USING PROBLEM-BASED LEARNING METHOD TO IMPROVE CREATIVE PROBLEM-SOLVING ABILITY OF UNDERGRADUATE STUDENTS

HU LING FENG

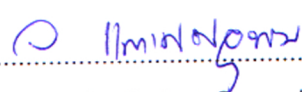|	
Thesis:	Using Problem-Based Learning Method to Improve Creative Problem-Solving Ability of Undergraduate Students
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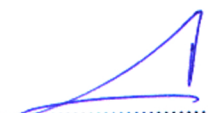
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ABSTRACT

The purposes of this research were 1) to using problem-based learning method to improve creative problem-solving ability of undergraduate students. and 2) to compare students' creative problem-solving ability before and after the implementation based on the problem-based learning method. The sample group included 30 first-year students majoring in graphic design from Zhejiang Yuxiang Vocational and Technical College, Huzhou City, China, in the first semester of the academic year 2023, The research instruments involved 1) lesson plan based on the problem-based learning method and 2) creative problem-solving ability scoring criteria. The data were analyzed by mean, standard deviation and t-test for dependent samples.

The results revealed the followings:

1) By using problem-based learning method and observing students' learning behavior, it was found that students' creative problem-solving ability has been improved.

2) By comparing students' creative problem-solving ability, the creative problem-solving ability of first-year students after class is significantly higher than before class, with statistical significance at the level of .01 level.

Keywords: Problem-Based Learning method, Creative Problem-Solving ability Undergraduate students

Acknowledgment

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Chapter 1
Introduction

Rationale

The National Vocational Education Reform Implementation Program issued by the State on January 24, 2019, proposes "concrete measures to further improve vocational education in the new era, raise the level of development of vocational education, and build a national standard for vocational education," "improve standards related to education and teaching, pay close attention to teaching and teachers, and cultivate and pass on the spirit of craftsmanship." Peng Bin (2019, pp.34-35) believes there are many experts and scholars in China have made achievements in the field of vocational education course pedagogy research, which is more consistent with the characteristics of higher vocational education teaching methods are mainly task-driven method, case study teaching method and project teaching method and so on. Therefore, developing various abilities of students is important Including the Creative Problem-Solving Ability of students. During the "14th Five-Year Plan" period, the rapid development of the national economy ushered in a critical period of industrial structure upgrading and transformation. The transformation and upgrading of industrial structure mean that more creative talents and adaptable technical and skilled talents are needed. As an important part of China's vocational education, secondary vocational education is the birthplace of China's labor force. The quality of its teaching is of outstanding significance to the cultivation of vocational talents. Li Xingfen (2019, p.78) insisted that braibo conducted an experiment in southern India. He issued several communication tasks, and in these tasks, set up knowledge points related to them, while proposing teaching methods that enable students to independently uncover knowledge while performing the tasks. In this method of teaching, by combining knowledge with tasks, the student completes the task, he or she acquires the knowledge point from the task.

In our rapidly changing situation, and it is especially important to have excellent learning ability, teamwork ability, and comprehensive application skills such as creative problem-solving ability. The problem-based learning method enables students to understand that in order to solve current problems, they need to be able to use their own knowledge to solve problems. In the research on the theoretical basis of problem-based learning method, Professor Li Henk (2019, p13) believes that the theoretical basis of problem-based learning method is the "discovery learning theory", and Lin

Othman (2017, p25) has also shown that the problem-based learning method can enhance the students' interest in learning through experimental methods. The problem-based learning method enables students to understand what they already have in order to solve current problems and what skills and abilities they need to acquire in the learning process in order to solve these problems more Creatively, which is a question worth considering. In this teaching model students first identify problems, establish the initial purpose of learning, and try to solve them in various ways, so special emphasis is placed on the students' creative problem-solving ability to mobilize various resources and information.

The problem-based learning method has matured in the late 20th century and has gradually evolved into an important teaching method for students, especially in the development of practical and vocational skills, Bolsunovskaya M.V. (2013, p3). implemented the designed English course tasks in several classes of selected primary schools in 2015 and concluded that the problem-based learning method can improve students' learning. Divjak (2008) conducted a study on the differences in the environment of the task-based teaching cases and concluded that different teaching methods have different effects on students' interest in learning. The problem-based learning method has been used in the foreign theoretical and practical courses, its application in practice for a long time, so the development is also more mature, and the views, theories and research results related to it are very rich, especially in vocational education, The problem-based learning method has a certain breadth of application.

Therefore, the researcher is interested in using problem-based learning method to organize the teaching process to improve creative problem-solving Ability for undergraduate students to make progress and be able to use it more efficiently, the professional construction of higher vocational colleges should be closely combined with job requirements, guided by market demand and oriented by employment, highlighting the cultivation of students' creative problem-solving Ability. Following the law of higher vocational talents cultivation and drawing on the practices of higher vocational colleges at home and abroad, a professional teaching design model with higher vocational characteristics is formed with the purpose of cultivating students' vocational ability.

Objectives

1. To using problem-based learning method to improve creative problem-solving ability of undergraduate students.

2. To compare students' creative problem-solving ability, before and after the implementation is a Photography course based on the problem-based learning method.

Research Hypothesis

After the implementation of Problem-based learning method, the students' creative problem-solving ability improved obviously.

Scope of the Research

Population and the Sample Group

Population

There are 150 students in 5 classes of the first-year majoring in visual communication design for photography course at Zhejiang Yuxiang Vocational and Technical College.

The Sample Group

Through cluster random sampling, 30 first-year students in class one with mix abilities (strong, medium, and weak) majoring in visual communication design of Zhejiang Yuxiang Vocational and Technical College were sampled.

The Variable

Independent Variable problem-based learning method

Dependent Variable creative problem-solving ability

Content (s)

Using problem-based learning method to improve creative problem-solving ability in photography course of undergraduate students. This course is divided into the following four chapters.

Chapter 1: Portrait Photography, 4 hours

Chapter 2: Wedding Photography. (done in studio, kit and caboodle), 4 hours

Chapter 3: Graphic Creative Photography, 4 hours

Chapter 4: Shoes Advertising Product Photography, 4 hours

Time

The study period from March to October 2023 will be divided into the following phases:

1. develop proposal 3 chapters and defense in March 2023.

2. Modify and complete lesson plan according to the problem-based learning method, modify relevant tools in August 2023.

3. Experimental studies will be conducted from August to September 2023.

4. The formal research will be conducted in September 2023.

5. Summarize the research in October 2023, complete the research thesis and publish the paper.

Advantages

1. For students, the problem-based learning method mobilizes the enthusiasm of the freshmen students of visual communication design majoring in Zhejiang Yuxiang Vocational and Technical College to learn Creative Problem-Solving ability, enables the students to participate in the course learning more actively, and prepares them to improve the learning performance of the professional courses.

2. For teachers. Introducing the problem-based learning method into the classroom can help teachers better understand students, improve teachers' teaching and design abilities, enrich teaching methods, change dull and single teaching mode, improve students' interest in Creative Problem-Solving ability, and provide theoretical reference for improving creative problem-solving ability under the problem-based learning method.

3. For Educational Institutions. The research is beneficial to the teaching reform in universities. At present, the education reform in primary and secondary schools is in full swing. However, higher education is lagging behind. The research and promotion of problem-based learning method can easily make universities find a breakthrough in the reform of teaching method, which can lead to the change of other aspects of teaching in universities and promote the quality of higher education.

Definition of Terms

Problem Based Learning method:

Problem-based learning method is a student-centered Learning method. Different from the traditional teacher-centered teaching model, P Problem-based learning method allows students to carry out a period of research and inquiry, and is committed to using innovative methods or solutions to solve a complex problem, difficulty or challenge, so as to acquire new knowledge and acquire new skills through these real experiences and experiences.

Step 1 Set up study groups. Group cooperative learning is the main form of Problem Based Learning method.

Step 2 Create a problem. Teachers put forward new questions in the classroom, let students take the initiative to think, the generation of problems is an important basis for the implementation of Problem-based learning method,

Step 3 Carry out activities. At this stage, the group members come together, exchange the knowledge and methods they have learned, use the new knowledge to rethink the problem and explore the problem in depth, and reach an outcome that the group members are satisfied with. We think this is an important part of embodying the Problem-based learning method.

Step 4 Presentation of achievements. Each group organizes and summarizes its own learning results, and selects appropriate ways to display their learning achievements according to the characteristics of the group, such as short videos, PPT, animations, etc.

Step 5 Reflection after solving the problem. At this stage, students need to reflect on the specific operation process of the entire Problem-based learning method, and inspire students to summarize the relationship between new theoretical knowledge and problems.

Creative Problem-Solving Ability:

Creative problem-solving ability is a method of identifying unique solutions to problems through a problem identification and solution planning process. It goes beyond traditional methods to find solutions to workflow problems, product innovation or brand positioning. Developing creative problem-solving skills requires continuous improvement to encourage an environment of continuous innovation. Creative problem solving is considered a soft skill, or personal strength. The CPS model has gone through a lot of modifications and refinements, and at present, the model most frequently used in classroom teaching is the CPS model modified by Teffinger and Isakson, which consists of three components and six stages:

1. Understanding the problem
    1.1 discovering confusion
    1.2 collecting information
    1.3 generating problems
2. Creative conceptualization
    2.1 creating ideas
3. Action plan
    3.1 finding answers
    3.2 seeking acceptance

Undergraduate students:

students who are enrolled in a regular full-time program of study. Specifically, they include specialists, undergraduates and postgraduates (master's degree, doctorate). That is, in the university enrolment and education group collectively,

including full-time and in the occupation of the two types of residual learning, usually for students, excluding self-study. Graduates of all types of higher education are generally referred to as having a university degree.

Research Framework

Using problem-based learning to improve creative problem-solving ability in photography course of undergraduate students. The research concept framework is as follows:
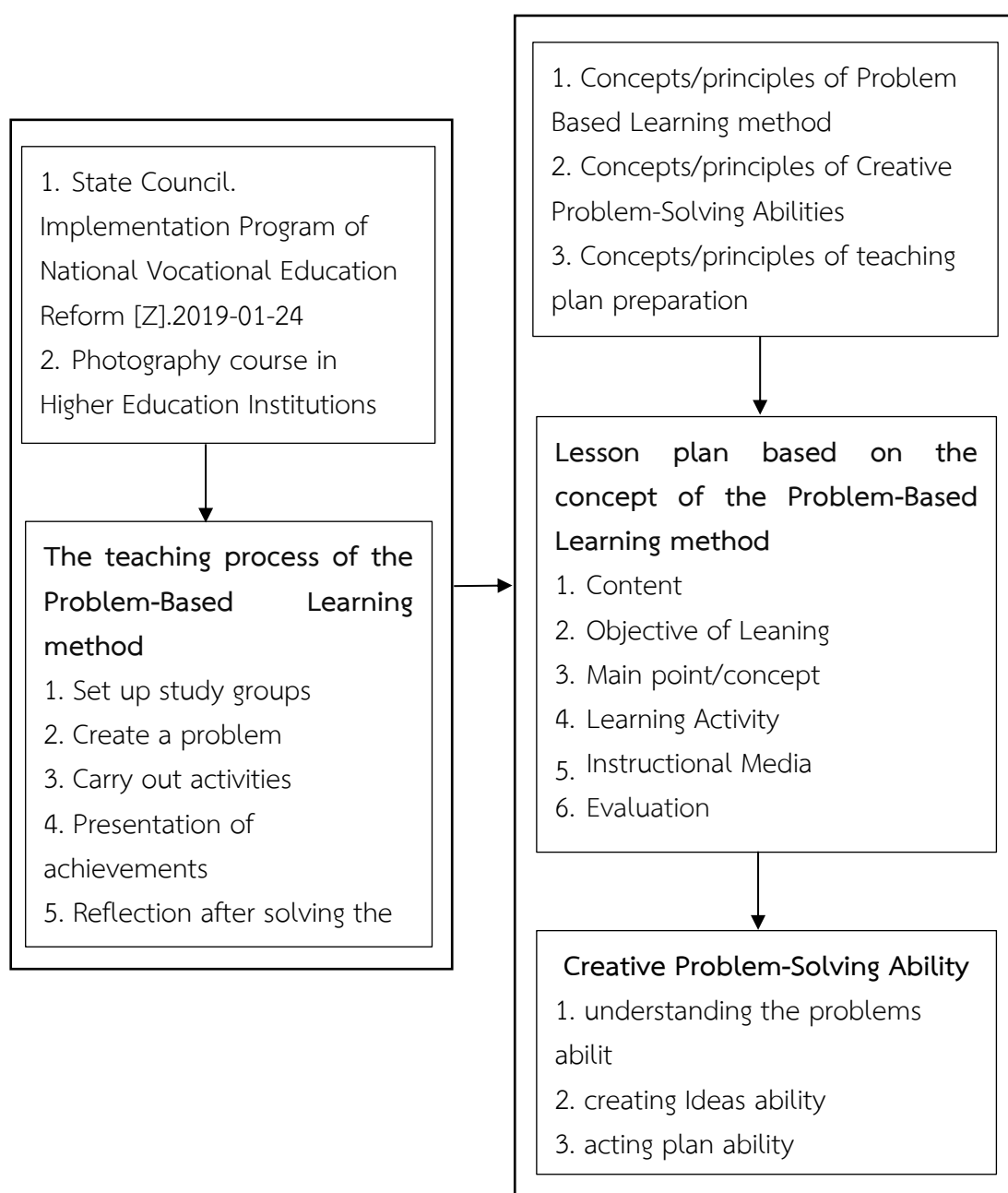
Figure 1.1 Research Frameworks

Chapter 2
Literature Review

This research, using problem-based learning method to improve creative problem-solving ability of undergraduate students, the following literatures were studied

1. Problem-Based Learning method
2. Creative Problem-Solving Ability
3. Photography course
4. Relevant research

The details are as follows

Problem-Based Learning method

The definition of Problem-Based Learning method

Problem-based learning (PBL) was first proposed at MC Master University in Canada in 1969. Domestic scholars have various translations of PBL, such as problem-based learning. Designing the learning process based on problems is a conceptual approach that is the common source of various models in problem-based learning. This study argues that in Problem-based learning method, students' learning process should be a continuous process of identifying, analyzing and solving problems. The teaching and learning activities in this study will be based on the five components of the problem-based learning process proposed by Barrows & Mayers in 1993: 1. establishment of cooperation groups, 2. ask a question, 3. take action, 4. organize and report, 5. reflection after problem-solving.

Torp and Sage (1999) believed that the Problem-based learning method is instruction that using of helps teachers to encourage students to think, explore, and seek answers to their questions and ultimately complete their teaching tasks. From the perspective of problem composition and pedagogy, the PBL model is an experiential learning process aimed at exploring and solving complex and authentic problems.

Schittek et al. (2001) argues that the Problem-based learning method is a didactic approach that differs from traditional teaching methods, and this approach is appropriate for senior medical students who need to develop advanced communication and clinical thinking skills. With the advent of the Internet and the

explosion of information, engaging them in active thinking and questioning, as well as guiding them to new information, are extremely important components of teaching.

Alamro (2019) stated that the Problem-based learning method Includes the theoretical principles of social constructivism. social constructivists view learning as the active construction of knowledge through social interaction and dialogue among learners. In order to capitalize on the potential of this approach, social constructivist methods have been adopted by several modern pedagogies such as problem-based and team-based learning, which encourage collaboration and promote meaningful interactions among learners.

Yong (2019) said that the Problem-based learning method focuses on teamwork as a practical process in the teaching and learning process, and the unity and cooperation among students produces a sense of teamwork, demonstration of results, and a sense of achievement, and the students psychologically change their attitudes towards physical exercise. Problem-based learning method is a practical learning activity.

Chen (2023) points out that the Problem-based learning method is a teaching method based on questions to guide students' thinking and learning, a teaching method that gives full play to students' initiative. Domestic and international research shows that problem-oriented teaching model helps develop students' analytical and problem-solving skills and critical thinking.

Yan, Xin and Wei (2023) believe that the Problem-based learning method is a process that generates learning in real situations. Designing a learning process based on questions process, which is a conceptual approach that is common to all models in Problem based learning is a method in which the teacher sets up problems in the course, and through the problems or situations, induces students to think and establish learning objectives. Problem Based Learning is a method in which the instructor sets problems in the course, induces students to think through the problems or situations, establishes learning objectives, and students work in small groups to conduct self-directed study, improve new knowledge or revise old knowledge and solve problems.

To Sum up, this teaching method has also attracted extensive research by academic scholars. They believe that the "problem-based learning method" can be understood as: problem-centered, the whole process of learning activities is aimed at solving problems as the ultimate goal. This method is problem-oriented and problem-driven, with group discussions, exchanges and presentations as the strategy, and teacher's guidance and comments as the means to stimulate students' learning interest

and improve their creative problem-solving ability. It also plays a positive role in the research and development of curriculum reform in higher education.

The principle of Problem-Based Learning method

The application of Problem-based learning method promotes teachers' integration into the industry and the market Many teachers in higher education are from the academy, i.e., they come out of school as students and then step into the door of another university as teachers, lacking practical experience. Through the implementation process of Problem Based Learning method, teachers have to continuously learn about practicing real problems. This process also promotes teachers to gradually integrate into the industry and market, which in turn enhances their professional skills and promotes the improvement of teaching effectiveness.

Slavin, Johnson's brothers and others (1970) promoted cooperative learning as a set of effective teaching theories under the existing cooperative learning concept, and applied it to teaching practice with good results, which is a successful educational reform. The problem-based learning method is also a group-based learning around the common goal of problem-solving, which has the connotation of cooperative learning.

Buck Institute of Education (2007) pointed out that the division of study groups is an important part of implementing Problem-based learning method. The division of groups should not only reflect the skill requirements of the work process, but also combine the individual characteristics of the students, even personality traits. Scientifically divided groups are the guarantee for the successful implementation of Problem-based learning method.

Shu (2021) pointed out that Bruner's discovery learning theory is an important inspiration for improving teaching and learning. Many scholars have conducted related research on Bruner's discovery learning theory. Discovery learning theory is proposed by Bruner, a famous American educator, for the traditional teaching "warehouse theory". It includes all ways of acquiring knowledge with one's own mind. Problem-based learning method is not receptive learning.

Zhiqiang (2021) point of view, Dewey was a major figure in pragmatist philosophy, writing in a variety of fields, and is considered one of the greatest philosophers of the twentieth century. Dewey's educational discourse theory can be summarized as "experience-centered, child-centered, and activity-centered". Project-based learning focuses on the development of students' hands-on skills, emphasizing the three centers of "experience", "student" and "activity", and the basic teaching model used is the basic teaching model is "learning by doing". Students learn and master skills through making works and various inquiry activities.

Yan and Lujin (2022) point out the problem-based learning method is a problem or project-oriented, student-centered teaching model. Problem Based Learning, as a new teaching mode under the constructivist concept, can cover many knowledge points in the course through carefully designed projects, integrating scattered knowledge points into an organic whole, making multiple knowledge points related and forming a complete knowledge and practice system, which is more conducive to students' mastery and application of knowledge than the traditional teaching mode.

Wen (2022) agreed that there are various forms of cooperative learning, but in essence All are activities in which students learn together in groups toward a common goal. It includes the combination of formative and summative evaluation, the combination of students' self-assessment and mutual evaluation, the combination of teachers' and students' mutual evaluation, and the combination of written and oral evaluation, among other features.

Ruosi et al. (2023) point out the problem-based learning method was introduced to medical education in the 1960s by Professor Barrow, a pioneer of medical education reform in the United States. introduced to medical education in the 1960s.Due to the disconnect between teaching in medical schools and the real-life situations and complex problems that students face in their future workplace and environment, medical schools began to investigate new teaching models and methods, which were then called problem-based learning, and in the mid-1950s it was promoted in more than 60 medical schools.

In summary, the problem-based learning method is not receptive learning, but discovery learning. The process of implementation involves continuous problem identification, analysis, and problem solving, resulting in their own project outcomes.

The teaching process of Problem-Based Learning method

The earliest problem-based learning method abroad originated from Socrates' mental midwifery. Firstly, he asked his opponents to make a general description of some problems and then asked questions. The opponent starts from a specific case, starts the discussion and then gradually penetrates into the core of the problem. This process ultimately leads to problem solving through knowledge acquisition. Thorndike has put forward the idea that the process of learning knowledge and problem-solving is completed after numerous trials and errors. According to the German psychologist Cauler, problem solving should be achieved through a sudden epiphany based on a comprehensive understanding of the specific problem situation. In the 1950s, Professor Barrows pioneered and applied it to the teaching of medicine. Subsequently, in 1996, medical schools abolished subject-centered curriculum teaching and implemented a

"three-year plan", which marked the birth of problem-based learning method. From the 1980s to the 1990s, the PBL teaching model was introduced into countries such as North America and Europe, and so far, the model has been most maturely and widely used in the medical field. With the popularity and development of the PBL model, the model has been applied in more and more fields. In addition to the medical field, it has been extended to the fields of economics, management, psychology and other disciplines, and has achieved remarkable results and achievements. In the 1990s, the PBL teaching mode formally entered the field of education.

The problem-based learning method pays more attention to the performance of students in the teaching process, not just the results of teaching, and attaches importance to the evaluation of the learning process of students, which is different from the evaluation of paper grades in the usual final examination. The evaluation characteristics of this teaching mode are diversified and diverse.

Brace, Joyce and others (1970) published the book "Teaching Model" in which the concept of "teaching model" was firstly proposed and triggered a great change in the education of the whole United States. It is believed that the teaching model is a kind of logical knowledge system involved in teaching, which can help teachers to teach, and is both a teaching plan and a teaching guide. Dunkin believes that the model of teaching has the role of planning and organizing, and is essentially a teaching tool that can be used to explain the teacher's behavior in teaching and the interaction with students in the role of the relationship between the overview.

Zheng (2002) agreed that PBL teaching method is to link the learning of knowledge with the real problem scenarios, so that students can explore the knowledge and solve the problems creatively in the teaching and practical activities of solving real problems, that is to say, the process of constructing knowledge itself is a problem-solving process, a learning process. According to Barrows' model, the PBL teaching method includes the following aspects in the implementation process:

1. Set up study groups

According to the characteristics of cooperative learning theory, the students are mixed into several groups (about 3 people in each group).In PBL teaching, group discussion is the main form. Through the real scenario display, the problem is raised. In order to solve the problem, the group members have to introduce themselves to each other. Through the self-introductions, the group members turn from strangers to allies, which lays the foundation of solving the problem and builds up a relaxed and witty learning atmosphere. Students and teachers to do self-introduction, say their

own ideas and doubts, the first to lift the strangeness between each other, to form a harmonious learning atmosphere. In order to better carry out the learning, also determine the leader and recorder of each group.

2. Create a problem

Through the display of real scenarios, students are allowed to think about the problem on their own, and the instructor is using the designed problem to let the students imagine a more complex problem, which should be very close to our real life in the first place, and fully mobilize the students' interest in learning. In the beginning of the problem-solving time, the instructor and the students to communicate in depth, carefully explore, and strive to find a solution to the problem of the same goal. In the implementation of PBL teaching method, the teacher is the guide, as a guide, to mobilize students' learning enthusiasm, guide students to work for the achievement of a unified goal, after determining the goal to be achieved, according to the goal, the guide teacher should firstly supervise the cooperation of the group, and if there is a problem, correct it in time, or nudge the students to adjust the idea. In this process, students may also ask questions to the instructor, trying to obtain certain information through the instructor's answers, or they may search the Internet or go to the library to obtain more information.

3. Carry out activities

Group members gather again to share what they have learnt with each other, to rethink the problem and explore it in depth by applying their new knowledge, and to form a virtual outcome afterwards. When viewing the results of their learning, students should evaluate the results of other students' learning in a fair and humble manner, and discuss with each other how the results of their learning were obtained and whether the information is reliable, etc. We believe that this is an important part of reflecting independent learning.

4. Presentation of achievements

After analyzing - summarizing - re-analyzing - re-summarizing, each group will form a unified answer. Then each learning group elects its own group members to present the learning results of the group through different forms, such as: multimedia courseware, flash animation, reports, etc. PBL teaching method is to present the problems through real situations, and the whole process of teaching emphasizes that students should not look at the surface things, but explore the relationship behind the problems in depth.

5. Reflection after solving the problem

After solving a problem, students are asked to actively reflect on the problem-solving process. Thinking about the connection between the current problem and the problems they have encountered, as well as the similarities and dissimilarities, inspires and induces students to summaries and understand the theoretical background of the new knowledge. At the same time, students can also evaluate themselves and their classmates when they show their results at the end. Evaluation is not an end in itself, but the highest level of evaluation is to reflect on the problems they encountered in the process of learning and the solution of the problem, which is of great significance for the students' future development.

Jing (2020) put forward that the problem-based learning method is a method in which teachers create authentic and meaningful problems by creating situations. In this process of teaching activities, teachers set the teaching atmosphere is the teaching context. Here, "context" contains two levels of meaning, on the one hand, it is the school's basic environmental facilities, such as the teacher's environment, the school's health environment, etc.

Sheng and Feng (2022) stated that problem-based learning method pedagogy is based on the belief that learning is constructive, self-managed and collaborative co-operative behavior. Teachers are the guides and facilitators of the teaching and learning process, allowing students to carry out their learning according to the task objectives, leading to the orderly completion of the task objectives, and students can also ask teachers for advice, so that students can improve all aspects of competence in the process of practice.

Wen (2022) believed that Problem-based learning method is a problem-based teaching method, students can solve the learning problems proposed by the teacher as the main direction of learning, for example, the case of teaching objectives. When teachers formulate teaching problems, they should combine with real life to put forward targeted problems, so that when students solve problems, they can not only exercise their ability to apply for practice, but also improve the deep knowledge of life on the real life, and further improve the students' life cognition.

Kai and Jin (2022) agreed that the innovative talent cultivation mode of art majors based on PBL is a more effective practical teaching method for cultivating innovative talents in art majors in response to the national call for cultivating innovative talents. Different from the experimental teaching of science and engineering majors, the experimental exploration of art majors takes a problem-oriented approach, combines with the classroom, and achieves the improvement of students'

independent innovation ability and comprehensive quality ability through the mode of problem exploration.

Evensen (1998) Said that in problem-based learning method, cooperative learning is one of the most important strategies. The so-called cooperative learning refers to the students according to different genders or abilities, mixed into a number of groups (each group of about 2 to 6 people), members of the group division of labor, mutual support, each other's guidance, and work together to learn the content of the teacher's arrangements for each lesson.

Therefore, from the knowledge above, it can be concluded that problem-based learning method is a student-centered Learning method. Different from the traditional teacher-centered teaching model, problem-based learning method allows students to carry out a period of research and inquiry, and is committed to using innovative methods or solutions to solve a complex problem, difficulty or challenge, so as to acquire new knowledge and acquire new skills through these real experiences and experiences.

Problem-based learning method consists of 5 teaching steps:

Step 1 set up study groups. Group cooperative learning is the main form of Problem Based Learning method.

Step 2 create a problem. Teachers put forward new questions in the classroom, let students take the initiative to think, the generation of problems is an important basis for the implementation of problem-based learning method.

Step 3 carry out activities. At this stage, the group members come together, exchange the knowledge and methods they have learned, use the new knowledge to rethink the problem and explore the problem in depth, and reach an outcome that the group members are satisfied with. We think this is an important part of embodying the problem-based learning method.

Step 4 presentation of achievements. Each group organizes and summarizes its own learning results, and selects appropriate ways to display their learning achievements according to the characteristics of the group, such as short videos, PPT, animations, etc.

Step 5 reflection after solving the problem. At this stage, students need to reflect on the specific operation process of the entire problem-based learning method, and inspire students to summarize the relationship between new theoretical knowledge and problems.

Table 2.1 The process of the problem-based learning method

Author	Barrows 1980	Hmelo 2004	Liu 2008	Guo 2013	Zhu 2020	This research Detail 2023
Step 1	Organize study groups	exploring the situation and characterizing the problem	Creating problem and situation	Ask a question	Script Writing	Set up study groups
Step 2	Create questions	forming various hypotheses	draw up a plan	Students explore with question	Prompt Task	Create a problem
Step 3	Implementation Problems	identifying missing information	Collect information	Group report	Analysis and Discussion	Carry out activities
Step 4	Results showcase	integrating new and old knowledge to solve the problem	Group collaboration research	Summary and Reflection	Direction definition	Presentation of achievements
Step 5	Reflection evaluation	summarizing the knowledge and skills gained	Reporting findings in a group		Independently completing work	Reflection after solving the problem
Step 6			Reflection and evaluation		Analysis, summary and evaluation	

Table 2.2 Detailed Interpretation of problem-based learning method

Teaching link	Teaching task	Teaching strategy
Set up study groups	Group cooperative learning is the main form of problem-based learning method.	Create problem situations to ask questions and enhance students' interest in learning.
Create a problem	Teachers raise new questions in the classroom and encourage students to actively think.	Organize cooperative group learning to explore problems together and promote in-depth problem analysis.
Carry out activities	Exchange the knowledge and methods they have learned, use new knowledge to rethink problems and delve deeper into them.	The group works together to solve problems and communicate and share together, prompting students to solve multiple problems of exercise therapy in depth and further understanding of exercise therapy knowledge.
Presentation of achievements	group organizes and summarizes outcomes and presents them.	The group summarizes, gives evaluation feedback, and students find deficiencies to promote creative problem-solving ability.
Reflection after solving the problem	Students need to reflect on the specific operation process of the entire problem-based learning method and inspire them to summarize new theoretical knowledge and the relationship between the problem.	Extend and apply new and old knowledge further to enhance students' creative problem-solving ability.

The teacher's role and student's role of Problem-Based Learning method

Bing et al. (2009) believe that PBL teaching mode is a new type of teaching mode and method, which is mainly characterized by advocating the combination of student independent learning and student cooperation as well as cultivating students' comprehensive thinking. Hu (2012) pointed out that PBL teaching mode is a kind of student-centered, teacher-led, problem-based heuristic education. Zhang (2014) and others defined PBL teaching mode as a problem-oriented teaching mode and teaching strategy that can improve students' analytical and problem-solving abilities. Tang (2005) and others believe that PBL model helps students to acquire new knowledge and deepen their understanding of existing knowledge. Some scholars also point out that PBL is a problem-oriented teaching mode. Analyzing and solving problems through group work helps to enhance students' interest in learning and optimize the teaching effect.

Lei (2020) put forward that Instructional design is a process of determining the appropriate starting and ending points of instructional content that should be instructed according to the purpose and orientation of instruction, standardizing and optimizing instructional elements, and forming an instructional plan. The problem-based learning method organizes teaching and learning activities around real projects that follow the flow of the project as well as the basic rules of the teaching and learning process, taking into account the lesson plans and milestones of the different grades.

Chao (2022) agreed that teachers must first strengthen their learning and have the ability to carry out pedagogical reform activities. That is, a full-time teacher takes on the task of mentoring. The full-time teacher can use class time to guide students in learning and training x students' basic skills, combining problems and authentic projects in the classroom to force students to master knowledge and skills.

ying (2023) pointed that the operation process of the teaching method is divided into five steps. Including Create groups, ask questions, carry out activities, present results, and evaluate and reflect. Based on the teaching guidance strategy of problem-based workflow, higher vocational institutions set up courses based on workflow according to the idea of combining engineering and fully reflect the inherent logical relationship between courses and job competencies. The ultimate goal of applying PBL in core courses, job courses, comprehensive training courses and graduation design is to make students master professional skills.

The implementation of the problem-based learning method consists of five stages. How to organically integrate these five steps with the curriculum can be done in the following three ways.

Firstly, the project is decomposed by process, and the curriculum drives the project. The process of film and television production includes several parts, such as topic planning, script creation, filming, editing and synthesis, which will be fine-tuned into the corresponding courses for learning and training as the core tasks of the courses. Secondly, multiple courses are interconnected and mutually supportive.

The implementation of PBL in one course cannot solve the knowledge and skills of each part of the workflow, so it must involve multiple courses. When formulating a teaching schedule, it is necessary to consider this issue, so that relevant courses can be arranged in the same semester or even in the order of the process. This way, multiple courses can be linked, kept independent and unified, and learning outcomes can be optimized through targeted and focused learning.

To sum up, higher education institutions are seeking a new teaching mode, especially some majors with strong practical skills need transformation more urgently. problem-based learning method is the need to adapt to the development of the times. The research and application of problem-based learning method can open a door for vocational colleges. As a useful supplement to the traditional teaching method, the combination of traditional teaching method and problem-based learning method is a powerful means to improve the practical ability of graduates in film and television production in higher vocational colleges, and has the value of research and promotion.

Creative Problem-Solving Ability

The definition of Creative Problem-Solving Ability

Guilford (1950) first proposed the definition of creativity scholars from various countries have started to study creativity, and the definitions of creativity naturally vary due to the different concepts of scholars from various countries. Guilford (3) pointed out that the components of creativity mainly include human cognitive ability and emotional part, at the same time, he also regarded creativity as a kind of ability of diffuse thinking, and believed that this ability is composed of fluency, adaptability, refinement and uniqueness.

Piirto (1992) believes that creative problem-solving ability is a core thinking. create or creativity comes from the Latin word "creatus", which means to make or produce, or literally, to grow with the rapid advancement of smart education, cultivating students' higher-order thinking has become the core content of education

as creative problem-solving ability is an important part of higher-order thinking, how to effectively use teaching strategies to improve students' creative problem-solving ability has become a hot spot in research.

In 2003, the OECD included creativity and problem-solving at the top of the top 10 core skills that students need. In addition, in the construction of smart campus advocated by the Ministry of Education, it is emphasized that information technology should be used to enhance students' higher-order thinking ability, and the cultivation of high-order thinking ability has become an important content of education work.

Zhi et al. (2013) defined that creative problem-solving is higher-order thinking. Higher-order thinking as mental activity or cognitive ability that occurs at a higher cognitive level. The creative problem-solving process is considered to be a complex process that combines creativity and problem-solving, and many scholars have studied the stages of the creative problem-solving process. Wallas argues that creative problem- solving needs to go through four periods: preparation, brewing, clarification, and validation.

Hao et al. (2014) proposed that creative problem-solving ability is inclusive of several sub-competencies. Higher-order thinking skills include problem-solving ability and creativity. Which argues that creative problem-solving consists of three phases: hypothesis formation, hypothesis validation, and communication. Treffinger et al. believe that in the process of creative problem-solving, individuals need to use creativity while reasoning and thinking to solve problems, so they modified the CPS process and believed that creative problem-solving consists of six main phases: identifying difficulties, searching for information, discovering problems or puzzles, constructing ideas, arriving at a solution, and accepting the resulting solution.

In 2017, the State Council proposed to focus on education in the 13th Five-Year Plan for Education and cultivate a large number of innovative talents. In current education, some students are limited to directed thinking to solve problems, so students are often able to solve conventional problems on their own, but have difficulties solving complex, open-ended creative problems.

This study conducted teaching research based on the CPS model developed by Tefenger and Isaacson, which consists of three components and six stages.

1. Understanding questions: This component includes three stages: Discovering confusion (MF): Discovering confusion based on real-life situations to select or determine research questions, goals, or tasks; Data Collection (DF): Collect different materials to understand the actual situation, and solve the tasks of the first stage by organizing, analyzing, and summarizing the materials; Problem Finding (PF): Identify

potential problems based on data, select a specific problem for a specific statement, in order to clarify the problem.

2. Creative Conception (IF): Think about problems from multiple perspectives and generate as many problem-solving ideas and ideas as possible.

3. Action Planning: This section includes two stages: Discovering Solutions (SF): Design evaluation criteria, which are used to evaluate the effectiveness of all problem-solving ideas; Seek agreement (AF) to choose the optimal solution, consider the strengths and weaknesses of the execution process, find the most suitable concept, formulate a plan, and implement it.

To sum up, creative problem-solving ability is the process of individual creativity seeking answers to problems. The core of creative problem-solving is creativity, which requires individuals to overcome the mindset and create new ways to solve problems, which is a complex and advanced comprehensive thinking activity.

The principle of Creative Problem-Solving Ability

Williams (1977) published his views on personality traits. He believed that the emotional domain in which creative behavior is expressed is the creative personality tendency, which includes curiosity, imagination, adventurousness, and challenge, among others.

Gardner (1993) through his research, believes that creativity is the ability of human beings to generate new ideas, concepts, objects, or novel and valuable products by integrating existing ideas or concepts on top of the existing material base through their own special creative traits, in other words, he believes that creativity is the ability to solve problems, produce results and raise new issues.

Sternberg and Lubart (1995) consider creativity as the ability to generate or produce novel, unique and useful products. Creativity is the ability to use the power of thought to produce unique and novel performances through the process of exploration, reflection, and personal qualities such as fluency, adaptability, and uniqueness.

According to Chen (1996) the personality traits of high creativity mostly have positive traits, such as: adventurousness, curiosity, concentration, perseverance, openness and adaptability, and so on. Creative tendency has a direct and key positive effect on the individual's creativity, so if an individual does not have a creative tendency, it proves that the individual is not creative, and naturally will not produce creative behaviors, and will not be able to carry out creative problem-solving ability.

Shi (2008) sees creativity as the ability to select knowledge, understand it, and improve upon that understanding. The learner uses divergent thinking to think of as

many solutions as possible before selecting or implementing a solution strategy, thus developing the learner's creative problem-solving skills. The CPS model has gone through a great deal of modification and refinement.

Lian, Shi and others (2005) believed that creative tendency refers to the personality tendency shown by an individual in creative activities, and this personality tendency refers to the personality traits shown by the creative person, including temperament, attitude, interest and emotion, and other non-capability traits.

Telfinger and Isaksons (1994) modified CPS-model. The model is based on the problem-solving process and emphasizes that Purwati et al. found that students who applied the CPS model of learning were better at mathematical problem-solving than those who learned conventionally, and that students' creativity increased. At the higher education level, a large number of pedagogical studies have demonstrated that the CPS model, used in a variety of curricular contexts, has had a positive impact on the development of students' creativity, problem-solving skills, and so on. The primary design principle of instructional design to promote the development of students' creative thinking is to respect the subjectivity of students. According to the theory of constructivist learning: students' learning is not a passive acceptance process, but an active construction process. Students' learning is the internal cause of learning, teachers' teaching is the external cause of learning, and teachers' teaching can only work through students' learning.

Therefore, in order to promote the development of creative thinking through students' learning activities in the teaching process, we must respect students' subjectivity and let them become the real masters of their learning activities. Therefore, in teaching, teachers must always put themselves in the students' shoes, consider the structure of the classroom, treat students as the masters of learning, fully mobilize students' initiative and enthusiasm for learning, make students learn lively, actively and effectively, and let all students actively participate in the whole process of learning from the beginning to the end. The specific performance is.

1. respect for students, establish a harmonious teacher-student relationship

In the teaching activities, only love, respect, understanding and trust for students, in order to give full play to the students' learning initiative, enthusiasm. Teachers should be good at using kind eyes, subtle actions, amiable attitude, enthusiastic praise, etc. to shorten the gap between the hearts of teachers and students, so that students get spiritual satisfaction. Especially for students with low or poor intelligence level, it is more important for them to criticize less and encourage more. Thus, a harmonious and democratic teaching atmosphere can be established, and students will have the

desire to cooperate with the teacher. In this teaching atmosphere, students can put aside their fear of the teacher, do not have to worry about the teacher's negativity and the ridicule of their classmates brought by not answering the teacher's questions, and can face learning with a relaxed mind, so that their thinking activities are not confined. This is very important for the development of creative thinking.

2. Provide diversified teaching activities and give students the opportunity to choose

Providing diverse teaching activities is one of the important strategies to reflect students' subjectivity. By providing students with a variety of different teaching activities, this can stimulate students' motivation to learn, so that different students can find learning activities that suit them, and in this way, students can be fully mobilized to participate in learning actively and proactively. These teaching activities can take the form of: using information on the Internet to provide learning materials for their own learning activities; they can generate arguments about an issue, use the Internet to express their own views and achieve communication with off-site learning partners and respond to their ideas. Students are free to choose their own learning tools, learning resources related to the learning content, discussion topics that interest them, and even in specific courses (e.g., activity classes, social classes). This freedom of choice creates a broader space for students to think and thus promotes the development of their creative thinking.

3. guide students to use the correct thinking method

If learning is a special cognitive process, then thinking is the core component of this process. In the teaching process of cultivating creative thinking, after creating a democratic teaching atmosphere and designing various teaching activities, students should also be taught scientific thinking.

The ultimate goal of teaching activities is to enable students to learn how to learn. Therefore, it is necessary to teach students basic thinking methods such as analysis, synthesis, comparison, abstraction, and summarization, so that they can gradually learn to use these thinking methods to solve specific problems in learning; In the process of solving specific problems, it is not only necessary to clarify the starting point of thinking, but also to grasp the direction of thinking development, so that one's own thinking process can proceed smoothly;

Strictly require students to be able to think about problems in an organized manner during learning, so that their thinking process can proceed in an orderly manner. Teachers must be aware that students must think in an organized manner. At the same time, teachers must realize that fully leveraging students' subjectivity does not mean

that they have lost their role or reduced their burden. On the contrary, this is more demanding and challenging for teachers.

Unlike traditional classrooms, teacher centeredness has disappeared, teacher control has decreased, student engagement has increased, and student autonomy has increased. It must be clear that whether the teacher is a presenter, organizer, or supervisor, the overall role of the teacher in the classroom should be to coordinate, promote, and guide. Teachers should create a positive atmosphere, fully mobilize and unleash students' subjectivity, which is required by their coordinating role in the entire process of classroom teaching;

Regardless of the subjectivity of students, teachers should cultivate their conscious strategies and abilities through classroom activities to enhance their independent innovation spirit. This is determined by the guiding role of teachers and is not contradictory to students' autonomous learning. It is not contradictory to students' independent learning ability:

Regardless of their level of cognition and skills, teachers must carefully analyze problems and provide timely assistance to promote students' learning; No matter how classroom teaching is conducted, teachers must manage and guide to maintain a dynamic balance in the classroom, which is a positive process that mobilizes all factors;

In Summary. Regardless of the type of activity, learning material, or classroom teaching, regardless of the type of activity, learning material, or classroom process, students' self-awareness and ability to make choices and decisions in learning need to be promoted and cultivated, because ultimately, it is about innovation. Ultimately, this is a classroom, not a library or reading room, where organized and purposeful teaching occurs, rather than randomly selected self-learning activities. Without the coordination, promotion, and guidance of teachers, students' subjectivity will not be well developed.

The importance of Creative Problem-Solving Ability

In the past 30 years, foreign psychologists and educators have conducted extensive research on CPS and achieved fruitful results. There is still little research by domestic scholars on this issue. Therefore, this article will review the origin, connotation, characteristics, and development of creative problem-solving models based on existing research, with the aim of providing inspiration for research on creativity development in vocational education.

For this matter, there have been various opinions given by academics, such as:

Wallas (1926) who published his views on creative problem-solving, believed that analytical problem-solving involves a four-step process: (i) Preparation: The

preparation stage involves defining and formulating the problem through a preliminary analysis in the light of what has been learnt. (ii) Brewing: The brewing stage mainly refers to the process of sifting and reassembling the problem through relaxation and free thinking by putting the problem on hold and turning to other aspects of the research, which is the process of one's own subconscious mind. (iii) Expansion stage: The expansion stage refers to the inspiration of finding a solution to a problem after a period of knowledge accumulation and bottlenecking. (iv) Validation phase: In the process of creative problem-solving, due to the new and unexpected problems that may arise from the inspiration through the flash of light, there is sometimes a restart of the preparation and gestation phases, and some related concepts may appear in different phases at the same time.

Sternberg (1991) rationale for investing in creativity is a combination of many studies and perspectives to create a specific description of creativity. According to this view, creative people can be characterized by the following attributes: (i) they do not accept traditional ways of looking at problems, but rather look at them in a new way; (ii) they must be knowledgeable about the field they want to contribute to, but they do not need to be overly proficient, or at least not let their own knowledge and experience affect the way they look at problems; (iii) they like to be creative; (iv) they have the courage to face difficulties; and (v) they are open to new knowledge and experience. (iv) courage in the face of difficulties; (v) openness to new knowledge and experience.

Treffinger and Isaksen et al.(1992) argue that the problem-solving process involves not only reasoning about the problem, but also applying creativity and reflective-critical skills to solve the problem, and also modify the CPS process by suggesting that creative problem-solving consists of six main stages: (i) identifying the difficulty (ii) finding the information (iii) identifying the problem or confusion (iv) constructing the idea (v) arriving at a solution (vi) accepting the solution arrived at.

Meihui (1994) believes that there is a close connection between creativity and problem-solving ability, and many scholars have also suggested that creative activities are problem-solving activities. Hong (1998) believes that creativity is the key element of problem-solving ability, and the process of creation is also the process of problem-solving. Students often need to break down various concepts and then organically integrate them when solving open-ended problems, so that they can get new and unique ideas and make unusual responses, and there is no uniform requirement for the answers.

Cropley and Urban (2000) argue that in order to develop creativity, students need to improve their abilities and skills, and that in addition to experience, general knowledge, and domain-specific knowledge in a wide variety of contexts, the following creativity-related skills are also needed: (i) a strong imagination; (ii) strong analytical and synthesis skills; (iii) strong critical thinking skills; (iv) the ability to find and define problems; and (v) the ability to evaluate and analyses problems. (ii) strong analytical and synthesizing skills (iii) strong critical thinking skills (iv) the ability to search for, identify and define problems (v) the ability to evaluate and analyses problems By synthesizing the views of various scholars, this study suggests that creativity requires three types of intellectual skills: integrative intellectual skills that enable the generation of new problems and new ideas; analytical intellectual skills that enable problems to be recognized, constructed, and evaluated by analyzing resources and evaluating the value of ideas; and analytical intellectual skills that enable the generation of new problems and new ideas. The analytical intelligence skill to recognize problems, construct them, analyses resources, and evaluate the value of ideas; and the practical intelligence skill to know how to modify and refine them according to the views and opinions of others.

In the WPI (Work Preference Inventory), Amabile (2004) clearly states that the main components of intrinsic motivation include: competence, curiosity, interest, love, and responsibility for work, etc. Other researchers also agree that intrinsic motivation is helpful to creativity. Other researchers also agree that intrinsic motivation is helpful to creativity, and believe that anyone who engages in work that he or she loves and enjoys will be fully engaged in the work and be more creative.

From the knowledge above, it can be summarized as follows. Creative Problem-Solving Ability emphasises divergent thinking, which extends the direction of thinking to generate many possible solutions, and convergent thinking, which analyses and compares them to select the most effective, evaluated and implemented solution. CPS is indeed a creative thinking exercise that can be used to solve complex problems. There are many studies that support the use of CPS in teaching and learning activities to enhance students' creativity

Photography course

Photography course is a compulsory course for college students, which is characterized by practicability and operability, and it is difficult for students to master it. In the traditional teaching process, the classroom lectures more hours, less hours of practice, students take the initiative to find out the problem and solve the problem

of less opportunity, easy to produce the emphasis on theory rather than practice, passive learning, learning purpose is not clear. In the long run, the formation of habits, resulting in students' poor independent learning ability, low motivation to actively think about the problem, and poor creative problem-solving ability. Therefore, exploring the problem-based learning method in higher vocational education is of great significance in changing the existing education model, improving the quality of education in higher vocational institutions, and cultivating compound talents with creative problem-solving ability.

Therefore, the photography course, as a course that pays great attention to the application of theory in practice, students must have a certain degree of mastery after class, and in the daily use of photographic and video skills, to be able to independently carry out photographic and video operations, to improve the creative problem-solving ability, to fill the gap in the market for talent.

Applicable professional: Visual Communication Design Professional
The nature of the curriculum, design ideas.

1. Nature of the course: Photography is a basic course in the Department of Film and Television Production. The standard of this course is based on the theoretical knowledge described in the course "Fundamentals of Photography", including the basic components of the camera, the imaging principle of the camera, the composition of photography, the use of colors, lights and the principle of digital cameras and other related theoretical knowledge. At the same time, consolidate the learning effect of the previous courses, for the future of creative photography and other related courses to lay a good foundation.

This course is to enable students to master the use of traditional SLR cameras and digital cameras through experimental teaching, as well as the post-processing skills of photos, combining teaching and practice, based on technology, focusing on the improvement of photography level, and accumulating rich technical experience for future related work.

2. Design Idea: The use of portrait photography is extensive, covering various photography fields from commerce to art and humanities, and has high aesthetic value. But on the whole, China's current portrait creation is in its infancy, still in the stage of imitating and following the West, especially in the field of commercial portrait photography, it is still in a very immature state. In addition, the education of standardized photography in domestic colleges and universities is rare. According to this main idea, the portrait photography course is set up to train a group of

photographers with professional skills and creative skills to fill these deficiencies and backwardness.

Curriculum Teaching Objectives

Photography is a science, an art, but also an important means of information dissemination, is now deep into every corner of society, into people's lives. Photography plays a more and more important role in information dissemination and is widely used in various fields of human society. With the development of computer technology and the advent of the information age, photography teaching is becoming more and more important in higher education in the 21st century.

This course mainly focuses on camera (including camera type, structure, use and maintenance), photography exposure (including correct understanding of exposure, exposure estimation, etc.), depth of field and hyperfocal length (including people, scenery, still life photography, etc.), photography composition (including principles and requirements of composition, factors affecting composition, etc.), digital photography system (working principle, performance and use of digital camera), etc.

Knowledge objectives:

Through the study of this course, students are required to comprehensively and systematically understand the basic theory of photography, master the performance and use of cameras through experimental courses, skillfully master the technical skills of photography, and learn to process photos in the post-processing, so as to lay a solid foundation for the application of photography technology in various fields in the future. The goal of this course is divided into three stages: photography skills-photography creation-post-processing, teaching and skills training in stages.

Professional ability objectives:

This course focuses on the overall goal of cultivating skilled talents suitable for photography and related professional positions, highlighting the ability "professionalism" and technical "application". Through 3 years of study in school, students can master the new technology and new technology of contemporary photography. Skills, with photography observation ability, thinking ability, performance ability and photography comprehensive ability of photography related positions. The course objectives are subdivided into the knowledge, ability and quality objectives corresponding to the three teaching modules of "photography technical skills", "image expression of photography" and "post-processing of digital photos.

Quality objectives

1. The quality goal of this course is to enable students to establish a good style of creation and shooting;

2. Cultivate students' ability to observe, imagine and think about the society, creatively use photographic equipment to create good works that meet the requirements of the times, and lay a good foundation for future study and work;

3. Proficient in the current photography workflow and able to learn continuously at the same time;

4. The constant pursuit of artistic beauty, photography can spend a lot of time and energy, money to improve their knowledge system and aesthetic accomplishment. III. Course Content and Requirements

In order to enable students to master the basic knowledge and skills of economics, the course is taught through 12 teaching units, using theory and combination methods, with 20 hours for the theoretical part and 25 hours for practice.

Implementation Recommendations

1. Selection and compilation of teaching materials

According to the curriculum standard selection or preparation of teaching materials. The textbook selected is "Basic Open Course of Photography" Author: Dai Fei Edited and Published: 214-11-1 Publishing House: China Radio and Television Publishing House

2. Teaching Suggestions

In the teaching process, we must instill some ideas into students, especially for beginners, the following contents are worth referring to for them:

1) Don't think twice about what you will shoot and what you will not shoot before you come into contact with photography. It is also a waste of time to think about it, let alone draw a conclusion and decide what equipment to buy. 100 percent of the people will not ask themselves which street they will go to or which alley they will go to before they learn to drive. The path of photography is in the unknown, relying on interest to explore the way forward, completely needless to say, arty.

2) Don't be superstitious. If you want to shoot a certain subject well, you must be equipped with certain equipment. For example, if you shoot a portrait, you must be 85/1.4, if you shoot a scenery, you must be 16-35/2.8L, if you shoot an insect, you must be 100/2.8 MACRO. You will become a black sheep. Wide angle can also shoot portrait, telephoto shot scenery more special flavor. The so-called a certain lens is a portrait head, a certain lens is a scenery head, such advertising words are used to deceive amateur consumers.

3) The camera is used to create visual enjoyment, not to smash walnuts and meet gangsters to fight back in self-defense. Try to choose a light and practical camera is more pragmatic, of course, the appearance to be beautiful, at least and their appearance to complement each other.

4) The so-called a lens to go to the end of the world is best not to buy, because you are likely to go to the end of the world, if you have the conditions to go to the end of the world, you cannot use such as 28-300 lens to shoot things, why.

5) If you don't have any foundation or are not interested in studying the basic knowledge of cameras, you may as well choose a digital pocket machine first. If you can manually adjust the aperture, don't buy a fool machine or a film entry machine. Because once you find yourself really more and more inspired, you will painfully spend a sum of money to buy a better camera, this is the law. And now it's outdated to get started with film.

6) The good-looking photos on the Internet, including the fine photos in the forum, especially the digital works, are almost all carefully produced in the later stage, which is also an indispensable part of photography. Therefore, in the forum, if you want to ask DX, you should sincerely dig out PS law from them, instead of interviewing them where the inspiration came from when they pressed the shutter. Inspiration is difficult to learn, and technology is common.

7) To participate in various shooting activities can quickly improve the level, but cannot further improve the level. Photography is a lonely art, whether it is portrait or scenery, independent thinking can have a unique style of work to their satisfaction. Therefore, my point of view is that if you want to make more friends, you should take part in more activities. If you want to improve your photography skills, you should try your best to practice alone and realize your own. It will be fun.

8) Since you are playing photography, you don't have to abide by too many dogmas. You can immerse yourself in self-satisfaction first, and then slowly accept other people's opinions and suggestions. Photography is a subjective art. Of course, being recognized by more people is an addictive enjoyment. You don't have to take other people's evaluation too seriously. No one understands your photography pursuit better than yourself.

9) Portrait, don't start with beautiful women and handsome men, it will make you inert. Real beautiful women and handsome men look good at everything. It is suggested to start with the old and ugly ones, and the psychological pressure of shooting such models is small, and they generally don't ask you to shoot well, and they generally know that they are not very photogenic, and once you shoot well, how

much sense of accomplishment!

10. When commenting on films in photography forums, for beginners, don't flatter DX, trying to get DX's favor and teaching you a few tricks is totally useless. The correct way is to make reasonable bricks and ask questions with doubts. DX people will often do their best to clarify his creative ideas, thus improving faster.

Basic teaching conditions

1. The department has 8 full-time teachers, multiple teaching places, and each classroom is equipped with multimedia;

2. The school is equipped with 3 70-square-meter studios with a variety of lamps. There are more than 10 lamps of 1000-watt and 600-watt in Kimbe. Dozens of background cloths; There are 2 still-object stations, equipped with other lamps and devices in the studio.

3. The school has an Apple computer room with a total of 25 Apple computers, which has basically met the teaching needs;

3. The studio is equipped with a 42-inch led TV for everyone to watch pictures in class;

Relevant research

Problem-Based Learning Method

Barrows (1969) a professor of neurology in the United States, pioneered the application of the PBL teaching model in teaching, aiming to solve the problem of poor articulation between theoretical learning in the early part of medical education and practice in the later part of the process, which has a negative impact on teaching. The researcher found that medical students can produce active learning state after participating in clinical practice, so he tried to carry out teaching reform. He divided students into groups, each group is equipped with a tutor, and a "patient" is arranged in each group. Students can interview and observe the patients, discuss and study different "diseases" in groups, or consult the tutor and look for information, and finally prescribe medicines for the "patients".

The students can interview and observe the patients or consult their tutors or search for information, and finally prescribe medicines for the patients. In this teaching process, students acquire and internalize the corresponding knowledge as well as the methods and operations required to deal with such knowledge. More importantly, the students' learning attitudes were more positive and active than before, which he considered as a reasonable and effective teaching reform. Later, this approach was systematically called "problem-based learning", problem-based learning, abbreviated

as ML. Harvard Medical School created the "New Pathways" under the guidance of the PBL teaching concept. Harvard Medical School has created the "New Pathways" course under the guidance of PBL teaching concepts and systematically introduced the basic connotation of the course model, i.e., under the guidance of the traditional teaching model of the course with the addition of small group discussion sessions and PBL teaching concepts. The "New Pathways" course has evolved into a model of a blended PBL course. Compared with the traditional teaching model, the study of the theoretical foundations of PBL began at this stage, with psychology, sociology, philosophy and other disciplines providing theoretical support for the PBL teaching model.

Philip Hallinger and Edwin M. Bridges (2002) Professors of Mahil on University and Stanford University believe that through the implementation of the PBL teaching model by teachers, students can be guided by the model not only to understand abstract concepts, the It also ensures that theory is linked to practice and provides students with a foundation for learning in other areas. The two professors found that the relationship between PBL teaching and curriculum design is also limited by external factors such as learning objectives and resource conditions, and they believe that if PBL teaching method is to be effective, it needs to be combined with the characteristics of the local culture, politics and economic system, which is the focus of the application of PBL teaching method. With the gradual improvement of the PBL theory.

Csikszentmihalyi and Wolf (2000) proposed the Creativity Systems Model for the classroom, which consists of three main factors: the student, the teacher, and the textbook. Students' creativity is influenced by the textbooks, the teacher's ability to convey knowledge, and the environment within the school. Teachers are important in promoting creativity if they have a good attitude towards teaching, if they actively guide their students towards creative activities and if the atmosphere in the classroom is favorable for learning. For the organization of the school.

Wong and others (2007) conducted a study on two groups of vocational college freshmen conducted a study on the Factors Influencing Students' Learning Motivation under the problem-based learning method. The objectives were Obtain driving factors for improving students' learning outcomes through group testing. The results of this study found that Students who have good learning methods and are encouraged by teachers will achieve more results. They pointed out that During the implementation of the PBL teaching model, students with strong motivation and effective learning methods will gain more compared to other students.

Williamsons. (2009) conducted a study on two groups of students in the traditional and problem-based learning method of instruction. The objectives were explored how student learning outcomes differ across instructional models. The results of this study found that students learning under the PBL teaching mode are more active in the teaching process, and the learning effect is more excellent compared with that of using the traditional teaching mode.

Othman Mat Daud K. A. Ewon U (2017) conducted a study on two groups of students were grouped together for the study of interest in learning. The objectives were to discover whether the problem-based learning method can increase students' interest in learning. The results of this study found that the PBL teaching mode can enhance the students' interest in learning. Eduardo Dopico (2017) believes that in the process of PBL teaching, teachers should change their roles appropriately, and change from the "dominant" to the "guide" to cooperate and help students in the classroom. "In the study of PBL curriculum design, Aalborg University in Denmark applied the PBL teaching model to single-discipline, multi-discipline and school curriculum system, which deepened the implementation effect and the alignment of curriculum objectives.

Problem-based learning method is instructional method that can improve students' learning effect. This learning model has been used in theoretical and practical courses at home and abroad for a long time, so its development is also more mature, and there are abundant views, theories and research results related to it, especially in vocational education, the application of problem-based learning method has a certain degree of extensiveness. The practical results have proved that the graduates under PBL teaching method have shown certain advantages in vocational skills, communication ability, cooperation ability and independence ability compared with the traditional graduates, which are the most important qualities to adapt to today's society.

Creative Problem-Solving Ability

Sema Tan & C. June Maker (2020) They studied on Assessing creative problem-solving ability in mathematics: The Discover Mathematics Assessment. The purpose of this study was to revise and revalidate the scoring procedure of the DISCOVER Mathematics Assessment to allow evaluators to better measure creative problem-solving ability in mathematics, identify gifted students, and evaluate the programs for creative problem-solving ability. The data consisted of scores of 233 students selected from five different grade levels. We compiled descriptive statistics and conducted regression analyses to compare the relationships between both the

original and revised versions of the scoring system and general creativity. The revised scoring system was more effective when predicting variance in general creativity for overall problem-solving performance, and performance in semi-open-ended problems. It also predicted more variance in general creativity for the group Higher Grade Levels than the group Lower Grade Levels. Therefore, we suggested that quality should be considered as well as fluency, flexibility, and originality when scoring assessments for creative problem-solving ability in mathematics.

Chen, Pengfei and Chang, Yuan Cheng (2021) They researched on Enhancing creative problem-solving in Postgraduate Courses of Education Management Using Project-Based Learning. The objective of this study is to enhance students' creative problem-solving ability using a project-based learning approach. The study was based on a quasi-experimental design and the participants were 69 postgraduate students in the field of education management. There were 35 of the students assigned to the experimental group, and the remaining 34 to the control group. The experiment was conducted over 15 classes for 2 months. A creative problem-solving questionnaire was used as a pre-test and post-test before and after the experiment. The results showed that the students' creative problem-solving ability had been effectively enhanced by the intervention of project-based learning, especially in terms of identifying problems, finding solutions and evaluating them. Although the project design and development were challenging, the master students coped with the difficulties and aimed to enrich their personal knowledge and skills. Evidence from this study demonstrated that the project-based learning approach actively enhanced students' higher-order thinking skills more successfully than the traditional lecture-based instruction it can be concluded that the project-based learning approach was effective in enhancing the creative problem-solving ability of postgraduate students in the education management field, specifically in the dimensions of identifying problems, finding solutions and evaluating the solution.

Pandya, Samta P. (2022) Studied about Enhancing High Schoolers' Creative Thinking and complex problem-solving abilities: Examining the Effectiveness of Spirituality. They found that High schoolers' creative thinking and complex problem-solving abilities are important for determining achievement. There is a need to investigate whether spiritual training delivered via a microblogging social networking platform would be effective. This article reports a study that examines the impact of Twitter-based spiritual posts on high school students' ($N_{\text{pre-test}} = 272$; $N_{\text{post-test}} = 234$) creativity and problem-solving abilities. Results indicated that spiritual posts were effective as compared with the control condition comprising

general creativity-enhancement posts. Post-test outcomes were higher for girls, middle class, who had mothers as primary caregivers, whose primary caregivers were highly qualified, living in standard family arrangements, scoring high on conscientiousness, emotional stability, and openness to experience personality characteristics, and whose intervention compliance in terms of reading/liking posts and homework was above threshold (>30). Intervention adherence mediated the association between demographic and personality characteristics and outcomes. Latent class analysis indicated eight clusters/subgroups of participants reporting maximum post-test gains: female, middle class, with mothers as primary caregivers, whose primary caregivers were higher qualified, who were highly conscientious and open to experience, and whose intervention compliance was above threshold.

Puchongprawet, Jakkrit and Chantraukrit (2022) They have conducted research on Creative Problem-Solving and Creativity Product in STEM Education that research aims to study and compare students' creative problem-solving ability and the quality of students' creative products before, during and after the study in STEM education with the emphasis on the engineering design process. This research is an experimental One-Group Repeated Measures design, with the target groups being 72 junior high school students. The data collection tools used are (1) a creative problem-solving competency test with a validity of 0.817 and (2) an evaluation form for the quality of creative products with a validity of 0.993. The data were analyzed using arithmetic mean, standard deviation and repeated measures ANOVA. The research findings are as follows: (1) The difference between students' creative problem-solving ability measured after the study and their creative problem-solving ability measured during the first and second study as well as before the study was statistically significant at the level of 0.05, with the level of ability being high; and (2) the difference between the quality of students' creative products after the study and that during the first study and before the study was significantly significant at the level of 0.05. The quality of the products was good.

Yonwilad, Wannatida and others (2022) They studied on Improving Mathematical Problem-Solving Abilities by Virtual 5E Instructional Organization. The purpose of this action research was to improve mathematical problem-solving abilities using the virtual 5E instructional organization for undergraduate math students who required to pass the criteria of 70% of the full score. This study involved thirty undergraduate math students from one university who were enrolled in mathematical problem-solving courses for mathematics teachers during the first semester of academic year 2021. They were randomly chosen using cluster random sampling.

There are three types of tools utilized in this research: 1) a plan for mathematical problem-solving abilities, 2) an assessment of problem-solving abilities in mathematics, and 3) a student behavior observation form. The statistics used in the data analysis are descriptive for calculating mean, standard deviation, and percentage. The finding showed that mathematical problem-solving abilities had been achieved. Undergraduate students in mathematics had average scores of 35.00, 46.07, and 50.19 after completing learning activities in the first, second, and third cycle, indicating 58.33%, 76.78%, and 83.65%, respectively. In the second and third cycle, all students achieved 70% of the entire score. The findings shows that experienced undergraduate students can solve mathematical problems as a proportion of the overall score when using the virtual 5E instructional organization.

Lin (2023) She studied on Creative problem-solving ability does not occur by chance: Examining the dynamic system model of creative problem-solving ability. This study examined Cho's dynamic system model of creative problem-solving ability in a sample of 112 gifted and non-gifted students. The cluster analysis and t-test results indicated that students should be categorized into high and low performance groups. Students who scored three points or more across all attributes also had a higher likelihood of possessing better mathematical creative problem-solving abilities. Furthermore, significant differences were found in the two groups 'scores on the creative problem-solving Attributes Inventory and Mathematical creative problem-solving ability Test. The environment attribute was the only one on which the two groups did not differ significantly; this may be the result of education fever in Asian societies. Finally, the results of this study not only indicated that creativity does not rely on a single factor but that a well-balanced environment is imperative to nurturing creativity.

To sum up, the creative problem-solving model also has reference significance for guiding vocational undergraduate curriculum and teaching reform. In teaching activities, teachers should adopt problem-based learning and creative problem-solving teaching models based on the process of problem-solving, providing appropriate problems, inspiring students' sensitivity to problems, stimulating students' flexibility in thinking, assisting students in overall thinking about problems, and encouraging students to solve difficult problems and acquire knowledge through exploration, discovery, deep thinking, reflection, and discussion during the learning process, Develop students' creativity.

The CPS model emphasizes group collaborative learning. Osborne once suggested using group collaboration when engaging in brainstorming, as group

collaboration can concentrate the creativity of all individuals, resulting in an overall effect in creative thinking through group collaboration. This allows limited individual creativity to interact with the creative ideas or ideas of other group members to generate greater creative effects. Therefore, group collaboration is an important factor affecting the effectiveness of CPS training.

Using group collaborative learning in CPS. Training can more effectively enhance the creativity of group members, but the atmosphere during CPS in the group is also an important influencing factor. When conducting creative thinking activities in the group, the following measures should be taken to create a good atmosphere: 1) Respect and accept the opinions of other members; 2) Able to communicate and encourage others; 3) Respecting individual progress in course learning; 4) Encourage individuals to generate unique ideas and reactions; 5) Help classmates; 6) Having enough time to discuss divergence and convergence; 7) Encourage divergent thinking and avoid criticism; 8) Provide a harmonious and safe discussion atmosphere; 9) Support others' opinions; 10) Allow individuals to have the right to choose; 11) Motivating members to create problems; 12) Don't worry about your own ideas being inconsistent with others.

Chapter 3
Research Methodology

Using problem-based learning method to improve creative problem-solving ability in photography course of undergraduate students. The research using experimental research methodology have the following procedures:

1. The population /the sample Group
2. Research Instruments
3. Data Collection
4. Data Analysis

The population / the sample Group

Population

There are 150 students having photography course in 5 classes of the first-year majoring in visual communication design at Zhejiang Yuxiang Vocational and Technical College.

Sample group

Through random cluster sampling, 30 first-year students with mix abilities (strong, medium, and weak) majoring in visual communication design of Zhejiang Yuxiang Vocational and Technical College were sampled.

Research Instruments

Using problem-based learning method to improve creative problem-solving ability of undergraduate students. The research Instruments is as follows:

1. Lesson plan according to the problem-based learning method.
2. Creative problem-solving ability test.

Lesson plan according to the Problem-Based Learning method

The development process of creating Lesson plan according to the problem-based learning method and assessment form for validity of lesson plan were followed as.

1. Studying the principles of creating Lesson plan according to the problem-based learning method and assessment form for validity of lesson plan from books, textbooks, articles, and related research.

2. Creating a Lesson plan according to the problem-based learning method and assessment form for validity of lesson plan, 4 plans as follows:

Chapter 1: Portrait Photography, 4 hours

Chapter 2: Wedding Photography. (done in studio, kit and caboodle), 4hours

Chapter 3: Graphic Creative Photography, 4 hours

Chapter 4: Shoes Advertising Product Photography, 4 hours

3. Drafting the assessment form for validity of lesson plan at the end of each section, there was a space for experts to write suggestions that could be helpful in improving students' creative problem-solving ability.

4. Taking the instruments to 3 experts to verify the validity. The test consistency the index of congruency is between 0.67-1.00, the level of consideration is as follows:

Rating is +1. There is an opinion that "Corresponds to definition/measurement objectives."

Rating is 0. There is an opinion that "Not sure it corresponds to definition/ measurement objectives."

Rating is -1. There is an opinion that "Inconsistent with definition/measurement objectives."

5. Modifying assessment form for validity of lesson plan according to suggestion.

6. Taking the research instruments to collect data with the research samples.

Creative Problem-Solving Ability Assessment

The development process of creating creative problem-solving ability test and assessment form for validity of creative problem-solving ability test were followed as.

1. Studying the principles of creating creative problem-solving ability test and assessment form for validity of creative problem-solving ability test from books, textbooks, articles, and related research.

2. Creating a creative problem-solving ability test and assessment form for validity of creative problem-solving ability test. Create a creative problem-solving ability assessment and assessment form for validity of creative problem-solving ability test. Creative problem-solving ability assessment consisted of three competencies that Proposed by the CPS model modified by Tefenger and Isaacson (1994) evaluation framework are a comprehensive and reasonable division of students' problem-solving ability, which is classified into the following:

1) understanding the problems

2) creating Ideas

3) acting plan

Referring to scholars Kandemir (2009) The use of creative problems solving scenarios in mathematics education: Views of some prospective teacher, and design

the evaluation test scale on this basis, as well as synthesize the PISA (2003) evaluation scale.

       3. Taking the instruments to 3 experts to verify the content validity and index of items objective congruence (IOC) of the assessment form. The test consistency the index of congruency was between 0.67-1.00.

       4. Taking research instrument to test reliability and result of reliability was 0.96.

       5. Modifying assessment form for validity of lesson plan according to suggestion.

       6. Taking the research instruments to collect data with the research samples.

Table 3.1 Evaluation criteria for Creative Problem-Solving Ability

Evaluation Items	Evaluation Content	Score and criterion		
		3	2	1
The student can understand the problems	1.find difficulties	Students can find problems independently, and the problems they are looking for are scientific and rational.	Students can find problems independently, but the problems they are looking for lack certain rationality.	Students cannot find problems independently and lack the ability to learn independently.
	2.Collection of information	In addition to the learning information provided by the teacher, it can independently collect various learning information to improve the learning effect.	There is an idea of collecting learning information, but very little learning information can be found.	Lack of awareness of collecting learning information, only using teaching resources provided by teachers.

Table 3.1 Evaluation criteria for Creative Problem-Solving Ability (continue)

Evaluation Items	Evaluation Content	Score and criterion		
		3	2	1
	3.Identify problems	Students are able to quickly identify issues and clarify their nature, context, and implications.	Students can identify issues and, to some extent, clarify the nature, context and implications of some issues.	Students were less likely to identify problems from instructional activities and to clarify the nature, context, and meaning of certain problems.
The student can creative Ideas.	4.Creative Ideas	Students think about problems from multiple perspectives, generate as many trains of thought and ideas as possible, and think rationally.	Students think about the problem from another angle and generate some thoughts and ideas.	Students can only think about problems from a single perspective, and some ideas and ideas are unreasonable.

Table 3.1 Evaluation criteria for Creative Problem-Solving Ability (continue)

Evaluation Items	Evaluation Content	Score and criterion		
		3	2	1
The student can action plan.	5.Discover Solutions	Students can explore the methods and steps to solve the problem by themselves, and find several reasonable ways to solve the problem.	Students can basically explore the possibility of methods and steps to solve the problem, and it is possible to solve the problem.	Students cannot occasionally explore the possibility of methods and steps to solve problems, but can only think in the way of the teacher.
	6.Seeking acceptance	Students are able to discuss in groups, choose the best solution, consider the pros and cons of the implementation process, find the most suitable ideas, develop a plan and implement it smoothly.	Students can discuss in groups, find solutions, and basically be able to make plans, but they may not be able to implement the plans smoothly.	Students can discuss in groups and find solutions, but cannot basically make plans.

Evaluate quality standards

Score Range	Quality Level
18	Strong
15-17	Relatively strong
12-14	General
09-11	Relatively weak
06-08	Weak

Data Collection

In this study, the data collection period was used for the first semester of the 2023 academic year, from August 2023 to October 2023, totaling 16 hours. Follow the steps below.

1. This research is experimental research. One Group Pretest – Posttest Design was used with the following experimental design:

Table 3.2 Experimental design

Group	Pretest	Experimental	Posttest
E	T_1	X	T_2

The meaning of the symbols used in the experimental design.

E	means	Random Sampling
X	means	experimental
T_1	means	Pretest
T_2	means	Posttest

2. Took a creative problem-solving ability test to obtained from the analysis, the difficulty value, Discriminant power, and reliability value. Then it was tested before class with the students that were research samples

3. Taught according to lesson Plans that using problem-based learning method to improve Creative Problem-Solving Ability. Organized teaching by the researcher about 4 hours per week, total 16 hours.

4. After completing the teaching, Teacher conducted with using the same creative problem-solving ability test to students. The scores obtained from the test were recorded to compare the creative problem-solving ability of students before and after studying.

5. Got data obtained from teaching activities according to using problem-based learning method to analyze the data according to statistical methods.

Table 3.3 The lesson plans specific teaching time

No.	Date	Time	Learning contents
Class1	September 1st 09:00-14:30	4 hours	Portrait Photography 4 hours
Class2	September 4th 09:00-14:30	4 hours	Wedding Photography 4 hours
Class3	September 5th 09:00-14:30	4 hours	Graphic Creative Photography 4 hours
Class4	September 6th 09:00-14:30	4 hours	Shoes Advertising Product Photography 4 hours

Data Analysis

The data analyzed as follows:

1. Quantitative data were analyzed through descriptive statistics; means, and standard deviation.

2. Quantitative data were analyzed through inferential statistics; Then calculate the different score of practical skills before and after using problem-based learning method were analyzed through t-test for dependent samples.

Chapter 4
Results of Analysis

This research was to using problem-based learning method to improve creative problem-solving ability for undergraduate students and to compare students' Creative problem-solving ability before and after using problem-based learning method for undergraduate students. The data analysis result can be presented as follows:

      1. Symbol and abbreviations

      2. Results of data analysis

      The details are as follows.

Symbol and Abbreviations

Represent data analysis results based on symbols and semantics. The details are as follows:

$\overline{X}$	means average value
SD.	means standard deviation
N	means number of students
D	means scores of differences between before and after learning
df	means degree of freedom
t	means statistical data for t-test value
**	means statistical significance at level .01

Results of Data Analysis

Using problem-based learning method to improve creative problem-solving ability of undergraduate students, the researchers conducted the study in the following sequence:

Part 1: Results of using problem-based learning method to improve Creative Problem-Solving ability of undergraduate students.

Part 2: Results of comparing students' creative problem-solving ability of undergraduate students before and after using problem-based learning method.

Part 1: Results of using Problem-Based Learning method to improve Creative Problem-Solving ability of undergraduate students

Creative problem-solving is the process in which individuals creatively seek solutions to problems. The core of creative problem-solving is creativity, which requires individuals to overcome fixed thinking patterns and create new methods to solve problems. It is a complex and advanced comprehensive thinking activity.

The creative problem-solving process is considered a complex process that combines creativity and problem-solving, and many scholars have studied the stages of the creative problem-solving process. Wallas believes that creative problem-solving requires four stages: preparation, incubation, openness, and validation.

Stein proposed the three-stage theory, which suggests that creative problem-solving involves three stages: hypothesis formation, hypothesis validation, and communication.

Treffinger et al. believe that in the process of creative problem-solving, individuals need to use creativity while reasoning and thinking to solve problems. Therefore, they modify the CPS process and believe that creative problem-solving mainly includes six stages: discovering difficulties, searching for information, discovering problems or confusion, constructing ideas, arriving at solutions, and accepting the resulting solutions.

In the stage of higher education, a large amount of teaching research has proven that the CPS model used in various curriculum environments has had a positive impact on cultivating students' innovation and problem-solving abilities. Purwati et al. found that students who apply CPS model learning have better mathematical problem-solving abilities than those who use traditional learning, and their creativity is improved. Hobri et al. found that the application of CPS based shared tasks can significantly improve students' problem-solving abilities.

In this study, the "Problem Based Learning method" was conducted on 30 students in the first-year grade of Zhejiang Yuxiang Vocational and Technical College, majoring in graphic design at the university, and the students' behavioral performance in each class was observed and recorded in the five teaching sessions of "Set up study groups", "Create a problem", "Carry out activities", "Presentation of achievements", "Reflection after solving the problem", and five teaching sessions. The changes in students' behaviors show that students' learning awareness, learning strategies, learning activities, learning assessment and Creative Problem-Solving Ability are gradually improved throughout the learning process. The specific results of the empirical study are as follows.

Experimental research was conducted on 30 first-year students majoring in graphic design, of whom 20 were female, accounting for 66.67%, and 10 were male, accounting for 33.33%. Subsequently, the researchers analyzed the students' Creative Problem-Solving ability before and after class in the problem-based learning method, and the results are shown in Table 4.1 below.

Table 4.1 Using problem-based learning method to improve creative problem-solving ability of undergraduate students

Problem-Solving Ability	n	Full Scores (18)	Pre-test		Post-test		D
			$\bar{x}$	SD.	$\bar{x}$	SD.	
1. understanding the problems	30	9	6.07	1.15	7.30	1.07	1.23
2. creating Ideas	30	3	2.10	1.25	2.37	1.21	0.27
3. acting plan	30	6	3.93	1.20	4.73	1.10	0.80
total		18	12.10		14.40		3.13

From Table 4.1, it can be seen that the basic scores of creative problem-solving abilities for undergraduate students Using problem-based learning method are 12.10 points which is 67.65 percent on average before learning and 14.40 points which is 79.65 percent on average after learning, with an average difference of 2.3 points. Higher score after learning than before learning

Part 2: Results of comparing students' Creative Problem-Solving Ability of undergraduate students before and after using Problem-Based Learning method.

The researchers analyzed the data by employing the scores from the pre-test and post-test of Creative Problem-Solving Ability. They conducted data analysis using measures like mean, standard deviation, and the t-test dependent for correlated samples. The results of this analysis are presented in Table 4.2.

Table 4.2 The comparing students' Creative Problem-Solving Ability of undergraduate students before and after using problem-based learning method

Creative Problem-Solving Ability	n	Full Score	$\overline{X}$	SD.	df	t	p
Pre-test	30	18	6.03	2.71	29	19.33	0.00**
Post-test	30	18	14.96	2.53			

**Statistically significant at level .01(p <.01)

Table 4.2 shows that the average score of first-year students' Creative Problem-Solving Ability after class is higher than the average score before class, indicating that students' Creative Problem-Solving Ability after class is higher than before class.p<.01 indicates statistical significance at the .01 level. By implementing the problem-based learning method on students, their creative problem-solving ability after class is significantly higher than that before class. This is consistent with the research hypothesis.

3. Learning Behavior

The researchers Using problem-based learning method to improve creative problem-solving ability of undergraduate students. In order to validate the findings, the researcher observed the students' behavior during the teaching and learning process. In this study, when the problem-based learning method was used to teach 30 first-year undergraduate students in Zhejiang Yuxiang Vocational and Technical College in Anji in the photography course, the students' behaviors were observed and recorded in the five teaching sessions of Step1: Set up study groups, step2: Create a problem, step3: Carry out activities, step4: Presentation of achievements, step5: Reflection in each class. Changes in students' behaviors indicated a gradual improvement in their Creative Problem-Solving ability throughout the learning process. Students' learning behaviors during the schedule of instructional activities were recorded as follows:

Problem Based Learning activities have 5 stages as follows: 1) Set up study groups, 2) Create a problem, 3) Carry out activities, 4) Presentation of achievements, 5) Reflection after solving the problem.

1. Set up study groups

According to the characteristics of cooperative learning theory, the students are mixed and organized into several groups (about 5 people in each group). problem-

based learning method teaching, group discussion is the main form, through the real scenarios show that the problem is raised, in order to solve the problem, the group members have to introduce each other to each other, through the introduction of self-introductions, the members of the group from strangers to allies. To lay a foundation for problem solving and build a relaxed and witty learning atmosphere. The students and the teacher introduce themselves respectively, say their own ideas and doubts, first lift the strangeness between each other, and form a harmonious learning atmosphere. In order to better carry out the study, the group leader and recorder of each group should also be determined.

2. Create a problem

In this session, the teacher provides students with a real case situation, in which students rise to the desire to explore and ask questions in the meantime. In the learning process, group members co-operate with each other and give play to their respective strengths. Students are able to discover the confusion in the information, can actively explore the information and knowledge related to the problem, and finally understand the problem under the guidance of the teacher.

3. Carry out activities

On the basis of the previous sessions, students need to collaborate among group members to analyses the structure and components of the problem, capture the key knowledge points and develop practical activities as a group to prove whether their analyses are correct. If the problem is not too difficult, the teacher can see that students can basically analyses the problem independently and carry out practical activities. It will then be left to the students to complete it on their own as a group. In other cases, if the problem is more complicated or the problem is more difficult, the teacher needs to give students some guidance.

4. Presentation of achievements

This session reports on the group's learning by showing group members in action to arrive at a solution. Report on the division of labor in the group, group members completing the task, the group solving the problem and the group completing the task. Groups learn from each other by sharing their learning. After listening to the debriefing of other groups, comments should be made to point out the problems that students have in the common operational activities and to complement each other's strengths and weaknesses. In this process, the teacher should focus on the students' critique because students, due to their learning and life experience, sometimes put forward some inappropriate or unrealistic opinions, and when they hear inappropriate opinions, they should stop them in time to ensure that the debriefing is carried out properly.

5. Reflection after solving the problem

Through exchanges, we critically accept the experiences and suggestions shared by other groups, draw on the rationalization suggestions of other groups or teachers, rethink and validate creative problem-solving methods, improve our own creative problem-solving abilities, and ultimately form our own effective paths for discovering, analyzing, and creatively solving problems, and validate the generated solutions.

In this teaching session, the case will be reintroduced and questions will be asked to test the students' creative problem-solving abilities. The students' answers will be uploaded to the teaching platform and their creative problem-solving abilities will be observed from the test results.

Chapter 5
Discussion Conclusion and Recommendations

The research "Using problem-based learning method to improve Creative Problem-Solving Ability of undergraduate students" aims to improve the Creative Problem-Solving ability of undergraduate students by using the problem-based learning method, to study the learning behavior of first-year students majoring in graphic design in Zhejiang Yuxiang Vocational and Technical College, and compare the Creative Problem-Solving ability of students before and after class when using the problem-based learning method. The details are as follows.

1. Research relevant information about problem-based learning method, including the meaning, teaching steps, theoretical basis, characteristics, teaching design, and practical application of problem-based learning method. This study is based on the courses "Photography Course", which is a professional elective course designed for students majoring in graphic design.

2. Research relevant information on creative problem-solving ability, including the meaning, characteristics, Eleme ents, influencing factors, improve strategies, and evaluation methods of creative problem-solving ability.

3. Create research instruments, including lesson plans for teaching using problem-based learning method, which includes five specific steps, Step1: Set up study groups，step2:Create a problem, step3: Carry out activities, step4: Presentation of achievements, step5: Reflection after solving the problem. Research and develop creative problem-solving ability evaluation scale, creative problem-solving ability mainly includes six dimensions: find difficulties, Collection of information, identify problems, Creative Ideas, Discover Solutions, Seeking acceptance.

4. Submit the research instruments to three experts to verify the effectiveness of the lesson plans and self-directed learning ability evaluation scale，using the consistency index as the consideration criterion (objective consistency index: IOC).The

5. reliability of the tool was checked by trying it out in Class 2, Grade 1 with similar conditions as the sample group.

6. After the development of the research tool was completed and passed expert inspection, lesson plans using the problem-based learning method were adopted. In the first semester of the 2023 academic year，first-year university .

7. students were tested and data was collected using the problem-based learning method.

8. Using experimental data, analyze the average ($\overline{\mathrm{X}}$), standard deviation(SD.) and T-test of paired samples.

Conclusion

According to the research topic, the summary of the research on improving undergraduate student's creative problem-solving ability through the problem-based learning method is as follows:

1. By using the problem-based Learning method and observing student's learning behavior, it is found that students' find difficulties, Collection of information, identify problems, Creative Ideas, Discover Solutions, seeking acceptance, and their creative problem-solving ability has been improved.

2. By comparing students' creative problem-solving ability, the average score of first-year students 'creative problem-solving ability after class is higher than the average score before class, and the student's creative problem-solving ability after class is significantly higher than before class, with statistical significance at the .01 level.

Discussion

The objective of this study is to enable first-year undergraduate students to improve their creative problem-solving ability through the problem-based learning method. The results of this study can be discussed as follows:

1. Develop constructivist learning theory to improve college students' photography skills. By following the five steps of the teaching process, this plan involves the following steps: Step 1. Build scaffolding. Step 2. Create a scenario. Step 3. Explore independently. Step 4. Collaborative learning. Step 5. Effectiveness evaluation. Students' photography skills have significantly improved compared to before after learning. Positive effects were observed in at least 10 aspects of photography skills. Including: camera operation, lighting control, composition, focus, color processing, theme performance, communication and interpersonal relationships, fixed lens photography, motion lens photography, post editing. Therefore, using

constructivist learning theory in photography teaching is crucial for improving students' photography skills. Due to the significant improvement in students' abilities in these areas, there is a significant difference between the posttest and pretest average scores at level .01.

The results of this study are consistent with previous research. Especially with Barrows. (1964) problem-based learning method in medicine and beyond: A brief overview [M] New Directions for Teaching and Learning The research on the application of learning models is consistent in order to improve students' learning outcomes, and the results of this study are consistent. Research has found that students have significantly improved their creative problem-solving ability and learning outcomes after completing the course (p<0.05). In addition, the research results are consistent with Carmeli, Sheaffer, Binyamin. et al. (2014) Transformational Leadership and creative problem-solving: The Mediating Role of Psychological Safety and Reflexivity [J]. The Journal of Creative Behavior, which involves the comprehensive impact of creative problem-solving ability. Research has found that students who adopt problem-based learning methods significantly improve their creative problem-solving ability, with a statistically significant difference (p< .01). In addition, the study also found that compared to students taught using traditional methods, students taught using the problem-based learning method showed higher progress in photography skills, with statistical significance (p< .01).

2. This type of learning management approach encourages students to independently explore knowledge, utilize diverse scenarios, align with student needs, stimulate collaborative problem-solving abilities, promote self-directed research-based learning, participate in group collaborative learning, and express opinions, enabling students to fully demonstrate their potential. Therefore, this method improves students' creative problem-solving ability, enabling the acquired knowledge to be applied in real-world scenarios. This is consistent with Ummah. Yu et al. (2020) The Effect of Jumping Task Based on creative problem-solving on students' problem-solving ability.

Recommendations

General recommendation

1. Using the problem-based learning method may consume more time than other teaching methods; therefore, teaching design needs to be done well in the process of problem-based learning method.

2. Based on the research results, researchers have found that using the problem-based learning method in teaching can effectively improve students' Creative problem-solving ability. Therefore, teachers should also adopt this teaching method in other subjects or content to promote the development of students' academic performance and learning abilities.

3. Before using the problem-based learning method for teaching, teachers should encourage students to fully express their opinions and not limit their ideas. This is beneficial for the development of students' expression skills and enables learning to proceed smoothly as expected.

Suggestions for future research:

In order to further carry out research on this topic, the research prospects proposed by the author are as follows:

1. Expanding the scope of research and increasing research duration. Future research should expand the sample size and research duration. At the same time, the teaching content should not be limited to a single course, and any interdisciplinary content can be studied to further construct and improve the problem-based learning method teaching strategy.

2. Establishing a multi-dimensional evaluation plan for creative problem-solving ability. Future research can use video capture devices, eye movement devices, EEG devices, etc. to record more physiological and procedural data of students, and complete scientific measurement of students' creative problem-solving ability. Collect more qualitative data to gain a deeper understanding of the trajectory of improving students' creative problem-solving abilities.

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Appendixes

Appendix A

List of Specialists and Letters of Specialists

Invitation for IOC Verification

Appendix A
List of Specialists and Letters of Specialists Invitation for IOC Verification

Name of Expe	Position/Office
1. Supaporn Srihamee	Assistant Professor Doctor Faculty of Education, Bansomdejchaopraya Rajabhat University
2. Sarawut Samanya	Assistant Professor Doctor Assistant Professor Faculty of Education, Bansomdejchaopraya Rajabhat University
3. Dong Shousheng	Professor Doctor East China Normal University

Appendix B

Official Letter

Ref.No. MHESI 0643.14/880

Bansomdejchaopraya
Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

18 August 2023

RE: Invitation to validate research instrument

Dear   Assistant Professor Dr.Supaporn Srihamee

        Mr.Hu Ling Feng is a graduate student in Master of Education Program in Curriculum and Instruction of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Using Problem Based Learning Method to Improve Creative Problem-Solving Ability of Undergraduate Students"

        The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

        We respectfully request your assistance in validating a research instrument that is attached to this message. We would be grateful for any help you can provide in this matter. We would like to express our sincere appreciation for your time and expertise. If you have any questions or concerns, please do not hesitate to contact Mr.Hu Ling Feng at 1403056327@qq.com

        Thank you for considering our request.

Sincerely,

(Dr.Nainapas Injoungjirakit)
Vice Dean, For Dean of the Graduate School

Bansomdejchaopraya Rajabhat University
Tel.+662-473-7000 ext. 1814
www.bsru.ac.th

Ref.No. MHESI 0643.14/881

Bansomdejchaopraya

Rajabhat University

1061 Itsaraparb Hirunrujee

Thonburi Bangkok 10600

18 August 2023

RE: Invitation to validate research instrument

Dear   Assistant Professor Sarawut Samanya

        Mr.Hu Ling Feng is a graduate student in Master of Education Program in Curriculum and Instruction of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Using Problem Based Learning Method to Improve Creative Problem-Solving Ability of Undergraduate Students"

        The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

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        Thank you for considering our request.

Sincerely,

(Dr.Nainapas Injoungjirakit)

Vice Dean, For Dean of the Graduate School

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Ref.No. MHESI 0643.14/882

Bansomdejchaopraya
Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

18 August 2023

RE: Invitation to validate research instrument

Dear   Professor Dr.Dong Shousheng

      Mr.Hu Ling Feng is a graduate student in Master of Education Program in Curriculum and Instruction of Bansomdejchaopraya Rajabhat University. He is undertaking research entitled "Using Problem Based Learning Method to Improve Creative Problem-Solving Ability of Undergraduate Students"

      The thesis adversity committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

      We respectfully request your assistance in validating a research instrument that is attached to this message. We would be grateful for any help you can provide in this matter. We would like to express our sincere appreciation for your time and expertise. If you have any questions or concerns, please do not hesitate to contact Mr.Hu Ling Feng at 1403056327@qq.com

      Thank you for considering our request.

Sincerely,

Nainapas I

(Dr.Nainapas Injoungjirakit)
Vice Dean, For Dean of the Graduate School

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Appendix C
Research Instruments

Lesson Plan

Using Problem Based Learning method to improve Creative Problem-Solving Ability of undergraduate students

Department	:	Department of Art and Design, Zhejiang Yuxiang Vocational and Technical College
Course name	:	Photography Course
Target Audience	:	Visual Communication Design, Grade 1, Class 2
Number of students	:	30
Teaching Time	:	16 hours
Lecturer	:	Hu Ling Feng

Lesson Plan I

The first semester of the first academic year

Department	Department of Art and Design, Zhejiang Yuxiang Vocational and Technical College
Course name	Photography Course: Chapter 1 Portrait Photography
Target Audience	Visual Communication Design, Grade 1, Class 2
Number of students	30
Teaching Time	5 hours
Lecturer	Hu Ling Feng

Content

Portrait Photography

Objective of Leaning

1. Students can identify the basic knowledge of portrait photography. (K)
2. Students can master camera equipment for portrait photography. (K)
3. Students can produce portrait photography. (p)

Main point/concept

Portrait photography is a very specific form of photography and it is important to use the right techniques and methods when taking portraits. Master your camera's shutter speed, sensitivity, aperture, color temperature and white balance. Only then will you be able to take realistic, meaningful and expressive portraits.

1. Mastering the basic functions of a photography course.

(1) Shutter speed: is an important parameter for the examination of the digital camera shutter, each different model of digital camera shutter speed is completely different, so in the use of a certain model of digital camera to shoot the scene, you must first understand its shutter speed, because when you press the shutter, only after taking into account the start-up time of the shutter, and to master the timing of the release of the shutter, in order to capture the vivid picture.

(2) Sensitivity: Also known as ISO, it refers to the ability of a sensor to feel light. In the era of traditional photography, the sensor is the negative, while in the era of digital photography, cameras use CCD or CMOS as the sensor. The higher the

sensitivity (i.e., the higher the ISO value), the less light is needed for shooting, and the lower the sensitivity, the more light is needed for shooting.

(3) Aperture: The aperture stops are designed so that the difference in value between two adjacent stops is 1.4 times (the square root of 2 is an approximation of 1.414). Between the two adjacent stops, the difference in aperture diameter is root 2, the difference in aperture area is double, the difference in the brightness of the image formed on the negative is double, and the difference in the time required to maintain the same amount of exposure is double. It is worth noting that the smaller the aperture F value, the larger the aperture diameter.

(4) White balance: It is the balance of white color. White balance is an indicator that describes the accuracy of the white color in a display after the red, green and blue colors are mixed to produce it. White balance is a very important concept in the field of television cameras, through which a series of problems in color reproduction and tonal processing can be solved.

(5) Color Temperature: There is another very important concept to figure out - color temperature. The so-called color temperature, in short, is quantitatively Kelvin temperature (K) to express the color. The famous British physicist Kelvin that, assuming that a black body material, can fall on all the heat absorbed, without loss, and at the same time can be generated by the heat of all the energy in the form of "light" released, it will be subject to heat high and low and become a different color.

2. Comprehensive training in the basics of the Applied Portrait Photography course.

(1) Shutter Speed: Learn to release the shutter speed at regular intervals to capture interesting images.

(2) Sensitivity: Learn to take sharp portraits with low sensitivity under certain conditions.

(3) Aperture: Learn that the smaller the aperture f-number the larger the aperture, the more light comes in, the brighter the picture, and the blurrier the background of the picture; the larger the aperture f-number the smaller the aperture, the darker the picture, and the clearer the background of the picture.

(4) Portrait Photography: Under the condition of sufficient light, it is recommended to try to use faster shutter speed, larger aperture, lower sensitivity, so that the shooting out of the portrait photography will be more attractive, and vice versa.

Learning Activity

Problem-based learning method activities have 5 stages as follows: 1) Set up study groups, 2) Create a problem, 3) Carry out activities, 4) Presentation of achievements, 5) Reflection after solving the problem.

1.Set up study groups

According to the characteristics of cooperative learning theory, the students are mixed and organized into several groups (about 5 people in each group). Problem-based learning method Teaching, group discussion is the main form, through the real scenarios show that the problem is raised, in order to solve the problem, the group members have to introduce each other to each other, through the introduction of self-introductions, the members of the group from strangers to allies. To lay a foundation for problem-solving and build a relaxed and witty learning atmosphere. The students and the teacher introduce themselves respectively, say their own ideas and doubts, first lift the strangeness between each other, and form a harmonious learning atmosphere. In order to better carry out the study, the group leader and recorder of each group should also be determined.

1.1 The teacher introduces the curriculum and guides the students into the classroom.

1.2 The teacher puts forward the grouping requirements and guides the students to Set up study groups.

1.3 The teacher explains the purpose and requirements of group cooperation and guides students' willingness to carry out cooperation.

1.4 Group members interact with each other, build co-operation and gain mutual trust in each other.

2. Create a problem

In this session, the teacher provides the students with a real case scenario in which the students raise the desire to explore and ask questions in between. During the learning process, students are able to find confusion in information, can actively explore information and knowledge related to the problem, and ultimately understand the problem under the guidance of the teacher.

The case is as follows:

We all know that the distribution of light indoors and outdoors is not the same, the camera parameters of the same conditions, you use the camera to shoot the same person, it will produce a different exposure, so the camera's exposure in the end with which parameters of the camera has a relationship?

2.1 The teacher introduces the case situation and guides students into the class.

2.2 The teacher inspires students to generate questions: With the same camera, why is the exposure different for indoor and outdoor shots?

2.3 The teacher leads students to ask the question: What are the factors affecting the accurate exposure of a photographic work?

2.4 Teachers lead students to analyze the case, find information, and identify Problems or confusion: What settings do I need to make on my camera if I want to take normal exposure portraits?

3. Carry out activities

On the basis of the previous sessions, students need to collaborate among group members to analyze the structure and components of the problem, capture the key knowledge points and develop practical activities as a group to prove whether their analyses are correct. If the problem is not too difficult, the teacher can see that students can basically analyze the problem independently and carry out practical activities. It will then be left to the students to complete it on their own as a group. In other cases, if the problem is more complicated or the problem is more difficult, the teacher needs to give students some guidance.

3.1 The teacher guides the students in executing Question 1: With the same camera, why is the exposure different for indoor and outdoor shots? (Expected responses: because the indoor light is insufficient and the environment is darker, and the outdoor light exposure is sufficient and the environment is brighter. So the same camera will perform differently.) Students have been grouped in class, and the group discussion will be lively.

3.2 The teacher guides students to perform Question 2: What are the factors affecting the accurate exposure of a photographic work? (Expected answers: shutter speed, sensitivity, aperture.) Involving the previously learned basics of photography, students discuss on their own in small groups and finally representatives of each group take turns to speak.

3.3 The teacher guides the students to perform Question 3: What settings do I need to make on my camera if I want to take normal exposure portraits?This is a difficult topic that involves the setup and operation of a professional camera. The teacher will demonstrate basic operations, which include how the camera's buttons are set, adjusting the camera's white balance function for the current environment, and student observation.

3.4 Teachers need to be patient when operating, show how to operate the function buttons of photographic equipment, how to observe the environment. Students observe and master the skills of photographic equipment. Teachers guide students to experience patience, carefulness and improve observation.

3.5 Students five create a group with each member of the group playing a different role. The teacher organizes the students to operate the photographic equipment in groups of five. Through student exchanges and group exchanges, the students are allowed to engage in collaborative learning, construct creative ideas, and take normal exposure portraiture photographs, which are guided by the teacher.

4. Presentation of achievements

This session reports on the group's learning by showing group members in action to arrive at a solution. Report on the division of labor in the group, group members completing the task, the group solving the problem and the group completing the task. Groups learn from each other by sharing their learning. After listening to the debriefing of other groups, comments should be made to point out the problems that students have in the common operational activities and to complement each other's strengths and weaknesses. In this process, the teacher should focus on the students' critique because students, due to their learning and life experience, sometimes put forward some inappropriate or unrealistic opinions, and when they hear inappropriate opinions, they should stop them in time to ensure that the debriefing is carried out properly.

4.1 Randomly select a member of a group to come on stage to demonstrate the use of photographic equipment to take a photograph with accurate exposure. Other students will observe carefully and find out the problems and put forward different opinions, while the teacher will guide them.

4.2 Teachers lead students to find out the problems that may arise in taking a photograph and try to come up with some creative solutions to these problems.

5. Reflection after solving the problem

Through exchanges, we critically accept the experiences and suggestions shared by other groups, draw on the rationalization suggestions of other groups or teachers, rethink and validate creative problem-solving methods, improve our own Creative Problem-Solving Ability, and ultimately form our own effective paths for discovering, analyzing, and creatively solving problems, and validate the generated solutions.

In this teaching session, the case will be reintroduced and questions will be asked to test the students' creative problem-solving abilities. The students' answers

will be uploaded to the teaching platform and their creative problem-solving abilities will be observed from the test results.

5.1 The groups share and reflect with each other, and the teacher guides and evaluates each group to learn lessons.

5.2 A beautiful customer wanted a collection of beautiful portraits in warm tones to commemorate her good life, and the style she wanted was the kind of photos that looked warm and had a nice bokeh background to highlight the idea of herself as the subject.

(1) What does the customer mean by the aesthetics and warmth that he emphasises?

(2) What do we need to do in order to achieve the customer's request?

(3) What are the characteristics of shutter speed, sensitivity, and aperture other than their ability to affect the camera's exposure?

(4) Is there any special connection between colour temperature and white balance?

(5) How can your photography team combine knowledge of exposure and colour temperature to create a shoot for a client?

(6) How do you plan to communicate with your customers?

5.3 The teacher guides the students in analysing the problem and uploading their conclusions to the platform.

5.4 Teacher displays student answers via the Learning Connect platform, explaining them in a timely manner and addressing any problems that arise with student answers. Students make corrections in a timely manner.

5.5 Assignment: after the lesson students complete a video of the case operation and upload it to the teaching platform, which the teacher reviews.

Instructional Media

1. China Learning Access Online Teaching Platform (online and offline mixed teaching on this basis).
2. Large Electronic Screen Displays.
3. PowerPoint

Evaluation

1. Observe students' creative problem-solving ability.
2. Check creative problem-solving ability while working.
3. post-lesson assignments are used to assess students' mastery in this lesson.

Learning Schedule: Portrait Photography 5 hours

Date/time	Teaching Process	Remark
Day 1 08:00-09:00	Pest-test **subjective test**	1 hour
09:00-09:10	**Introduction:**Portrait Photography	10 minutes
09:10-09:40	**Learning Activity:** Using Problem-Based Learning method have 5 stages 1) Set up study groups	30 minutes
09:40–10:30	2) Create a problem	50 minutes
10:30–11:30	3) Carry out activities	1 **hour**
11:30–13:00	**Lunch time**	1.5 hour
13:00–14:00	4) Presentation of achievements	1 **hour**
14:00–14:30	5) Reflection after solving the problem	30 minutes

> **Assessment form for Validity of Portrait Photography lesson plan**

Research Title: Using Problem-Based Learning method to improve Creative Problem-Solving ability of undergraduate students

Research Objectives:

    1.To use Problem Based Learning method to improve Creative Problem-Solving ability of undergraduate students.

    2.To compare students' Creative Problem-Solving ability, before and after the implementation base on the Problem Based Learning method.

Directions:

    Please assess the congruence between components of lesson plan based on Problem Based Learning model by putting ✓ in the box according to the following criteria.

    Rating is +1. There is an opinion that "consistent to relevant."

    Rating is 0. There is an opinion that "Not sure it consistent to relevant."

    Rating is -1. There is an opinion that "Inconsistent with relevant."

No.	Questions	Assessment Results			Suggestions
		+1	0	- 1	
1	Learning objectives sort the contents from easy to difficult.				
2	The Problem Based Learning method encourages students to work in teams and solve problems rationally.				
3	Determining content suitable for the age of students.				
4	Organizing activities suitable for learning objectives.				
5	Problem Based Learning activities actually motivate students to learn and creative problem solving.				
6	Learning activities are linked from basic knowledge to ask questions, express their real ideas and effective discussion.				
7	The using instructional media are suitable for learning activities.				
8	The duration of the activity was appropriate to improve creative problem-solving ability of undergraduate students in the Photography Course.				
9	Measurement and evaluation are suitable for learning activities to develop real ability.				
1 0	Assessment criteria are appropriate for subjective learning.				

Sign..Assessor

(...)

Date........../................./.............

Worksheet for student's Creative Problem-Solving abilityability

Worksheet I

A beautiful customer wanted a collection of beautiful portraits in warm tones to commemorate her good life, and the style she wanted was the kind of photos that looked warm and had a nice bokeh background to highlight the idea of herself as the subject.

(1) What does the customer mean by the aesthetics and warmth that he emphasizes?

....

....

(2) What do we need to do in order to achieve the customer's request?

....

....

(3) What are the characteristics of shutter speed, sensitivity, and aperture other than their ability to affect the camera's exposure?

....

....

(4) Is there any special connection between color temperature and white balance?

....

....

(5) How can your photography team combine knowledge of exposure and color temperature to create a shoot for a client?

....

....

(6) How do you plan to communicate with your customers?

....

....

Lesson Plan II

<u>The first</u> semester of <u>the first</u> academic year

Department	Department of Art and Design, Zhejiang Yuxiang Vocational and Technical College
Course name	Photography Course: Chapter 2 wedding Photography. (done in studio, kit and caboodle)
Target Audience	Visual Communication Design, Grade 1, Class 2
Number of students	30
Teaching Time	4 hours
Lecturer	Hu Ling Feng

Content

Wedding Photography. (done in studio, kit and caboodle)

Objective of Leaning

1. Students can identify the basic knowledge of wedding Photography.　　(K)
2. Students can master studio equipment for wedding Photography.　　　(K)
3. Students can produce studio wedding photography work style photos.　(P)

Main point/concept

Photography Studio Wedding Photography Practical Training is a course to master the various equipment and devices of a photography studio, to cultivate interest in photography, and to improve students' understanding and use of studio equipment.

1. Wedding Photography Studio Equipment Hands-On Training

(1) electronic flash: Learn about electronic flash, a lighting fixture that emits light instantaneously, and master its characteristics of high light intensity and speed. Train to freeze moving images.

(2) Softbot: Learn to soften the nature of the flash's strong light with a soft box to make it diffuse and master the characteristics of light. The device has a large light area, soft and delicate, is one of the most important accessories for studio lighting.

(3) Studio Light Stand: Learn the structure of the studio light stand and its accessories combination training, film and television lights and light stand with training.

(4) Reflective and translucent umbrellas: learn the role of reflective and translucent umbrellas, which also have a soft light effect. Train the flash in the direction of the light, through the umbrella nest of the reflective surface of the light will be reflected back to the subject.

(5) Reflector: Learn the role of reflector as an auxiliary lighting tool and train the operation of using reflector to fill light on dark areas.

2. Wedding Photography Studio Equipment Hands-On Training Considerations

Learning Activity

Problem-based learning activities have 5 stages as follows: 1) Set up study groups, 2) Create a problem, 3) Carry out activities, 4) Presentation of achievements, 5) Reflection after solving the problem.

1. Set up study groups

According to the characteristics of cooperative learning theory, the students are mixed and organized into several groups (about 5 people in each group). Problem-based learning method teaching, group discussion is the main form, through the real scenarios show that the problem is raised, in order to solve the problem, the group members have to introduce each other to each other, through the introduction of self-introductions, the members of the group from strangers to allies. To lay a foundation for problem solving and build a relaxed and witty learning atmosphere. The students and the teacher introduce themselves respectively, say their own ideas and doubts, first lift the strangeness between each other, and form a harmonious learning atmosphere. In order to better carry out the learning, also determine the leader and recorder of each group.

1.1 Teachers make grouping requirements according to the work characteristics of wedding photography studios and guide students to work in groups.

1.2 The teacher explains the purpose and requirements of group cooperation, and guides students to actively cooperate.

1.3 Group members respect each other, talk to each other, and use studio equipment to find confusion in hands-on training.

2. Create a problem

In this meeting, the teacher provides students with case scenarios to keep them motivated to explore and ask questions. The case is as follows:

Due to the work needs, the wedding photography studio purchased a batch of photographic equipment, and you, as the studio's assistant, now need to set up this

batch of photographic equipment for the combination of equipment debugging and placing the photographic equipment in the appropriate location.

2.1 The teacher introduces the case scenario and guides the students into the classroom.

2.2 The teacher inspires students to ask: What factors affect Photography Studio Equipment Hands-on Training?

2.3 The teacher leads the students to ask questions: What skills are required to mount a combination of these photographic devices?

2.4 Teachers lead students to analyze the case study, find information, and ask questions: Based on the case study, how can you use wedding photography studio equipment for hands-on training skills, and creatively use this photographic equipment to take photos in the style of wedding photography?

3. Carry out activities

Building on the first session, students need to analyze the structure and components of the problem. If the problem is not too difficult and the teacher can see that the students are basically able to analyze the problem on their own, the students will analyze it on their own in small groups. In other cases, if the problem is more complex or the problem is more difficult, the teacher will need to give some guidance to the students.

3.1 The teacher guides students through Question 1: What factors affect Photography Studio Equipment Hands-on Training? (Expect answers: electronic flash,Softbox, Studio Light Stand, Reflective and translucent umbrellas, Reflector.) Students have been grouped before the lesson and the groups discuss and speak enthusiastically.

3.2 The teacher guides the students through question 2: What skills are required to mount a combination of these photographic devices? (Expected answer: full knowledge of the characteristics of these devices) Involving previously learned assessment knowledge, students discuss this on their own in small groups and finally each group representative takes a turn to speak.

3.3 The teacher guides the student through question 3: Teachers lead students to analyze the case study, find information, and ask questions: Based on the case study, how can you use wedding photography studio equipment for hands-on training skills, and creatively use this photographic equipment to take photos in the style of wedding photography? The problem is difficult and the instructor demonstrates Photography Studio Equipment Hands-on Training, the operation includes operating electronic flash, adjusting soft boxes, assembling studio light stands, installing reflector umbrellas and

translucent umbrellas, and adjusting the angle of the reflector, and other six items, which are observed by the students on site.

3.4 Teachers operate to remind students of the precautions to be taken when using this photographic equipment in the studio, and students observe and experience the operating techniques. Teachers guide students to experience care, patience and cherish this photographic equipment.

3.5 In this lesson, students have been divided into appropriate groups of five, with each member playing a different role in the group. Teachers organize students to work together in groups of five. Through student-to-student exchanges, group-to-group exchanges, and co-operative learning under the guidance of the teacher, students can identify problems or puzzles, find ideas and methods to solve problems, and put them into practice.

4. Presentation of achievements

This session reports on the group's learning by demonstrating the actions of the group members. Report on the division of labor in the group, the completion of tasks by the group members, the problem-solving in the group and the completion of tasks by the group. The groups learn from each other by exchanging their learning. After listening to the other groups' reports, some comments are made to point out problems in the students' balancing and co-ordination exercises and to make up for their shortcomings. The teacher should focus on monitoring the comments made by the students during the process, as they sometimes make inappropriate or unrealistic comments due to their learning and life experience, and should stop them when they hear inappropriate comments to put the debriefing on track.

4.1 Randomly selected members of a group on the stage to demonstrate the creative debugging of these photographic equipment training operations, other students to carefully observe and identify problems, put forward different views, the teacher in the side of the instructions.

4.2 Teachers lead students to identify problems that may arise from looking for each creative commissioning of these photographic equipment training operations, and try to come up with a program of these hands-on problems and literacy issues.

5. Reflection after solving the problem

Through exchanges, they critically receive the experiences and suggestions shared by other groups, learn from the rationalized suggestions of other groups or teachers, rethink and revalidate problem-solving methods, improve their own problem-solving skills, and eventually develop their own effective paths to identify problems, analyze them, solve them, summarize them and gain experience.

In this teaching session, the case will be reintroduced and questions will be asked to test the students' creative problem-solving abilities. The students' answers will be uploaded to the teaching platform and their creative problem-solving abilities will be observed from the test results.

5.1 The groups share and reflect with each other, and the teacher guides and evaluates each group to learn lessons.

5.2 A couple who are about to get married want to shoot a set of wedding photography photos in the photography studio, they prefer the kind of small fresh style of photography, hope to shoot the wedding photos of the overall shadow of the brighter, do not like the contrast between dark and light is very strong that kind of style.

(1) What is a small fresh style of photography?

(2) What do I need to pay attention to when shooting indoor wedding photography in a brighter tone?

(3) What equipment does the wedding photography studio need to use to assist the shooting?

(4) If you need to use electronic flash and soft boxes and other photographic aids, how do you need to use them?

(5) How to design a suitable shooting plan to support your shooting?

(6) How are you going to present your shooting plan to get the couple to agree with your idea?

5.3 The teacher guides the students in analyzing the problem and uploading their conclusions to the platform.

5.4 Teacher displays student answers via the Learning Connect platform, explaining them in a timely manner and addressing any problems that arise with student answers. Students make corrections in a timely manner.

5.5 Assignment: after the lesson students complete a video of the case operation and upload it to the teaching platform, which the teacher reviews.

Evaluation

1. China Learning Access Online Teaching Platform (online and offline mixed teaching on this basis).

2. Large Electronic Screen Displays.

3. PowerPoint

Instructional Media

1. Observe students' creative problem-solving ability.

2. Check creative problem-solving ability while working.

3. post-lesson assignments are used to assess students' mastery in this lesson.

Learning Schedule: Wedding Photography 4 hours

Date/time	Teaching Process	Remark
Day 2 09:00-09:10	**Introduction:** Portrait Photography	10 minutes
09:10-09:40	**Learning Activity:** Using Problem Based Learning method have 5 stages 1) Set up study groups	30 minutes
09:40–10:30	2) Create a problem	50 minutes
10:30–11:30	3) Carry out activities	1 **hour**
11:30–13:00	**Lunch time**	**1.5 hour**
13:00–14:00	4) Presentation of achievements	1 **hour**
14:00–14:30	5) Reflection after solving the problem	30 minutes

Assessment form for Validity of Wedding Photography lesson plan

Research Title: Using Problem Based Learning method to improve Creative Problem-Solving Ability of undergraduate students

Research Objectives:

1.To use Problem Based Learning method to improve Creative Problem-Solving Ability of undergraduate students.

2.To compare students' Creative Problem-Solving Ability, before and after the implementation base on the Problem Based Learning method.

Directions:

Please assess the congruence between components of lesson plan based on Problem Based Learning model by putting ✓ in the box according to the following criteria.

Rating is +1. There is an opinion that "consistent to relevant."

Rating is 0. There is an opinion that "Not sure it consistent to relevant."

Rating is -1. There is an opinion that "Inconsistent with relevant."

No.	Questions	Assessment Results			Suggestions
		+1	0	- 1	
1	Learning objectives sort the contents from easy to difficult.				
2	The Problem Based Learning method encourages students to work in teams and solve problems rationally.				
3	Determining content suitable for the age of students.				
4	Organizing activities suitable for learning objectives.				
5	Problem Based Learning activities actually motivate students to learn and creative problem solving.				
6	Learning activities are linked from basic knowledge to ask questions, express their real ideas and effective discussion.				

No.	Questions	Assessment Results			Suggestions
		+1	0	- 1	ns
7	The using instructional media are suitable for learning activities.				
8	The duration of the activity was appropriate to improve creative problem-solving ability of undergraduate students in the Photography Course.				
9	Measurement and evaluation are suitable for learning activities to develop real ability.				
1 0	Assessment criteria are appropriate for subjective learning.				

Sign..Assessor

(...)

Date........../................./.............

Worksheet for student's Creative Problem-Solving ability

Worksheet II

A couple who are about to get married want to shoot a set of wedding photography photos in the photography studio, they prefer the kind of small fresh style of photography, hope to shoot the wedding photos of the overall shadow of the brighter, do not like the contrast between dark and light is very strong that kind of style.

(1) What is a small fresh style of photography?

....
....

(2) What do I need to pay attention to when shooting indoor wedding photography in a brighter tone?

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(3) What equipment does the wedding photography studio need to use to assist the shooting?

....
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(4) If you need to use electronic flash and soft boxes and other photographic aids, how do you need to use them?

....
....

(5) How to design a suitable shooting plan to support your shooting?

....
....

(6) How are you going to present your shooting plan to get the couple to agree with your idea?

....
....

Lesson Plan III

The first semester of the first academic year

Department	Department of Art and Design, Zhejiang Yuxiang Vocational and Technical College
Course name	Photography Course: Chapter 3 Graphic Creative Photography
Target Audience	Visual Communication Design, Grade 1, Class 2
Number of students	30
Teaching Time	4 hours
Lecturer	Hu Ling Feng

Content

Graphic Creative Photography

Objective of Leaning

1.Students can identify the basic knowledge of graphic Creative Photography. (K)

2.Students can master the composition of graphic creative photography.　　(K)

3.The student can create graphic Creative Photography.　　　　　　　　(P)

Main point/concept

Mastering the laws of photographic composition to shoot the basis of good creative photography, which is both technical skills, but also artistic skills. Composition in the graphic creative photography art occupies a very important position.

1. Shadows and Lines: The American photographer Edward Weston said, "Composition is the grouping and summing up of different parts to obtain a unified whole, in order to achieve the purpose of reaching the meaning, simplicity of method, condensation, and pleasing to the eye."

2. Special viewpoints: Shooting point of view is different, the same scene on the screen is not quite the same effect, it plays an important role in creative photography composition effect.

3. Close-ups: Different scenes have different expressive power, according to the intention to determine the scene. Painting theory has "far from its potential, close to its God", your picture is to move people with the potential, or to move

people with the God, or to win the plot, to a large extent, to determine what kind of scene should be used.

4. Color: Color is so much more than just the actual recording of an object; it has the ability to evoke a particular response. When used creatively, color can also dominate a creative photographic image, sometimes even more so than the subject itself.

5. Abstract Photography: Abstract" from a photographic point of view means that there are no available references to material objects or particular examples. In other words, an abstract photograph.

Learning Activity

Problem Based Learning activities have 5 stages as follows: 1) Set up study groups, 2) Create a problem, 3) Carry out activities, 4) Presentation of achievements, 5) Reflection after solving the problem.

1. Set up study groups

According to the characteristics of cooperative learning theory, students are mixed and organized into groups (each group has about 5 members)." Problem Learning Method" teaching, with group discussion as the main form, through the real scenarios show, raise the problem, in order to solve the problem, the group members have to introduce each other, through self-introduction, the group members from strangers to allies. To lay the foundation for problem solving and create a relaxed and witty learning atmosphere. The students and the teacher introduce themselves separately, speak out their ideas and doubts, lift the sense of strangeness between each other first, and form a harmonious learning atmosphere. In order to better carry out the learning, the leader and recorder of each group were also identified.

1.1 The teacher proposes grouping requirements according to the working characteristics of creative graphic photography and guides students to work in groups.

1.2 The teacher explains the purpose and requirements of group work and guides students to cooperate actively.

1.3 Group members respect each other, communicate with each other and trust each other.

2. Create a problem

In this session, the teacher provides students with authentic photography projects to stimulate exploration and questioning. Examples are shown below:

In the eyes of the famous photographer Ansel Adams, "a great work" must "express in the deepest sense our feelings about what is being photographed", and the photographer must be able to "envisage the image in advance".

(1) What do you mean by the photographer's feeling mentioned above?

(2) Can you summarise the image in the abstract?

(3) What factors should we pay attention to at the moment of shooting?

2.1 The teacher introduces the case scenario and guides the students into the class.

2.2 The teacher inspires students to ask: What do you mean by the photographer's feelings mentioned above?

2.3 The teacher guides students to analyses the photographic scenario, look up information and ask the question: Can you summaries the image in the abstract?

2.4 The teacher organizes a viewing of the photographs of the famous photographer Ansel Adams. Find questions and discuss: What factors should we pay attention to at the moment of shooting?

3. Carry out activities

Building on the first session, students need to analyze the structure and components of the problem. If the problem is not too difficult and the teacher can see that the students are basically able to analyze the problem on their own, the students will analyze it on their own in small groups. In other cases, if the problem is more complex or the problem is more difficult, the teacher will need to give some guidance to the students.

3.1 The teacher guides students through Question 1: What do you mean by the photographer's feelings mentioned above? (Expected answer: Mastering basic compositional skills.) Students have been grouped in the classroom, and the groups discuss and speak enthusiastically.

3.2 The teacher guides students to complete Question 2: Can your summaries images in the abstract? This question is difficult. The teacher demonstrates how to summaries abstract photographic composition techniques, including five exercises on shading and lines, special viewpoints, close-ups, colors and abstract photography, and students observe.

3.3 Teachers emphasize the key points and difficulties in the operation process, and students observe and experience the communication skills. Teachers guide students to appreciate the importance of care and patience in observing objective things.

3.4 Teachers guide students to complete Question 3: What factors should we pay attention to at the moment of shooting? Teachers organize an appreciation of the photographs of the famous photographer Ansel Adams. Find and discuss the question: What factors should we pay attention to at the moment of shooting? In the classroom, students have been reasonably grouped into groups of 5, with each member taking up a different role in the group. The teacher will organize the students to work in groups of 5, and under the guidance of the teacher, they will carry out co-operative learning through student-to-student exchanges and group-to-group exchanges.

4. Presentation of achievements

This session reports on the group's learning by demonstrating the actions of the group members. Report on the division of labor in the group, the completion of tasks by the group members, the problem solving in the group and the completion of the task by the group. The groups learn from each other by exchanging learning outcomes. After listening to the other groups' reports, they should give some comments and point out the problems that occurred during the students' muscular manipulation to make up for their shortcomings. The teacher should focus on monitoring the comments made by the students during the process, as they sometimes make inappropriate or unrealistic comments due to their learning and life experience, and should stop them when they hear inappropriate comments to put the debriefing on the right track.

4.1 One group member is randomly selected to demonstrate graphic creative photographic composition techniques on the stage, while other students observe carefully, identify problems and put forward different opinions, and the teacher points them out from the side.

4.2 The teacher guides students to discover and look for problems that may arise in each shooting exercise and try to solve these practical problems.

5. Reflection after solving the problem

Through exchanges, they critically receive the experiences and suggestions shared by other groups, learn from the rationalized suggestions of other groups or teachers, rethink and revalidate problem-solving methods, improve their own problem-solving skills, and eventually develop their own effective paths to identify problems, analyze them, solve them, summarize them and gain experience.

In this teaching session, the case will be reintroduced and questions will be asked to test the students' creative problem-solving abilities. The students' answers will be uploaded to the teaching platform and their creative problem-solving abilities will be observed from the test results.

5.1 The groups share and reflect with each other, and the teacher guides and evaluates each group to learn lessons.

5.2 With the popularity of smartphones in hand, the threshold of photography is getting lower and lower, but there are not many photographers who can take good works. Today, you need to use the mobile phone in your hand, to shoot five out of the photos that can sum up the objective scenery. Requirements for the picture is simple and creative. You can use shading, lines, colors, scenery and other forms to create.

(1) What makes a good photo creative?

(2) What does a minimalist style of photography look like?

(3) Are there rules of composition for the general public?

(4) How do you go about summing up an image?

(5) Can you find graphic creative photography shots that are appropriate for the environment you are in?

(6) How do you plan to communicate your photographic ideas to others?

5.3 The teacher guides the students in analyzing the problem and uploading their conclusions to the platform.

5.4 Teacher displays student answers via the Learning Connect platform, explaining them in a timely manner and addressing any problems that arise with student answers. Students make corrections in a timely manner.

5.5 Assignment: after the lesson students complete a video of the case operation and upload it to the teaching platform, which the teacher reviews.

Evaluation

1. China Learning Access Online Teaching Platform (online and offline mixed teaching on this basis).

2. Large Electronic Screen Displays.

3. PowerPoint

Instructional Media

1. Observe students' creative problem-solving ability.

2. Check creative problem-solving ability while working.

3. post-lesson assignments are used to assess students' mastery in this lesson.

Learning Schedule: Wedding Photography 4 hours

Date/time	Teaching Process	Remark
Day 3 09:00-09:10	**Introduction:** Portrait Photography	10 minutes
09:10-09:40	**Learning Activity:** Using Problem Based Learning method have 5 stages 1) Set up study groups	30 minutes
09:40–10:30	2) Create a problem	50 minutes
10:30–11:30	3) Carry out activities	1 **hour**
11:30–13:00	**Lunch time**	**1.5 hour**
13:00–14:00	4) Presentation of achievements	1 **hour**
14:00–14:30	5) Reflection after solving the problem	30 minutes

Assessment form for Validity of Graphic Creative Photography lesson plan

Research Title: Using Problem Based Learning method to improve Creative Problem-Solving Ability of undergraduate students

Research Objectives:

1.To use Problem Based Learning method to improve Creative Problem-Solving Ability of undergraduate students.

2.To compare students' Creative Problem-Solving Ability, before and after the implementation base on the Problem Based Learning method.

Directions:

Please assess the congruence between components of lesson plan based on Problem Based Learning model by putting ✓ in the box according to the following criteria.

Rating is +1. There is an opinion that "consistent to relevant."

Rating is 0. There is an opinion that "Not sure it consistent to relevant."

Rating is -1. There is an opinion that "Inconsistent with relevant."

No.	Questions	Assessment Results			Suggestions
		+1	0	- 1	
1	Learning objectives sort the contents from easy to difficult.				
2	The Problem Based Learning method encourages students to work in teams and solve problems rationally.				
3	Determining content suitable for the age of students.				
4	Organizing activities suitable for learning objectives.				
5	Problem Based Learning activities actually motivate students to learn and creative problem solving.				
6	Learning activities are linked from basic knowledge to ask questions, express their real ideas and effective discussion.				

No.	Questions	Assessment Results			Suggestions
		+1	0	- 1	
7	The using instructional media are suitable for learning activities.				
8	The duration of the activity was appropriate to improve creative problem-solving ability of undergraduate students in the Photography Course.				
9	Measurement and evaluation are suitable for learning activities to develop real ability.				
1 0	Assessment criteria are appropriate for subjective learning.				

Sign..Asse ssor

(...)

Date........./................./.............

Worksheet for student's Creative Problem-Solving ability

Worksheet III

With the popularity of smartphones in hand, the threshold of photography is getting lower and lower, but there are not many photographers who can take good works. Today, you need to use the mobile phone in your hand, to shoot five out of the photos that can sum up the objective scenery. Requirements for the picture is simple and creative. You can use shading, lines, colours, scenery and other forms to create.

(1) What makes a good photo creative?

....

....

(2) What does a minimalist style of photography look like?

....

....

(3) Are there rules of composition for the general public?

....

....

(4) How do you go about summing up an image?

....

....

(5) Can you find graphic creative photography shots that are appropriate for the environment you are in?

....

....

(6) How do you plan to communicate your photographic ideas to others?

....

....

Lesson Plan IV

The first semester of the first academic year

Department	Department of Art and Design, Zhejiang Yuxiang Vocational and Technical College
Course name	Photography Course: Chapter 4 Shoes Advertising Product Photography
Target Audience	Visual Communication Design, Grade 1, Class 2
Number of students	30
Teaching Time	5 hours
Lecturer	Hu Ling Feng

Content

Shoes Advertising Product Photography

Objective of Leaning

1.Students can identify the basic knowledge of Shoes Advertising Product Photography. (K)

2. Students can understand Shoes Advertising Product Photography shooting techniques. (K)

3. Students can shoot product photography for footwear advertising. (p)

Main point/concept

Shoes advertising product photography training is mainly to shoes as the main object of the goods, by reflecting the shape, structure, performance, color and use of the goods and other characteristics, so as to cause the customer desire to buy a photographic act.

1. Shoes product shooting style: pure white and simple. According to the description of the merchant's rendering, the kind of simple and bright style is needed.

2. Product image background: this photo is clean and crisp in white, preferably with a pure white smooth material as the background. Don't think that using a piece of cloth will work! White cloth surface is not smooth, cannot reflect light, the bottom part of the shoe will be darker, and the side and top of the shoe light and better, the whole shoe light is not coordinated, and white cloth cannot form a clear reflection

effect. Generally, to wool glass and PVC plastic plate and other similar materials can achieve good results.

3. Light source: strong enough spotlight, outdoor light that is not too dark and without glare. Without enough light source you will send out the picture blurred, uneven light, the whole picture is not white but grey. Some people will say that the shot is not good so that the artisan to do a good job soon line? Rotten wood cannot be carved, the foundation is not good, poor picture quality, post-processing is just a drop in the bucket, and a lot of post-processing is easy to make the picture distortion, the cost of time, not to mention the cost of time, all the shooting is the key.

Learning Activity

Problem Based Learning activities have 5 stages as follows: 1) Set up study groups, 2) Create a problem, 3) Carry out activities, 4) Presentation of achievements, 5) Reflection after solving the problem.

1. Set up study groups

According to the characteristics of co-operative learning theory, students are mixed and organized into several groups (about 5 people in each group)." Problem Learning Method" teaching, with group discussion as the main form, through the real scenarios show, put forward the problem, in order to solve the problem, the members of the group should be introduced to each other, through the introduction of self-introduction, the group members from strangers to allies. To lay the foundation for problem solving and create a relaxed and witty learning atmosphere. The students and the teacher introduce themselves separately, speak out their ideas and doubts, lift the sense of strangeness between each other first, and form a harmonious learning atmosphere. In order to better carry out the learning, the group leaders and recorders of each group were also determined.

1.1 The teacher puts forward the grouping requirements according to the working characteristics of footwear advertising product photography and guides the students to work in groups.

1.2 The teacher explains the purpose and requirements of group co-operation and guides students to co-operate actively.

1.3 Group members respect each other, communicate with each other and take care of the studio equipment.

2.Create a problem

In this session, the teacher provides students with case scenarios to stimulate them to explore and ask questions. The cases are as follows:

The client needed a photographer to shoot product photography for footwear advertising for promotional purposes. He asked the photographer to photograph the product as close as possible to the way people view it in terms of shape, colour and texture. However, the characteristics of the product must be reflected. How can photography be used to show the characteristics of a product?

2.1 The teacher introduces the case scenario and guides the students into the class.

2.2 The teacher inspires the students to ask the question: How to photograph promotional footwear in a way that is close to the way the human eye sees it?

2.3 The teacher guides the students to analyses the photographic project, search for information and ask the question: How to show the characteristics of footwear products?

3. Carry out activities

Building on the previous sessions, students need to analyze the structure and components of the problem. If the problem is not too difficult and the teacher sees that the students are largely able to analyze the problem independently, he or she will let the students analyze the problem on their own in small groups. In other cases, if the problem is more complex or if the problem is difficult, the teacher will need to give the students some guidance.

3.1 The teacher guides students to answer Question 1: How to photograph promotional footwear in a way that is close to the way the human eye sees it? (Expected answers: perspective, light, etc.). Students have been grouped before the lesson and the groups discussed and spoke enthusiastically.

3.2 The teacher guides the students to perform Question 2: How to show the characteristics of footwear products? The question is somewhat difficult, the teacher demonstrates the product shooting training operation, including perspective observation training, light use training, camera setup training and other training in three photography courses, students observe.

3.3 Teachers in the process of operation in a timely manner to supplement the explanation of the main points of photographic knowledge, students observe and experience the shooting skills. Teachers guide students to experience the characteristics of careful observation, patient arrangement and flexible use of light in product photography.

3.4 Before the lesson, students will be reasonably grouped into groups of five, with each member taking a different role in the group. Teachers will organize students

to work in groups of 5 to carry out cooperative learning through student-to-student and group-to-group exchanges under the guidance of teachers.

4. Presentation of achievements

This session reports on the group's learning by showing the actions of the group members. Report on the division of labor in the group, the completion of tasks by group members, the solution of problems by the group, and the completion of tasks by the group. Groups learn from each other by sharing their learning outcomes. After listening to the reports of other groups, it is important to make comments, point out the problems that students have in product photography, and complement their strengths and weaknesses. In this process, the teacher must pay attention to observe the students' speeches, because their speeches may be inappropriate or not in line with the actual situation due to their learning and life experiences.

4.1 One member of the group is randomly selected to demonstrate the product shooting training, other students observe carefully, identify problems and put forward different opinions, while the teacher gives guidance from the side.

4.2 The teacher leads the students to identify problems that may arise in each product shooting training and try to solve these practical problems.

5. Reflection after solving the problem

Through exchanges, critically accept the experiences and suggestions shared by other groups, draw on the rationalization suggestions of other groups or teachers, rethink and verify the problem-solving methods, improve their own Creative Problem-Solving Ability, and finally form their own effective paths of discovering problems, analyzing problems, creatively solving problems, and summing up experiences.

In this teaching session, the case will be reintroduced and questions will be asked to test the students' creative problem-solving abilities. The students' answers will be uploaded to the teaching platform and their creative problem-solving abilities will be observed from the test results.

5.1 The groups share and reflect with each other, and the teacher guides and evaluates each group to learn lessons.

5.2 There is a photography project, need to shoot a pair of black leather material leather shoes, but in the ordinary environment out of the shoe's pictures cannot see the shoes material, now need you to solve this problem.

(1) Why can't we see the material of the shoes in the ordinary environment?

(2) What are the elements of a qualified commercial product picture of leather shoes?

(3) How to build a studio to shoot black leather shoes

(4) Can PVC plastic board, flash, white background and other elements perfectly show the characteristics of shoes?

(5) Please design a mature shooting plan.

(6) How to show your shooting plan to win customers?

5.3 The teacher guides the students in analyzing the problem and uploading their conclusions to the platform.

5.4 Teacher displays student answers via the Learning Connect platform, explaining them in a timely manner and addressing any problems that arise with student answers. Students make corrections in a timely manner.

5.5 Assignment: after the lesson students complete a video of the case operation and upload it to the teaching platform, which the teacher reviews.

Evaluation

1. China Learning Access Online Teaching Platform (online and offline mixed teaching on this basis).

2. Large Electronic Screen Displays.

3. PowerPoint

Instructional Media

1. Observe students' creative problem-solving ability.

2. Check creative problem-solving ability while working.

3. post-lesson assignments are used to assess students' mastery in this lesson.

Learning Schedule: Wedding Photography 5 hours

Date/time	Teaching Process	Remark
Day 4 09:00-09:10	**Introduction:** Portrait Photography	10 minutes
09:10-09:40	**Learning Activity:** Using Problem Based Learning method have 5 stages 1) Set up study groups	30 minutes
09:40–10:30	2) Create a problem	50 minutes
10:30–11:30	3) Carry out activities	1 **hour**
11:30–13:00	**Lunch time**	**1.5 hour**
13:00–14:00	4) Presentation of achievements	1 **hour**
14:00–14:30	5) Reflection after solving the problem	30 minutes
14:30–15:30	**Post-test** **subjective test**	1 hour

Assessment form for Validity of Shoes Advertising Product Photography lesson plan

Research Title: Using Problem Based Learning method to improve Creative Problem-Solving Ability of undergraduate students

Research Objectives:

      1.To use Problem Based Learning method to improve Creative Problem-Solving Ability of undergraduate students.

      2.To compare students' Creative Problem-Solving Ability, before and after the implementation base on the Problem Based Learning method.

Directions:

      Please assess the congruence between components of lesson plan based on Problem Based Learning model by putting ✓ in the box according to the following criteria.

      Rating is +1. There is an opinion that "consistent to relevant."

      Rating is 0. There is an opinion that "Not sure it consistent to relevant."

      Rating is -1. There is an opinion that "Inconsistent with relevant."

No.	Questions	Assessment Results			Suggestions
		+1	0	- 1	
1	Learning objectives sort the contents from easy to difficult.				
2	The Problem Based Learning method encourages students to work in teams and solve problems rationally.				
3	Determining content suitable for the age of students.				
4	Organizing activities suitable for learning objectives.				
5	Problem Based Learning activities actually motivate students to learn and creative problem solving.				

No.	Questions	Assessment Results			Suggestions
		+1	0	- 1	
6	Learning activities are linked from basic knowledge to ask questions, express their real ideas and effective discussion.				
7	The using instructional media are suitable for learning activities.				
8	The duration of the activity was appropriate to improve creative problem-solving ability of undergraduate students in the Photography Course.				
9	Measurement and evaluation are suitable for learning activities to develop real ability.				
1 0	Assessment criteria are appropriate for subjective learning.				

Sign...Assessor

(…...)

Date........../………………/……………

Worksheet for student's Creative Problem-Solving ability

Worksheet IV

There is a photography project, need to shoot a pair of black leather material leather shoes, but in the ordinary environment out of the shoes pictures cannot see the shoes material, now need you to solve this problem.

(1) Why can't we see the material of the shoes in the ordinary environment?

....

....

(2) What are the elements of a qualified commercial product picture of leather shoes?

....

....

(3) How to build a studio to shoot black leather shoes?

....

....

(4) Can PVC plastic board, flash, white background and other elements perfectly show the characteristics of shoes?

....

....

(5) Please design a mature shooting plan.

....

....

(6) How to show your shooting plan to win customers?

....

....

Evaluation criteria for Creative Problem-Solving Ability

Evaluation Items	Evaluation Content	Score and criterion		
		3	2	1
The student can understand the problems	1.find difficulties	Students can find problems independently, and the problems they are looking for are scientific and rational	Students can find problems independently, but the problems they are looking for lack certain rationality.	Students cannot find problems independently and lack the ability to learn independently.
	2.Collection of information	In addition to the learning information provided by the teacher, it can independently collect various learning information to improve the learning effect.	There is an idea of collecting learning information, but very little learning information can be found.	Lack of awareness of collecting learning information, only using teaching resources provided by teachers.
	3.Identify problems	Students are able to quickly identify issues and clarify their nature, context, and implications.	Students can identify issues and, to some extent, clarify the nature, context and implications of some issues.	Students were less likely to identify problems from instructional activities and to clarify the nature, context, and meaning of certain problems.
The student can creative Ideas.	4.Creative Ideas	Students think about problems from multiple perspectives, generate as many trains of thought and	Students think about the problem from another angle and generate some thoughts and ideas.	Students can only think about problems from a single perspective, and some ideas

Evaluation Items	Evaluation Content	Score and criterion		
		3	2	1
		ideas as possible, and think rationally.		and ideas are unreasonable.
The student can action plan.	5.Discover Solutions	Students can explore the methods and steps to solve the problem by themselves, and find several reasonable ways to solve the problem.	Students can basically explore the possibility of methods and steps to solve the problem, and it is possible to solve the problem.	Students cannot occasionally explore the possibility of methods and steps to solve problems, but can only think in the way of the teacher.
	6.Seeking acceptance	Students are able to discuss in groups, choose the best solution, consider the pros and cons of the implementation process, find the most suitable ideas, develop a plan and implement it smoothly.	Students can discuss in groups, find solutions, and basically be able to make plans, but they may not be able to implement the plans smoothly.	Students can discuss in groups and find solutions, but cannot basically make plans.

Evaluate quality standards

Score Range	Quality Level
18	Strong
15-17	Relatively strong
12-14	General
09-11	Relatively weak
06-08	Weak

Appendix D

The Results of the Quality Analysis of Research

Instrument

Table 1 Analysis of the Index of Coherence (IOC) of lesson plans to improve creative problem-solving ability of sophomore medical students with Problem Based Learning method.

Evaluation checklist	experts			Sum of scores	IOC value
	1	2	3		
Lesson Plan I: Portrait Photography					
1. Learning objectives sort the contents from easy to difficult.	+1	+1	+1	3	1
2. The Problem Based Learning method encourages students to work in teams and solve problems rationally.	+1	+1	+1	3	1
3. Determining content suitable for the age of students.	+1	+1	+1	3	1
4. Organizing activities suitable for learning objectives.	+1	0	+1	2	0.67
5. Problem Based Learning activities actually motivate students to learn and creative problem solving.	+1	+1	+1	3	1
6. Learning activities are linked from basic knowledge to ask questions, express their real ideas and effective discussion.	+1	+1	+1	3	1

Table 1 (continue)

Evaluation checklist	experts			Sum of scores	IOC value
	1	2	3		
Lesson Plan II: Wedding Photography. (done in studio, kit and caboodle)					
1. Learning objectives sort the contents from easy to difficult.	+1	+1	+1	3	1
2. The Problem Based Learning method encourages students to work in teams and solve problems rationally.	+1	+1	+1	3	1
3. Determining content suitable for the age of students.	+1	+1	+1	3	1
4. Organizing activities suitable for learning objectives.	+1	0	+1	2	0.67
5. Problem Based Learning activities actually motivate students to learn and creative problem solving.	+1	+1	+1	3	1
6. Learning activities are linked from basic knowledge to ask questions, express their real ideas and effective discussion.	+1	+1	+1	3	1

Table 1 (continue)

Evaluation checklist	experts			Sum of scores	IOC value
	1	2	3		
Lesson Plan III: Graphic Creative Photography					
1. Learning objectives sort the contents from easy to difficult.	+1	+1	+1	3	1
2. The Problem Based Learning method encourages students to work in teams and solve problems rationally.	+1	+1	+1	3	1
3. Determining content suitable for the age of students.	+1	+1	+1	3	1
4. Organizing activities suitable for learning objectives.	+1	0	+1	2	0.67
5. Problem Based Learning activities actually motivate students to learn and creative problem solving.	+1	+1	+1	3	1
6. Learning activities are linked from basic knowledge to ask questions, express their real ideas and effective discussion.	+1	+1	+1	3	1

Table 1 (continue)

Evaluation checklist	experts			Sum of scores	IOC value
	1	2	3		
Lesson Plan IV: Shoes Advertising Product Photography					
1. Learning objectives sort the contents from easy to difficult.	+1	+1	+1	3	1
2. The Problem Based Learning method encourages students to work in teams and solve problems rationally.	+1	+1	+1	3	1
3. Determining content suitable for the age of students.	+1	+1	+1	3	1
4. Organizing activities suitable for learning objectives.	+1	0	+1	2	0.67
5. Problem Based Learning activities actually motivate students to learn and creative problem solving.	+1	+1	+1	3	1
6. Learning activities are linked from basic knowledge to ask questions, express their real ideas and effective discussion.	+1	+1	+1	3	1

Table 2 Results of problem-solving ability scores before and after applying the Problem Based Learning model in an exercise therapy course.

Student	Pre-study test scores (Pre–test)	Post-study test scores (Post–test)	Difference scores (D)
1	5	12	7
2	3	14	11
3	6	10	4
4	2	18	16
5	4	16	12
6	5	11	6
7	7	15	8
8	10	18	8
9	8	17	9
10	2	10	8
11	6	18	12
12	7	16	9
13	4	13	9
14	3	15	12
15	21	24	3
16	5	18	13
17	3	14	11
18	4	13	9
19	6	15	9
20	7	18	11
21	9	16	7
22	5	14	9
23	11	16	5
24	10	18	8
25	3	11	8
26	7	15	8
27	10	17	7
28	3	12	9
29	7	17	10
30	8	15	7
$\bar{X}$ S.D.	6.03	14.96	8.93

Appendix E
Certificate of English

BS RU BANSOMDEJCHAOPRAYA
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This is to certify that

Mr. Hu Lingfeng

Achieved BSRU English Proficiency Test (BSRU-TEP) level

B2

Given on 25th January 2021

(Assistant Professor Dr Kulsirin Aphiratvoradej)

Director

Appendix F

Turnitin Plagiarism Check Report

Using Problem Based Learning method to improve Creative Problem-Solving Ability of undergraduate students

ORIGINALITY REPORT

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Using Problem Based Learning method to improve Creative
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6	Savin-Baden, Maggi, Wilkie, Kay. "EBOOK: Problem-based Learning Online", EBOOK: Problem-based Learning Online, 2006 Publication	1%

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PRIMARY SOURCES

1	Dwiarso Rubiyanto, Mai Anugrahwati, Nurcahyo Iman Prakoso. "Problem based learning (PBL) method as a synchronization approach of chromatography course and chromatography laboratory work", AIP Publishing, 2018 Publication	2%
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1 Hyunjoo Im, Brad Hokanson, Kim K. P. Johnson. "Teaching Creative Thinking Skills", Clothing and Textiles Research Journal, 2015
Publication — 2%

2 Hwang-Woo Byun. "Efficacy Verification of Team Learning Satisfaction, Problem Solving Ability, and Communication Ability of Problem Solving Process Classes Applying Action Learning, Problem-Based Learning, and Mentoring", Journal of Problem-Based Learning, 2020
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3. Ida Fiteriani, Rahma Diani, Athi' Hamidah, Chairul Anwar. "Project-based learning through STEM approach: Is it effective to improve students' creative problem-solving ability and metacognitive skills in physics learning?", Journal of Physics: Conference Series, 2021
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Appendix G

The Document for Accept Research/ Full Paper

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SPU: 0203/4269

17 October 2023

Title: Paper Acceptance

Dear Hu Ling Feng

On behalf of the Organizing Committee and Peer Review Committee, we are pleased that your paper titled,

"USING PROBLEM BASED LEARNING METHOD TO IMPROVE CREATIVE PROBLEM-SOLVING ABILITY OF UNDERGRADUATE STUDENTS"

submitted for presentation at the 18th National and the 8th International Sripatum University Conference (SPUCON2023) on Research and Innovations to Sustainable Development, held on 27 October 2023, is formally accepted for inclusion in the conference program.

The conference program is shaping up to reflect a wonderful event. We hope that you will be able to fully participate in the conference and take advantages of all the benefits that this conference offer participants and attendees. Besides, your presented paper will be published in the on-line proceedings which will be available at http://spucon.spu.ac.th

We are looking forward to meeting you.

Sincerely yours,

Y. Subin

(Assoc. Prof. Subin Yurarach, Ph.D.)
Chairman of Peer Review Committee
SPUCON2023

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SRIPATUM UNIVERSITY

USING PROBLEM BASED LEARNING METHOD TO IMPROVE
CREATIVE PROBLEM-SOLVING ABILITY OF UNDERGRADUATE STUDENTS

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ABSTRACT

The objective of this research were 1) to using a problem based learning method to improve a creative problem-solving ability of undergraduate students and 2) to compare students' Creative Problem-Solving ability before and after the implementation based on a problem based learning method. The sample group included 30 undergraduate students from Vocational and Technical College, Anji City, China, in the first semester of the academic year 2023. The research instruments involved 1) four lesson plans based on a problem based learning method, including 16 hours of teaching time and 2) a creative problem-solving ability test. The test question is designed to test the three sub variables in the dependent variable, including 1) understanding the problem (discovering confusion, collecting information, generating problems), 2) creative conceptualization (discovering ideas), 3) action plan (finding answers, seeking acceptance). The data were analyzed by mean ($\bar{x}$), standard deviation (S.D.) and paired sample t-test for dependent samples. The results revealed the followings: 1) By using Problem Based Learning method and observing students' learning behavior, it was found that students' creative problem-solving ability has been improved. The creative problem-solving ability scores before and after using problem

based learning method of the undergraduate students, the average score for the pre-test was 6.03, while the average score for the post-test after learning was 14.96, and the mean difference was 8.93. The after-learning score was found to be higher than the before-learning score. 2) Using Problem Based Learning method, the creative problem-solving ability of students after class is significantly higher than before class, with statistical significance at the level .01 the students' creative problem-solving ability after class is higher than before class and P< .01 indicates statistical significance at the .01 level. By implementing the problem based learning method on students, their creative problem-solving ability after class is significantly higher than that before class. This is consistent with the research hypothesis.

KEYWORDS: Problem Based Learning Method, Creative Problem-Solving Ability, Undergraduate Students

1. Introduction

The National Vocational Education Reform Implementation Program issued by the State on January 24, 2019, proposes "concrete measures to further improve vocational education in the new era, raise the level of development of secondary vocational education, and build a national standard for vocational education," "improve standards related to education and teaching, pay close attention to teaching and teachers, and cultivate and pass on the spirit of craftsmanship". The rapid advancement of smart education, cultivating students' higher-order thinking has become the core content of education. Define higher-order thinking as a psychological activity or cognitive ability that occurs at a higher cognitive level. During the "14th Five-Year Plan" period, the rapid development of the national economy ushered in a critical period of industrial structure upgrading and transformation. The transformation and upgrading of industrial structure means that more creative talents and adaptable technical and skilled talents are needed. Therefore, developing various abilities of students is important Including a creativity and creative problem-solving ability of students. (Zhixia and others, 2014).

Creative problem-solving ability encourages exploring open-ended solutions. It also focuses on developing new perspectives and fostering creativity in the workplace. Its benefits include: finding creative solutions to complex problems: user research can insufficiently illustrate a situation's complexity. While other innovation processes rely on this information, creative problem-solving can yield solutions without it. Adapting to change: business is constantly changing, and business leaders

need to adapt. Creative problem-solving helps overcome unforeseen challenges and find solutions to unconventional problems. Fueling innovation and growth: In addition to solutions, creative problem-solving can spark innovative ideas that drive company growth. These ideas can lead to new product lines, services, or a modified operations structure that improves efficiency.
(Yonwilad, Wannatida, and others, 2023).

The popularization and development of the Problem Based Learning method, it is being applied in more and more fields. The problem-based learning method provides a necessary way to improve students' creative problem-solving ability. The main purpose of implementing the problem-based learning method is to cultivate students' problem-solving ability and communication and coordination ability, and to exercise teamwork and organizational skills in practical operation. (Lian Lian, 2013).

Therefore, the researcher is interested in using problem-based learning method to organize the teaching process to improve a creative problem-solving ability for undergraduate students to make progress and be able to use it more efficiently.

2. Research Objective

(1) To Using Problem Based Learning method to improve Creative Problem-Solving Abilities of undergraduate students.

(2) To compare students' Creative Problem-Solving Ability , before and after the implementation based on the Problem Based Learning method.

3. Theory, Concept and Related Research

This title research using a problem based learning method to improve a creative problem-solving ability of undergraduate students, the following literatures were studied, the details are as follows:

3.1 Problem Based Learning method

This study argues that in problem-based learning, students' learning process should be a continuous process of identifying, analysing and solving problems. Lin (2019) believes that from the perspective of problem composition and teaching methods, the PBL model is an experiential learning process aimed at exploring and solving complex and real problems. The teaching and learning activities in this study will be based on the five components of the problem-based learning process proposed by Barrows & Mayers (1993): 1) Set up study groups, 2) Create a problem, 3) Carry out activities, 4) Presentation of achievements, 5)

Reflection after solving the problem. Saqr (2019) stated that social constructivists view learning as the active construction of knowledge through social interaction and dialogue among learners. Xin & Wei.(2023) believe that Designing a learning process based on questions process, which is a conceptual approach that is common to all models in PBL. Problem based learning is a method in which the teacher sets up problems in the course, and through the problems or situations, induces students to think and establish learning objectives.

3.2 Creative Problem-Solving ability

Hao et al. (2014) proposed that higher-order thinking skills include problem-solving ability and creativity.which argues that creative problem solving consists of three phases:hypothesis formation, hypothesis validation, and communication. Treffinger et al.(1987) believe that in the process of creative problem solving, individuals also need to use creativity while reasoning and solving problems. At present, the most commonly used Creative Problem-Solving (CPS) model in classroom teaching is the modified CPS model by Tefenger and Isaacson. This version of the CPS model consists of three components and six stages, namely: understanding problems (discovering confusion, collecting data, generating problems) creative ideas (discovering ideas) action plans (finding solutions, seeking acceptance). Many studies at home and abroad have shown the effectiveness of CPS model teaching, and a large number of research results have shown that the application of CPS model in various educational fields such as mathematics and engineering has a significant positive impact on the higher-order thinking ability of students at different stages. In the WPI (Work Preference Inventory), Amabile (2014) clearly states that the main components of intrinsic motivation include: competence, curiosity, interest, love, and responsibility for work, etc. Other researchers also agree that intrinsic motivation is helpful to creativity.

3.3 Research Framework

Independent Variable	Dependent Variable
The teaching process of the Problem Based Learning method. 1) Set up study groups 2) Create a problem 3) Carry out activities 4) Presentation of achievements 5) Reflection after solving the problem	Creative Problem-Solving Ability 1) Understand the problems 2) Creative Ideas 3) Can action plan

Figure 1 Research Framework

3.4 Research Hypotheses

After the implementation of Problem based learning method, the students' Creative Problem-Solving Ability improved explicitly.

4. Research Methodology

4.1 Research Design

The research "Using problem based learning method to improve creative problem-solving ability of undergraduate students" aims to improve the creative problem-solving ability of undergraduate students by using the Problem Based Learning method, and compare the creative problem-solving ability of students before and after class when using the Problem Based Learning method. This research is experimental research. One group pretest – posttest design was used with the following experimental design:

Table 1 Experimental design

Group	Pretest	Experimental	Posttest
E	T_1	X	T_2

The meaning of the symbols used in the experimental design.

E means Random Sampling
X means experimental
T_1 means Pretest
T_2 means Posttest

4.2 Population and Sample

Population

There are 150 students in 5 classes of the first-year majoring in visual communication design for photography course at Vocational and Technical College in the first semester of the 2023 academic year.

The Sample Group

Through random cluster sampling, 30 first-year students majoring in visual communication design of Vocational and Technical College were sampled in the first semester of the 2023 academic year.

4.3 Research Instrument

Using Problem Based Learning method to improve Creative Problem-Solving Abilities in Photography Course of undergraduate students. The research Instruments is as follows:

Lesson plans according to the Problem Based Learning method: that was a student-centered learning method consisted of 5 step of teaching, including: step1, set up study groups. Group cooperative learning is the main form of Problem Based Learning method, Step2, ceate a problem, Teachers put forward new questions in the classroom, let students take the initiative to think, Step3, carry out activities, at this stage, the group members come together, exchange the knowledge and methods they have learned, use the new knowledge to rethink the problem and explore the problem in depth, Step4, presentation of achievements, Each group organizes and summarizes its own learning results, and selects appropriate ways to display their learning achievements, Step5, reflection after solving the problem, at this stage, students need to reflect on the specific operation process of the entire the problem based learning method, and inspire students to summarize the relationship between new theoretical knowledge and problems, by teaching through contents of Photography Course of undergraduate students. Including four lesson plans, 16 hours of teaching which were as follows: chapter 1: portrait photography, 4 hours, chapter 2: wedding photography. (done in studio, kit and caboodle), 4hours chapter 3: graphic creative Photography, 4 hours chapter 4: shoes advertising product photography, 4 hours.

Creative Problem-Solving ability test: the test was created from sub-variables of creative problem-solving ability that was a method of identifying unique solutions to problems through a problem identification and solution planning process. It went beyond traditional methods to find solutions to workflow problems, producted innovation or brand positioning. Developing creative problem solving ability requires continuous improvement to encourage an environment of continuous innovation. Creative problem solving was considered a soft skill, or personal strength. The CPS model had gone through a lot of modifications and refinements, and at present, the model most frequently used in classroom teaching was the CPS model modified by Teffinger and Isakson which consisted of three components: 1) understanding the problem (discovering confusion, collecting information, generating problems). 2) creative conceptualization (discovering ideas). 3) action plan (finding answers, seeking acceptance).

4.4 Data Collection

The data were collected as follows:

1. Determine research objectives: Firstly, clarify the research objectives and issues. Here, 30 freshmen majoring in graphic design from Vocational and Technical College were selected as experimental subjects, which helps to determine what data needs to be collected to answer research questions.

2. Design data collection methods: Determine appropriate data collection methods based on research objectives. The data collection methods used here include on-site observation and experimental design. Design the differences in students' creative problem-solving abilities before and after using problem-based learning methods. The experimental design method includes developing an experimental plan for three sub abilities related to creative problem-solving ability: the ability to understand problems, the ability to create ideas, and the ability to collect experimental data in an action plan. The total score is 18 points.

3. Data analysis: Input and organize the collected data. This includes encoding, cleaning, classifying, and other processing of data from 30 students for subsequent statistical analysis. Use appropriate statistical methods to analyze data. These methods can be selected based on research questions and data types, including descriptive statistics, analysis of variance, regression analysis, etc. for 30 students before and after the test.

4.5 Data Analysis

1. Analyze and validate the effectiveness of the course plan, and self guide the consistency index of the Problem Based Learning Method learning ability scoring criteria as the consideration criterion (IOC : Index of item objective congruence).

2. Based on the problem based learning method, evaluate students' learning ability before and after the implementation of creative problem solving ability, and analyze the bias and t-test of statistical data related samples through means and standards from experiments. In this research, the researcher has synthesized the creative problem-solving abilities that will be promoted in students. This ability can be classified into 3 sub-abilities: 1) The ability to understand the problems 2) The ability to creative Ideas 3) the ability to action plan.

The "problem based learning method" was conducted on 30 students in the first year grade of Vocational and Technical College, majoring in graphic design at the university, and the students' behavioural

performance in each class was observed and recorded in the five teaching sessions of "set up study groups", "create a problem", "carry out activities", "presentation of achievements", "reflection after solving the problem", and five teaching sessions. The changes in students' behaviours show that students' learning awareness, learning strategies, learning activities, learning assessment and creative problem-solving ability are gradually improved throughout the learning process. The specific results of the empirical study are as follows.

5. Research Findings

This study concluded through experimental design that using a problem based learning method to improve a creative problem-solving ability of undergraduate students was reasonable and effective, and the following conclusions were drawn:

1. Based on the problem based learning method can further enhance students' creative problem-solving ability, especially significantly improve their idea generation ability. With the continuous deepening of teaching, the task list reflects an upward trend in students' creative problem-solving ability.

2. Compared with traditional teaching, creative problem solving ability teaching based on the problem based learning method is more helpful in enhancing students' creative problem-solving abilities.

Table 2 The comparing students' creative problem-solving ability of undergraduate students before and after using Problem Based Learning method.

Creative Problem-Solving Ability	n	Full Score		SD.	df	t	p
Pre-test	30	18	6.03	2.71	29	19.3	.001
Post-test	30	18	14.96	2.53		3	**

**Statistically significant at level .01 (p < .01)

Table 2 shows that the average score of first-year students' creative problem-solving ability after class is higher than the average score before class, indicating that students' Creative Problem-Solving Ability after class is higher than before class P< .01 indicates statistical significance at the .01 level. By implementing the problem based learning method on students, their creative problem-solving ability after class is significantly

higher than that before class. This is consistent with the research hypothesis.

6. Discussion

1. Utilize problem-based learning methods to enhance college students' creative problem-solving abilities. This is consistent with the concept of Xiangqing et al. (2014), which defines PBL teaching mode as a problem oriented teaching mode and teaching strategy, which can improve students' ability to analyze and solve problems.

2. Compare students' creative problem-solving abilities before and after the implementation of problem-based learning method. Research has shown similarities with the research findings of Sitthichai (2014). Applying the CPS model to cultivate undergraduate creativity in an ubiquitous learning environment, experiments have shown that this strategy can effectively enhance students' creative problem-solving abilities.

7. Suggestion

In order to further carry out research on this topic, the research prospects proposed by the author are as follows:

1. Expanding the scope of research and increasing research duration. Future research should expand the sample size and research duration. At the same time, the teaching content should not be limited to a single course, and any interdisciplinary content can be studied to further construct and improve the problem-based learning method teaching strategy.

2. Establishing a multi-dimensional evaluation plan for creative problem-solving ability. Future research can use video capture devices, eye movement devices, EEG devices, etc. to record more physiological and procedural data of students, and complete scientific measurement of students' creative problem-solving ability. Collect more qualitative data to gain a deeper understanding of the trajectory of improving students' creative problem-solving abilities.

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