three stages: problem scaffolding, student-centered scaffolding, and mixed online and offline learning scaffolding.

Keyword : Scaffolding teaching, Teaching model, Undergraduate students, Independent learning ability, Woodcut prints

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CHAPTER 1
INTRODUCTION

1.1 Background of the Study

With China's emphasis on quality education,universities put forward new requirements for students' quality development and ability improvement, and the curriculum teaching reform is constantly updated. In the past, classroom teaching primarily emphasized the acquisition of basic knowledge and skills. but ignored the students' ability growth and future development in learning. To align with the rapid evolution of cultural and educational landscapes, higher education now demands heightened standards for cultivating personnel. Prospective talents must not only possess robust professional knowledge and skills but also demonstrate strong learning capabilities and personal development skills. Of particular importance is the promotion of independent learning abilities, which significantly contributes to the quality of talent development within universities.

In 2010, Outline of the National Medium-and Long-Term Education Reform and Development Plan(2010-2020), to improve the quality of university education and implement education reform. The strict teaching management. Improve the quality of teaching and improve the evaluation of teaching in universities. Fully mobilize students' enthusiasm and initiative to learn, encourage students' efforts, enhance their sense of honesty, develop a good learning style. (Ministry of Education,PRC.2010).

At present, there is a lack of students' independent learning ability in undergraduate teaching in China. The researchers analyze the reasons from the following aspects:

The single and traditional teaching model leads to the insufficiency of students' independent learning ability.

Most of the majors adopt one teaching model and method, and do not pay attention to the interests, hobbies and their own characteristics and strengths of the

students, resulting in the lack of students' independent learning ability(Zhou, 2023). Moreover, "traditional teaching model causes students' rigid learning thinking" and insufficient independent learning ability(Xu & Xu, 2016).

(2)Traditional teaching methods lead to the insufficiency of students' independent learning ability.

"Traditional teaching methods are difficult to adapt to students' knowledge needs in the new era"(Sun & Li,2022)."The teaching method does not achieve the effect of teaching students according to their aptitude."(Kong,2019) Most students lack subjective initiative and enthusiasm for teaching activities such as classroom discussion and independent inquiry."(Wang, 2011)

(3)Teacher-led and passive learning leads to insufficient independent learning ability of students.

Most professional curriculum are still teacher-led, teachers are the indoctrinators of knowledge, and students are passive(Xu,2023)."Students are used to being taught by teachers and acquiring knowledge passively."(Wang,2023). Students' intrinsic learning motivation is weak, and their learning style is mainly passive learning.(Shi,2019)

(4) Teachers' lack of guidance and development of teaching resources lead to the insufficiency of students' independent learning ability.

Teachers should give effective guidance to the problems such as the lack of independent learning ability, the lack of discussion within and between groups, and the inactivity of after-class learning in blended teaching.(Li, Yu, & Liu, 2022) Teachers lack the full use of the Internet during teaching, and fail to collect, organize, develop and utilize online teaching resources, resulting in the relative insufficiency of students' independent learning ability(Chen, 2022).

Scaffolding teaching helps students to effectively carry out independent learning, thus improving their independent learning ability, which has the following benefits:

(1) Scaffolding can help students become independent learners. The use of scaffolding in classroom teaching can effectively promote students' cognitive development and improve students' independent learning ability(Yuan, 2023).

(2) Scaffolding teaching optimizes student learning by providing a supportive environment while promoting student independence(Larkin,2002).

(3) Using scaffolding as a teaching technique can help students build ideal learning strategies or tasks in their spare time(Vacca,2008).

(4) Scaffolding teaching can make students unconsciously change from passive learning to active learning, from passive receiving to active construction of knowledge, and from result evaluation to process evaluation.

In a word,scaffolding teaching is to use scaffolding teaching method to carry out curriculum teaching reform. In view of the shortcomings of traditional classroom teaching in universities, Scaffolding is used to guide students to study independently, and help them master knowledge and skills flexibly, monitor the learning process, and effectively improve students' independent learning ability.

Therefore,the research aims to address the deficiency of students' independent learning ability in traditional teaching methods.This study develops a scaffolding teaching model to help students improve their independent learning ability.

1.2 Objectives of the Study

- To develop scaffolding teaching model for enhancing independent learning ability of undergraduate students in China.
- To evaluate the effectiveness of scaffolding teaching model for enhancing independent learning ability of undergraduate students in China.

1.3 Significance of the Study

This research is very helpful for university, teaching and research team members and all students. Because this research was produced in the context of teacher education professional certification, the philosophy of which is "student-centered, output-oriented,continuous improvement". Therefore, It is helpful for university

to implement the concept of teacher professional certification, reduce the anxiety of teaching and research team staff, improve students' independent learning ability, and prepare them for future success as primary and secondary school art teachers.

The scaffolding teaching designs emphasize that teachers list the scaffolding, and students are centered, so these students can learn step by step in the scaffolding list, so as to generate higher quality artworks and develop the habit of self-examination and continuous improvement. Therefore, it is a beneficial exploration of using scaffolding teaching theory to reform the curriculum, which is of great benefit to the construction of art curriculum in universities.

At the same time, this research can also provide theoretical and practical reference for other art educators. For example, the publication of research results and the application of teaching cases, may further influence the art teaching in universities at home and abroad.

1.4 Scope of the Study

The scope of this study is as follows:

1.4.1 Participants in the Study

Participants in this study included the research team and two groups participating in the experiment. The research team consists of a professor and an associate professor majoring in fine arts in the university, three master students of education (fine arts), and an art teacher from Huang Gang Middle School.

This study will select 31 students from years 1-4 of the Department of the Academy of Fine Arts, Huang Gang Normal University as the research object, to use scaffolding teaching method.

1.4.2 Duration of the study

According to the practical demands of undergraduate education and teaching reform, the scaffolding teaching and learning plan was formulated, and the teaching model design was carried out based on the improvement of students' independent learning ability. The whole research lasted for 2 years. The total teaching

time is four weeks, with four lessons every Monday, Tuesday, Wednesday, and Friday afternoon, A total of 64 lessons,each lesson lasting 45 minutes.

TABLE 1 Scaffolding teaching model development schedule

purpose	Prepare teaching resources	Build a teaching team	Model design stage	quasi-experimental	evaluation and updating
task	The goal is to prepare resources related to scaffolding teaching	According to the needs, 3-5 members will form a research team	Complete the design of scaffolding teaching model	Implement the scaffolding teaching model and test the effect	Evaluate the quasi-experimental effect， improve design and update part of the teaching content
time	H1 of 2022	H2 of 2022	H1 of 2023	H2 of 2023	H2 of 2023

1.4.3 Population and Sample Groups

● Population

The total number of undergraduates is 511 of fine arts major of Huanggang Normal University in Hubei Province.

● sample Groups

This study adopts simple random sampling method, to select Sample multi-stage.

The first stage: Fine Arts college is selected from 20 departments of Huanggang Normal University.

The second stage: the five majors of the second year sudents is selected from in the Academy of Fine Arts.

The third stage: We chose one fine arts major from the five majors of the second-year students,

Step 4: The four classes of this major are selected through simple sampling by lot. There are 31 students in this class.

1.4.4 Variables of the study

The independent variable of this study is as follows:

- The scaffolding teaching model developed by the research team.

The dependent variable of this study is as follows: Students' independent learning ability.

The dependent variable has 5 sub-dimensions:

- Decide on learning objectives
- Decide the learning content and progress
- Choose learning methods and techniques
- Monitor the learning process
- Evaluate the results of acquisition

1.4.5 Concept and scope of the study

This study involves concepts such as scaffolding teaching, and independent learning ability,etc.mainly focuses on the scaffolding teaching model design and quasi-experimental in Huang Gang Normal University. The research scopes involve theoretical and practical on scaffolding teaching both domestically and internationally, as well as the application of scaffolding teaching in the field of art, especially the teaching model design of scaffolding teaching The research scopes of independent learning ability involve the concept and connotation of independent learning ability, as well as the improvement of students' independent learning ability.

1.5 Definition of Terms

1.5.1 Scaffolding teaching

Scaffolding teaching is a process of constantly constructing their own knowledge system. Teachers' teaching only provides students with the help of scaffolding function continuously, so as to help students climb and solve problems continuously. In the scaffolding teaching design, teachers should continuously reduce

the scaffolding and finally remove the scaffolding.Therefore, students' ability to construct knowledge and obtain successful learning can be improved.

1.5.2 Teaching model

The teaching model is a relatively stable structure frame and procedure of teaching activities established under the guidance of mature teaching theory or teaching ideology. It carries out teaching design according to the research structure of teaching model,and tests in practice according to established teaching procedures and steps. It has a relatively stable teaching method and teaching process, and has certain demonstration significance.

1.5.3 Scaffolding teaching model

Scaffolding teaching model is a kind of teaching model which takes the building, climbing and removing of scaffolding as the teaching idea. It takes students as the main body, takes students' existing knowledge level as the foundation, and completes the construction of the support. And use a variety of measures to actively guide students, promote students to a higher level of knowledge development, to achieve the process of climbing the scaffolding. The students achieve the purpose of constructing the knowledge system with the help of the scaffolding, and finally remove the scaffolding. "Scaffolding" teaching is composed of five stages: scaffolding, problem setting, independent inquiry, cooperative learning and effect evaluation. The main purpose is to help students improve their ability to self-manage learning.

1.5.4 Students' independent learning ability

The concept of independent learning ability refers to "the ability to self-manage learning", and contains five aspects as follows:

● Decide on learning goals.It is the student to complete the current learning task or solve the learning problem to establish the goal.

● Determine the learning content and progress.It means that students spontaneously choose the learning content according to the curriculum learning tasks and flexibly grasp the learning progress.

●Choosing learning methods and techniques. It means that students take the initiative to choose learning methods and techniques according to the learning content and task list.

●Monitoring the learning process.It means that students take the initiative to learn the details of the learning process and supervise each other's learning process.

●Evaluate the results of acquisition.It means that students can reasonably evaluate the theories and skills they have mastered in the curriculum practice.

1.6. Conceptual Framework

This thesis first analyzes the constructivism theory and the Zone of Proximal Development theory. By combing through the past literature, on the basis of explaining its concepts and main views, explains the main characteristics of art learning based on the constructivism theory from three aspects: the characteristics of visual experience, the characteristics of intellectual participation and the characteristics of independent innovation, and explains the main characteristics of art learning based on scaffolding teaching from three aspects: the optimization of the teaching process, targeted teaching and the release of students' art learning potential.

Secondly, The study systematically defines scaffolding teaching, thoroughly explores its meanings, elucidates key theoretical perspectives, and examines its application in art education. providing reference value for this study.

Thirdly, the concept, research structure, types and characteristics of teaching model are explained, and then the differences between scaffolding teaching model and traditional teaching model are compared, and the advantages of scaffolding teaching model are analyzed.

Finally, It explains the concept of independent learning ability and its research status, focusing on the concept of independent learning ability proposed by French linguist Holec,and analyzes the basic connotation of independent learning ability from five aspects.

On the basis of reviewing the literature on teaching model. Three kinds of teaching cases are designed in the scaffolding teaching model: problem scaffolding, student-centered scaffolding, and online-offline mixed learning scaffolding.

In order to test the effectiveness of the teaching implementation, Before starting the teaching implementation, the research team designed the Assessment Scale of students' independent learning ability. The Assessment Scale referred to the above theories and set 5 sub-dimensions to facilitate the assessment of students' independent learning ability. The scaffolding teaching model was implemented in the experimental group. Finally, comparing the measured values of students' independent learning ability pre-test and post-test, it proves that the scaffolding teaching model can improve students' independent learning ability better.These studies provide the theoretical basis and action guide for the scaffolding teaching model to improve students' independent learning ability.

Constructivism theory is adopted in this thesis to help teachers better understand students' learning starting point, learning habits, active learning status, learning strategies and other content, to help teachers better teaching design, so that students can quickly build knowledge.

The theory of Zone of Proximal Development is used to help teachers find the gap between the student’s current learning level and their potential learning level, so as to determine the Zone of Proximal Development of students' learning.The targeted teaching work should be carried out.

The study of scaffolding teaching theory is mainly to facilitate teachers to guide students to establish scaffolding, so that students can understand the advantages of scaffolding teaching and scaffolding learning rules, so as to quickly establish scaffolding for independent learning.

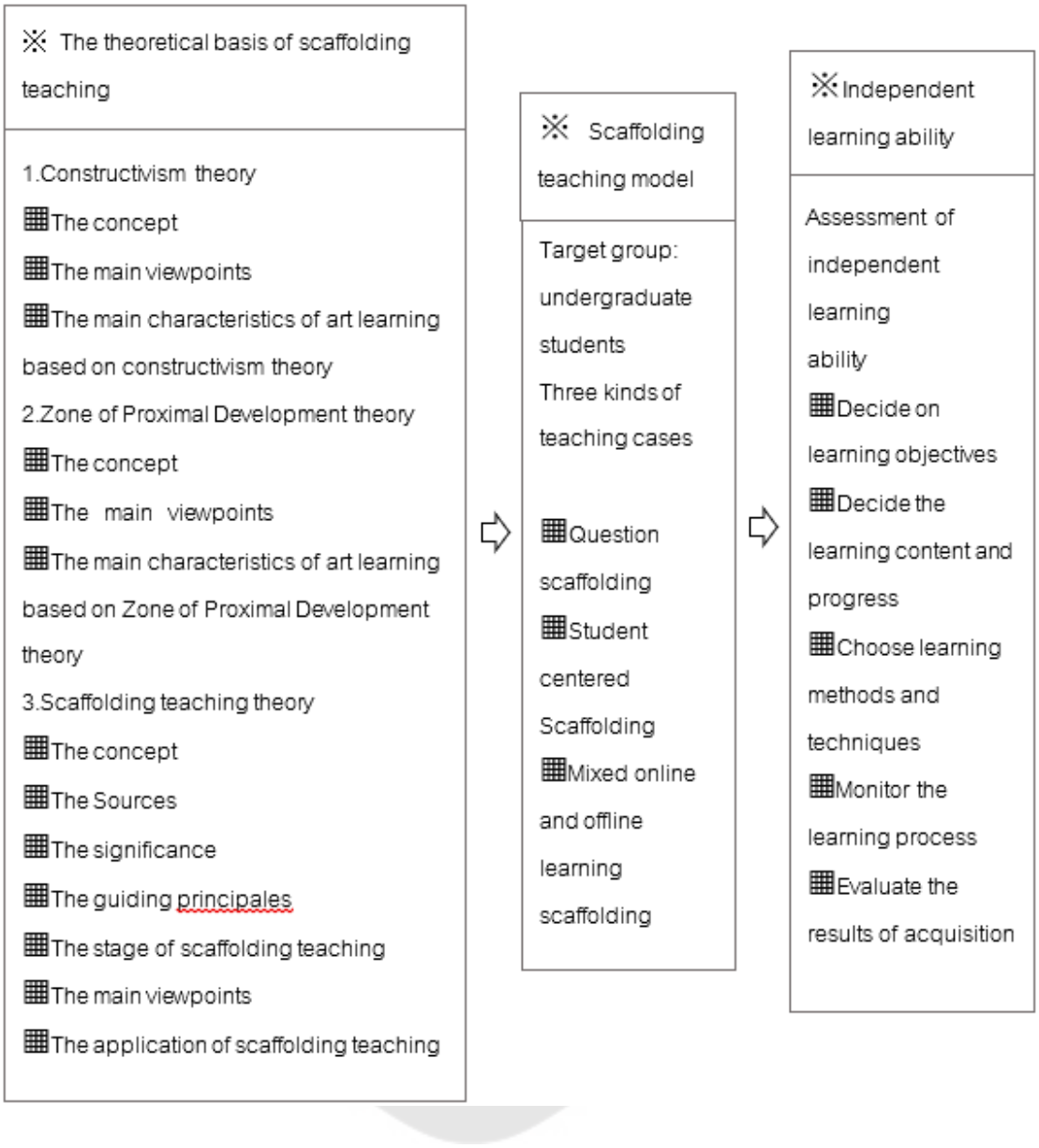


FIGURE 1 Conceptual Framework

The study of teaching model is mainly to provide basic theoretical guidance for the construction and implementation of scaffolding teaching model in this study. By comparing the difference between the scaffolding teaching model and the traditional teaching model, the teaching design content, implementation procedures and steps are more targeted.

The combination of relevant theories of independent learning ability provides references for how to determine learning content, how to guide students to choose

learning strategies, how to independently allocate learning time and grasp learning progress, and how to effectively evaluate their learning effects in the design of this scaffolding teaching model.

1.7. Hypotheses of the Study

The hypothesis of this study is:

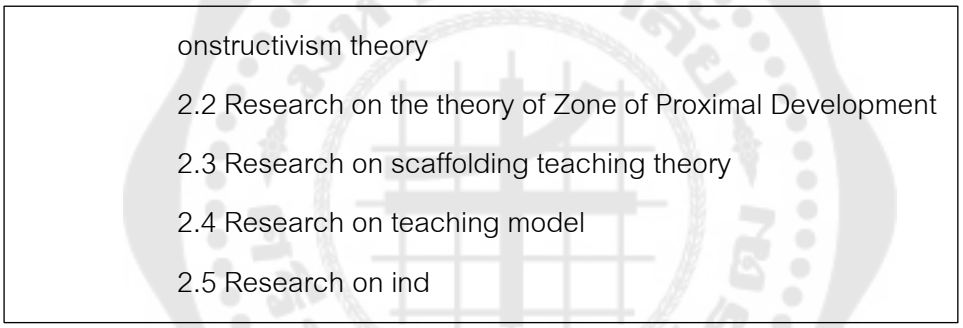
The effectiveness of the scaffolding teaching model to improve students' independent learning ability is based on the following standards:

(1)The expert evaluation results before the scaffolding teaching model implementation show that the design draft has high suitability and consistency.

(2)Through scaffolding teaching, the post-test value of independent learning ability of students in the experimental group is significantly higher than that of the pre-test value, and the difference is statistically significant.

CHAPTER 2
REVIEW OF THE RELATED LITERATURE

Scaffolding teaching theory was based on constructivism and Zone of Proximal Development theory(Li,2022). This chapter will elaborate constructivism and the theory of the Zone of Proximal Development,and summarize the main characteristics of art learning of these two theories. On this basis, it will sort out the literature related to scaffolding teaching, and independent learning ability. The purpose is to provide research background and data for the research on the improvement of students' independent learning ability by scaffolding teaching model, and to provide theoretical basis for later teaching model design.



2.1 Research on Cependent learning ability

2.1 Research on Constructivism theory

2.1.1 The concept of constructivism

Constructivism was proposed by Swiss psychologist Jean Piaget (1966). In his view, knowledge is constructed in the interaction of subject and object.

In The Principles of Genetic Epistemology, Piaget(1970) also discussed how knowledge is formed and developed. Through the study of children's psychology, he pointed out that cognition is a view that is actively constructed on the basis of the subject's existing knowledge and experience.

Widdowson also pointed out that learners shape meaning and construct new knowledge based on previous knowledge and experience (1979).

Therefore, knowledge construction emphasizes the interaction between learner subjects and external material environment. It is a construction behavior in which learners constantly interact with the external environment on the basis of existing knowledge and experience.It should be an active behavior of learners,not passively imposed.

2.1.2 The main viewpoints of constructivism theory

(1) The learning process requires the help of others

Constructivism holds the view that knowledge is not taught by teachers, but got by oneself with the help of other people by using the necessary learning materials in a certain situation through the construction of meaning and obtain(Ye,2015).Therefore, the construction of knowledge is not only the use of learning materials in a certain situation, but also the active construction with the help of others.

Constructivism theory explains the cognitive law of human learning process. pointing out that learning is essentially a process of learners' active construction of mental representation, and students' learning process is a process of completing the task of building the knowledge building with the necessary and timely help of teachers and peers. After the building is completed, the scaffolding to help students can be removed in time. And leave no trace(Huo, Li & Guo,2012). This view views learning by its very nature as a mental activity and likens the process of learning to the scaffolding used in building the edifice of knowledge.

(2) Different roles of teachers and students in knowledge construction

Piaget also analyzed the knowledge experience, social and cultural environment of learners and the process of constructing knowledge. He believed that learning is learners' active processing of new information based on the original knowledge and experience in a certain social and cultural environment. The process of constructing the meaning (or representation) of knowledge."(Wu,2016) In particular, it emphasizes the initiative of learners in processing information and constructing knowledge, and highlights the learners' active construction, which shows that students are in the role of active construction of knowledge in learning.What is the role of

teachers in knowledge construction? Piaget also made an explanation, emphasizing the guiding and helping role of teachers and the self-construction and self-development of students(Li, 2014).Therefore, learners also need teachers' guidance and help in the process of self-construction and development. One of the most fundamental principles for learners to learn "activities" on their own initiative is that they cannot leave the guidance and help of teachers.

(3) Learning is characterized by step development

The development process of learning is not achieved overnight, but also presents the characteristics of stepped development.Piaget believes that"Intelligence constitutes an equilibration between assimilation and accommodation", intelligent behavior relies on assimilation and Accommodation of two functions from the initial unstable balance to the gradual stable balance. This new temporary balance was not the end, but the beginning of a higher level of balance movement(Piaget & Inhelder,1969). Assimilation and accommodation made individual psychology continuously develop from low level to high level. For learners, they also constantly complete the process of "unstable balance, transient balance and higher level balance". Therefore, learning itself is a kind of intelligent behavior, which always develops in balance and stability, and the individual psychology of learning is also constantly improved on this kind of step development.

(4) Knowledge is the process of active construction

Constructivism can also be called structuralism. From its theoretical perspective, it holds that knowledge is not passively accepted by cognitive subjects, but actively constructed. Learners gradually establish a cognitive system for new knowledge through the guidance of teachers and the help of partners, combined with their own learning basis, and through the process of absorption, construction and internalization(Song, Dong & Li, 2020). It can be seen that the learning emphasized by constructivism is a system for learners to gradually establish new knowledge cognition, and emphasizes the process of active construction, which is also in line with the law of

human cognitive development and negates the cognitive subject's passive acceptance of knowledge.

According to one researcher, learning is not about forming associations between stimulus and response, but about actively forming cognitive structures(Li,1999). scaffolding teaching with "students as the main body" is an important teaching method proposed by structuralism. This teaching method emphasizes that students use scaffolds to actively learn and actively form cognitive structure.

(5) Learning cannot be separated from knowledge conversion

As early as 1960, Jerome Bruner, a famous representative of structuralism, introduced Piaget's theory of the development stage of cognitive structure into the classroom teaching reality and proposed the theory of cognitive structure learning. He believed that the essence of every learning task is the same, including the discipline structure composed of basic concepts, basic thoughts or principles. Students need to acquire knowledge or skills in the teaching process through knowledge acquisition, knowledge transfer, and knowledge evaluation(Guan, 2002). It can be seen that in learning tasks, students cannot learn without acquiring learning knowledge and skills, and the acquisition of knowledge and skills is closely related to the guidance of teachers. Teachers need to provide students with the guidance of scientific knowledge transfer methods. Therefore. Bruner believed that students cannot acquire knowledge or skills without knowledge conversion. On this basis, Ausubel put forward the theory of cognitive structure transfer in 1963. He believed that the so-called transfer process is the process of learners analyzing and assimilating new content based on the concepts and principles of the existing cognitive structure(He, 2020).

brief summary

In summary, we can get the following theoretical explanation:

(1) Knowledge is an interactive behavior actively constructed under the guidance of teachers and the active participation of students. Students need necessary help from others for their learning.

(2) Students play an active role in knowledge construction, while teachers play a leading role.

(3) Learning from low to advanced, in the balance and stability of development, showing the characteristics of step development.

(4) A new cognitive system is gradually established through the active construction of knowledge.

(5) Students need to acquire knowledge and skills through knowledge transformation, and teachers need to provide scientific method guidance.

2.1.3 The main characteristics of art learning based on constructivism theory

Art learning based on constructivism theory is a process in which the subject of the learner constructs the thought of the object, a process in which the subject builds knowledge in the independent activities taking the object as the object, a process in which the subject of the learner experiences the vision, which is characterized by visual experience, and an intellectual behavior in which the subject of the learner participates in the curriculum teaching through learning activities.It has the characteristics of intellectual participation.Through independent learning in learning activities, learner subjects give full play to their learning initiative, independent thinking and independent innovation ability. Therefore, they also have the characteristics of independent innovation.

(1) The characteristics of visual experience

In the learning activities of constructivist arts, visual experience is one of the most important contents of curriculum learning. Visual experience has visual language components and other non-visual language components. When learners learn new knowledge in a certain field of art design and master a new skill, they are bound to use visual languages such as lines, colors, light and shade to construct specific forms of art works and form visual language coding. Of course, it will also involve the participation of non-visual languages such as thinking, hearing and touch, forming non-visual language coding,which interact with each other and provide powerful language support for the learning of art knowledge and the expression of skills. That is to say, the

construction of art cognition should be completed by double coding of visual language and non-visual language, and we should not only attach importance to visual language coding while ignoring non-visual language coding.

In the traditional art classroom, the construction activities of art cognition are relatively simple, often focusing only on visual language coding, ignoring non-visual language coding, or visual language coding first, then non-visual language coding, the two are rigid juxtaposition, and do not combine the two types of coding according to the needs of classroom teaching and the characteristics of students' development. Constructivism believed that verbal and non-verbal representation are equally important in the process of information processing, storage and extraction(Li,2003).

Only when visual language coding and non-visual language coding are flexibly and effectively used in art classes can visual language coding play a unique value. The application of visual language coding must rely on the representation of visual language, which runs through the entire art teaching activities. It can be the visual language presentation of images, plots, actions, etc., or it can be the abstract expression of historical events, life experiences or imagination in the form of visual symbols.

In short, through coding or representation of visual language, combined with non-visual language coding, art learning enables learners to achieve the completeness of the object construction in the form of artistic expression and psychology. If we only pay attention to visual language coding and representation, and ignore the participation of non-visual language coding, then the cognition of art learning is incomplete and cannot effectively achieve the purpose of art classroom teaching.

(2) Characteristics of intellectual participation

Piaget pointed out that intelligence begins neither with knowledge of the self nor of things as such but with knowledge of their interaction(1954) Therefore, intelligence is based on mutual understanding between the self and the thing itself. In the scaffolding teaching model, the learner's intelligence is established in the students' own mutual understanding of curriculum theory and skills.

According to Gardner's theory of multiple intelligences, each person's intelligence was different in mathematics, language, literature, space, music, art, sports, society and so on. (Rong,2015) The learning of art knowledge is a process in which learners constantly establish and develop the cognitive structure of art in their minds, a process in which art activities and experience are constantly internalized, or in the form of assimilation, to incorporate the object into the existing cognitive structure, to maintain consistency with the object that does not fit with their own, so as to bring about qualitative changes in the original cognitive structure.(Wang,2013) It can be seen that in the process of forming the cognitive structure of art knowledge, the learner of art knowledge is completely an independent behavior, and the whole behavior process cannot be separated from the support of intelligence. Learners are not knowledge porters or mechanical laborers, but constantly build new knowledge and show the ability of creative thinking.

Under the guidance of teachers, students actively participate in classroom learning activities and build learning scaffolding, which is a highly intellectual participation behavior. It changes the past teaching model dominated by teachers' teaching and demonstration, and students really improve their independent learning ability. This design focuses on the cultivation of students' ability in the teaching content, so that students can actively participate in the scaffolding teaching design activities.

(3) Characteristics of independent innovation

A researcher pointed out that teaching lies in guiding students to cooperate in constructing knowledge and encouraging students' independent innovation(Zhang， 2013). The scaffolding teaching model in universities should also attach importance to guiding students to construct knowledge and independent innovation. On the one hand, the learning based on constructivism is based on the independent learning of students, highlighting the visual experience of learners, constructing the cognitive structure of art through intellectual participation, and achieving the purpose of constructing knowledge.On the other hand, in the learning process, students' independent learning is the first, but this kind of independent learning

is under the guidance of teachers, students use the learning scaffolding to help themselves improve their ability to construct knowledge, and the strength of this ability is related to students' independent innovation ability.

In the past, simple artistic demonstration steps and blind imitation can not reflect students' independent innovation consciousness.Scaffolding teaching method is used to design teaching model.eliminate the mistakes of teacher-centered or dogmatic teaching in traditional classroom teaching, and re-design the teaching content and activities scientifically to highlight the cultivation of students' independent learning and innovative ability.

As mentioned above, in the process of forming the cognitive structure of fine arts, learners need to constantly take the initiative and actively learn, rather than be passive, which indicates that the formation of the cognitive structure of fine arts is based on learners' independent learning. However, this kind of independent learning is not a mechanical copy, but a learning activity in line with the cognitive and scientific laws and under the guidance of innovative thinking. Therefore, art learning based on constructivism theory has the characteristics of independent innovation.

brief summary

As the art learning of constructivism theory is characterized by visual experience, intellectual participation and independent innovation, researchers need to consider the following aspects in the development of scaffolding teaching model:

(1) Students take the initiative to participate in the creation practice and display of works, fully experience the visual beauty of works, grasp the form of visual art, and perceive the visual art language.

(2) Students' independent learning in the curriculum interaction, actively build learning scaffolding, and fully demonstrate intellectual participation.

(3) Under the guidance of teachers, students cooperate to construct knowledge, form a cognitive structure of art, and achieve independent innovation.

2.2 Research on the theory of Zone of Proximal Development

2.2.1 The concept of Zone of Proximal Development

The theory of Zone of Proximal Development was put forward by Vygotsky (1929), a famous psychologist in the former Soviet Union.Vygotsky believed that there were two levels of students' intelligence: the first level of development, which is the current level of development reached through independent learning without any guidance based on past learning experience and knowledge accumulation; and the second level of development, which refers to the higher level of development that students may reach under the guidance of teachers based on their own potential and existing educational resources. The distance between the two is what he called the Zone of Proximal Development. It can be seen that the first level of development is the level that students can reach through independent learning, while the second level of development refers to the level of development that students cannot reach by virtue of individual ability and need the help of teachers or peers in cooperative learning.

2.2.2 The main viewpoints of Zone of Proximal Development theory

(1) Zone of Proximal Development emphasizes cooperative learning by teachers or peers

Some researchers believed that the Zone of Proximal Development refers to the distance between the level of actual development determined by solving problems independently and the zone of potential development determined (Murray & Arroyo,2002).Obviously,this theory was of great importance to peer cooperation (Karim, 2010).

The concept of Zone of Proximal Development emphasizes that the dominant role of cooperative learning by teachers or peers in students' development level, and reveals that the essence of teaching is not mechanical training and homework reinforcement, but the psychological function of stimulating students to form a new way of learning. Therefore, only the use of new teaching methods, let teaching reform at the forefront, and stimulating the development potential of students, is a good teaching method. The concept of Zone of Proximal Development indicates that students' learning

and development level is transforming from level of current development to level of potential development.Yaroshevsky(1989) described it as"the student's thought, with its structural characteristics,is shifted from level to level".(Verenikina,2003) Obviously, the core of the concept of the Zone of Proximal Development is that the development of students comes from cooperation, from the cooperative learning of teachers or peers, and from the use of teaching methods to stimulate the development potential of students.

(2) Scaffolding teaching should constantly create Zone of Proximal Development

Scaffolding teaching relied on scaffolding to guide students' intelligence level from the present development level to the higher development level (Lin, 2007). This is constantly creating Zone of Proximal Development for students.Before using scaffolding to design learning activities, it is necessary to research on learners to understand their existing basic knowledge and experience. As Chen & Ren(2005)said, According to Vygotsky's theory of Zone of Proximal Development, it is necessary to analyze students' preconception before situational teaching, to understand learners' experience and knowledge preparation before learning activities, and to take it as an important basis before situational design. In other words, the theory of Zone of Proximal Development provides the basis for scaffolding teaching, and the scaffolding construction in the teaching process basically follows the principle of Zone of Proximal Development.

(3) The establishment of teaching objectives should follow the Zone of Proximal Development theory

The theory of Zone of Proximal Development is instructive on how to establish teaching objectives in curriculum design. To establish curriculum teaching objectives, it is necessary to find out students' Zone of Proximal Development, understand their actual knowledge level, personality, and psychological characteristics, so as to facilitate teachers to teach students in accordance with their aptitude and fully stimulate their development potential. Yang P.S.(2009) believed that scientific

establishment of teaching objectives, fully explore the individual potential of students teaching objectives should be based on the actual level and psychological characteristics of students, to meet the learning desire and demand of students. The knowledge points should be based on the theory of Zone of Proximal Development(Ministry of Education, PRC2010).

(4) Teachers need to accurately find the Zone of Proximal Development of students

So how do you find a student's Zone of Proximal Development? Wu(2013) believed that Once the actual and level of potential development of students are determined, the Zone of Proximal Development of students can be determined according to the interval enclosed by the differences between the two. Compare the level of actual development with the level of potential development, and find out the gap between the knowledge and skill level, namely the student's proximal development zone.Therefore, when teaching, teachers need to make clear the level of potential development and the level of actual development of students and find out the gap between the two, so as to determine the Zone of Proximal Development of students.

However, the Zone of Proximal Development is constantly changing, changing as teachers apply new teaching methods and students improve their ability to learn independently. In the case of art teaching, there is a gap between the level of potential development and the level of actual development in different time periods. According to the teaching methods chosen by teachers and the learning progress of students' knowledge and skills, as well as the situation of independent learning. Of course, the zone of closest development is also different. Therefore, researchers should determine it within a certain range of regulation.

brief summary

Based on the above research, we conclude that: educators should not only look at the development process that students have completed, but should pay attention to the development process that is taking shape. If teachers only know how to use the existing knowledge level of students to teach, but do not know how to use the

Zone of Proximal Development to motivate and guide students, such a teaching process will undoubtedly not become the source of students' knowledge growth and ability enhancement.If the teaching objectives are not determined according to the Zone of Proximal Development theory, students will not only become blind and helpless, but also their development will be restricted to a certain extent, and the improvement of independent learning ability and the cultivation of creative thinking ability will be hindered.Only by identifying the Zone of Proximal Development, and carrying out necessary scaffolding teaching guidance, can we effectively promote the improvement of students' independent learning ability and the cultivation of creative thinking ability, so that students' mental health develops.

To sum up, we can get the following theoretical explanation:

(1) Knowledge is an interactive behavior that is actively constructed under the guidance of teachers and the active participation of students. Students need necessary help from others for their learning.

(2) Students play an active role in knowledge construction, while teachers play a guiding role.

(3) From low level to high level, learning develops in balance and stability, showing the characteristics of step development.

(4) A new cognitive system is gradually established through active construction of knowledge.

(5) Students need to acquire knowledge and skills through knowledge conversion, and teachers need to provide scientific method guidance.

2.2.3 The main characteristics of art learning based on Zone of Proximal Development theory

(1) To optimize the teaching process

Scaffolding teaching can help students overcome various obstacles in learning, including barriers to building knowledge, barriers to mastering basic knowledge and skills, and improve the teaching effectiveness and students' independent learning ability.

Through scaffolding teaching, teachers let students learn to build knowledge with scaffolding so that they can master the basic knowledge and skills, and have the quality to be engaged in primary and secondary school Art teachers in the future. In such a basic art teaching process, according to the theory of Zone of Proximal Development, adopting the scaffolding teaching model can effectively improve the teaching quality and realize the optimization of the teaching process.(Feng, 2016)

Therefore, the scaffolding teaching design can be carried out for the art curriculum according to the theory of Zone of Proximal Development to change traditional teaching methods and help students improve their independent learning ability, So as to achieve the maximum optimization of the teaching process.

(2) Carry out targeted teaching

Some scholars believed that the theory of proximal development zone and the theory of individualized teaching express the idea that students will have learning disabilities in independent learning due to their learning style, original learning ability level, and way of thinking, and cannot reach the expected or deserved level of development.(Guo, Gao & Hua,2002) In fact, the theory of individualized teaching is to carry out targeted teaching according to the characteristics of different students. In the process of guiding students to learn, teachers investigate students' learning styles, learning abilities and ways of thinking, so as to quickly find out the Zone of Proximal Development, so as make targeted teaching designs.

In art teaching, teachers should not only make constant investigation to understand students' learning conditions,so as to help teachers carry out targeted teaching. Students should also closely cooperate with teachers' teaching activities, timely feedback on learning problems, timely Self-Assessment and Mutual-Assessment of learning, so as to provide a reference for teachers to master the progress of learning. Only when teachers and students cooperate closely can teachers carry out targeted teaching effectively.

(3) Release students' art learning potential

In traditional art teaching, the method of comparative evaluation was not used in teaching, and students' interest and potential in art learning have not been well explored. Therefore, teaching researchers believed that: Teachers should stimulate students' interest in art activities through a variety of comparative evaluations, carry out a variety of comparative evaluations with The Times, break the previous art teaching activities part of the set, build students' confidence in learning art, tap students' art learning potential, activate students' proximal development zone, and realize students' needs to create beauty(Shao, 2018).

So, what is the art learning potential? Art learning potential refers to students' potential ability to be explored, including art learning ability, professional expansion ability and practical ability(Zhang & Yang, 2015). Only by stimulating students' art learning potential, can these abilities be rapidly improved.

brief summary

In summary, we can get the following views on curriculum development:

(1) The scaffolding teaching model requires according to the theory of nearest development zone to optimize the teaching process.

(2) Teachers should investigate and know students' nearest development zone, and students should make positive evaluation, so as to effectively carry out targeted teaching.

(3) Evaluation is helpful to stimulate students' potential development zone and release students' art learning potential.

2.3. Research on scaffolding teaching theory

2.3.1 The concept of scaffolding teaching

Scaffolding theory was first proposed by Bruner in the late 1950's and is used to describe spoken language acquisition in young children. With the help of parents, children acquire the instinctive structure to learn language as soon as they begin to learn to speak. It is a conceptual framework for learners to understand knowledge, and it is a teaching model based on the current level of developmentof

learners, systematically guides learners to use various methods, actively construct knowledge and skills, and moving towards a higher development level(Bruner,1975).

Wood, Bruner & Ross(1976a)are the first to use the term "scaffolding" in Problem Solving. It was explained as a "process that enables a learner to solve a problem,carry out a task, or reach a goal that would be beyond his unassisted efforts."

Rosenshine(1992) defined scaffolding teaching as: in the process of learning activities, the teacher or more talented students provide a ladder for them to use new skills and solve problems by themselves through the ladder.

Therefore, a researcher believes that the scaffolding teaching aims to cultivate students' problem-solving ability and independent learning ability(Li, 2019).

2.3.2 Sources of scaffolding teaching

The word scaffolding, which has been used in the construction industry since 1,300 years ago, as a synonym for scaffolding, a platform or column used by workers to build, repair, or decorate a building. When the construction was finished, the scaffolding was removed or removed (Palincsar,1986). The scaffold provides a bridge between the workers and the construction of the building, helping construction workers to achieve effective construction.

Scaffolding teaching originated from the research of American educator and psychologist Bruner and his colleagues on the influence of a mother on children's language development in the late 1950s. In their research, they found that mother 'help for children, like the scaffolding used in buildings, played a temporary but necessary role(Zhou, 2012). Most foreign scholars also agree with this view and believe that scaffolding is of great significant in the construction industry. After that, Bruner applied Vygotsky's theory of Zone of Proximal Development and Piaget's constructivism to the field of education and teaching, and put forward the concept of scaffolding teaching.

(1) Derived from the theory of zone of proximal development

Wood, Bruner & Ross(1976b) Pointed out that a process by which teachers and peers help students to improve to the next level and surpass their Zone of Proximal Development is scaffolding. A researcher also believes that scaffolding

teaching is developed from Vygotsky's sociocultural theory and the Zone of Proximal Development, which refers to the role of teachers in scaffolding the development of learners by providing a scaffolding structure so that they can enter the next stage or level(Li, 2020).

Vygotsky interprets the zone of proximal development as the distance between the actual development level of independent problem solving and the potential development level of adult or peer cooperative problem solving(1978a).This explanation provides a theoretical basis for educators to look for students' proximal development zone. In the 1970s, his theory was introduced to the United States. American educators absorbed and developed Vygotsky's theory and derived the idea of scaffolding teaching based on the cultural background of general emphasis on child-centered teaching.

(2) Derived from the theory of constructivism

Constructivism arose in the 1980s, and its founder Piaget made a systematic exposition of the theory of constructivism.He founded a school of thought on the cognitive development of children, the Geneva School. Two basic links of children's interaction with the surrounding environment, assimilation and adaptation, are summarized and refined. The cognitive development process of children is to gradually develop, enrich and construct their understanding of the external world in the process of constant assimilation and adaptation, in the cycle of getting balance, breaking balance and finding new balance(He,1998a).

In the process of guiding teaching, teachers enable students to master, construct and internalize the knowledge and skills they have learned(Chen & Liu,2007). It is like providing the "scaffolding" for students to build understanding of knowledge.

2.3.3 The significance of scaffolding teaching

(1) Help learners complete tasks and manage the progress of tasks

Scaffolding teaching plays an expert role to support students and help them develop learning ability in order to succeed in specific learning tasks

(Vygotsky, 1978b).appropriate scaffolding provided by the teacher can reduce the cognitiveload.

Provide students with more convenience for process management in specific tasks (Quintana et al., 2004). It can also make certain disciplinary thinking and strategies more explicit, helping learners to construct complex tasks (Weinberger, 2011).

(1) Help students to construct knowledge system and improve independent learning ability

Scaffolding teaching allows students to carry out independent, cooperative and exploratory learning activities in the context of building auxiliary understanding, so that students can climb from the current real level to the level they can achieve, so as to realize the construction and internalization of knowledge system(Feng,2017). Through teaching practice, students can climb from the zone of current development to the zone of potential development of knowledge, and realize the improvement of Independent Learning Ability.

(2) Help students to provide a reasonable conceptual framework and form structured thinking

Scaffolding teaching design means that when students lack necessary knowledge and experience for what they have learned, teachers provide a set of the reasonable conceptual framework to help students understand knowledge, construct meaning and explore and solve practical problems independently(Yang, Nie & Zhang, 2009). In the teaching, the teacher as a guide, provides scaffolding for students, along which students climb to understand new knowledge, so as to realize the essence of knowledge, form structured thinking and complete the construction of knowledge.

2.3.4 The guiding principles of scaffolding teaching

Pressley & Hogan (1997) studied literatures related to scaffolding teaching, analyzed and summarized eight guiding principles that should be followed in adopting scaffolding teaching.

- Make full preparations before the class. Teachers should set up corresponding tasks according to the needs and characteristics of students, learning conditions, etc., and make adequate preparation before class.

- Teachers and students set common goals. Teachers and students should discuss and determine common tasks and goals to fully mobilize the enthusiasm of students.

- Pay close attention to the needs and development of students. Pay close attention to students to identify their potential mistakes and developmental needs to ensure student progress and development.

- Give students appropriate and timely help according to different situations. Through demonstration, demonstration, motivation, group discussion and other ways to provide different help to students to meet their development needs.

- To enable students to maintain the persistence of the pursuit of goals. Encouraging mechanisms should be developed to engage and ask questions to help students stay focused on their goals.

- Teachers should have timely feedback on students' performance. Timely feedback on students' learning, so that students can adjust their learning direction and monitor their learning progress.

- Cultivate students' risk awareness. By creating the environment, controlling frustration and risk scale, exercise students' endurance and pressure resistance, and cultivate students' sense of adventure.

- Gradually remove environmental support for knowledge and capabilities and promote the internalization of knowledge and capabilities by the environment. Help students gradually reduce dependence, provide them with various opportunities to try and practice, and cultivate their ability to complete tasks independently.

2.3.5 The stage of scaffolding teaching

The early scholars divided the scaffolding teaching process slightly differently. For example, in 1984, Brow et al. divided scaffolding teaching into three

stages: preheating, exploration and independent exploration(Chen & Liu,2010).Other researchers divided it into four stages: putting up scaffolding, entering the situation, inspiring guidance and removing scaffolding(Zheng & Zu,2010). But later researchers generally agree that Scaffolding teaching has five inseparable stages: building scaffolding; entering the situation; independent exploration; cooperative learning; effect evaluation (He,1997).

Building scaffolding is to set up scaffolds according to students' zone of current development.Entering the situation is to provide teaching situation for scaffolds' learning.Independent exploration is to carry out independent learning and exploration under the guidance of scaffolds.Cooperative learning is to learn and solve problems together with the help of teachers or peers.Effect evaluation is to evaluate the acquired results.

However, the order of the five stages is not static. It can be adjusted at any time according to the needs of scaffolding teaching.Some researchers also believed that the relationship of these five stages was not linear, but could be arranged flexibly according to teaching needs (Chen & Chen, 2009).

Obviously, the five stages of scaffolding teaching well show the law of the learning process from the establishment of scaffolding to the removal of scaffolding, and this law is not a fixed procedures, with the characteristics of flexibility.It is a scientific teaching method.

2.3.6 The main viewpoints of scaffolding teaching theory

(1) The construction of knowledge can not be separated from the help of stents

Scaffolding teaching theory also influenced by Piaget's constructivism and emphasized children's self-construction and self-development(Wang,2005). However,the construction of children's knowledge is inseparable from the scaffolding structure provided by teachers, as if giving them a scaffold to help children construct knowledge and self-development. Not only children's knowledge construction is inseparable from the scaffolding provided by teachers, but also ordinary learners.

Therefore, some researchers believed that scaffolding was now used to describe how teachers facilitate learners' transition from assisted performance to independent performance(Berk & Winsler, 1995). Providing scaffolding for learners is an auxiliary performance. When learners rely on scaffolding to construct knowledge and achieve self-development, they realize the transformation of independent performance.

When learners encounter complex learning tasks in the learning process, they need to decompose the tasks with the help of teachers to establish a scaffolding conceptual framework. After the teacher leads learners to a certain node of the scaffolding through the setting of problem situations, learners will gradually climb along the scaffolding through independent exploration and timely prompts of teachers to complete the meaning construction of knowledge.(Wu & Zheng,2020)

Therefore, the researchers pointed out that scaffolding learning was a method to help learners master the knowledge or complete tasks that learners cannot do independently at first but can complete with the help of teachers or other more capable partners.(Preston et al.,2006)

(2) Application of scaffolding teaching in educational theory

Bruner applied scaffolding teaching to educational theory in 1976, and since then the concept of scaffolding teaching has been formally proposed(Le & Liu,2022a). Scholars such as Wood, Pushiness, Dickson and Slavin have explained the concept of scaffolding teaching. Wood believes that scaffolding teaching is the effective help and support provided by teachers to help learners narrow the gap between the zone of current development and the zone of potential development(Pan,2022). Pushiness argues that scaffolding teaching is when those with more knowledge help those with less knowledge to achieve their goals(Liu,2019). Dicosen et al. believed that "scaffolding teaching is systematic and orderly, including suggestive content, materials, tasks and the corresponding process of teachers' help to improve teaching"; Slavin believed that Scaffolding teaching is the process of teachers guiding children to learn, enabling them to construct and internalize the knowledge and skills they have learned, so as to enable them to acquire higher levels of knowledge(Le & Liu,2022b).

Pressly et al. Defined the concept of "scaffolding teaching" as "providing assistance to learners according to their needs and removing assistance as they improve."(Le & Liu,2022c) Benson thought that "Scaffolding is actually a bridge used to buildup on what students already know to arrive at something they do not know."(2001)

These studies can help us grasp the connotation of scaffolding teaching in a more comprehensive way. In other words, in order to help students narrow the gap between zone of potential development and zone of current development, teachers guide students to use the scaffolding for learning and remove the scaffolding when they master the knowledge and skills they have learned.

(3) Research on the application of scaffolding teaching in practice

The application of the scaffolding teaching has also attracted the attention of researchers at home and abroad. Initially, foreign experts applied scaffolding to the cognitive apprenticeship model developed by Collins-Brown-Newman(1989) (Zhang,2012). By the 1990s, there were Web sites and online classrooms that introduced scaffolding teaching, such as Letus Online in the United States, which embedded and reinforced the use of information technology in curriculum learning in American urban schools(Gu,2014). Jonassen has used stents in training for diagnostic evaluation, and Winnips in the Netherlands has used stents in various educational media(Chen,2016). Scholars also discussed the function, applicability and teaching effect of scaffolding teaching. Lauren Resnick from the United States affirmed the role of scaffolding teaching in promoting children's independent learning ability, but he believed that scaffolding teaching should not be carried out blindly for students(Zhang,2022). Among relevant literature studies in China, the most representative ones are: Ann Arbor analyzed the applicability of the scaffolding teaching in software design teaching cases(2007). Some researchers in China have conducted empirical studies on the improvement of teaching effect by scaffolding teaching. For example,Huang Z.J.(2020) proved that adopting the scaffolding teaching can improve students' mathematics achievement through the practice comparison method, and was

recognized by students.Wang Z.W. (2011) believed that the scaffolding teaching can enhance the teaching effectiveness of accounting, improving students' theoretical level and professional ability in accounting. Yi Z.Y. (2014) thought that the teaching effect of scaffolding teaching model is obviously better than traditional teaching model of aerobics under the guidance of Dole's "4R" theory.

In a word, although the research on scaffolding teaching abroad started earlier, it focused on the theoretical basis and applied research. Although the research on scaffolding teaching in China started late, it has developed rapidly. Moreover, scaffolding teaching has expanded from the single field to mathematics, physical education and other subjects, and the research content has gradually turned from theory to practice.

(4) Study on stent construction and removal

The research on scaffolding construction and removal in scaffolding teaching has also attracted the attention of related scholars. Gai S.H.(2010) believes that scaffolding teaching is composed of several important links, namely scaffolding building, entering the situation, independent exploration, collaborative learning, effect evaluation.Liu J.(2010) thinks: scaffolding is the core of scaffolding teaching, and the procedure of scaffolding teaching is the process of selection, construction, application and withdrawal of' scaffolding. Li Y.T.(2019) pointed out that scaffolding teaching generally includes three steps: building scaffolding, students constructing knowledge and removing scaffolding. It can be seen that scaffolding is a prerequisite for scaffolding teaching. Only when the scaffolding is well built can students enter the teaching situation, carry out independent exploration and independent learning, so as to construct the knowledge system, master the basic theories and skills of the subject, achieve an effective transfer of knowledge, and finally remove the scaffolding. When using scaffolds for unit learning, the learning content of each unit must be rebuilt and removed to form a closed loop around the continuous construction and removal of scaffolds for learning units.

2.3.7 Research on the application of scaffolding teaching in Fine arts

Research on the theory and practice of scaffolding teaching applied in fine arts disciplines in universities is very rare. Only in Zhang X.W.'s Research on the Construction Practice of Scaffolding Teaching Model for Film and Television Animation Major(2018), Pan Q.S. & Xu J.J.'s Research on Animation Teaching Practice Based on Scaffolding Teaching Strategy(2014) and other articles have discussed the scaffolding teaching problem of animation major. However, there are still some research on the application of scaffolding teaching in art teaching in primary and secondary schools and vocational schools. For example, Xie X.M.'s "Application of Scaffolding Teaching Model in High School Art Appreciation curriculum"(2011), Song C.'s "Application of Scaffolding Teaching in Secondary Vocational Art Appreciation curriculum"(2021), Li S.k.'s "Strategy of Scaffolding" in Art scaffolding Teaching "(2017), Wu H.F.'s "Strategy Exploration of Scaffolding Learning" in High School Digital Art "(2021), Feng Q.'s "Application of scaffolding Teaching Theory in primary school art pyrography teaching" Research(2020), etc. These articles discussed how to apply scaffolding teaching in art appreciation curriculum teaching. How to build a scaffolding teaching strategy? How to apply scaffolding teaching theory in art practice teaching? These discussions are helpful for people to understand the application of scaffolding teaching theory in primary and secondary schools and vocational schools. In particular, art in primary and secondary schools and vocational schools focuses on appreciation and practical teaching. It is of practical significance to explore the application of frame teaching from the theoretical level for teachers in primary and secondary schools and secondary vocational schools to change teaching concepts, update teaching methods and improve teaching effects.

Obviously, the research scope of the theory and practice of scaffolding teaching carried out by relevant scholars is mostly limited to the fine arts teaching in basic education, and the research on scaffolding teaching in the fine arts curriculum in universities is still very lacking. The research in This thesis may make up for the deficiency of the research on scaffolding teaching in the fine arts curriculum in

universities. Promote the improvement of students' independent learning ability, so as to effectively improve the classroom learning effect.

brief summary

To sum up, we can summarize the following theoretical viewpoints:

(1) The concept of scaffolding comes from the construction industry, which can help workers to construct smoothly and is instructive for learning.

(2) The theories of Bruner, Vygotsky and others have become the source of the rise of scaffolding teaching theory, which all emphasize that learning needs the help of others.

(3) The construction of knowledge requires scaffolding from others, so as to realize the transformation from auxiliary representation to independent representation.

(4) The study of scaffolding teaching theory can help us to fully grasp the connotation of scaffolding teaching , thus guiding students to learn by scaffolding teaching.

(5) Practical application of scaffolding teaching has attracted the attention of scholars at home and abroad. They mainly study the application of scaffolding teaching to improve the classroom teaching effect.

(6) The five links of scaffolding teaching are not fixed and can be changed flexibly according to the teaching needs.

(7) Scaffolding and removal reflect the law of knowledge construction and knowledge transfer, and teachers need to grasp this law.

(8) There is little research on the application of scaffolding teaching in the fine arts discipline in universities. The research on the application of scaffolding teaching in some primary and secondary schools and secondary vocational schools is instructive for teachers to change teaching concepts, update their teaching methods and improve their teaching effects.

2.4. Research on teaching model

2.4.1 Definition of teaching model

Joyce et al. (1972) put forward in the book Teaching Model that Teaching model is a plan or model that can be used to structure curriculum and homework, select textbooks, and encourage teachers to teach in class or other occasions.

The definition of teaching can be roughly divided into two categories: one definition thinks that teaching model belongs to the category of teaching process, they either propose that teaching model is the model of teaching process, or think that teaching model is a "strategy system" or "teaching style" related to teaching procedures. Another kind of definition holds that teaching model belongs to the category of teaching structure(Yan,2001).

Teaching model is the basic thinking frame and technical methods and paradigm for teaching work design. It is the summary and conceptualization of long-term practical experience and theoretical experimental research, it is also the technical guarantee for classroom teaching to achieve the best results (Feng,1997).It represents a stable structural framework for the process of teaching activities guided by specific teaching ideas, theories, and learning theories (He, 1998 b).

To sum up, the teaching model is guided by mature teaching ideas or teaching theories, and is a summary of long-term practical experience and theoretical experimental research. It is a structure of organizing curriculum with rich teaching practical experience as the condition, or a model of teaching process.

2.4.2 Research structure of teaching model

The research structure of teaching model generally includes the following elements(Ran,2006):

1. Teaching ideology or teaching theory: This is the theoretical basis on which the teaching model is based, and it helps people to understand the theoretical origin of the teaching model.

2. Teaching objective: It is the core element determined by the teaching model, which determines the standard based on the operating procedure of the teaching model, the proportion of teacher-student activities and the evaluation standard.

3. Operation procedures: Handle the implementation of time procedures for teaching content by teachers and students.

4. Teaching strategy: The synthesis of teaching methods, methods and measures adopted by teachers and students in the teaching process.

5. Evaluation: Evaluation methods and standards should be used in the applicable teaching environment. Different teaching models have different evaluation methods and standards.

2.4.3 Types and characteristics of teaching model

The first influential teaching model in the world is the teaching model of Herbart School, which is a teaching model with "textbook as the center", "teacher as the center" and "classroom teaching as the center". In the 1820s, there appeared the Dewey-style teaching model, which emphasized the teaching of "child-centered", "experience-centered" and "activity-centered", trying to shift the focus of modern education from the teacher's teaching to the student's learning (Zhu,2016).

Since then, scholars at home and abroad have proposed a variety of classification forms for teaching modes, among which the representative classification forms are as follows:

● According to the theoretical roots, Joyce et al. divided the teaching model into four categories (2009):

(1) Social interactive teaching model: Based on social interaction theory, it emphasizes the mutual influence and social connection between teachers and students, and between students and students. Representative teaching models include: Dewey and Sellin's model of group exploration, Thelen's model of group research and so on.

(2) Information processing teaching model: The second is information processing teaching model. According to the theory of information processing, teaching is regarded as a creative process of information processing, and the teaching procedure is determined according to the operating rules of computer and artificial intelligence. The representative teaching models are: Schward's model of

scientific exploration teaching , Bruner's model of concept acquisition teaching and so on.

(3) Individual teaching model: According to individual teaching theory and humanistic teaching thought, it emphasizes individual subjective initiative, adheres to individual teaching, and focuses on human potential and personality development. Representative teaching models include: Rogers' model of non-directive teaching, Gordon's model of "creative engineering" and so on.

(4) Behavior modification teaching model: According to behavioral psychology theory, teaching is regarded as a behavior process of continuous modification. Representative teaching models include: Skinner's model of procedural teaching, etc.

● American scholars Gaunt & Estes et al. selected eight models, which are suitable for different teaching objectives and provide reference and theoretical basis for teachers to creatively use various teaching models.

Direct teaching model. It is suitable for teachers to teach basic facts, basic knowledge and skills, which can be used in the teaching of various subjects.

Concept acquisition model. Applies to the definition, understanding and application of concepts, focusing on how to obtain concepts.

Conceptual development model. It is suitable for developing students' thinking ability around concepts, focusing on exploring the relationship between concepts and reaching new understandings, and students have greater autonomy.

Group argument model. The creative process of harnessing irrational forces to reach new understandings through a collective exchange of ideas. It is suitable for developing students' creative thinking ability.

Inquiry patterns. It is used for problem solving and inquiry, trying to simulate the process of problem solving by scientists, so that students can obtain the ability to find and solve problems in real life situations. Scientists face difficult situations,

collect and process the required data, and finally reach the inquiry process of problem solving.

Classroom discussion model. Used to ask questions, foster insight and promote critical thinking, teachers stimulate discussion through factual, interpretive and evaluative questions to inspire students to form their own opinions.

Cooperative learning model. In the form of group learning, students' cognitive, emotional and social growth is promoted through communication and cooperation between students.

Explore emotional and conflict resolution patterns. This model consists of two independent strategies: emotion exploration strategy and conflict resolution strategy. It aims to help students connect learning with emotions and attitudes, and learn how to deal with contradictory situations (Gao,2000).

● Yang K.C. et al.(2001)put forward two teaching models from Beijing Normal University. One is a specific teaching model. For example, "collaborative teaching mode" refers to the teaching model involving collaborative learning, and "inquiry teaching model" refers to the teaching model involving problem inquiry. The second kind refers to a specific teaching procedure, such as the teaching model of "reading, discussing and practicing".

Although the above model has obvious advantages, it also has disadvantages. In order to meet the needs of students, society and education, a teaching model to improve students' independent learning ability is explored, in order to Improve students' learning enthusiasm.

2.4.4 The difference between traditional teaching model and scaffolding teaching model

Traditional teaching model refers to the teaching behavior carried out in the school classroom, the teacher transmits the contents of the knowledge carrier textbook to the students by way of explanation. The teaching process is carried out according to the pre-planned process, and the students need to listen carefully, understand and master the knowledge passed by the teacher, and do exercises and review after

class(Zheng et al.,2023). Teachers emphasize to use traditional teaching method in traditional teaching model, this teaching method is still teacher-centered, and knowledge and skills are taught to students through teachers' explanations and demonstrations.

Through the review of past literature, the traditional teaching model has the following drawbacks:

The biggest drawback of the traditional teaching model is that the teacher dominates the classroom, the teaching effect cannot get timely feedback, and the teaching and learning are disconnected (Cai & Hu,2023).

most teaching institutions and units spend a lot of time on "technique research and teaching", and students' "theoretical knowledge is also lack of systematics"(Shi, Liu &Lu,2023).

It is not possible to monitor the students' self-learning status and learning efficiency before class (Qi et al., 2023).

The teaching method of "reading from the book" is adopted, which will erode students' enthusiasm and initiative in the long run(Liang,2023).

The scaffolding teaching model is a teaching model which is put forward in view of the shortcomings of the traditional teaching model. Holton & Clarke (2006) defined scaffolding teaching model as a teaching model that can support learners in self-construction of knowledge, which also lays a foundation for individual independent learning in the future. They pointed out that there are three types of scaffolding models: teacher-guided, mutual-learning and self-construction. Compared with the previous research, they have refined the classification of scaffolding teaching model. It can help teachers guide students to use scaffolds to learn.

At the beginning of the 21st century, scaffolding teaching model was introduced into China and has been involved in many areas of English teaching(Zhu,2018).A total of 69 literatures related to "scaffolding teaching" and "fine arts" were searched through CNKI, of which only 2 were dedicated to higher education.

It can be seen that scaffolding teaching is very lacking in the research of art in higher education.

However, compared with the traditional teaching model, scaffolding teaching model has the following advantages for the curriculum teaching in the field of fine arts in higher education:

(1) Under the scaffolding teaching model, teachers no longer dominate the classroom, but become the center of students, teachers mainly play a guiding role, students timely feedback teaching effect, teaching and learning close integration.

(2) Scaffolding teaching model emphasizes more systematic knowledge than traditional teaching model. Its learning content, materials and related tasks are suggestive to a certain extent, providing support for the improvement of teaching process.

(3) In scaffolding teaching, teachers provide students with necessary support guidance to help students timely monitor their independent learning status and learning efficiency.

(4) Scaffolding teaching adopts the teaching method of individualized teaching, respects the personality of students, and is more conducive to stimulating the enthusiasm and initiative of students.

Compared with the traditional teaching model, the teaching content design and knowledge construction model are also very different.

In traditional teaching model, the teaching content is more theory than practice, and the teaching content is teacher-led. The emphasis is on how the teacher imparts knowledge to the students and how the students accept the knowledge (Dai & Xie, 2023).

In this study, we use scaffolding teaching method for undergraduate students under the guidance of teachers. Has designed three kinds of teaching cases, namely problem scaffolding, student-centered scaffolding and online-offline mixed learning scaffolding, with reference to the scaffolding teaching theory, and implemented the teaching design in the experimental group, formed a scaffolding teaching model.

The traditional teaching model emphasizes the knowledge transfer of teachers and the memory-based learning of students, and attaches great importance to the acquisition effect after learning(Cui & Zeng,2018). Thus, students are in a state of passive learning in terms of knowledge construction.

This research emphasizes that students carry out independent learning under the scaffolds listed by teachers. Through teaching practice, students can climb from the zone of current development to the zone of potential development of knowledge, and realize the improvement of Independent Learning Ability. After completing the task of learning scaffolds in teaching cases, the scaffolds are removed. At the same time, students also achieve the goal of self-construction of knowledge.

2.5.Research on independent learning ability

2.5.1 The concept of independent learning ability

The concept of independent learning ability originates from the West. It comes from the constructivism learning theory. French linguist Henri Holec(1981) first proposed the concept of Independent Learning Ability in the 1980s, defining it as "the ability to self-manage learning", and specifically explaining it as "Decide on learning goals, determine the learning content and progress, choose leaning methods and techniques, monitor learning process and Evaluate the results of acquisition".

Some researchers have specifically explained these five aspects as:

Students can determine their own learning objectives

Determine their own learning content spontaneously during the learning process

In order to achieve better learning results, they can choose different learning methods for different content

At any time Monitor your learning progress and learning status, correct problems when they are found

Evaluate learning outcomes(An & Jiao,2020).

If a student can set clear learning objectives, spontaneously determine their own learning content, flexibly choose learning methods according to the

learning content, monitor their learning progress and status at any time, discover and solve problems in time, and evaluate their own learning effect, then the student will have a strong independent learning ability.

Zimmerman(2002) from the City University of New York defines independent learning as "the self-directed process in which learners transform their mind, wisdom and power into academic skills".Therefore, successful learners can organize and monitor their learning process, set their own learning goals, seek learning help or guidance, allocate and manage their learning time freely and appropriately, and apply effective learning strategies. This kind of learning is actually an ability to transform academic skills.

Littlewood (1999), a British scholar, believes that students' Independent Learning Ability is "learners' desire and ability to make independent choices for their own learning".The desire here refers to the expectation of learners for their own learning goals, and the ability is the evaluation of learners' own learning effect or the evaluation of their execution in the learning process. Students' independent learning is driven by their learning desire, and the growth of their learning ability is directly related to whether the learning wish list is strong or not.

Chinese researchers believe that "independent learning can be defined as the process that learners actively construct and take responsibility for their own learning"(Huo, Xu & Huang, 2012).Therefore, independent learning also shows that learners have a responsible attitude towards learning and actively construct knowledge.

Therefore, independent learning ability is a kind of ability to self-manage learning, but also a kind of ability to change learning technology. It not only reflects the desire and ability of learners to choose independently, but also reflects a process of constructing knowledge responsibly.

2.5.2 The main research viewpoint of independent learning ability

- The formation of independent learning ability requires students' active learning

A researcher believes that, students should actively accept external knowledge and information, and understand, sort out, digest and absorb knowledge on the basis of existing knowledge, so as to change their own cognitive structure. Learning is an active, active and inevitable cognitive activity in the process of human development. In the whole process of learning, middle school students belong to the leader, while teachers belong to the guide. The role of teachers is to help students develop the habit of active learning, which includes the control of learning content, learning strategy, learning time, learning progress and independent learning evaluation(Mo, 2013). Active learning here refers to a learning behavior that is carried out on the basis of existing knowledge and under the guidance of teachers. The purpose of active learning here is to help students form good habits of independent leaning, control their own learning content, choose learning strategies, control learning time and progress, and have timely Self-Assessment.

● The formation of independent learning ability needs the help of others

A researcher believes that scaffolding teaching is a student-centered teaching method in which teachers play the role of organizer, director, and use learning environment elements to give full play to students' initiative and creative spirit, to effectively construct knowledge(Yang,2012). This view affirms the role of teachers in organizing, guiding and helping students in the process of independent learning. Different from predecessors, the learning environment is emphasized here as an indispensable element, which helps students to realize active learning and knowledge construction. These views have important research significance for the theory of scaffolding teaching. In addition to the guidance of teachers, students should also create a good learning environment when using scaffolding for learning. Only in a good learning environment can students be willing to carry out independent learning activities, so as to build knowledge actively and happily.

Therefore, the ancient Chinese traditional view of "teachers, so preach and teach to solve doubts" is no longer applicable in contemporary times. Teachers should

help students, guide them to learn spontaneously and actively, and build knowledge framework.

● The formation of independent learning ability needs to stimulate students' learning motivation

Learning motivation is also very important, "Bruner believes that learning is an active process. Teachers should try to make students interested in learning, take the initiative to participate in learning, and experience their own abilities from the personal side, so as to stimulate students' learning motivation.(Bruner, 1989) If students do not have a strong motivation to learn, they will not take the initiative to learn. Of course, it is difficult to develop an interest in learning content. If teachers guide students to actively participate in learning activities and experience their own abilities in the learning process and achievement display, they can help students enhance their learning motivation.

At present, the learning motivation of undergraduate students of art major mainly comes from some scattered assignments and exhibition tasks assigned by teachers, which makes it difficult to improve the independent learning ability of undergraduate students. Some scholars believe that the cultivation of students' independent learning ability can effectively help students learn the method of active learning, free from the past passive learning, learning as a kind of fun rather than a burden, cultivation of students' comprehensive quality and self-value has an irreplaceable role(Zhou,2015). Only active learning can truly take learning as a kind of fun, and students' comprehensive quality can be improved under the drive of active learning. They can gain confidence through the affirmation of self-worth, which is conducive to enhancing their professional development ability.

● The cultivation of independent learning ability needs to update teaching methods

It is not easy to cultivate students' independent learning ability, which requires teachers to update their teaching methods and change their inherent teaching model from traditional teacher-centered teaching to student-centered teaching.When

discussing the teaching strategies of independent learning of art in middle school, Ma X. took the teaching practice of the lesson "Expression with Decorative Colors" as an example, "selected five teaching methods: teaching method, demonstration method, question-and-answer method, group discussion method and activity method", and designed the evaluation questionnaire of independent learning. It is carried out for students from the aspects of consciously previewing the textbook content, looking up materials as required, having their own thinking about the new curriculum content, bringing all the materials and tools as required, thinking independently and answering actively, actively participating in class activities, actively participating in homework planning with group members, clearly dividing the division of labor and conscientiously completing the task, correctly evaluating individual and group works and creative activities, etc. According to the survey data analysis, the implementation of the teaching strategy of independent learning has achieved results(Ma,2017a).The achievement of these results is inseparable from the traditional practice teaching, but the student-centered teaching model plays a more important role.

In the traditional teaching of art curriculum in universities, although much attention is paid to improving students' practical skills, it mainly focuses on teachers' teaching and demonstration.The teaching method is outdated and backward.Moreover, students' passive learning affects the development of students' independent learning ability. A researcher believe that "teaching methods are stiff and backward" in the learning of art in universities, and students usually use rote learning methods, which affects students' ability and learning effect. Therefore, Teachers need to deeply study and find scientific teaching model and method, constantly update teaching concept, optimize teaching content, and strive to improve education and teaching level(Zhang,2017).

Another researcher believes that students create a batch of excellent works, which can help students improve their independent leaning ability(Han, 2011).Under the guidance of teachers, students can create excellent works of art after independent learning, and of course, their independent learning ability can be significantly improved.

However, if excellent works of art are forced out by passive learning under the teacher's demonstration and nanny cultivation, students' independent learning ability may not be improved. It is difficult to make full use of network resources to teach the creation and practice of fine artworks. In particular, the application of some experimental materials and machines, and it is difficult to collect the network resources required for teaching. Obviously, the effect of online teaching completely relying on is definitely not ideal. The ideal state should be a mix of online and offline learning.

Therefore, the traditional teaching methods should be changed in the art curriculum and it is urgent to explore a new teaching method that can improve students' independent learning ability.

● The development of independent learning ability requires the choice of learning strategies and learning environment

Independent learning ability also puts forward certain requirements on how to choose learning strategies and learning environment.Because of its value orientation of cultivating students' independent learning ability, scaffolding teaching is more and more favored by teachers and researchers at home and abroad(Sheng & Zhang,2011). Through a questionnaire survey, a researcher found that scaffolding teaching model can improve students' independent learning awareness, independent learning motivation, independent learning strategies, self-efficacy and other aspects to varying degrees, which proves that scaffolding teaching is conducive to developing students' independent learning ability(Wang, 2014). It can be seen that scaffolding teaching is not only for teachers to guide students to enhance their awareness and motivation of independent learning, but also for students to independently choose learning strategies and improve their sense of self-efficacy. Without the guidance of teachers, students may not know how to choose learning strategies and self-evaluate learning effects, thus becoming at a loss.

Another researcher believes that the use of scaffolding teaching in art teaching can make students take the initiative to participate in pre-set art teaching activities, which is conducive to improving students' independent thinking and problem-

solving ability.(Feng,2016b) The art teaching activities mentioned here are actually to create a learning environment. Through art teaching activities, students can give full play to their strengths, speak freely and learn in a relaxed and pleasant environment.students' ability to think independently and solve complex problems will be enhanced.

From the above perspective, students improve their independent learning ability through the scaffolding teaching. On the one hand, they need to independently choose learning strategies under the guidance of teachers; on the other hand, they also need to give play to their strengths in the teaching environment preset by teachers.

brief summary

Through the above research, we can summarize the following theoretical views:

(1) Understanding the connotations of the five aspects of independent learning ability can help us better conduct scaffolding teaching model design and evaluation.

(2) Carry out active learning on the basis of existing cognition, with the purpose of developing good learning habits.

(3) The formation of independent learning ability needs the help of teachers. Teachers should use a good learning environment to guide students to learn actively and construct a knowledge framework.

(4) Stimulating students' learning motivation can effectively help students to actively learn, so as to take learning as a kind of fun, and obtain the affirmation of self-value through active learning.

(5) Changing the traditional teaching methods, optimizing the teaching content, exploring the creation of excellent works, using network resources to carry out online and offline teaching can help students improve their independent learning ability.

(6) Scaffolding teaching model can help students choose learning strategies and create learning environment, so as to improve students' independent learning ability.

CHAPTER 3
METHODOLOGY

This chapter presents the research methods and processes of scaffolding teaching model and improving students' independent learning ability, which includes the following four phases:

Phase 1: Studying Basic Data

The purpose of this phase is to explain the basic situation, role and task of the researcher. Literature research provides a theoretical basis for scaffolding teaching model design, and investigation and interview provide a practical basis for scaffolding teaching model design.

Phase 2: Teaching model design

The purpose of this phase is to provide working procedures and steps for the design, evaluation and inspection of the scaffolding teaching draft, and to provide a design scheme for the pilot study.

Phase 3 ： Pilot study

The purpose of this stage is to test the design quality of the scaffolding teaching draft, verify the feasibility of the scaffolding teaching draft through the pilot study of a small number of samples, and revise the scaffolding teaching draft according to the research results.

Phase 4: Implementation steps and Procedures

The purpose of this stage is to test the effect of scaffolding teaching model in the experimental group. By comparison, it is proved that the scaffolding teaching model is conducive to improving students' independent learning ability.

The research design and basic procedures are as shown in Figure 2.

Phase 1: Studying Basic Data

This phase describes the basic information, roles and task division of the participants, provides theoretical basis for curriculum design through literature research, understands the current situation of students' independent learning ability through questionnaire survey and experts interview, and clarifies "zone of current development"

of students, providing practical basis for scaffolding teaching model design. This phase consists of the following steps:

Step 1: review literature

Step 2: depth interview expert

Step 3: questionnaire survey

Step 4: Participants information and Field Study

Step 5: Determine research roles and tasks

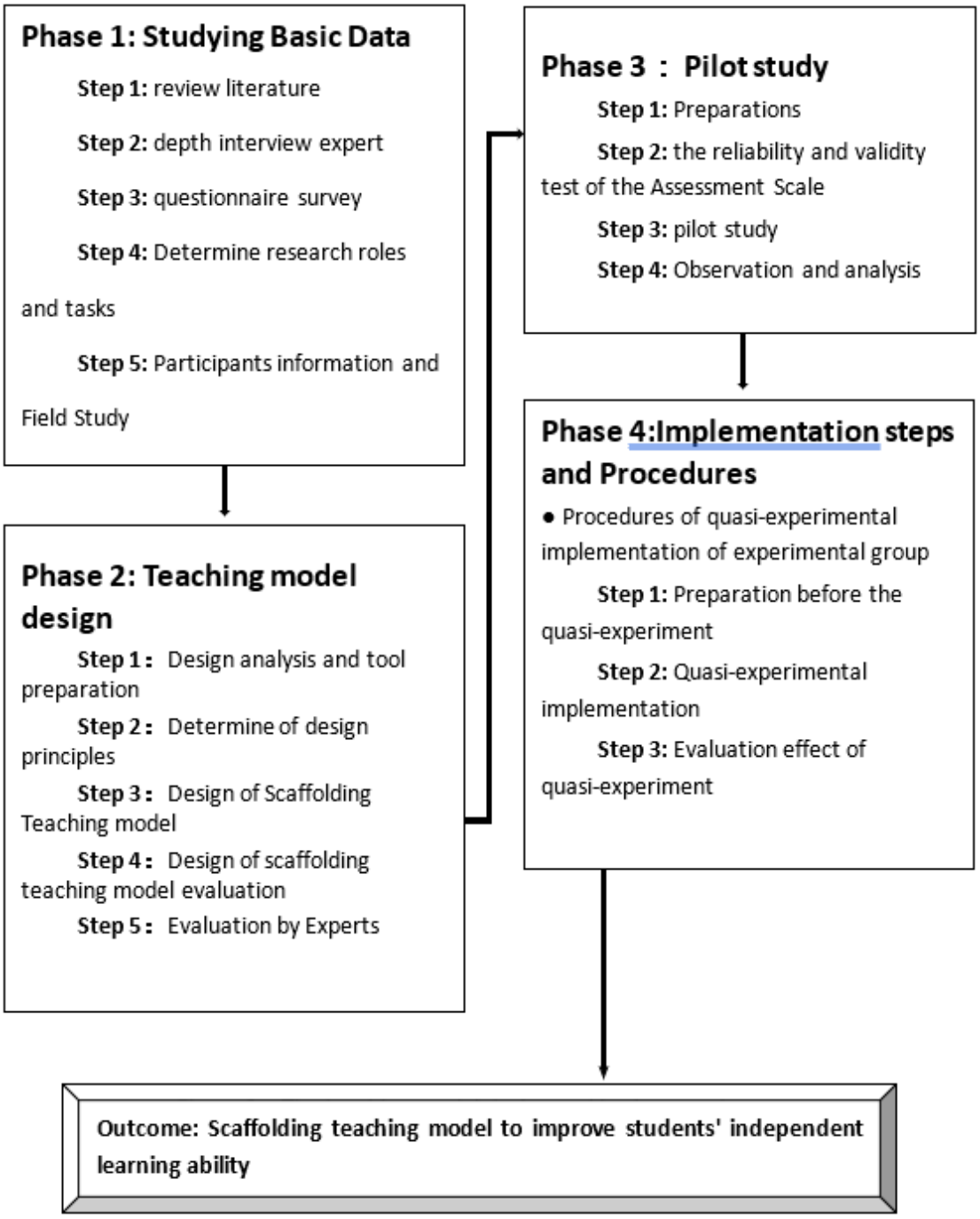


FIGURE 2 The teaching model design and basic procedures

Step 1: review literature

● Through the analysis and reading of relevant literature, to understand the research results of scaffolding teaching design at home and abroad, especially the scaffolding teaching design related to art teaching in universities, to find the existing problems in the current art scaffolding teaching design in universities, and to find new ideas of using scaffolding teaching method to improve students' independent learning ability.

● Through literature research, this thesis defines the concepts of woodcut prints scaffolding teaching and independent learning ability in universities. By combing the constructivism theory, the theory of the Zone of Proximal Development and scaffolding teaching theory, the theoretical foundation is consolidated, the research structure of the paper is gradually clarified, and the main ideas of the research are planned.

● Summarizing the previous research literature, and provides a reference for further formulation of teaching design principles, arrangement of the teaching design process and writing of teaching design.

Step 2: In-depth interview with experts

The research team plans to select six experts for interviews and discuss 10 questions. Finally, the interview results are analyzed, and the necessity of research on scaffold instructional design is expounded.

The in-depth interview method was used to verify the design objectives of the scaffolding teaching model, so as to provide forward-looking thinking for timely detection of possible problems in the experiment.

(1) Interview subjects

In this study, the six experts are divided into three types.

● The first kind of experts are new experts who have been working for more than 5 years. They are enthusiastic about their work, hoping to be liked by colleagues and students. They try to arouse students' enthusiasm for learning through classroom interaction, but the lack mature teaching experience.

● The second kind of experts are those who have been working for more than 10 years. They have formed a relatively stable teaching style and accumulated certain teaching experience, but there are shortcomings in the application of new teaching theories and innovation of teaching methods.

● The first type of experts are art teachers who have been working for more than 5 years. They are enthusiastic about their work and hope to be liked by colleagues and students. They try to motivate students to learn through classroom interaction, but they lack mature teaching experience.

The second type of experts are art teachers who have been working for more than 10 years. They have formed a relatively stable teaching style and accumulated a certain amount of teaching experience, but there are shortcomings in the application of new teaching theories and the innovation of teaching methods.

The third type of experts are teachers who have been working for more than 20 years. They are experts in scaffolding teaching and have deep theoretical cultivation and practical experience in scaffolding teaching. One is a professor and doctoral supervisor of Northeast Normal University, who is engaged in curriculum teaching theory and is an expert in scaffolding teaching. The other is a professor of Jiaying College,Supervisor of Master's, proficient in scaffolding teaching theory.

(2) Interview outline

According to the design objectives of this study, the research team designed the interview outline, and adjusted the interview outline at any time according to the content needs of the teaching model development, aiming at the learning motivation of students in the classroom teaching and the difficulties encountered by students in independent learning. Students' learning gains, teacher-student interaction, student works display, teaching reflection and so on put forward the interview questions, and finally established a relatively complete interview outline (Appendix 1).

(3) Interview methods and data arrangement

According to the interview outline designed in advance, to design a table of in-depth interview with experts(Appendix 2). The method of QQ chat or face-to-

face interview is adopted to collect data. The selected time is usually in experts' spare time, and the place is in the classroom or on the Internet. The investigation content can also be supplemented by telephone or further communication.

(4) Advantages and disadvantages of interview methods

The advantage of the interview is that it can directly interact with each other face to face or on the Internet to understand the research questions, and further discuss the relevant information of students' active learning, supplement the deficiency of questionnaire data collection, and help the research team to further discuss the improvement of students' independent learning ability in the curriculum of woodcut printing by scaffolding teaching.

Due to the limitation of time and energy of the research team, there is no more time to interview more experts. Moreover, there are too few experts of woodcut related curriculum in the Academy of Fine Arts, so the breadth and accuracy of the interview subjects are not enough.

Step 3: questionnaire survey

(1) Survey respondents

Huang Gang Normal University is a 117-year-old provincial university in Huang Zhou District, Huang Gang City, Hubei province. This Fine Arts (teacher education) major of the university undertakes the pilot task of the undergraduate curriculum reform of fine arts (teacher education) in the national universities, and is the key major of the university. Students who chose this major, which successfully passed the Education major certification of the Ministry of Education in 2022, are representative of the survey subjects. The fine arts major consists of 18 classes in years 1-4， and a total of 511 students. In order to improve the accuracy of the survey data, the research team surveyed students in other classes of the major as well as those in the class , so as to improve the breadth and accuracy of the questionnaire.

(2) Questionnaire content

Before the implementation of the curriculum, according to scaffolding teaching theory and the concept of independent learning ability, the research team

designed a questionnaire about students' independent learning(Appendix 3), and conducted a survey on the students of experimental group before the quasi-experiment.

The questionnaire is designed with 21 questions in six categories: learning intention, learning habit, learning overview, learning cognition, learning strategy and learning suggestion, including 19 multiple choice questions and 2 question and answer questions. The investigation of learning intention is mainly to understand the status quo of students' decision on learning objectives; the investigation of learning habits and learning suggestions is mainly to understand the status quo of students' choice of learning methods and techniques; the investigation of learning cognition is mainly to understand the status quo of students' monitoring of learning process; the investigation of learning overview is mainly to understand the status quo of students' decision on learning content and progress. The research of learning strategies is mainly to understand the status quo of students' assessment of acquisition results.

(3) Purpose of survey

This survey is mainly used to understand the students' independent learning before the teaching model implementation, to understand the students' "proximal development zone", and to better use the scaffolding teaching theory to develop teaching model. The questionnaire data is used by the research team to understand the students' basic profile, knowledge reserve, learning habits, etc. According to the analysis of the survey data, it is concluded that the problems still exist in the development of students' independent learning ability before the scaffolding teaching model implementation, which provides a basic reference for the design of scaffolding teaching model.

Step 4: Participants information and Field Study

The teachers and students participated in each phase of this study are as follows:

● Participants information

Participating teachers:The participating teachers are two art teachers from Huang Gang Normal University and an art teacher from Huang Gang Middle

School. They have at least five years of art teaching experience, and participate in the curriculum outline planning and the formulation of curriculum activities.

Participating students: The students involved include three graduate students in education major of Huang Gang Normal University. From the beginning of the study, they participated in the learning and development of the whole scaffolding teaching process. The participants also included all the students of the experimental group, who mainly cooperated with the teacher to complete the teaching practice and evaluation.

- Field Study

Participating teacher: Two university art teacher who participated in this study were responsible for the teaching and implementation of experimental group respectively. The middle school art teacher mainly participate in teaching case design and evaluation content review. The three teachers always communicate with each other about the theoretical and practical issues based on scaffolding teaching method.

Participating students: The three graduate students used their spare time to search literature and independent leaning the knowledge of teaching model development, joined the research team to learn the woodcut print scaffolding teaching design, and put forward constructive suggestions on the teaching model development scheme and teaching case details from the perspective of students. Students in the experimental group participated in the quasi-experiment.

Step 5: Determine research roles and tasks

In this study, three groups of people were involved:

- Researcher

The roles and tasks of the researcher are as follows:

(1) Prepare all the research tools required for the laboratory

(2) Set out each procedure and step of the research proposal

(3) List basic information about the school, teachers, groups, etc

(4) Conduct questionnaire survey on students and interview teachers to understand the status quo of students' independent learning ability before class

(5) The contents and specific steps of teaching design related to scaffolding teaching are listed

(6) Issue and collect evaluation forms for consistency and appropriate checking of experts

(7) Arrange the teaching environment and prepare the teaching equipment, tools and materials required for the quasi-experiment

(8) Supervise teachers' guidance in pilot research and implementation

(9) Prepare teaching draft related documents, and teaching outline, lesson plan, teaching PPT

(10) Prepare teaching assessment tools for experimental groupe

(11) In the pre-test and post-test, the teachers and students will be issued the evaluation form of independent learning ability in time

(12) Check whether students fill in the assessment form normally

(13) Write down the main procedures and basic contents of the study with notes

● Participating teachers

The roles and tasks of participating teachers are as follows:

(1) Participate in the study of the teaching syllabus, teaching plan, lesson plan and other teaching documents

(2) Attend a seminar on expert opinions on teaching evaluation

(3) Cooperate to develop the draft of teaching model design required by scaffolding teaching, to participate in teaching case design and assessment content review

(4) Provide specific guidance to students in the pre-experiment and implementation

(5) Observe classroom teaching and evaluate and reflect on students' independent learning

(6) In the pilot study, the content of teaching design is discussed and suggestions for modification are put forward

(7) Be familiar with the use of Assessment Scale, and make accurate evaluation of students' independent learning ability

● Participating students

The roles and tasks of participating students are as follows:

(1) Participate in the pre-class questionnaire survey and fill in the survey information accurately

(2) Participate in all learning activities and complete all learning tasks

(3) Timely fill in and submit the Assessment Scale issued by the research team, and successfully complete the pre-test and post-test

(4) Clarify the learning objectives and tasks, and carry out online or offline learning according to the requirements of teachers

(5) Use machines and learning tools in accordance with laboratory requirements

(6) Summarize and reflect on learning in a timely manner

● Research Instruments

(1) Outline of expert interview

According to the needs teaching model development, it is necessary to know the status quo of students' independent learning ability from experts. Therefore, the research team formulated an interview outline to conduct unstructured interviews with experts.

(2) Questionnaire of students' independent learning

This study uses the questionnaire on students' independent learning designed by the research team. The questionnaire is released to the target group through the Questionnaire Star website, After the questionnaire survey is

completed, use Excel software to summarize and statistically analyze the questionnaire survey data.

● Collection data

(1) Collection of expert interview information

Interviews were conducted with six teachers of different teaching ages in the Academy of Fine Arts of Huang Gang Normal University, and interview information was collected. Six interview Outlines were set in this interview, including 10 questions. The way of the interview is mainly through telephone, Tencent QQ contact, in the way of questions and answers. Six teachers are expected to finish the interview one week before the teaching design. The collection of interview information is helpful for this research to understand the current situation of students' independent learning and grasp teachers' views on teaching method innovation.

(2) Collection of questionnaire survey data

The current situation of students' independent learning ability was investigated before the formal implementation of the teaching model, and some students were selected from the total population of 511 students for investigation. The questionnaire was edited on the website of Questionnaire Star, and the link was posted among the students majoring in fine arts in the College of Fine Arts of Huang Gang Normal University. The research team needs to organize students to fill in the questionnaire carefully and recover the effective electronic questionnaire.

● Analysis data

(1) Analysis of expert Interview results

The research team summarized the interview contents according to the students' learning interests, classroom interaction, learning effects, learning suggestions and other issues concerned by the interviewees, and made the list of interview results (Appendix 4) to provide reference for the later teaching design.

(2) Analysis of questionnaire survey data

Before the design of scaffolding teaching model, and investigate the independent learning ability of freshmen and seniors majoring in fine arts through

the questionnaire star website (all students from experimental group will participate),and analysis from the following aspects to provide references for the teaching model development.

(1) Investigation and analysis of learning willingness

(2) Investigation and analysis of learning habits

(3) Investigation and analysis of learning situation

(4) Investigation and analysis of learning cognition

(5) Investigation and analysis of learning strategies

(6) investigation and analysis of learning suggestions

Phase 2: Teaching model design

This phase mainly shows the design process and steps of this research, so that the preliminary theoretical basic research can be embedded in the applicable design scheme, and make full preparation for the later scaffolding teaching model implementation. This phase contains several related steps:

Step 1 ： Design analysis and tool preparation

Step 2 ： Determine of design principles

Step 3 ： Design of Scaffolding Teaching model

Step 4 ： Design of scaffolding teaching model evaluation

Step 5 ： Evaluation by Experts

Step 1 ： Design analysis and tool preparation

(1) Analysis of the reasons for Scaffolding teaching model design

The traditional teaching method of the woodcut is mainly teacher teaching. Teachers pay too much attention to the explanation and demonstration of basic knowledge, and students are in a passive learning position. There are shortcomings such as low learning enthusiasm, poor active learning ability, weak scientific learning ability, and difficult to achieve knowledge transfer in the learning process. The scaffolding teaching method is to build learning scaffold in the process of classroom teaching, and teachers guide students to learn independently. Students can choose the learning content they are interested in according to their own learning

interests and personality in the scaffolding catalog. Learning partners and learning methods are decided by students themselves.(Shi &Han, 2014) The role of teachers has changed from a single lecturer to an organizer and guide, and students have changed to active learning. Therefore, it can update the teaching methods of woodcut prints curriculum, and transform the traditional teacher-centered role into a student-centered role.

(2) Analysis of Scaffolding teaching design demand

Independent learning is a student-centered learning concept. By incorporating this concept into scaffolding teaching design, the roles of teachers and students can be changed. The former leading role of teachers can be changed into the leader, and the former passive role of students can be changed into the role of active learning. Take students as the main body of independent learning, so that students have sufficient independent choice and control ability of learning activities.

Before carrying out the scaffolding teaching design of woodcut, the members of the research team shall follow the Implementation Measures for Teacher Professional Certification of Ordinary Universities issued by the Ministry of Education, and need to do a preliminary analysis of students.According to this analysis, we will adjust the teaching objectives and teaching plan, and redesign the teaching content.

(3) Analysis of teaching goals

Teachers provide learning scaffolds for students through scaffolding teaching, and students learn theoretical knowledge and skills of woodcut prints step by step with the help of scaffolds. Finally, the scaffolds are removed to complete the construction of the knowledge system.Students' independent learning ability is obviously improved.

(4) Analysis of learners' goals

The learners of the woodcut prints curriculum are students majoring in fine arts. They have mastered the basic techniques of sketch, color, Chinese painting, oil painting and so on, and have the basic modeling ability, but they still lack the understanding of woodcut prints. Students are eager to use the scaffolding to learn the

curriculum of woodcut Prints, master the basic theoretical knowledge and skills of woodcut prints, and have strong independent learning ability. They can change the passive learning method in the past and solve the complex problems in woodcut prints learning through the methods and thinking learned in the curriculum, so as to achieve the effective transfer of knowledge.

(5) Preparation of learning tools

This teaching model uses commonly used tools for teaching woodcut prints, such as designing lesson plans using desktop computers and laptops, conducting online learning, and displaying PPT and classroom artworks using a projector. Use woodcut printing machines, woodcut knives, rollers, ink, wooden boards, etc. To create woodcut prints, and use drawing papers, brushes, carbon paper, etc. To draw and transfer prints. Use the nationwide textbook "Printmaking" compiled by Chang Yong. To use high-definition smartphones or digital cameras to capture artworks for on-site display in classroom activities.

This teaching model adopts the Superstar learning pass App to carry out online learning. Superstar Learning pass APP is a smart phone online learning software. The research team has uploaded all the resources of the woodcut prints teaching on this platform, including the syllabus, teaching design, PPT, test question bank, etc. Students are free to download all the teaching resources according to the learning purpose, and arrange the learning time and progress reasonably.

Step 2 ： Determine of design principles

(1) Put the question as center

According to Bruner's "scaffolding" teaching theory, when complex problems appear, they need to be decomposed. Zhao Y. (2020) believes that "to build a framework for learners to climb more complex problems, so as to help learners construct the meaning of complex concepts". Therefore, taking the problem as the center can better guide the students to use the learning scaffold to learn.

The teaching of woodcut prints adopts the scaffolding teaching model. Firstly, question awareness should be integrated into the teaching process. The

responsibility of teachers is to guide students to constantly discover questions, to continuously think deeply through independent learning, and to find ways to solve problems independently, so as to achieve the purpose of solving questions innovatively. Therefore, guiding students to ask questions through scaffolds is the basis for students to learn new knowledge, put forward new ideas and master new methods.

The first task of the "scaffolding" teaching model adopted in the curriculum of "Woodcut" is to establish a scaffold of questions. Specifically, it is to guide students to transform what they have learned into a list of questions. As a scaffold of questions, relevant questions are derived from the list of questions, and then guide students to solve these questions by themselves through independent learning. To achieve knowledge building or mastery of skills.

As far as learning interest is concerned, students with the same or similar learning interests can be guided to choose the same learning content. Choosing learning content in groups according to students' interest can stimulate students' interest in learning and improve their learning efficiency. Teachers can formulate multiple study topics and let students choose different study content according to their own interests. For example, students who like animals, characters or landscapes can choose their favorite themes for creative exercises according to their own interests. This grouping of creative exercises is also convenient for teachers to manage and explain uniformly.

As far as choosing creative materials is concerned,Students can be guided to choose creative materials according to their own life experience. Students can be familiar with materials, understand materials and use materials flexibly when choosing creative materials according to their own life experience. For example, some students choose food and drink tools in daily life as their creative materials, while others choose topics such as youth trifles, ecological protection and farming utensils. In this way, the subjects can be diversified and the classroom teaching content can be enriched. According to the different creative materials chosen by students, teachers can

carry out targeted guidance, and the classroom teaching effect can be more easily highlighted.

(2) Student-centered

Constructivist learning theory emphasizes student-centered approaches, asserting that students are active constructors of knowledge.(He,2021), the student-centered principle of this study can help teachers design curriculum teaching content that is beneficial to students' active construction of knowledge.

Student-centered means to carry out practical teaching centered on the purpose and needs of students, centered on the expansion of students' abilities and centered on the knowledge structure of students(Wang, Zhang & Ye,2004). During the learning of traditional woodcut Prints, teachers rely too much on demonstration teaching. Students learn step by step, although the teaching purpose is clear. However, the research on the purpose and demand of students is not sufficient. Under the background of the professional certification of teachers in China, the teaching outline of Woodcut has been revised, and the teachers have redetermined the teaching objectives based on years of teaching experience and observation of students, but the research on the purpose and demand of students is not enough. In other words, at present, the teaching objectives in the curriculum outline of Woodcut are not completely determined by the purpose and demand of students as the center, so this aspect needs to be improved.

Although the traditional teaching of woodcut emphasizes the importance of students' learning techniques, and students' ability has been improved correspondingly, their ability is not developed enough. When they encounter new creative tasks or learning tasks, they cannot flexibly adapt to changes, that is to say, they have not really achieved effective transfer of knowledge.Therefore, when designing teaching content and teaching activities, It should focus on the development of students' abilities.

The traditional teaching of woodcut Prints takes the teaching plans, curriculum ware and textbooks designed by teachers as the learning materials. Due to

the lack of research on students before class and teachers' insufficient understanding of students' knowledge structure, practical teaching is carried out with the knowledge structure of teachers as the center instead of students' knowledge structure. The scaffolding teaching of Woodcut emphasizes student-centered teaching, avoiding the traditional teaching modes centered on the teacher's teaching and demonstration. Teachers only play the role of the guide of knowledge learning and the companion of skill learning, and play the role of helping students to learn and grow anytime and anywhere. The role of students has changed from the traditional passive learner to the active learner.

Before teaching, teachers fully investigate students, fully understand them, grasp their knowledge characteristics, learning habits, learning personality, learning advantages and other aspects, and then according to the actual situation of students, group teaching, teaching in accordance with their aptitude, scientific and appropriate to write the teaching outline, teaching plan, teaching plan, teaching plan. Fully mobilize the initiative and enthusiasm of students in learning.

In the process of specific teaching design, group teaching can be carried out according to the differences in students' learning ability. The difference in learning ability refers to the difference in students' learning ability. According to the difference in students' learning ability, students are divided into several groups, and the group with weak learning ability is assigned basic learning content so that they can understand basic knowledge and master general skills. The group with strong learning ability is assigned innovative and expansive learning content. Develop their ability to integrate knowledge and think creatively. The team leader is selected from these groups. The team leader is responsible for supervising the learning progress and quality control of the students in the group, and coordinating the communication, cooperation and learning between groups. This way of learning highly respects students' learning personality, and greatly arouses students' interest in learning. According to the strength of students' ability, students can choose learning content with moderate difficulty

according to their own situation, improve their learning efficiency and expand their ability.

Due to the thorough understanding of students' knowledge structure through sufficient research before the curriculum teaching, the writing of the curriculum outline and the content of Lesson Design can be closely related to students' knowledge structure. Therefore, the use of scaffolding teaching method for the teaching design of woodcut is to put students' learning objectives, needs and ability expansion in the central position, and teach according to students' knowledge structure, which is a truly student-centered teaching design.

(3) Focus on mixed online and offline learning

The concept of independent learning ability proposed by Holec includes "deciding learning content and progress". Mixed online and offline learning helps students actively choose learning content and grasp learning progress.Along with the continuous progress of information technology, online and offline mixed teaching has become an important starting point of university classroom teaching reform. Under this model, teachers can realize real-time and objective grasp of students' learning progress and learning results (Li & Zhao, 2023). According to students' learning progress and results, teachers can timely adjust teaching strategies and update teaching methods. Therefore, online and offline mixed learning promotes the transformation of teaching and learning methods, making independent, cooperative and exploratory learning possible(Dai,2019).

Traditional classroom teaching only offline teaching, teachers can not real-time monitoring of each student's learning content and learning time, it is difficult to accurately grasp each student's learning progress, but online teaching will become a reality, through real-time monitoring of students' learning process, adjust teaching strategies at any time, mobilize students' learning enthusiasm, so as to improve the learning effect. Therefore, promoting students' independent learning through online and offline mixed learning should also be one of the principles followed by this study.

Although the teaching of the woodcut prints is mainly focused on technique training, it also has relevant theoretical knowledge and teaching resources such as video, voice, pictures, teaching plans and curriculum ware. By assigning teaching tasks, teachers enable students to carry out online learning, which can not only arouse students' enthusiasm for independent learning, but also effectively use teaching resources to improve teaching effect. Offline learning can consolidate the content of online learning and master some key points of woodcut printing techniques. Moreover, teachers can provide individual guidance and carry out targeted teaching at any time in classroom teaching, so as to make up for the deficiency of students' independent learning.

Step 3 ： Design of Scaffolding Teaching model

Scaffolding teaching model of Woodcut Prints will design three teaching cases: problem scaffolding, student-centered scaffolding and online and offline mixed learning scaffolding. (Figure 3), which includes all the contents of scaffolding teaching.

● Problem scaffolding mainly studies the basic knowledge of woodcut prints. Using this kind of teaching case to carry out scaffolding teaching, can guide students to better preview the new lesson, look up the information, take the initiative to think and answer questions, and prepare tools and materials.

● Student-centered scaffolding learning woodcut drawing and transfer printing techniques. It is helpful to enhance students' learning desire, confidence and active sharing of learning results.

● Online and offline mixed learning scaffolding is used to learn the production, rubbing and lesson design of woodcut prints.Help students actively participate in group cooperation, take the initiative to participate in class, and be good at planning and evaluation.

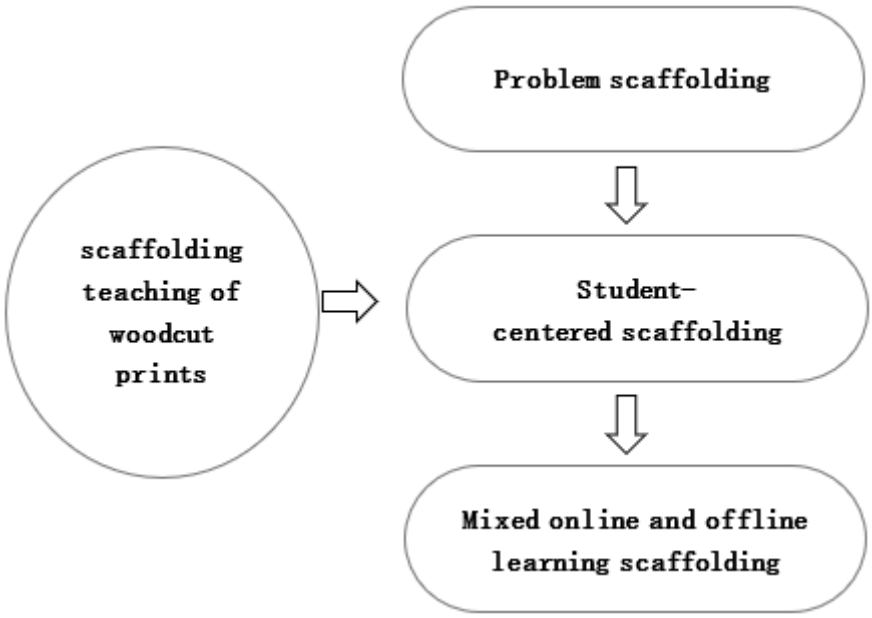


FIGURE 3 Three kinds of scaffolding teaching cases

Teaching design of problem scaffolding

(1) Design reasons

As mentioned above, Bruner proposed in scaffolding teaching theory when students encounter more complex learning tasks, and need to decompose them, so as to establish a "scaffolding" conceptual framework. When students learn the basic knowledge of woodcut, they encounter complex problems that they have never come into contact with. Therefore, it is very important to decompose this complex problem into small problems and construct "problem scaffolding".

In the learning of the basic knowledge of woodcut, teachers find out the "zone of current development" and "zone of potential development" of students, and carry out teaching with problem scaffolding. Students self-monitor the learning process according to their answers to the questions, so as to achieve the optimization of the teaching process.

(2) Main contents and steps

The main content includes the following three kinds of Problem scaffolding:

● Learn the concept of woodcut prints and carry out the teaching of Problem scaffolding 1.

● Learn the footprint of woodcut prints and carry out the teaching of Problem scaffolding 2.

● Learn the tool materials and printing of printmaking, and carry out the teaching of Problem scaffolding 3.

Under the guidance of teachers, students carry out independent learning according to the five steps of scaffolding teaching (figure 4).

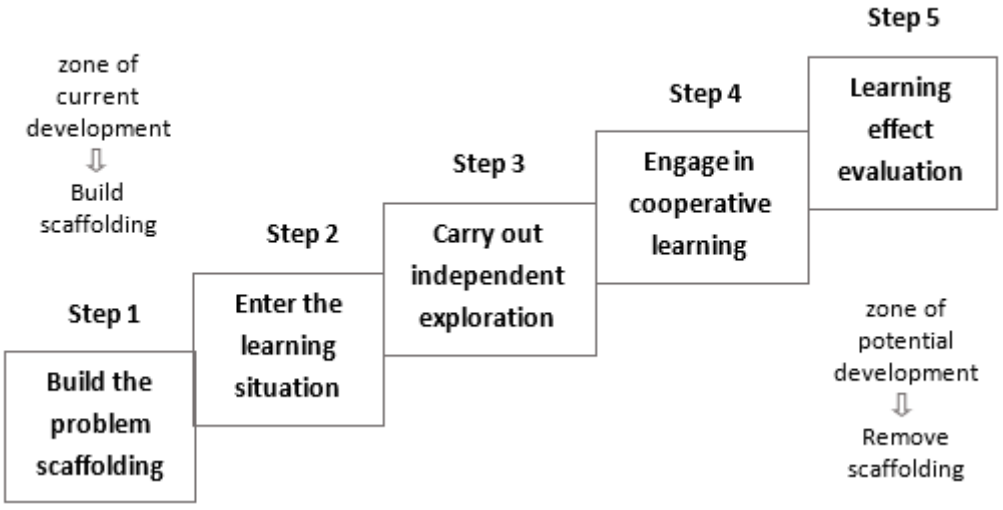


FIGURE 4 Five steps of problem scaffolding learning

(3) learning evaluation

Through the study of the above three Problem scaffolds, students will be evaluated from the following aspects:

● The situation in which students decide their learning objectives through problem scaffolding learning.

● The content and progress of students' learning of the basic knowledge of preparing tools and materials and selecting woodcut prints.

● Students flexibly choose learning methods and skills on the basis of the "proximal development zone" level in order to master the knowledge reserve needed for the next practice.

● Monitor the learning process of plate making method and printing process.

● Self-Assessment of the learning results of all sub-problems of the three Problem scaffolds.

(4) Reflection and discussion

This part will summarize the situation of students' learning with Problem scaffolds, describe the effect of learning evaluation, and discuss the changes of various indicators of students' independent learning ability after learning with three Problem scaffolds.

Teaching design of student-centered scaffolding

(1) Case overview

This case focuses on the woodcut drawing and transfer training, and builds a woodcut learning scaffolding with students as the center, so that teachers can transform from the protagonist in traditional teaching activities to the guide or companion of learning, which is of great help to students to improve their independent learning ability and spirit of exploration.

This instructional design case is based on the characteristics of constructivism art learning. On the one hand, students can enlighten and enhance their wisdom by learning art knowledge, which embodies the characteristics of intellectual participation. To achieve the purpose of learning by building the problem scaffolding, and form the cognitive structure of art independently. On the other hand, under the guidance of teachers, students use learning scaffolds to conduct independent learning, develop independent thinking and take the initiative to innovate.

According to the characteristics of art learning based on the theory of Zone of Proximal Development. On the one hand, hierarchical teaching is designed to find out the Zone of Proximal Development of students at different levels and provide

targeted guidance for problems existing in learning. On the other hand, the learning frame of small composition exercises can stimulate students' creative inspiration and release their art learning potential.

(2) Case presentation

- Build a learning scaffolding and make a task list.
- Create a learning situation to stimulate students' interest in learning.
- Hierarchical inspiration and guidance to stimulate students to explore independently.
- Carry out cooperative learning and share learning results.
- Carry out effect evaluation based on student center.

(3) learning evaluation

Student-centered scaffolding teaching design mainly evaluates students from the following aspects:

- Identify and determine their own learning objectives, learning woodcut composition, conception and drawing process confidence.
- Students at different levels of the Zone of Proximal Development will carry out cooperative learning, receive hierarchical inspiration and guidance from teachers, and decide the learning content and progress.
- Carry out exploratory learning in the drawing of woodcut small composition and creative sketch, and independently choose learning methods and skills.
- Self-monitor the learning process in the Drawing small composition, board handling and transfer method task list.
- The groups with different professional scores mastered the methods of painting and printing through independent leaning, actively shared the results and carried out classroom evaluation.

(4) Reflection and discussion

This part will reflect on the scaffolding teaching of Student-centered based on the constructivism theory and the theory of the nearest development zone, analyze the changes of various indicators of students' independent learning ability, and discuss the changes of students' learning effect and teachers' role.

Teaching design of online and offline mixed learning scaffolding

The teaching design of woodcut scaffolding teaching and online and offline mixed learning takes two experimental projects of woodcut production and artistic language training, woodcut lithography and signature training, as well as works display and lesson design as teaching contents. "teacher-led, student-dominated" is used to carry out online and offline mixed learning.

(1) Design intention

From the perspective of the characteristics of art learning based on constructivism theory, with the help of learning scaffolding provided by teachers, students use visual language forms to construct specific forms of art works and use visual language representations to express learner psychology. This is a very complex learning task, and it is difficult to achieve the preset effect by relying on traditional offline classroom. Because the creation of art works requires repeated viewing and demonstration and searching for a lot of image materials, and spiritual expression requires an open space for display and communication. Obviously, it is not enough to only use traditional offline classroom teaching, so it is necessary to build a scaffold for mixed online and offline learning by giving full play to the advantages of online teaching resources.

This design focuses on online and offline mixed learning to make up for the lack of free learning time, missed wonderful demonstrations, and too short work display time in traditional curriculum teaching. It respects students' personality and independent learning laws, integrates skill practice, exhibition display, and interactive evaluation, and truly realizes the organic integration of modern educational technology and traditional classroom.

(2) Case presentation

- Build a mixed online and offline learning scaffolding
- Create mixed learning situations
- Explore independently
- Show learning results through cooperative learning
- Evaluation of the effect of online and offline mixed learning

(3) learning evaluation

Learning evaluation is mainly carried out from the following aspects:

- The learning desire to carry out mixed online and offline learning and the active determination of learning objectives.
- Use the Internet to access learning materials as required and flexibly grasp the learning progress.
- Use the online platform to prepare new teaching content consciously and take the initiative to understand the situation of professional techniques.
- Take the initiative to participate in group cooperation, online Mutual-Assessment and other activities, understand the details of the learning process, mutual supervision.
- Take advantage of activities such as works exhibition and lesson plan design display to actively share learning results.Self-Assessment in group review, online Mutual-Assessment and other activities.

(4) Reflection and discussion

This part will summarize the advantages of online and offline mixed learning, discuss group cooperative learning, individual tutoring, Mutual-Assessment activities, and show how teaching design affects students' independent learning ability.

The teaching process of scaffolding teaching model

The teaching process of scaffolding teaching model includes three stages(figure 5):

● The first stage is to prepare teaching materials and tools. Teaching materials include: teaching plan, lesson plans, PPT, etc. Tools include: wooden boards, carbon paper, paper, ink, rollers, etc.

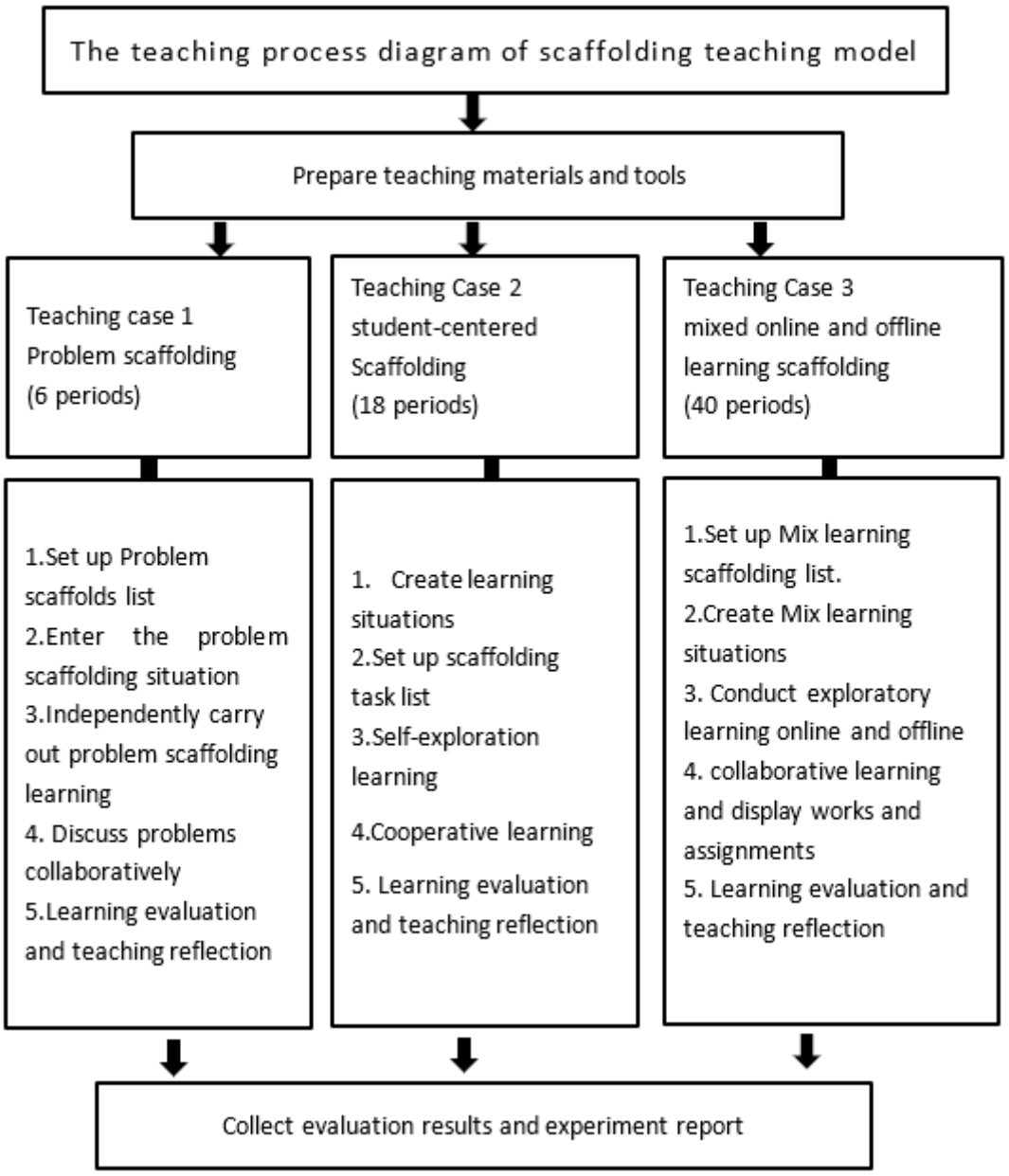


FIGURE 5 The teaching process of scaffolding teaching model

One period = 45 minutes

● The second stage is to carry out teaching of three teaching cases.

The teaching process of the first teaching case includes: (1) Set up Problem scaffolds list, allowing learners to preview. (2) Students enter the problem scaffolding situation. (3) Students independently carry out problem scaffolding learning based on their chosen learning questions (4) Students discuss problems collaboratively to solve complex problems. (5) Conduct a Learning evaluation and teaching reflection to check the effectiveness of the first teaching case.

The teaching process of the second teaching case includes: (1) creating a student-centered learning situations, (2) setting up a scaffolding task list, (3) conducting exploratory learning based on scaffolding, (4) conducting collaborative learning based on student-centered scaffolding. (5) Conduct learning evaluation and teaching reflection to check the effectiveness of student-centered scaffolding application.

The teaching process of the third teaching case includes: (1) establishing a list of online and offline blended learning scaffolds, (2) creating blended learning situations, (3) utilizing online and offline blended learning scaffolds for exploratory learning, and (4) conducting collaborative learning, showcasing printmaking works and designing middle school printmaking lesson plans. (5) Conduct learning evaluation and teaching reflection to test the effectiveness of using online and offline blended learning scaffolds.

● The third stage is to collect evaluation results and experimental reports. The evaluation results include the qualitative evaluation results of three teaching cases, as well as the pre-test and post-test results of the experimental group, as data for later quantitative analysis.

Step 4 ： Design of Scaffolding teaching evaluation

Evaluation is also learning. The implementation of evaluation projects can effectively urge students to learn, and the feedback from evaluation is conducive to helping students make improvements(Lu,Yu & Tan, 2011).The Assessment Scale of

students' independent learning ability designed in this study refers to Ma X.'s Assessment Scale of independent learning of “Expression with Decorative Colors “lesson (Ma,2017b) .

This Assessment Scale has three ways: student Self-Assessment, Mutual-Assessment and Teacher-Assessment. And the reliability and validity of the Assessment Scale were tested before the formal implementation of the scaffolding model. After obtaining a relatively scientific Assessment Scale, students' Self-Assessment, Mutual-Assessment and Teacher-Assessment were arranged before and after the curriculum practice.Self-Assessment refers to students' evaluation of their own independent learning ability, and Mutual-Assessment refers to different students' evaluation of each other's independent learning ability. For example, students with different student numbers are evaluated as misaligned. Such an evaluation method can avoid malicious evaluation of students. Teachers evaluate students' independent learning ability according to their daily observations.

The scale of Self-Assessment, Mutual-Assessment and Teacher-Assessment adopts the 10-point system.1 represents the lowest score, 10 represents the highest score, and the larger the value, the stronger the ability of the evaluation index.Five evaluation indexes are set respectively, and two questions are set for each evaluation index.

- The first item measures students' ability to "Decide on learning goals" by measuring their answers to “Strong desire to learn, take the initiative to establish learning goals " “Have firm learning goals and believe that you can learn well " questions.
- The second item measures students' ability to "Decide the learning content and progress" by measuring their answers to the "Consult materials as required, and grasp the learning progress flexibly " "Prepare the materials and tools well and learn the new lesson actively"questions.
- The third item measures students' ability to “Choose learning methods and techniques” by measuring their answers to the "Consciously preview the

content of new curriculum, take the initiative to understand professional techniques" "Use scaffolds well, think and answer questions actively" questions.

● The fourth item measures the students' ability to "Monitor the learning process" by measuring their answers to the "Actively participate in class activities to understand the details of the learning process" “Actively participate in group work and monitor each other's learning process”questions.

● The fifth item measures students' ability to “Evaluate the results of acquisition” by measuring their answers to “Actively share creative achievements and Self-Assessment” "Be good at planning and commenting, and realize the promotion of learning by commenting”questions.

After the Self-Assessment, Mutual-Assessment and Teacher-Assessment, the data should be summarized. computer software was used to calculate the AVG of these three kinds of evaluation.

After the completion of student Self-Assessment, Mutual-Assessment and Teacher-Assessment, the research team will collect the evaluation data as the original data of the design and implementation effect of the teaching model. In order to further test whether the independent learning ability of students is effectively improved, a comparison table of the independent learning ability of students in the experimental group of woodcut Printing is also needed to be made. Finally, to test the effectiveness of the design of the teaching model. After all these works are completed, a feedback opinion is written to make an overall evaluation of the process and effect of the quasi-experiment.

Step 5 ： Evaluation by Experts

After the scaffolding teaching design is completed, five experts need to be invited to test the Consistency and Appropriate of the teaching design. The steps are as follows:

(1) Prepare the Consistency checking form and Appropriate checking form, and write the invitation letter.

(2) The research team sent the teaching design materials to five fine arts teachers with more than 10 years of teaching experience, and invited them to score on the Consistency checking form and Appropriate checking form.

(3) Collect expert evaluation information, make statistics on the scoring results, and decide whether to adjust part of the teaching design according to the scoring results and expert opinions.

(4) If the experts give suggestions, the research team is ready to hold a special discussion and assign tasks. It is expected that within one week, according to the experts' suggestions, a small range of modifications will be made to make the original teaching design objectives more accurate, the scaffolding teaching steps more clear, and the teaching design content more perfect.

● Research Instruments

(1) Design draft of Scaffolding teaching of Woodcut Prints

The research team used scaffolding teaching theory to develop a teaching design draft called Woodcut Prints. The principles of teaching design, teaching cases, evaluation methods are expounded in detail.

(2) Consistency and appropriate checking forms by experts

In order to evaluate the quality of teaching design, this study adopts consistency and appropriate checking forms by experts. The consistency checking form has 10 evaluation sub-items, and the evaluation results are divided into three situations: Consistent, insecure and Inconsistent. The appropriate checking form has 18 evaluation sub-items, and the evaluation results adopt a 5-score rating system. If the experts have more opinions about the draft of teaching design, they can send the electronic version of the document to any member of this research team.

● Data Collection

(1) Collection of Scaffolding teaching design draft

After the design of the scaffolding teaching draft, collect the teaching design principles, teaching content, teaching cases, and students'

independent learning ability Assessment Scale and other materials, and make these materials into PDF files or print and bind them to send to relevant experts for inspection.

(2) Data collection of Evaluation by Experts

After receiving the consistency and appropriate checking forms by Experts, input the data into computer software for statistics, to prepare for the later data analysis.

● Data Analysis

(1) Analysis of curriculum draft

Before sending the scaffolding teaching design draft to experts for review, it is necessary to carefully check the teaching design content and design cases, especially to analyze whether the five links of scaffolding teaching follow the theoretical principles of this study, and whether the five sub-dimensions of students' independent learning ability correspond to the design of teaching content and evaluation.

(2) Analysis of Evaluation by Experts

The data of the consistency and appropriate checking forms fed back by experts are imported into SPSS software, and the average score of each item in the Consistency checking form will be calculated to analyze whether the teaching design has good Consistency . Calculate the average score of each item in the appropriate checking form to analyze whether the teaching design is appropriate. If the teaching design has good consistency and appropriate, the first hypothesis of this study is proved to be valid.

Phase 3 ： Pilot study

The purpose of this phase is to test the effect of scaffolding teaching model design in the pre-experiment, to verify the quality of the teaching design, and to provide a reference for further improving the teaching design. This is achieved in the following four steps:

Step 1: Preparations

Step 2: the reliability and validity test of the Assessment Scale

Step 3: pilot study

Step 4: Observation and analysis

Step 1: Preparations

(1) Research related documents

In this step, the research team is familiar with the relevant documents of the Ministry of Education on university teaching, and understands the newly revised teaching outline of Woodcut Prints. By combining the literature related to scaffolding teaching, the concept of national teacher professional certification and the teaching design, it provides the theoretical direction and action guide for the teaching model implementation.

(2) Collection of curriculum-related information

The research team collected woodcut teaching cases through the Internet, purchased and prepared tools and materials, and checked laboratory equipment and working environment. Further verify the minor modification of Consistency checking and Appropriate checking of the teaching design by experts, and check the expected use of the Assessment Scale.

(3) Writing teaching documents

The research team will further improve the design of teaching content, write teaching plan, lesson plan, PPT for the pilot study, and prepare experimental reports, skill activity templates and other documents used by students.

(4) Selection and preparation of teachers

One printmaking teacher with more than five years' teaching experience and two graduate students of fine arts in subject education were selected to participate in this pilot study. They set the stage for the pilot study by holding a teacher preparation workshop (Jansawang, 2005), on June 10, 2023.

Step 2: the reliability and validity test of the Assessment Scale

Since the Assessment Scale used in this study has been greatly modified on the basis of referring to relevant researchers, it is necessary to test the

reliability and validity of the scale before it is formally used. For specific reference, a study by Ma,X.R.(2022) will use Cronbach's α coefficient and KMO value of Bartlett sphericity test. Before the implementation of the teaching model, the research team will collect pre-arranged small test samples and use SPSS software to test the reliability and validity of the Assessment Scale to determine whether it needs to be adjusted.

Step 3: pilot study

(1) Determine the purpose of the experiment

● Investigate whether students can really carry out independent learning according to the scaffolding provided by the teacher.

● Investigate whether the scaffolding teaching method improves students' independent learning ability in the pilot study.

(2) Select the population and sample for pilot study

6 students from years 1-4 of fine arts major in College of Fine Arts, Huang Gang Normal University will be randomly selected to carry out a pilot study of scaffolding teaching of woodcut prints, using scaffolding teaching method.The pilot study will last for 32 periods.

(3) Procedures of pilot study

● Before the pilot study is carried out, the students are pre-tested with the independent learning ability measurement scale designed in advance.

● Three cases of scaffolding teaching are used for teaching. After the pilot study, students' independent learning ability is post-tested and measurement data is collected.

● After the experiment, use computer software to calculate the value of post-test independent learning ability of students.

Step 4: Observation and analysis

(1) Observation

● Whether students can carry out independent learning under the scaffolding provided by teachers.

● Whether the post-test value of the independent learning ability of students is significantly higher than the pre-test value.

(2) Analysis

The purpose of the pilot study was to see if there was a significant improvement in the independent learning ability of students using scaffolding teaching methods. What needs to be further optimized in the steps and teaching process of the original design? How to make corresponding improvements to the original design so as to make the original design more scientific, reasonable and effective?

● Research Instruments

(1) The scaffolding teaching draft of Woodcut Print

The scaffolding teaching draft of Woodcut Prints, which has passed expert tests for consistency and suitability, is used.

(2) The lesson plans and instructional materials

Prepare and use the lesson plan as required by the pilot study, as well as the required learning materials and tools.

(3) Assessment Scale of students' independent learning ability

According to the reliability and validity test requirements of the Assessment Scale and the requirements of the pilot study, the students' independent learning ability scale was used.

(4) pilot study

Refer to the relevant literature, develop the pilot study procedures and specific operating steps.

● Data Collection

(1) Data collection of the scaffolding teaching draft of Woodcut Print

In order to save the pilot research time, only the main contents of the three teaching cases of the teaching model implementation were collected.

(2) Data collection of the lesson plans and instructional materials

Collect lesson plans for the pilot study and the teaching materials, machines, PPT, woodcutting knives, rollers, ink, paper and other tools required for teaching.

(3) Data collection of Assessment Scale of students' independent learning ability

The collected data includes two aspects. First, the reliability and validity test data of students' independent learning ability Assessment Scale are collected. The second is to collect pre-test and post-test data of students' independent learning ability assessment scale according to the needs of pilot research.

(4) Data collection of pilot study

Collect all the data of the pilot study, including the records of the research process, operation steps and research results, to observe the initial effect of the teaching draft design in practice.

● Data Analysis

(1) Data analysis of scaffolding teaching draft of Woodcut Prints

Analyze whether the content of the three teaching cases in the pilot study and the allocation of Credit are Consistency with the teaching plan.

(2) Data analysis of the lesson plans and instructional materials

This phase analyzes whether the teaching plan table of the pilot study reflects the core content of the teaching design well, whether it can test the effectiveness of the teaching design smoothly and check the change of students' independent learning ability. Whether the quantity and quality of teaching materials meet the needs of pre-experiments.

(3) Data analysis of students' independent learning ability evaluation Scale

Using assessment scale to test students' independent learning ability to determine whether it has good reliability and validity,and whether it needs to be adjusted or directly used.

The pilot study was conducted on whether the evaluation of students' independent learning ability was carried out smoothly, whether there were significant differences in the measurement data, and whether necessary to adjust part of the teaching content according to the test results.

(4) Data analysis of pilot study

The research team plans to carry out the pre-experiment of the woodcut prints scaffolding teaching for 6 students after 32 periods of pilot study. After collecting the pre-test and post-test data of students' independent learning ability, the paired sample T-test method is adopted to observe the P-value of the paired T-test of the pre-test and post-test results. See if there is a significant difference between pre-test scores and post-test scores.

Phase 4: Implementation steps and Procedures

This phase mainly carries out the quasi-experiment of scaffolding teaching woodcut prints and the ordinary experiment, and verifies the research hypothesis through comparison. There are three steps:

Step 1: Preparation before the quasi-experiment

Step 2: Quasi-experimental implementation

Step 3: Evaluation effect of quasi-experiment

Procedures of quasi-experimental implementation of experimental group

This is a study that uses experimental procedures, takes advantage of teaching scenarios, and controls subjects flexibly. As scaffolding teaching is more flexible, this study does not have to directly practice lesson design completely in classroom teaching like traditional teaching. Teachers are required to build scaffolding in class according to the actual situation to help students solve specific problems in specific situations. Scaffolding teaching is used in the experimental group to test the feasibility and effectiveness of this study, verify whether the hypothesis is valid, and test the effect of this teaching design on improving students' independent learning ability.

The quasi-experimental procedures is as follows:

Step 1: Preparation before the quasi-experiment

Before implementing the scaffolding teaching model in the experimental group, Researchers work in the following steps:

Select experimental group population and sample according to the teaching design.

(2) Prepare and train professional teachers to learn the "Woodcut" teaching documents. The teacher spent periods familiarizing themselves with teaching plan,lesson plans, teaching materials, and assessment tools.

(3) Prepare the learning environment. Including preparing the laboratory, arranging tables and chairs, arranging teaching and learning tools, checking the quality of machine operation and health environment.

Step 2: Quasi-experimental implementation

The quasi-experimental implements the following procedures:

Pre-test the independent learning ability of students in the experimental group before the implementation of the quasi-experimental, and collect the average values of students' self-assessment, mutual-assessment and Teacher-Assessment tests.

In the classroom prepared before class, according to the scaffolding teaching design, the students of the experimental group are carried out quasi-experiments. The three teaching cases in the teaching design are mainly implemented according to the five steps of scaffolding teaching. The purpose is to improve students' independent learning ability through quasi-experiment of scaffolding teaching.

After the quasi-experiment, qualitative analysis was carried out on the three teaching cases respectively to summarize the improvement of students' independent learning ability through scaffolding teaching.

Step 3: Evaluation effect of quasi-experiment

(1)Conduct post-test on students immediately after the implementation of the quasi-experiment, summarize the average values of students' self-assessment, mutual-assessment and Teacher-Assessment.

(2)Use SPSS software to conduct paired T-Test on the experimental data, and compare whether there is a significant difference between the P-values of the pre-test and post-test of students' independent learning ability in the quasi-experiment.

● Research Instruments

(1) The documents of the scaffolding teaching of Woodcut prints

The documents of the scaffolding teaching of Woodcut prints: revised syllabus, teaching design, teaching plan, lesson plan, PPT,etc.

(2) Assessment Scale of students' independent learning ability

After the formal implementation of the teaching, the research team needs to collect pre-test and post-test data of students' independent learning ability in the experimental group. The pre-test is to understand students' independent learning and original knowledge construction at the stage of the "zone of current development". Post-test is to test the level of potential development of students and the status of self-construction of knowledge.

(4) Quasi-experiment

All the students in the experimental group by using the scaffolding teaching, which is carried out in strict accordance with the syllabus, teaching cases, teaching steps, evaluation methods, etc., And the teaching by a teacher who has learned all the contents of the teaching.

● Data Collection

Data collection for this study included the following:

Collection documents of the scaffolding teaching of Woodcut prints

Check and collect the syllabus, teaching design, teaching plan, lesson plan, PPT, etc, about the scaffolding teaching of woodcut prints, upload the electronic version to the superstar learning pass network curriculum system, and print the paper version for the reference of the experimental group.

Before the experiment, a total of 31 pre-test data of students' independent learning ability in experimental group were timely collected.Computer software was used to summarize the data.

After the end of the experiment, the Assessment Scale data of the independent learning ability of the students were collected again.

Data collection of Quasi-experimental

Collect all the data of the quasi-experiment in the experimental group, including the records of the study participants, samples and population,teaching content, teaching cases, teaching implementation process and steps, the assessment data of students' independent learning ability and the results of the quasi-experiment.

● Data Analysis

(1) Analysis documents of the scaffolding teaching of woodcut Prints

The research team researched and analyzed the woodcut prints scaffolding teaching documents through collective study and discussion meetings, and analyzed the corresponding relationship between the talent training objectives and students' independent learning ability in the final revised syllabus, whether the teaching design,teaching plan,lesson plan, PPT and other contents.

Whether the theoretical basis of this study is well applied, whether the content and steps of scaffolding teaching are clear, and whether it can better develop students' independent learning ability.

(3) Data analysis of students' independent learning ability evaluation Scale

Both quantitative and qualitative data exist in this study. the qualitative data was presented in descriptive text. The quantitative data was analyzed and Basic statistical methods such as percentage, mean, standard difference,T-test were used to analyze the value of students' independent learning ability. Statistical data were analyzed using computer software.The data analysis steps are as follows:

● Basic data analysis

The percentage, mean and standard deviation of pre-test and post-test of independent learning ability of students in experimental group were analyzed.

● Comparison of pre-test and post-test in experimental group

The paired T-test analysis is conducted on the experimental group data. If p<=0.05, it indicates that the five dimensions of pre-test and post-test of the experimental group show significant differences, which explains that the students in the experimental group with the scaffolding teaching method have significantly improved their independent learning ability, proving the validity of the second hypothesis of this study.

(4) Data analysis of Quasi-experimental in experimental group

Data analysis of the quasi-experimental in experimental group, including the task execution of the study participants, sample and population selection methods, the presentation of teaching content and teaching cases, the standardization of teaching implementation process and steps, the use and statistics of the assessment data of students' independent learning ability, and the qualitative evaluation of the quasi-experimental results.

CHAPTER 4
FINDINGS

This chapter presents the results of data analysis of scaffolding teaching model for reference of researchers and teaching staff. The four phases and implementation procedures in this study are described in Chapter 3. Data analysis and research results at each stage are divided into the following parts:

Phase 1: The results of basic data analysis

Phase 2: The results of Teaching model design

Phase 3: The results of Pilot study

Phase 4: The results of the Implementation steps and Procedure

Phase 1: The results of basic data analysis

The results of basic data analysis are as follows:

1.The results of the review literature

Through reading the research results of scaffolding teaching design literature at home and abroad, and analyzing the scaffolding teaching design, it is found that the independent learning ability of undergraduates in the current art scaffolding teaching design needs to be improved. These research results reveal that scaffolding teaching can meet the needs of undergraduate students to improve their independent learning ability. Taking woodcut teaching as practice, the construction of scaffolding teaching model is a beneficial supplement to previous research.

Through the collection and analysis of literature, the draft of scaffolding teaching design is drawn up, including the steps and process of constructing scaffolding teaching model. There are several documents related to this research, such as the 2010 Outline of National Medium and Long-term Education Reform and Development Plan (2010-2020) and the newly revised curriculum outline of Woodcut Prints of Huanggang Normal University in 2022. The theory of teaching model and the research of scaffolding teaching methods and steps. Data were collected from the research for reference in this draft instructional design.

2.Results of in-depth interviews with experts

The research team contacted six experts and conducted in-depth interviews (table 2). According to the students' learning interests, classroom interaction, learning effect, learning suggestions and other issues concerned by the interviewees, the interview content is summarized to provide reference for the later curriculum design.

TABLE 2 Expert interview information

Serial number	interviewee	age	Teaching Experience	Professional title
1	Teacher F	47	4	lecturer
2	Teacher W	34	5	lecturer
3	Teacher Z	43	15	Associate professor
4	Teacher J	47	18	Associate professor
5	Teacher M	47	25	professor
6	Teacher Y	46	22	professor

According to the results of the interview expert, the students are interested in creative techniques, and they mainly study sketching in the past, and the creative practice and thinking are not enough. It is not only necessary to stimulate students' interest in learning, so that they can learn rich theoretical knowledge while learning techniques, increase their learning ability, and have strong independent learning and exploration ability. Therefore, the cultivation of students' independent learning ability in fine arts curriculum should be put in the first place. Only when the independent learning ability is enhanced, students' ability of subject knowledge transfer and innovation can be developed, and sustainable learning can be guaranteed. So how to improve students' independent learning ability?

According to the interview data, efforts can be made in the following aspects: First, thinking according to students' learning interests, further studies, employment

needs, etc., stimulating students' learning motivation, and scientifically organizing students for self-study under the guidance of teachers. Second, while stimulating students' interest in learning, let students learn independently, but pay equal attention to techniques and theories, online learning and offline learning, and promote the growth of students' sustainable learning ability. The third is to change the classroom teaching mode, from "teaching before learning" to "learning before teaching", change the shortcomings of the traditional teaching model, and establish the fundamental principle of "student-centered". At the same time, it is necessary to clarify the learning objectives and stimulate the students' enthusiasm for independent learning and sense of competition. However, these changes need to consider a new teaching method to guide students to study on their own. This study chooses scaffolding teaching method and guides students to use scaffolding to carry out independent learning step by step through teaching design and practice, in an attempt to meet the above efforts.

3.Survey results of the questionnaire

86 students from a total population of 511 were selected to carry out a survey on independent learning. The sample group accounted for 16.4% of the total population, and the second year students accounted for 61.9% of the total number of the sample group, which ensured the reliability of the study.

In order to facilitate the investigation, questionnaire star website is used to design the questionnaire, and the link is published through the network for students to fill in online. 84 electronic questionnaires were effectively recovered. The research team tested the answers to the questionnaires and found no abnormal answers. Therefore, this questionnaire survey is true and effective. All the 84 questionnaires collected can be included in the analysis of students' independent learning(Appendix 5).

(1) Investigation and analysis of learning willingness

According to the survey, 41.67% of students think that the motivation for learning art is to have one more specialty, so as to prepare for making a living in the future. 28.57% of the students think that the motivation for learning art is a

personal hobby, and they regard learning as a kind of enjoyment. Only 19.05% of the students regard the enhancement of art quality as the motivation of art class learning, while 10.71% of the students regard the curriculum arranged by the school as the motivation of art learning under the requirements of teachers and parents. It can be seen that students attach importance to their personal strengths as a means to make a living in the future, and take their career development as the motivation for learning fine arts, rather than to complete the curriculum and be forced to learn under the requirements of teachers and parents.

Students generally think that they have a high initiative in learning art, and 42.86% think that they like doing things and taking the initiative to complete classroom learning tasks, and 55.95% think that they can basically complete classroom learning tasks. Although most students think that they can take the initiative to learn and complete tasks, in fact, many students are passive in learning. Often, only under the teacher's continuous teaching and demonstration can they study independently, otherwise many students cannot do their homework properly or submit it late. According to the situation of question 3, the vast majority of students hope to improve their Independent Learning Ability through a new teaching method, which indicates that the traditional teaching methods have limited effect on improving students' Independent Learning Ability. The fourth question shows that most students like to learn woodcut prints, and their strong interest in learning will surely stimulate them to further study, which will be of great benefit to active learning by using scaffolds in later teaching.

(2) Investigation and analysis of learning habits

From the students' study habits survey, 58.33% of the students basically according to the teacher's requirements preview, look at the mood, sometimes preview, sometimes do not preview of the students account for 22.62%, too much homework, no time preview of the students only 7.14%, indicating that students have the habit of preview before class, but the vast majority of students are passive, Are in accordance with the teacher's requirements to preview. Only 11.9 percent of the

students are very careful about preparing for the exam, so the motivation of students to prepare for the exam is not strong.

In the preview before class, 47.62% of the students "pay attention to new knowledge points and design legend", 40.48% of the students "carefully read the text and pictures in the textbook", and only 11.9% of the students "skim the textbook without paying special attention to knowledge points and design legends". It shows that most students are serious when they preview before class, and only a few students regard preview as going through the motions. However, the preview method is a kind of spontaneity, and general teachers have not taught the special preview method, so the effect of students' preview before class is not necessarily ideal.

In the preview before class, 65.48% of the students "occasionally look up materials, completely depending on their mood and subjective will", only 3.57% of the students "have no time to look up materials", 30.95% of the students "often look up materials and do an in-depth preview of the textbook", indicating that students are not unwilling to do the preview before class, but do not know how to do an in-depth preview. When they encounter difficulties in the preview process, they do not know how to often look up materials to solve problems by themselves. Instead, they rely too much on teachers and wait for teachers to solve problems for them. They would rather be an auditor than an explorer.

In terms of students taking notes in art classes, 70.24 % of the students said that they wrote down the teacher's notes and main ideas on the blackboard and annotated them in the textbook, while only 1.19 % of the students that said they never took notes. It can be seen that students have a high enthusiasm for art learning and they are eager to learn more knowledge. However, the students who "often read" art books only accounted for 23.81%, and the students who "occasionally read" accounted for 42.86%, indicating that although students are willing to learn more knowledge, they rely too much on the teacher's explanation, and would rather write down the knowledge points explained by the teacher in class rather than actively read

books to learn, which is obviously not conducive to the improvement of Independent Learning Ability.

(3) Investigation and analysis of learning situation

According to the learning situation survey, 39.29% of the students are "not very confident" when learning art, indicating that the cultivation of students' self-confidence should become an important aspect of art class learning. 42.86% of the students think that they should "have some independent in learning", 33.33% of the students think that they should "be able to control their own learning time independently". Therefore, independent learning should become the main way of classroom learning, and take advantage of the advantages of online teaching, so that students can spend their study time freely.

44.05% of the students think that they "like to explore a new set of methods by themselves". However, students do not know much about new learning methods. Therefore, teachers should properly guide students to understand new learning methods in the teaching design, so as to help them improve their Independent Learning Ability faster.

(4) Investigation and analysis of learning cognition

Understanding students' learning cognition of art curriculum is the basis of understanding students. According to the survey, 52.38% of students think that electronic products such as mobile phones and tablets in art curriculum"have no influence on learning, and sometimes I use them to look up materials". Therefore, the use of these electronic products for online learning should be a beneficial supplement to the traditional teaching of the woodcut.

When asked how art teachers should allocate their time, 44.05% of the students thought that "more time should be allocated to students for self-study and hands-on practice, and teachers should give priority to guidance", and 46.43% of the students thought that "teachers' explanation and demonstration and students' practice occupy half of the time", indicating that teachers' guidance is very important in students' minds. It is not scientific only to have the teacher's explanation demonstration

or only the students' practice, but should be under the guidance of the teacher's explanation demonstration and students' independent practice cooperation, it is possible to obtain a more ideal learning effect.

69.05% of the students think that "sometimes summarize and find the problems in learning". It can be seen that students attach more importance to art curriculum homework, especially to summarizing, find out learning problems and deficiencies. However, such attention and summary are often based on classroom learning activities or assignments assigned by teachers, and cannot fully reflect students' enthusiasm and ability to active learning. Therefore, the curriculum design should consider more how to stimulate students' enthusiasm for active learning. Improve Independent Learning Ability.

Only 22.62% of the students believed that "frequently summarize and find out the problems and deficiencies in learning", indicating that it is not enough for students to regularly take the initiative to summarize and find out the problems in learning. Most students only occasionally summarize and find out the problems in learning. They also need to improve their enthusiasm and strengthen their active learning in this aspect.

(5) Investigation and analysis of learning strategies

From the perspective of students' attitude towards the knowledge and skills they have not learned, 39.29% of the students think that "they will study hard and learn from teachers or classmates what they do not understand", 35.71% of the students think that "they will try their best to learn knowledge and skills and strive to be better than other students", indicating that students are very eager to master professional knowledge and skills and are willing to study hard. Learn as much as you can.

From the perspective of students' performance in class, 71.43% of students "try their best to grasp the key points of the art knowledge and master basic skills", only 1.19% of students "often absent-minded, dazedly or do their own things".

Therefore, students in the previous art curriculum have a high enthusiasm for art knowledge and basic skills, only a few students have the phenomenon of inattention.

In addition, 42.86% of students think that they need to "look for reference materials and then try to solve problems" when they encounter problems in art class.

(6) investigation and analysis of learning suggestions

According to the survey results, the vast majority of students think Independent Learning Ability is important, while a few students think it is very important. The students put forward their own views from the aspects of learning habits, preview before class, innovation ability, learning methods and so on. Some of the views have a certain effect on improving the students' active learning ability. For example, some students proposed that "we should improve our Independent Learning Ability from searching materials to hands-on practice", "read and observe teachers' model paintings and masters' paintings", and some students proposed that we should master learning methods such as keyword extraction method, goal decomposition method, regular reflection method, repeated learning method, and other supervision methods help them improve their Independent Learning Ability. Other students suggested that the level of difficulty and reward system should be reasonably arranged to improve student initiative.

Most students think that teachers need to explore new teaching methods, and this part of students believe that new teaching methods can drive students' learning enthusiasm, improve students' learning interest, correctly guide students' learning. Good teaching methods will improve the teaching effect and the teaching effect reflects the correct teaching method. The two are actually complementary relationships. However, there are still very few students who think that it is not necessary for teachers to explore new teaching methods, and even some students think that "if you are not sure, don't use new methods". It can be seen that there are still some students who do not have a special understanding of teaching methods,

and do not really understand the close relationship between teaching methods and teaching effects.

4.Results of Participants information and Field Study

● Results of participants information

In this study, two art teachers with more than 20 years of teaching experience at Huang Gang Normal University were selected. Both of them were good at woodcut prints teaching. One teacher was good at scaffolding teaching and the other was good at traditional teaching. In addition, an art teacher from Huang Gang Middle School participated in the whole study, and three teachers participated in the formulation of the curriculum outline and curriculum activity plan. The co-researchers also included three graduate students in education major from the School of Fine Arts of Huang Gang Normal University, who participated in the construction and implementation of the scaffolding teaching model. Participants' names, research directions, contact information and other information were recorded in the computer for reference at any time during the research.

● Results of field study

The two teachers involved in this study are responsible for teaching and implementation respectively, the teacher who is good at scaffolding teaching is responsible for teaching the experimental group, and the other teacher is responsible for traditional teaching. The art teachers of Huang Gang Middle School mainly completed the teaching case design and evaluation content review, and gave feedback on the review results. As the three teachers are responsible for different areas, they communicate with each other and help each other in this study to solve theoretical and practical problems in the research.

The graduate students in education program are all in the direction of fine arts education. After self-learning curriculum development knowledge and being familiar with the wood-cut print scaffolding teaching design, they gave feedback on the details of the design scheme and teaching cases from their own perspective.

5.Result of determine research roles and tasks

According to the assignment of researchers' tasks in Chapter 3, the tasks completed by three types of researchers are as follows:

● The researcher, as the main role, completed 13 tasks according to the research design.

(1) All the research tools needed for the teaching experiment were prepared for two different classes before class.

(2) The researcher has listed each procedure and step of the research plan, and there is no confusion in the process of teaching practice.

(3) The research team has listed the name of the school implementing the curriculum, teachers, classes and other basic information for the teachers and students participating in the research.

(4) Completed the questionnaire survey of students and in-depth interviews with experts, and analyzed the current situation of students' low self-learning ability before class.

(5) The contents and specific steps of scaffolding teaching design are listed in chapter 3 and its appendix .

(6) Five experts were invited to issue and collect consistency and appropriate check forms through the Internet to test the consistency and appropriate of teaching design.

(7) With the help of laboratory staff, the researcher has arranged the teaching environment and prepared all the teaching equipment (projectors, print-stamping machines, etc.), tools (wood mushrooms, ink, etc.) and materials (paper, pencil, carbon paper, etc.) needed for the quasi-experiments of the curriculum in advance.

(8) Researchers should supervise teachers' teaching behavior in the curriculum pilot study and curriculum implementation, and give feedback and guidance.

(9) Draft documents, curriculum Outlines, teaching plans and teaching PPT were prepared for the experimental group.

(10) The researcher prepared evaluation forms for curriculum for the experimental group, which can be filled in online or in paper version for selection.

(11) In the pre-test and post-test, the researchers provided assessment forms for students' independent learning ability. Among them, the electronic assessment form issued by students' self-assessment and mutual-assessment, and the paper version assessment form used by teachers' assessment.

(12) The researchers also checked whether the students filled in the assessment form properly, used to eliminate unqualified forms, and urged students to fill in again.

(13) A researcher was assigned to record the main procedures and basic contents of the study with notes for reference in the specific planning and writing of the research design.

● The participating teachers completed 7 tasks in the task list.

(1) The two teachers in charge of the teaching have respectively studied the teaching syllabus, teaching plan, lesson plan and other teaching documents according to the needs.

(2) The three teachers participated in the special discussion of expert opinions on teaching model evaluation and gave timely feedback on the discussion opinions.

(3) The teachers of the experimental group and the art teachers of Huang Gang Middle School participated in the cooperative development of the scaffolding teaching draft, in which the art teachers of Huang Gang Middle School reviewed the teaching case design and assessment content and gave feedback.

(4) The teachers of the experimental group give specific guidance to the students in the pilot study and quasi-experiment.

(5) The teachers of the experimental group carefully observed the classroom teaching, and made timely evaluation and reflection on the students' independent learning.

(6) Except for the teachers of the traditional teaching of woodcut prints, all the other teachers participated in the discussion of the pilot study, and put forward specific modification suggestions for the content of the teaching design.

(7) The teachers of the experimental group were familiar with the use of the assessment scale, and made an accurate evaluation of the students' independent learning ability after the end of the curriculum.

● The students completed 6 tasks.

(1) Three masters participated in the design of the pre-class questionnaire and organized the students to fill in the questionnaire.

(2) The students of the experimental group participated in all the learning activities and tasks assigned by the teacher.

(3) The students of the experimental group filled in and handed in the evaluation scale in time according to the requirements, and successfully completed the pre-test and post-test.

(4) On the basis of clear learning goals and tasks, the students of the experimental group carried out online or offline learning according to the requirements of the teacher, and completed the learning task of scaffolding teaching.

(5) Students used machines and learning tools in accordance with laboratory requirements.

(6) The students of the experimental group completed the summary and reflection of the learning in a timely manner according to the teaching design.

Phase 2: The results of teaching model design

Woodcut scaffolding teaching model consists of five parts:

1. Results of design analysis and tool preparation

● This thesis analyzes the shortcomings of traditional teaching of woodcut prints, the main contents of scaffolding teaching, and the advantages of changing teaching methods and the roles of teachers and students.

● This thesis analyzes the scaffolding teaching of woodcut from three aspects: student demand, social demand and educational goal demand.

● The teaching objectives and learner objectives are analyzed, and the objectives that teachers and students need to achieve in this study are clarified.

● Prepared the equipment described in Chapter 3, such as computer, projector, woodcut prints, woodcut knife, roller, ink, wood and other learning tools, as well as teaching plans, PPT, art model painting, etc. The learning materials of woodcut prints curriculum were built by using the Super Star Learning Pass APP, and the class student list was imported into the system in advance.

2.Results of determine of design principles

The instructional design is based on three principles: problem-centered, student-centered and online and offline mixed learning.

● Analyzing Bruner et al. 's decomposition method of complex problems with the principle of problem as the center, so as to guide students to use scaffolds to learn. Then the teaching design is carried out from the two dimensions of integrating problem consciousness into the teaching process and establishing problem support, which enricfies the content of teaching design.

The student-centered principle analyzes the student-centered perspective in constructivist learning theory. Under the background of teacher professional certification, the revision of curriculum syllabus, the development of teaching plans and courseware design all follow this principle. pre-class student research is also centered on students' goal needs and ability expansion, and the teaching design is carried out on the basis of respecting students' knowledge structure.

● The principle of focusing on online and offline mixed learning is more suitable for students to "decide the learning content and progress", which makes up for the problem of difficult teacher monitoring in traditional teaching. The design in accordance with this principle has aroused the enthusiasm of students, improved the teaching effect, consolidated the learning efficiency, and made students gain more in the learning process of theoretical knowledge.

3.Results of design of Scaffolding Teaching model

The scaffolding teaching model design of Woodcut has completed the writing of teaching play(Appendix 6) and three kinds of lesson plays(Appendix 7): question scaffolding, student-centered scaffolding and online and offline mixed learning scaffolding. The teaching contents of these three lesson plans are carried out according to the five steps of scaffolding teaching, and specific teaching implementation steps and evaluation contents are set up.

● Teaching model design of question scaffolding consists of three parts. The first part is Learning the concept of woodcut prints. Carry out the teaching of problem scaffolding 1. The second part is learning woodcut footprint,Carry out the teaching of problem scaffolding 2. The third part is learning the tools and materials of woodcut and printing, Carry out the teaching of problem scaffolding 3. The teaching design is mainly guided by questions, allowing students to use the question scaffolding to carry out learning of the theoretical knowledge of woodcut.

● Teaching model design of student-centered scaffolding includes Case overview, Case presentation, learning evaluation and teaching reflection has four parts. It is not only designed according to the five steps of scaffolding teaching, but also set up a scaffold closely around student-centered in order to guide students to carry out independent learning.

● Teaching model design of mixed online and offline learning scaffolding includes Design intention, Case presentation and learning evaluation, teaching reflection four parts. The teaching design is mainly based on mixed learning theory and uses learning activity support to guide students to learn step by step to make up for the shortcomings of traditional teaching model.

4.Results of design of scaffolding teaching model evaluation

Teaching evaluation is mainly evaluated by scale. The research team designed five indicators for undergraduate students, including a 10-question scale for evaluation of independent learning ability. According to the original scheme, the evaluation method adopts the combination of student self-evaluation, mutual evaluation and teacher evaluation, and the average value of the three is regarded as the total value

of students' independent learning ability. The scale is designed as a fixed form, but there are three options: Self-Assessment, Mutual Assessment and Teacher Assessment (Appendix 8). This table was used for the pre-test and post-test of students in the experimental group.

The pre-test was conducted before the students of the experimental group started the formal class, and the post-test was conducted at the formal end of the teaching for the students of the experimental group. After obtaining the original data, to summarize the overall independent learning ability of students in the class.

5.Results of Evaluation by Experts

The research team sent the teaching design materials to five senior teachers of art curriculum theory with more than 10 years of teaching experience, and invited them to score on the Consistency checking form (Appendix 9) and the Appropriate checking form (Appendix 10) . After receiving the original form of expert scores, we summarized them to make a table, and entered the data into computer software for statistics. Calculate mean score of each item, mean score of each item is greater than 0.05 in the teaching design Consistency checking form (Table 3).

TABLE 3 Consistency checking results by experts

No.	Items	Mean score
1	Learning problem with principles	1
2	Principles and aims	0.8
3	Principles and learning activities	0.8
4	Aims and content	1
5	Aims and learning activities	0.6
6	Content and learning activities	0.5
7	Content and learning materials	0.8
8	Content and learning resources	0.6
9	Content and learning duration	0.8
10	Assessment with aims	0.8

mean score of each item greater than 3.5 in the teaching design Appropriate checking form(Table 4).Therefore, the teaching design is Appropriate.

TABLE 4 Appropriate checking results by experts

No.	Items		Mean score
1	Principles	1.1 Reasonable	4.8
		1.2 Theoretical concepts used to support	4.4
		1.3 Lead to practice	4.2
2	Objectives	2.1 Clear and concrete	4.2
		2.2 Can be measured and evaluated	4
		2.3 Suitable for the target group	4.4
3	Content	3.1 Meet the objectives	4.6
		3.2 Academically correct	4.6
		3.3 Suitable for the target group	4.2
4	Learning activities	4.1 Meet the objectives	4
		4.2 Suitable for the target group	4.6
		4.3 Interesting and possible	4.2
5	Materials	5.1 Meet the learning activities	4.4
		5.2 Suitable for the target group	4.8
		5.3 Interesting and possible	4.2
6	Evaluation	6.1 Meet the objectives	4.6
		6.2 Suitable for the target group	4.6
		6.3 Possible to practice	4

According to the following suggestions put forward by experts: "The teaching resources of the teaching are rich, suitable for the target group, the teaching content is interesting and feasible, but the compatibility between the basic concept of the teaching and the guiding practice can be slightly adjusted, and the teaching objectives can be further adjusted and clarified." "In the later stage, it can be slightly adjusted to make the teaching content and learning activities unfold in accordance with the five steps of scaffolding teaching and correspond to the teaching objectives." The research team held a special discussion and assigned tasks, and made small modifications according to the expert suggestions within one week, making the original teaching design objectives more accurate, the scaffolding teaching steps more clear, and the teaching design content more perfect.

The specific revisions are as follows:

(1) Added the expression of teaching objectives.

(2) The teaching content is described in more detail according to the steps of scaffolding teaching, so that the content is consistent with the teaching objectives.

(3) The expression of theoretical application is added in the teaching content, which makes the basic concept of the teaching more closely fit with guiding practice.

(4) Adjust the teaching assessment design to be consistent with the teaching objectives.

(5) Modify the correspondence between teaching content and learning activities.

Phase 3: Results of pilot study

After pilot studies, students using scaffolding teaching methods have significantly improved their independent learning ability. During the pilot study, it was found that the scaffolding steps of the original teaching design needed to be clearer, the teachers should give proper guidance in the process of students' cooperative learning, and the details of the teaching design of the online and offline hybrid learning scaffolding needed to be further optimized. Therefore, the research team made

corresponding improvements to the original teaching design to make the original teaching design more scientific, reasonable and effective.

The results of the pilot study revealed problems in the teaching and learning process. Data collected from conducting pilot studies are used to revise instructional designs, lesson plans, and instructional materials for:

(1) Adjust the appropriateness of teaching activities.

(2) Modify the expression of teaching plans and teaching plans to avoid ambiguity.

(3) Revise the teaching plan by adding teaching design details and giving teaching situations.

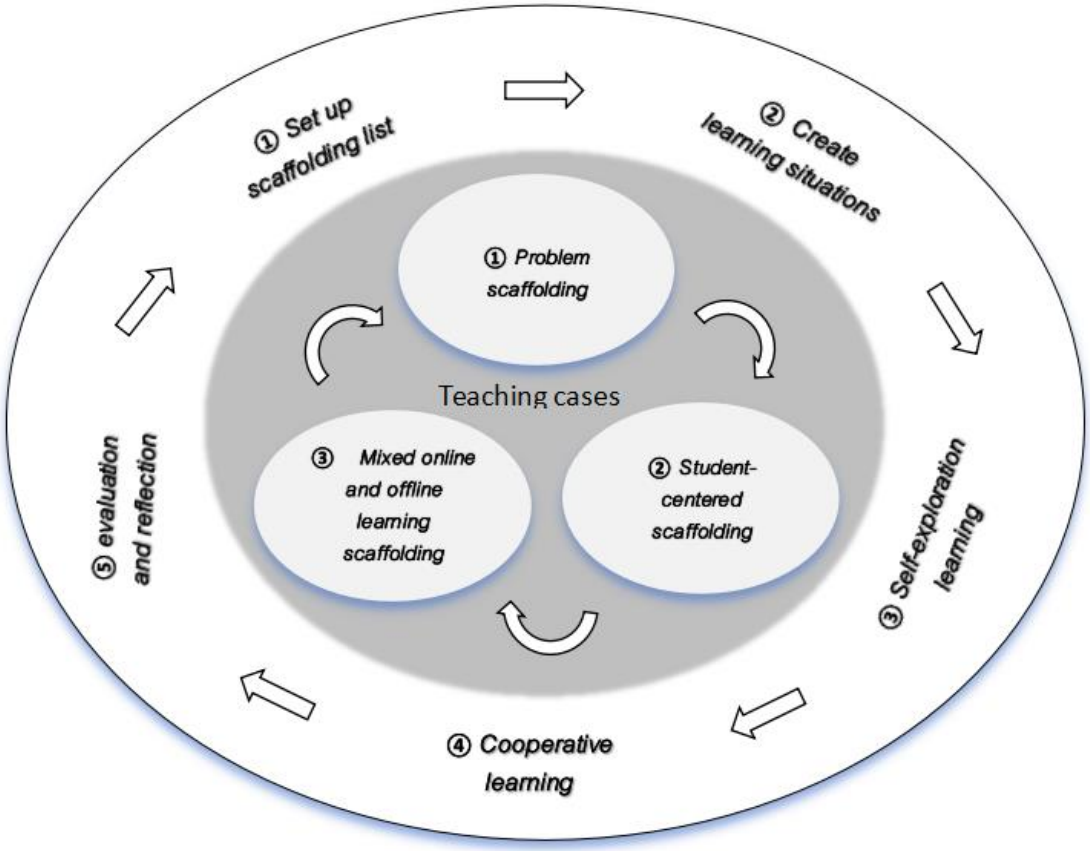


FIGURE 6 First draft of scaffolding teaching model

The greatest achievement of the pilot study is to obtain the first draft scaffolding teaching model(Figure 6). In the next stage, quasi-experiments will be carried out in the

experimental group.To guide students' independent learning, according to the five steps of the draft scaffolding teaching. The specific teaching content is divided into three teaching examples: problem scaffolding, student-centered scaffolding, and mixed online and offline learning scaffolding. Students' independent learning ability will be measured before and after the implementation of the teaching model. Finally, by using computer software to calculate the improvement of students' independent learning ability.

Phase 4: Results of Implementation steps and Procedures

This teaching model implemented in the 2023 academic year for second-year undergraduates. The subjects of the experimental group as a whole underwent scaffolding teaching practice in the printmaking laboratory. A random pre-test and post-test design study was used to test the improvement of students' independent learning ability. The results of the implementation of the teaching model are as follows.

1.The results of woodcut print scaffolding teaching documents

Check and collect the syllabus, teaching design, teaching plan, lesson plan, PPT, etc. of the woodcut scaffolding teaching curriculum, upload the electronic version to the Super Star Learning online curriculum system, and print the paper version for the reference of the experimental group.

2. The data results of the assessment scale of students' independent learning ability

According to paired sample T-test, the mean and standard deviation of 5 dimensions of students' independent learning ability were obtained. The T-values are more than 6.7, and all the P-values are less than 0.05, the measured values of 5 dimensions of the experimental group of students' independent learning ability have significantly improved(Table 5), which confirms the validity of the second hypothesis of this study.

TABLE 5 Comparison of pre-test and post-test scores of 5 Dimensions of experimental group

No.	Dimensions	Full score	pre-test		post-test		T	P
			$\overline{X}$	SD	$\overline{X}$	SD		
1	Decide on learning goals	10	6.41	1.20	8.36	1.04	7.523	<0.001
2	Decide the learning content and progress	10	6.67	0.99	8.50	0.96	8.662	<0.001
3	Choose learning methods and techniques	10	6.61	0.98	8.37	0.93	7.331	<0.001
4	Monitor the learning process	10	6.74	0.98	8.46	0.92	7.153	<0.001
5	Evaluate the results of acquisition	10	6.56	1.09	8.24	1.01	6.799	<0.001

* p<0.05

TABLE 6 Comparison of the total score of pre-test and post-test in experimental group

Test	$\overline{X}$	S.D.	T	P
Pre-test	6.60	0.122	37.432	<0.001
Post-test	8.38	0.102		

* p<0.05

Table 6 shows that the pre-test data of the experimental group is distributed near the mean value 6.60, with an average deviation from the mean value 0.122.The post-test data is distributed near the mean value 8.38, with an average deviation from the mean value 0.102. By the paired sample T-test, the T-value is 37.432, The p-value is less than 0.05, Which means that the independent learning ability of the students has been increased by using the scaffolding teaching model.

3. Conduct qualitative data analysis on the study results

The scaffolding teaching model of woodcut prints has significantly improved the independent learning ability of students in the quasi-experimental group. However, this teaching model is still in the process of exploration. While summarizing successful experiences, we also need to discuss some shortcomings and put forward practical suggestions.

● Qualitative data collected during the teaching implementation phase

(1) The teachers of the experimental group inspected the learning environment. Including arranging laboratory tables and chairs, arranging teaching and learning Aids, checking the operation of the machine, etc.The experimental group needs to prepare an online learning environment, so that students can better carry out online independent learning.

(2) The teachers of the experimental group have been prepared separately the curriculum syllabus, teaching plan, lesson plan and PPT used.The teaching materials used in the experimental group mainly focus on scaffolding teaching.

(4) quasi-experiment were carried out in the experimental group. And have been separately to carry out pre-test and post-test of independent learning ability, and collected student self-assessment, mutual assessment and teacher assessment forms.To use the same evaluation form and evaluation method to compare the independent learning ability of students in the experimental group.

(5) The teachers of the experimental group implemented the three teaching cases in the teaching design according to the five steps of scaffold teaching, analyzed the teaching effects of the three teaching cases, and summarized the improvement of students' independent learning ability.This approach can well apply the theory to the concrete scaffolding teaching model.

(7) After the study, the teacher timely collected the students' classroom experiment report and skill activity report (the middle school printmaking lesson plan written by the students).These materials can be used as the archives of the implementation results of the scaffolding teaching model.

● Analysis data of experimental group

The quasi-experimental study participants in the experimental group performed well and completed the expected tasks on time. The method of sample and population selection is reasonable and conforms to the law of this study. The teaching content and teaching cases are complete and consistent with the teaching design. The teaching implementation process and implementation steps are orderly and in line with standards. The assessment data of students' independent learning ability were collected using Computer software. The data usage and statistics were in line with statistical principles and norms. The qualitative evaluation of quasi-experimental results was consistent with quantitative statistical results.

● Revision results after the implementation of scaffolding teaching model

The data collected from the implementation and evaluation of the scaffolding teaching model were used to revise the construction scheme of the model. The revisions are as follows:

(1) Modify the question scaffolding in the teaching plan by asking more detailed questions.To guide students to learn new teaching content by themselves with more abundant question scaffolding.

(2) Write down the details of the organized activities, so that students can understand the details of the activities and know the activities procedures.

(3) Increase the teaching content and specific time of teaching activities, so that students can clearly choose what content to learn and where to participate in activities at a specific time node.

(4) Arrange details of how students will present their work and lesson plans in class.

(5) Further refine and modify the handout to make it look more practical, simple and interesting.

CHAPTER 5
CONCLUTION AND DISCUSSION

This chapter puts forward the conclusions, discussions and suggestions of the research, which will promote the design of the scaffolding teaching model of woodcut prints to be further improved and the practice to be carried out more effectively.

5.1. Conclusion

5.1.1 Research instruments of scaffold teaching model

In terms of the use of research instruments, the following research instruments are used in this study.

In-depth interviews with experts.Through in-depth interviews with 6 experts, it is understood that undergraduates in this major are not good at independent learning and are completely immersed in passive learning. Therefore, it is necessary to reform the traditional teaching method and explore a new teaching method. The experience of scaffolding teaching shared by experts has important reference value for the teaching design of this study.

Students' questionnaire survey of independent learning ability.Mainly used to collect students' learning intention, learning habits, learning profiles, learning cognition, learning strategies and other aspects of information.This information can provide the most basic reference for the design of the draft teaching model.

Design draft of Scaffolding teaching of Woodcut Prints.The teaching design draft of Woodcut Prints is completed by using scaffold teaching theory, which provides basic documents for the implementation of scaffolding teaching model of woodcut prints.

Consistency and appropriate checking forms by experts.It is mainly used for experts to evaluate the design of scaffolding teaching model, observe its suitability and consistency, and provide reference for the modification of teaching model design.

The documents of the scaffolding teaching of Woodcut prints.Using wood engraving scaffolding teaching document. For example, revised syllabus, teaching

design, teaching plan, lesson plan, PPT,etc., in order to facilitate the development of scaffolding teaching model.

Quasi-experiment.The experimental group adopts the scaffolding teaching model, and the pre-test and post-test data are obtained through the assessment, so as to check the effect of the draft design of scaffolding teaching model of the woodcut prints.

5.1.2 Development results of scaffolding teaching model

The purpose of the scaffolding teaching model is defined

According to constructivism theory, zone of proximal development theory and scaffolding teaching theory, scaffolding teaching model is constructed to improve undergraduates' independent learning ability, and the effect of this teaching model on improving undergraduates' independent learning ability is verified through the practice in the teaching of woodcut prints curriculum for second-year undergraduates.

Research roles are divided into three groups

The first role is researcher.Who have Prepared all the research tools needed in the laboratory.Set out each procedure and step of the research proposal, and basic information about the school, teachers, classes, etc.Conduct a questionnaire survey on students and interview teachers to understand the status quo of students' independent learning ability before class.

The content and steps of teaching design related to scaffolding teaching were listed, the assessment forms were issued and collected, the expert consistency and appropriate checking were completed, the teaching environment was arranged, and the teaching equipment, tools and materials required for the quasi-experiment were prepared.

Supervised teachers' guidance on pilot research and implementation. The teaching draft, teaching outline, lesson plan and teaching PPT have been written. Teaching assessment tools were prepared for the experimental groups.

In the pre-test and post-test, the teachers and students issued the assessment form of independent learning ability on time.check whether the students fill

in the assessment form normally,Write down the main procedures and basic contents of the study with notes.

The second role is teacher participation. They participated in the study of the teaching syllabus, teaching plan, lesson plan and other teaching documents, participated a seminar on expert opinions on teaching evaluation.

Cooperate to develop the draft of teaching model design required by scaffolding teaching, and participated in teaching case design and assessment content review.The pre-experiment and implementation are guided in detail.The classroom teaching was observed, and the students' independent learning ability was evaluated and reflected.

In the pilot study, the content of teaching design is discussed and suggestions for modification are put forward. We have been familiar with the use of the Assessment Scale, and accurately evaluated students' independent learning ability.

The third role is student participation. They have participated in the pre-class questionnaire survey and filled in the survey information accurately.Participated in all learning activities and completed all learning tasks.Timely filled in and submitted the Assessment Scale issued by the research team, and successfully completed the pre-test and post-test.Clear learning objectives and tasks, according to the requirements of teachers to carry out online or offline learning.Machines and learning tools were used in accordance with laboratory requirements.The summary and reflection were carried out in time.

Teaching content of scaffolding teaching model

This study ultimately formed a scaffolding teaching model(Figure 7). The teaching content was presented through three cases: question scaffolding, student-centered scaffolding, and online and offline mixed learning scaffolding. In terms of content design, it fully follows the five steps of scaffolding teaching, connects scaffolding teaching theory with teaching content, makes up for the lack of flat teaching content in traditional classroom, and makes boring teaching content full of interest, so it has great advantages in the arrangement of teaching content. And in the design of

teaching model, the concrete teaching implementation steps and evaluation content are formulated, which lays a solid foundation for the later implementation and evaluation of teaching model. From the point of view of the content design and the whole implementation and evaluation design of the scaffolding teaching model, this model belongs to the process teaching model, emphasizing the whole teaching content design and implementation and the final evaluation process.

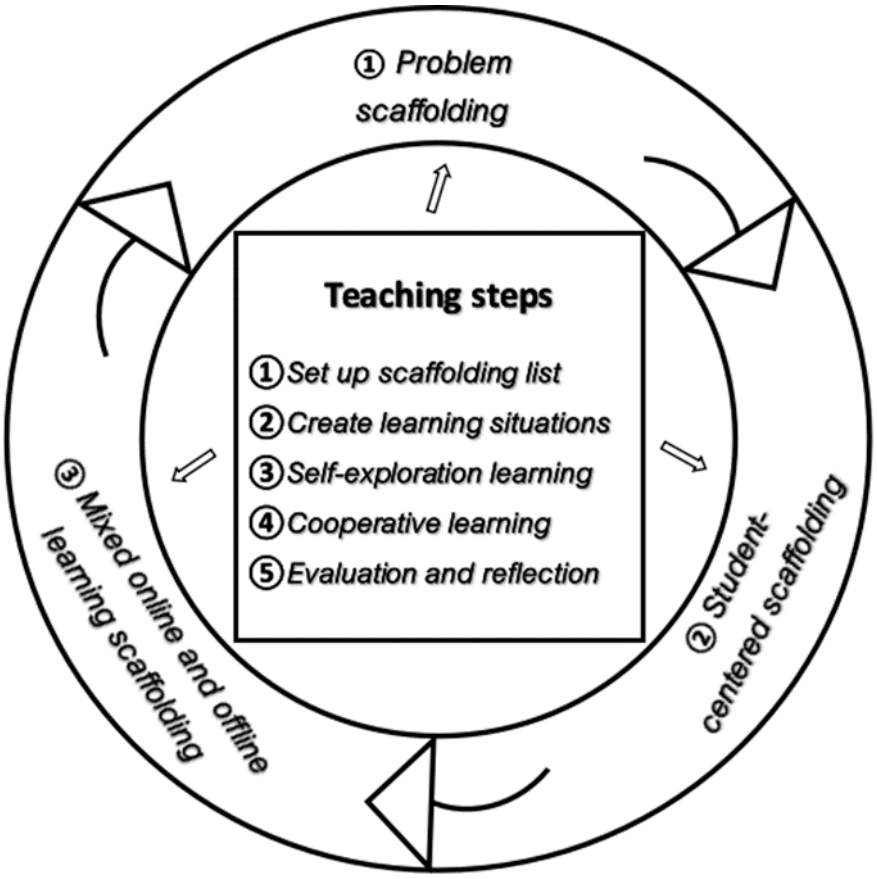


FIGURE 7 The scaffolding teaching model

This model subverts the traditional art teaching, brings new opportunities for the development of art teaching, and provides a reference model for students to determine their own learning objectives, choose their own learning content, monitor their own learning process, and conduct self-evaluation. Although the content design of this teaching model is mainly aimed at the woodcut prints curriculum of university, the teaching content is extensible and compatible, and its content arrangement mode,

teaching process mode and evaluation method are worthy of reference by other disciplines.

The implementation of the scaffolding teaching model

This scaffolding teaching model is to carry out in the experimental group, which is implemented in three steps:

The first step is Preparation before the quasi-experiment.Firstly,select the population and sample of the experimental group.Secondly,train professional teachers, organize them to study teaching documents and syllabuses, and familiarize themselves with teaching plans, teaching materials and assessment tools.Finally, prepare the learning environment, including arranging the laboratory, tables and chairs, tools and machines, cleaning the environment, etc.

The second step is Implementation of quasi-experiment.Before the implementation of the teaching model, the students of the experimental group were pre-tested on their independent learning ability, and the measured values were collected.

In the process of implementing the teaching model.The students in the experimental group were carried out quasi-experiments according to the scaffolding teaching design, According to the five steps of scaffolding teaching, three teaching cases are implemented.

At the end of the quasi-experiment, the research team conducted qualitative analysis of the three teaching cases respectively to summarize the improvement of students' independent learning ability through scaffolding teaching.

The third step is evaluation after the implementation of teaching model.Firstly, conduct post-test on students immediately after the implementation of the teaching model, and summarize the data of students' self-assessment, mutual -assessment and teacher-assessment.

Secondly, computer software was used to conduct a paired T-Test on the experimental data to compare whether there were significant differences in the P-values of the pre-test and post-test of the students' independent learning ability in the experimental group.

Finally, it was proved that the scaffolding teaching model implemented in the experimental group improved students' independent learning ability significantly.

Revision of the scaffold teaching model

At the end of scaffolding teaching model,the research team must to Revision of teaching model.The revision work is an important stage for the improvement of the teaching model. Through the quasi-experiment of the experimental group, it is found that although the scaffolding teaching model has significantly improved the students' independent learning ability, how to formulate the policy? How to carry out real and effective evaluation? How to further expand the research depth? It also needs further revision and improvement.

5.1.3 The effectiveness of scaffolding teaching model

Evaluate the effectiveness of scaffolding teaching model through the following strategies:

The first. Before the implementation of the teaching model, experts will evaluate it to verify the appropriateness and consistency of the teaching model.The second.Test the feasibility of research design and operation procedures through pilot research, and test the reliability and validity of the assessment scale to ensure the reliability of measuring tools.Once again.Carry out quasi-experiments in the experimental group to verify the effect of scaffolding instruction model on improving undergraduates' independent learning ability.Finally.Use the pre-test and post-test data of the experimental group for quantitative statistics to verify the research hypothesis.

This study verifies the research hypothesis in the following ways:

The evaluation and analysis of expert consistency and suitability show that the instructional design has good consistency and suitability, and the first hypothesis of this study is valid.

Paired T-test was carried out on the data of the experimental group, $p<=0.05$, which showed that there were significant differences in the five dimensions of the pre-test and post-test of the experimental group, and the students' independent

learning ability in the experimental group with scaffolding teaching method was significantly improved, so the second hypothesis of this study was valid.

5.2. Discussion

5.2.1 The value of this study

The research on the scaffolding teaching model in woodcut teaching has proved that students' independent learning ability is more significant. Therefore, this research has high theoretical value and practical significance for improving students' independent learning ability.

The scaffolding teaching model of woodcut prints constructed in this study is a teaching process model, with three teaching cases as the core content. It has positive reference significance for traditional art teaching, which can provide a useful reference for art teachers to change the traditional teaching model, promote students' independent learning more effectively and reduce teachers' burden.

This study is very helpful for students to develop the habit of independent learning, and provides an effective application model for online and offline mixed learning. From this point of view, it helps China undergraduates to develop the habit of online and offline independent learning, so in theory, its application scope can be wider and its application value can be greater.

5.2.2 Limitations of this study

The intensity of teaching principles guiding teaching practice in this teaching model needs to be enhanced. The content of teaching design and the details of corresponding teaching principles need to be more closely coordinated, so as to highlight the advantages of scaffolding teaching.The closeness between theoretical basis and teaching content also needs to be strengthened.In particular, the theory of the latest development area and the design of teaching content need to be implemented in the details of each teaching case to ensure that the theory is fully utilized.

The scaffolding teaching method that takes learners as the center and uses online and offline mixed learning needs continuous improvement to form a more stable and mature teaching model.The online and offline learning content can be adjusted

according to the characteristics of theoretical and skill learning, allowing students to conduct skill learning offline. They can observe demonstration videos online, learn theories online, and apply theories to practical exercises offline to optimize the arrangement of teaching content.

This study constructs scaffolding teaching model through quasi-experiment of woodcut prints curriculum, but the scope of application of this model is not verified. It may have an obvious effect on improving students' independent learning ability in woodcut prints or other art curriculum, but whether it is also applicable in other subject curriculum needs further research and exploration. Therefore, the scope of application and possible effects of this study need to be further explained.

5.2.3 Formulation of recommendations for policy changes

Multi-party cooperation to formulate policies

Principals and school administrators should attach importance to teaching reform, apply new teaching theories to guide practice, try new teaching models, train teachers regularly, and learn relevant knowledge of teaching reform and classroom management.For example, organize them to learn scaffolding teaching theory, let them participate in scaffolding teaching model together, conduct training at the beginning of each semester, and learn to use scaffolding teaching method to carry out classroom teaching reform and manage the classroom.

Teachers should participate in the formulation of various teaching policies, so that teachers can be familiar with the operation of scaffolding teaching model in the whole teaching process. Participate in the whole process of teaching model design, and effectively promote the effective implementation of various activities in the scaffolding teaching model.

First of all, teachers need to participate in the formulation process of teaching management, training, teaching evaluation and other policies.“Including the management of teaching plans, training teachers, teaching quality assessment, the development and improvement of teaching management related systems, teacher classroom management and so on” (Fu, 2021).So that these policies are more in line

with the actual needs of teachers and teaching practice, and can provide good policy guidance for the optimization of scaffolding teaching model.

Secondly, teachers need to be familiar with the operation process and method of scaffolding teaching model and master its core concepts and skills through repeated training and practice, so as to improve the teaching quality of crrriculum, improve students' independent learning ability and cultivate their cooperative spirit (Zhu,2016).

Thirdly, teachers should participate in the whole process of designing and implementing the scaffolding teaching model, including the setting of teaching objectives, the selection of teaching contents, and the application of teaching methods and means (Xu et al.,2021).

Finally, according to the requirements of the scaffolding teaching model, teachers should organize students to conduct activities such as independent learning, cooperative learning and inquiry learning (Xiao,2002).

The application of research results should emphasize the three-dimensional

Before the application of teaching model, teachers should have sufficient time to study teaching documents, write teaching plans and lesson plans, and prepare all materials for teaching.If they are not prepared enough in one aspect, the effect of scaffolding teaching model will be affected, It has a serious impact on the later work.

The research results can not only be used in woodcut prints curriculum, but also as a reference for curricula such as sketching, Chinese painting, oil painting, etc., with the aim of helping teachers improve teaching methods and cultivating students' independent learning ability (Sun et al.,2021). However, it is necessary to constantly supplement and enrich the content of the original scaffolding teaching model, which can provide the choice of multiple curriculum modules and adjust the teaching steps of each module appropriately. In order to make the revised teaching model more suitable for sketching, Chinese painting, oil painting and other curriculum.

The application of the research results can even be extended to other curriculum, such as sports, music and other curriculum, that focus on skills training. In these curriculum, Referring to the specific teaching steps and implementation process in the scaffolding teaching mode, it can not only enhance students' active learning ability, but also enable teachers to innovate teaching methods and improve teaching effects (Ding, 2020).

Teachers should study scaffolding teaching techniques

Teachers should understand the law of scaffolding teaching, It is suggested that we should always pay attention to the latest achievements of scaffolding teaching practice and grasp the laws of scaffolding teaching in practice.especially focus on the research of scaffolding teaching skills.Therefore, it is necessary to participate in scaffolding teaching skills training regularly.Through pre-class research to understand the students' independent learning situation (Zhang,2018), grasp the characteristics of students' independent learning, and run the concept of student-centered into the whole teaching process.

Specifically, teachers should flexibly apply the law of scaffolding teaching to teaching, especially grasp the five links of scaffolding teaching, integrate the scaffolding teaching theory with classroom teaching practice (Gan,2022). Hence, it is essential to review the original teaching model's content design and modify segments that do not align with the five stages of scaffolding teaching. This process aims to enrich initial mundane teaching content, thereby effectively stimulating students' enthusiasm for learning.

Teachers should also make use of modern information technology to assist teaching (Cai,2006). First of all, they should learn how to use common software for scaffolding teaching, and use this software to build an online curriculum. It involves constructing online curriculum content tailored for the scaffolding teaching method, thereby creating an optimal learning environment conducive to online education.

Teachers should encourage students to carry out online learning

Teachers should establish online curriculum (Wu,2020). Encourage students to use the Internet and APP software for independent online learning through online management and process evaluation, get familiar with the use of online curriculum software, organically link online independent learning with offline teachers' demonstration guidance, and highlight the characteristics of this scaffolding teaching model.

Teachers can release Teaching Videos and Teaching Steps (Ye,2020) through online learning platforms, so that students can watch them repeatedly. It can also make up for the shortcomings of traditional demonstration teaching in which students easily forget knowledge points, improve students' enthusiasm for independent learning, and improve the classroom teaching effect.

Through the online learning platform to carry out scaffolding teaching, students will combine traditional offline learning and online learning, improve their interest in course learning content, but also effectively avoid the behavior of secretly playing mobile phones in class, and spend more time on online learning course content.

5.2.4 Recommendations for real and effective evaluation

implementing the scaffolBefore ding teaching model, the research team should develop a comprehensive evaluation plan in advance, conduct testing and evaluation strictly according to the timeline, and collect and analyze data as soon as possible. During the evaluation process, it is necessary to check the authenticity of the data, and delete invalid data in time. "To ensure the authenticity and reliability of statistical data"(Song,2015).

The validity of the evaluation results is reviewed, especially the value of students' independent learning ability under the scaffolding teaching model is checked again to obtain completely accurate and reliable data, and the logic and scientificity of the data analysis results are tested to obtain a true and scientific research result, which is convenient for later promotion and dissemination.

Check for imperfections in the evaluation process, optimize the original evaluation plan, establish a dynamic evaluation plan (Huang et al.,2018), and make the evaluation effect of the scaffolding teaching model more withstand the test of time.

In addition, if this scaffolding teaching model is applied to the teaching of sketch, color and other curriculum, it is necessary to adjust the evaluation content and evaluation process to make it more suitable for the scaffolding teaching model.

5.2.5 Recommendations for further study

This scaffolding teaching model is aimed at the woodcut prints curriculum, which may have similar effects on other fine arts disciplines. We can try to improve the independent learning ability of students in other fine arts disciplines through this teaching model. For example, in the curriculum of Chinese painting, oil painting, watercolour painting and so on, we can also try to use the scaffolding teaching model of woodcut prints to carry out teaching. We can fully refer to the whole teaching process model, but we need to tailored teaching content and activity design(Luo, Ma & Yao,2020).Because different curriculum have different teaching contents and need to carry out different teaching activities.

However, the applicability of this scaffolding teaching model to other non-fine arts curriculum remains to be tested. If we want to expand the scope of application of the curriculum, we must increase some general art knowledge and skills applicable to various disciplines, reduce the difficulty of the content, so as to improve the independent learning ability of students in different disciplines.

From the content of this scaffolding teaching model, the original teaching content is more professional, not necessarily applicable to other disciplines. In order to apply this teaching model to other disciplines, multiple teaching modules can be set up for each major to choose from (Yang et al., 2022), while enriching the teaching content of each discipline, so that the original teaching model is more inclusive.

In addition, the participation and effect of the research role in this teaching model need to be further monitored, and the monitoring results should be timely fed back to the participants.Timely solve the problems and shortcomings of the research

roles in the process of participating in the study of this model, so as to better achieve the purpose of improving the design and implementation effect of the teaching model.

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APPENDICES

APPENDICES A

INTERVIEW OUTLINE

Interview outline

1. Do you feel that students are interested in techniques? What was the biggest problem that students encountered in the practice process, and how did you solve it?

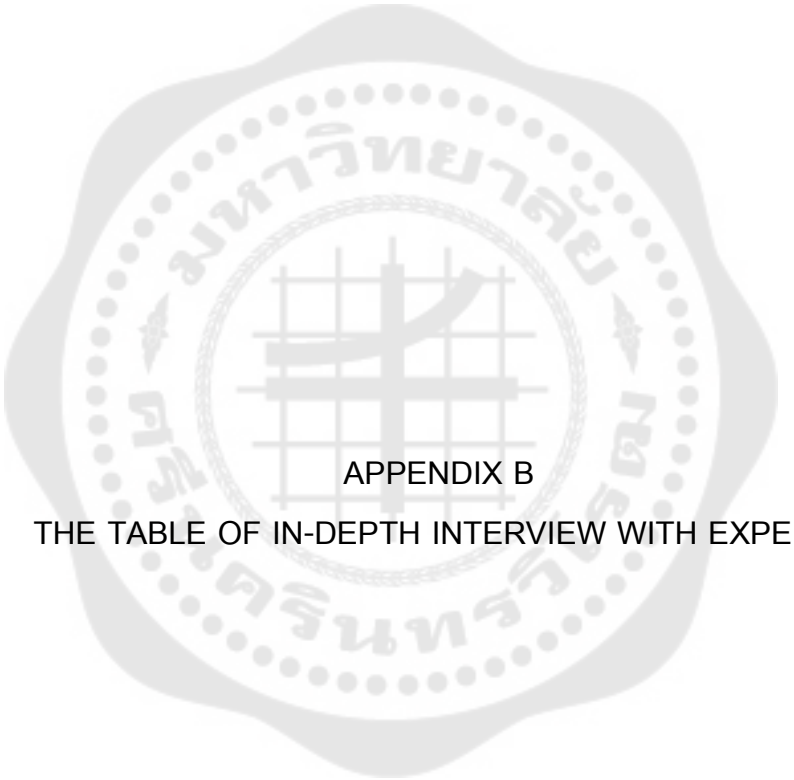
2. How do you think to organize students to study by themselves? What are the main problems students encounter in their studies?

3. What do you think about the effect of classroom teaching to guide students to learn independently? Can the works created by students under the guidance of teachers meet your requirements?

4. What do you think are the main gains of students after learning the basic theories and techniques of the curriculum?

5. What difficulties do you think teachers and students encounter when interacting with each other in online teaching curriculum?

6. Do you have any ideas or suggestions for improving students' independent learning ability in class?



APPENDIX B

THE TABLE OF IN-DEPTH INTERVIEW WITH EXPERTS

The table of in-depth interview with experts

Question number	Interview question	Summary of respondents' responses	summarize
1	Do you feel that students are interested in techniques?		
	What are the biggest problems that students encounter during the practice?		
	How did you solve it?		
2	In your opinion, how to organize students' independent leaning?		
	What are the main problems students encounter in their studies?		

3	What do you think of the effect of classroom teaching to guide students to learn independently? Can the works created by students under the guidance of teachers meet your requirements?		
4	What do you think are the main gains of students after learning the basic theories and techniques of the curriculum?		
5	What difficulties do you find in the interaction between teachers and students in an online curriculum?		
6	Do you have any ideas or suggestions for improving students' independent learning ability in class?		

APPENDIX C
RESEARCH QUESTIONNAIRE

Table of investigation on the learning willingnessof sophomore Fine Arts majors

Questionnaire range	No.	problem	option	proportion
Willingness to learn	1	What motivated you to study art?	Personal hobby, learning as a kind of enjoyment.	
			School programs, at the request of teachers and parents.	
			Enhance the quality of art, do an excellent student.	
			One more specialty, prepare for the future living.	
	2	What do you think of your initiative in learning art?	Like hands-on, take the initiative to complete the classroom learning tasks.	
			Basically able to complete classroom learning tasks.	
			Afraid of affecting the grades, have to complete the task of learning.	
			Lazy,often do not complete the study task.	
	3	To what extent do you want to improve your independent learning ability through a new teaching method?	Very strong	
			More intense	
			In general	
			Not strong	
			Be indifferent	
	4	How interested are you in learning woodcut prints?	Like very much	
			like	
			In general	
			dislike	

Table of study habits of sophomore Fine arts majors

Questionnaire range	No.	problem	option	proportion
study habit	5	How is your preview going before class?	Prepare very carefully on your own	
			Basically preview according to the teacher's requirements	
			Look at the mood, sometimes preview, sometimes do not preview	
			There is too much homework and no time to preview	
	6	What kind of preview method do you usually use?	Scan the text and pictures in the textbook	
			Focus on new knowledge points and design legends	
			Skimming through textbooks, not paying special attention to knowledge points and design legends	
	7	Do you take the initiative to look up information during the preview?	Often look for information, do a deep preview of the textbook	
			Occasionally look up information, completely depending on the mood and subjective will	
			There was no time to look things up	
	8	Do you take notes in art class? How to do that?	Do, usually only write down the teacher's blackboard	
			Do, write down the teacher's blackboard notes and main points, and underline them in the textbook	
			Don't do, try to remember in my heart, don't remember	
			Never take notes	
	9	How often do you read art books?	Read often	
			Read when you have a study assignment	
			Occasional reading	
			Chronic non-reading	

Table of study habits of sophomore Fine arts majors

Questionnaire range	No.	problem	option	proportion
study overview	10	How was your self-confidence when you were studying art?	Very confident	
			More confident	
			Not very confident	
			Have no confidence at all	
	11	Which of the following learning situations is better for you?	You can control your study time independently	
			Have some independent in learning	
			You don't need independent to follow your teacher's lead	
			The cognition of learning independent is fuzzy	
	12	How are you getting along with your art studies?	Like to explore a new set of methods	
			Always learn from others' methods and use them for your own use	
			All he knows is his nose to the grunt, never his method	
			Often read books or consult teachers and classmates to find new ways	
	13	How is my independent learning ability in the art curriculum I have learned	strong	
			stronger	
			In general	
			weaker	
			Very weak	

questionnaire range	No.	problem	option	proportion
study overview	10	How was your self-confidence when you were studying art?	Very confident	
			More confident	
			Not very confident	
			Have no confidence at all	
	11	Which of the following learning situations is better for you?	You can control your study time independently	
			Have some independent in learning	
			You don't need independent to follow your teacher's lead	
			The cognition of learning independent is fuzzy	
	12	How are you getting along with your art studies?	Like to explore a new set of methods	
			Always learn from others' methods and use them for your own use	
			All he knows is his nose to the grunt, never his method	
			Often read books or consult teachers and classmates to find new ways	
	13	How is my independent learning ability in the art curriculum I have learned	strong	
			stronger	
			In general	
			weaker	
			Very weak	

study cognition	14	Do you think mobile phones, tablets and other electronic devices have had a negative effect on your art studies?	Yes, so I try not to play with them in class	
			Yes, but I'm addicted to mobile phones and tablets. I often lose control	
			It doesn't matter. I use them sometimes	
			Don't play mobile phones, tablets feel boring, art is a little boring	
	15	How do you think an Art teacher should allocate time to a class?	Teachers should spend more time explaining theoretical knowledge and examples, and students should not spend too much time practicing	
			Allocate more time for students to learn by themselves and do hands-on work, with teachers giving priority to guidance	
			The teacher's demonstration and the students' practice are divided into half time	
	16	Do you often review your studies?	Summarize frequently and find out the problems and deficiencies in learning	
			Sometimes summarize and find the problems in learning	
			Generally do not summarize, only know to use action to prove their learning effect	
			Never summarize, learn where is where	

	17	What would you do if you didn't learn the knowledge and skills you have already learned?	After learning can be, not to understand really understand or really will	
			Will study hard, from the teacher or classmates to understand the knowledge that does not understand	
			I will try my best to learn knowledge and skills and strive to be better than other students	
			Although I don't know a lot of knowledge and skills, but I think these are not important	
study strategy	18	What was your performance like in class?	Trying to remember every point in class	
			I want to try my best to grasp the key points of art knowledge and master basic skills	
			Thinking, asking "why" and struggling to find the answer	
			Often absent-minded, in a daze or doing their own thing	
	19	What do you do when you have a problem in your art class?	Think and solve problems entirely on your own	
			Find references and figure it out	
			Seek help from your teacher or classmates to solve the problem later	
			I like to discuss and solve problems with others	
			Encounter problems generally unwilling to think, directly give up	

questionnaire range	No.	problem	Answer the situation in detail	description
study suggestion	20	Do you think it is important for students to learn independently ? In what ways should we improve the ability of independent learning?		
	21	Do you think teachers should explore new teaching methods? What is the relationship between the teaching effect and the teacher's teaching method?		

Appendix D

Results of interview with experts

Results of interview with experts

No.	Interview question	Summary of respondents' responses	summarize
1	Do you feel that students are interested in techniques?	Students are interested in techniques.	Students are interested in techniques, attach importance to sketching, and emphasize artistic expression and personality exploration. However, they are not enough in creation and thinking, and lack the solution path of independent learning and exploration.
	What are the biggest problems that students encounter during the practice?	The contradiction between sketching practice and individual artistic creation.	
	How did you solve it?	Combined with the specific situation, sketching is not only a physical representation, but a certain artistic expression into sketching, striving to create a more aesthetic background of sketching, adjust the environment of indoor sketching objects, achieve the artistic effect of the picture, and explore students' personality and artistic creation potential.	
2	In your opinion, how to organize students' self-study?	In my opinion, the motivation of students' self-study can be promoted from the following aspects: interest, the pressure of admission and employment, and the mutual influence between classmates and friends.	Students are organized to study by themselves from the aspects of students' interest, admission, employment, etc. There are many problems in how to learn, but the guiding role of teachers is ignored.
	What are the main problems students encounter in their studies?	The main problem students encounter in learning is that they do not know how to learn, where to start, how to enter the professional field, what information to look up and how to look up.	
3	What do you think of the effect of classroom teaching to guide students to learn	The premise of independent learning is to stimulate students' interest and enthusiasm in learning, if students have a great interest in the content and knowledge, the effect of independent	Stimulate the interest of students, the effect of independent learning is good, but there are not many satisfactory works

	independently?	learning is still ok.	in independent learning, indicating the lack of guidance.
	Can the works created by students under the guidance of teachers meet your requirements?	The proportion of satisfied works created by independent learning is not very large.	
4	What do you think are the main gains of students after learning the basic theories and techniques of the curriculum?	On the one hand, I learned to use theoretical knowledge to guide the application of skills; On the other hand, techniques can be used to verify the authenticity of the theory.	Ignoring the growth of students' sustainable learning ability.
5	What difficulties do you find in the interaction between teachers and students in an online curriculum?	On the one hand, the timeliness and consistency of interaction are not as good as offline teaching. On the other hand, the emotional communication between teachers and students is not enough.	The difficulties encountered in online teaching can be easily solved in offline teaching.
6	Do you have any ideas or suggestions for improving students' Independent Learning Ability in class?	First, from the lecture-style teaching of "teach first and learn later" to "learn first and teach later". In other words, students are allowed to master the learning content through self-study and discussion, and then teachers will focus on the content that students cannot master or give guidance. Second, clear learning objectives, which is conducive to students' concrete thinking and operation, but also conducive to the cultivation and improvement of students' self-efficacy. 3. Stimulate students' curiosity and sense of competition, and encourage students to learn by themselves.	Change the classroom teaching model, while stimulating students' interest, clear learning objectives. But a new teaching method should be considered to guide students to study on their own.

Appendix E

Results of the research questionnaire

Table of investigation on the learning willingness of sophomore Fine Arts majors

questionnaire range	No.	problem	option	proportion
Willingness to learn	1	What motivated you to study art?	Personal hobby, learning as a kind of enjoyment.	28.57%
			School programs, at the request of teachers and parents.	10.71%
			Enhance the quality of art, do an excellent student.	19.05%
			One more specialty, prepare for the future living.	41.67%
	2	What do you think of your initiative in learning art?	Like hands-on, take the initiative to complete the classroom learning tasks.	42.86%
			Basically able to complete classroom learning tasks.	55.95%
			Afraid of affecting the grades, have to complete the task of learning.	1.19%
			Lazy,often do not complete the study task.	0%
	3	To what extent do you want to improve your Independent Learning Ability through a new teaching method?	Very strong	29.76%
			More intense	47.62%
			In general	19.05%
			Not strong	2.38%
			Be indifferent	1.19%
	4	How interested are you in learning woodcut prints?	Like very much	7.14%
			like	47.62%
			In general	40.48%
			dislike	4.76%

Table of study habits of sophomore Fine arts majors

questionnaire range	No.	problem	option	proportion
study habit	5	How is your preview going before class?	Prepare very carefully on your own	11.9%
			Basically preview according to the teacher's requirements	58.33%
			Look at the mood, sometimes preview, sometimes do not preview	22.62%
			There is too much homework and no time to preview	7.14%
	6	What kind of preview method do you usually use?	Scan the text and pictures in the textbook	40.48%
			Focus on new knowledge points and design legends	47.62%
			Skimming through textbooks, not paying special attention to knowledge points and design legends	11.9%
	7	Do you take the initiative to look up information during the preview?	Often look for information, do a deep preview of the textbook	30.95%
			Occasionally look up information, completely depending on the mood and subjective will	65.48%
			There was no time to look things up	3.57%
	8	Do you take notes in art class? How to do that?	Do, usually only write down the teacher's blackboard	22.62%
			Do, write down the teacher's blackboard notes and main points, and underline them in the textbook	70.24%
			Don't do, try to remember in my heart, don't remember	5.95%
			Never take notes	1.19%
	9	How often do you read art books?	Read often	23.81%
			Read when you have a study assignment	30.95%
			Occasional reading	42.86%
			Chronic non-reading	2.38%

Table of study survey of sophomore students majoring in Fine Arts

questionnaire range	No.	problem	option	proportion
study overview	10	How was your self-confidence when you were studying art?	Very confident	16.67%
			More confident	42.86%
			Not very confident	39.29%
			Have no confidence at all	1.19%
	11	Which of the following learning situations is better for you?	You can control your study time independently	33.33%
			Have some autonomy in learning	42.86%
			You don't need autonomy to follow your teacher's lead	17.86%
			The cognition of learning autonomy is fuzzy	5.95%
	12	How are you getting along with your art studies?	Like to explore a new set of methods	44.05%
			Always learn from others' methods and use them for your own use	26.19%
			All he knows is his nose to the grunt, never his method	10.71%
			Often read books or consult teachers and classmates to find new ways	19.05%
	13	How is my Independent Learning Ability in the art curriculum I have learned	strong	7.14%
			stronger	44.05%
			In general	41.67%
			weaker	7.14%
			Very weak	0%

Table of study survey of sophomore students majoring in Fine Arts

study cognition	14	Do you think mobile phones, tablets and other electronic devices have had a negative effect on your art studies?	Yes, so I try not to play with them in class	34.52%
			Yes, but I'm addicted to mobile phones and tablets. I often lose control	11.9%
			It doesn't matter. I use them sometimes	52.38%
			Don't play mobile phones, tablets feel boring, art is a little boring	1.19%
	15	How do you think an Art teacher should allocate time to a class?	Teachers should spend more time explaining theoretical knowledge and examples, and students should not spend too much time practicing	9.52%
			Allocate more time for students to learn by themselves and do hands-on work, with teachers giving priority to guidance	44.05%
			The teacher's demonstration and the students' practice are divided into half time	46.43%
	16	Do you often review your studies?	Summarize frequently and find out the problems and deficiencies in learning	22.62%
			Sometimes summarize and find the problems in learning	69.05%
			Generally do not summarize, only know to use action to prove their learning effect	5.95%
			Never summarize, learn where is where	2.38%

Table of study survey of sophomore students majoring in Fine Arts

questionnaire range	No.	problem	option	proportion
study strategy	17	What would you do if you didn't learn the knowledge and skills you have already learned?	After learning can be, not to understand really understand or really will	21.43%
			Will study hard, from the teacher or classmates to understand the knowledge that does not understand	39.29%
			I will try my best to learn knowledge and skills and strive to be better than other students	35.71%
			Although I don't know a lot of knowledge and skills, but I think these are not important	3.57%
	18	What was your performance like in class?	Trying to remember every point in class	15.48%
			I want to try my best to grasp the key points of art knowledge and master basic skills	71.43%
			Thinking, asking "why" and struggling to find the answer	11.9%
			Often absent-minded, in a daze or doing their own thing	1.19%
	19	What do you do when you have a problem in your art class?	Think and solve problems entirely on your own	14.29%
			Find references and figure it out	42.86%
			Seek help from your teacher or classmates to solve the problem later	19.05%
			I like to discuss and solve problems with others	23.81%
			Encounter problems generally unwilling to think, directly give up	0%

Table of study survey of sophomore students majoring in Fine Arts

questionnaire range	No.	problem	Answer the situation in detail	description
	20	Do you think it is important for students to learn independently? In what ways should we improve the ability of independent learning?	Independent Learning Ability is important. Students should study more, think more, preview learning knowledge, develop good learning habits, strengthen self-discipline, restrain loose, cultivate innovation ability, master key words refining, target analysis, repetition method and other methods. Hold relevant competitions appropriately to improve the effect of students' active learning.	From the perspective of students themselves, but ignored the teacher's guiding role in students' active learning.
study suggestion	21	Do you think teachers should explore new teaching methods? What is the relationship between the teaching effect and the teacher's teaching method?	Teachers need to explore new teaching methods. Teaching effect and teachers' teaching methods complement each other. The new teaching method is a way for teachers to improve teaching ability, which is conducive to improving teaching efficiency, improving students' learning interest and enhancing learning motivation. Teaching method affects teaching effect, teaching effect reflects teaching method is correct, facing different students, teaching method should also change.	The understanding of the relationship between teaching effect and teaching method is not deep enough, and the understanding of new teaching methods is not enough.

Appendix F

The teaching plan for Scaffolding teaching model of woodcut prints

The teaching plan for Scaffolding teaching model of woodcut prints

Scaffolding Name	Content	Periods
Problem scaffolding 1	What are the types of printmaking? What is black and white woodcut?	2
	What is the difference between woodcut prints and oil painting, Chinese painting and other kinds of painting?	
	What are the pluralistic characteristics of woodcut prints?	
Problem scaffolding 2	Which is the earliest woodcut in our country? What is the basic content of the painting?	2
	Do you know anything about the new woodcut movement? Who are its chief advocates?	
	How did woodcut prints serve the people during the Anti-Japanese War?	
	After the Chinese Association of Printmakers was established in 1980, what printmaking groups appeared in different places?	
Problem scaffolding 3	What are the tools and materials commonly used in the engraving?	2
	What are the drawings and production processes of prints?	
	What should we pay attention to in the standardization of print signature format?	
student-centered scaffolding	The basic form and characteristics of composition	18
	The basic points of composition	
	Follow the steps to draw a small composition	
	Enlarge the small composition into a creative sketch	
	Deal with the board, practice the transfer method	
mixed learning scaffolding	Teaching Activity 1:Woodcut Making and Art Language Training	20
	Teaching Activity 2:Rubbing and Signature Training of woodcut Prints	14
	Teaching Activity 3:Work display and lesson design	6

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