



**EFFECT OF LEARNING MANAGEMENT USING PROBLEM-BASED  
LEARNING TOGETHER WITH THE MOBILE PHONE APPLICATION ON  
STUDENTS' LEARNING ACHIEVEMENT AND THE ABILITY OF  
LANDSCAPE DESIGN OF COLLEGE STUDENTS**

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**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS  
FOR THE DEGREE OF MASTER OF EDUCATION  
IN CURRICULUM AND INSTRUCTION  
GRADUATE SCHOOL  
VALAYA ALONGKORN RAJABHAT UNIVERSITY  
UNDER THE ROYAL PATRONAGE PATHUM THANI  
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ผลของการจัดการเรียนรู้โดยใช้ปัญหาเป็นฐานร่วมกับการใช้แอปพลิเคชันโทรศัพท์เคลื่อนที่ต่อ  
ผลสัมฤทธิ์ทางการเรียนและความสามารถในการออกแบบภูมิทัศน์ของนักศึกษาวิทยาลัย

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                                 Together with the Mobile Phone Application on Students' Learning  
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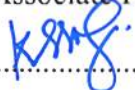
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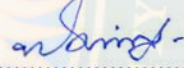
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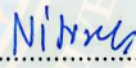
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### บทคัดย่อ

การวิจัยครั้งนี้เป็นการวิจัยเชิงทดลอง มีวัตถุประสงค์เพื่อ 1) เปรียบเทียบผลสัมฤทธิ์ทางการเรียน ในการออกแบบภูมิทัศน์ของนักศึกษาวิทยาลัยก่อนและหลังการจัดการเรียนรู้โดยใช้ปัญหาเป็นฐานร่วมกับการใช้แอปพลิเคชันโทรศัพท์เคลื่อนที่ 2) เปรียบเทียบความสามารถในการออกแบบภูมิทัศน์ของนักศึกษา วิทยาลัยหลังการจัดการเรียนรู้โดยใช้ปัญหาเป็นฐานร่วมกับการใช้แอปพลิเคชันโทรศัพท์เคลื่อนที่กับเกณฑ์ ร้อยละ 70 และ 3) เปรียบเทียบค่าเฉลี่ยความพึงพอใจของนักศึกษาวิทยาลัยหลังการจัดการเรียนรู้โดยใช้ปัญหา เป็นฐานร่วมกับการใช้แอปพลิเคชันโทรศัพท์เคลื่อนที่ กลุ่มตัวอย่างเป็นนักศึกษาจีน สาขาการออกแบบ สถาปัตยกรรม จำนวน 30 คน (1 ห้องเรียน) ที่ได้มาจากการสุ่มแบบแบ่งกลุ่มจาก Zhoukou Normal University ประเทศสาธารณรัฐประชาชนจีน เครื่องมือที่ใช้ในการวิจัยครั้งนี้ ได้แก่ 1) แบบทดสอบผลสัมฤทธิ์ทางการเรียน ในการออกแบบภูมิทัศน์ ซึ่งมีค่าความสอดคล้องเท่ากับ 1.00 ค่าความยากอยู่ระหว่าง 0.20-0.80 ค่าอำนาจจำแนก มากกว่า 0.20 และความเชื่อมั่นโดยใช้สูตรค่าสัมประสิทธิ์ของแอลฟาครอนบาคเท่ากับ 0.96 2) แบบประเมิน ความสามารถในการออกแบบภูมิทัศน์ของนักศึกษาซึ่งมีค่าความสอดคล้องเท่ากับ 1.00 และ 3) แบบสอบถามความ พึงพอใจของนักศึกษาซึ่งมีค่าความสอดคล้อง เท่ากับ 1.00 โดยความเชื่อมั่นโดยใช้สูตรค่าสัมประสิทธิ์ ของแอลฟาครอนบาคเท่ากับ 0.86 ค่าสถิติที่ใช้วิเคราะห์ข้อมูลในการวิจัยครั้งนี้ ได้แก่ ค่าเฉลี่ย ส่วนเบี่ยงเบน มาตรฐาน และสถิติที่ใช้สำหรับการทดสอบกลุ่มตัวอย่างที่เป็นอิสระต่อกันและกลุ่มตัวอย่างเดียว

ผลการวิจัยพบว่า 1) ผลการเปรียบเทียบผลสัมฤทธิ์ทางการเรียนในการออกแบบภูมิทัศน์ของนักศึกษา วิทยาลัยหลังการจัดการเรียนรู้โดยใช้ปัญหาเป็นฐานร่วมกับการใช้แอปพลิเคชันโทรศัพท์เคลื่อนที่สูงกว่า ก่อนจัดการเรียนรู้อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 โดยค่าเฉลี่ยผลสัมฤทธิ์ทางการเรียนในการออก แบบภูมิทัศน์ของนักศึกษาวิทยาลัยหลังจากการจัดการเรียนรู้มีค่าสูงกว่าก่อนจัดการเรียนรู้ 2) ผลการเปรียบเทียบ ความสามารถในการออกแบบภูมิทัศน์ของนักศึกษาวิทยาลัยหลังการจัดการเรียนรู้โดยใช้ปัญหาเป็นฐาน ร่วมกับการใช้แอปพลิเคชันโทรศัพท์เคลื่อนที่สูงกว่าเกณฑ์ร้อยละ 70 อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 และ 3) ค่าเฉลี่ยความพึงพอใจของนักศึกษาวิทยาลัยหลังการจัดการเรียนรู้โดยใช้ปัญหาเป็นฐานร่วมกับการ ใช้แอปพลิเคชันโทรศัพท์เคลื่อนที่อยู่ในระดับมากที่สุด

องค์ความรู้ที่ได้จากการวิจัยครั้งนี้ คือ แนวทางการจัดการเรียนรู้เพื่อปรับปรุงความสามารถของนักศึกษา ชั้นปีที่สองในการออกแบบภูมิทัศน์ผ่านกระบวนการวิจัยอย่างเป็นระบบและนวัตกรรมทางการศึกษา โดยนักศึกษา ใช้การจัดการเรียนรู้โดยใช้ปัญหาร่วมกับการใช้แอปพลิเคชันโทรศัพท์เคลื่อนที่ซึ่งสามารถใช้เป็นแบบอย่างให้ครู ใช้ในการจัดการเรียนรู้ของนักเรียนได้

**คำสำคัญ :** การจัดการเรียนรู้โดยใช้ปัญหาเป็นฐาน แอปพลิเคชันโทรศัพท์เคลื่อนที่ ความสามารถในการออกแบบภูมิทัศน์



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### ABSTRACT

The purposes of this experimental research were to 1) compare the learning achievement of the students about landscape design before and after being exposed to Problem-Based Learning through a mobile phone application, 2) compare the ability of the students about landscape design after being exposed to Problem-Based Learning through a mobile phone application with the established 70% criterion, and 3) compare the means of satisfaction of the students after being exposed to Problem-Based Learning through a mobile phone application. The sample was 30 Chinese students (1 class) from Zhoukou Normal University, Republic of China, majoring in Environmental Design. They were selected by cluster random sampling. The research instruments used in this research were as follows. The first instrument was the test of the learning achievement of landscape design with the IOC value of 1.00. The item difficulty (p) ranged from 0.20-0.80, and the item discriminability (r) was more than 0.20. The reliability was also calculated by the Cronbach's Alpha Coefficient, whose value was 0.96. The second instrument was the evaluation form about the students' abilities of landscape design with the IOC value of 1.00. The third instrument was the questionnaire for students' satisfaction with the IOC value of 1.00. The reliability was calculated by the Cronbach's Alpha Coefficient, whose value was 0.86. The statistics used to analyze the data was mean, standard deviation, and dependent t-test and one sample test.

The research findings were as follows: 1) the students' learning achievement about landscape design after being exposed to Problem-Based Learning through a mobile phone application was higher than before being exposed to Problem-Based Learning through a mobile phone application at a significance level of 0.05, 2) the students' ability of landscape design after being exposed to Problem-Based Learning through a mobile phone application was higher than the criterion of 70% at a significance level of 0.05, and 3) the students' satisfaction after being exposed to Problem-Based Learning through a mobile phone application was at the highest level.

The body of knowledge acquired in this study is a learning management guide to improve the ability of college sophomores in landscape design through a systematic research process and educational innovation. That is, that the students are exposed to Problem-Based Learning through a mobile phone application can be used as a model for teachers who can apply this learning management to teach their students.

**Keywords:** Problem-Based Learning, Mobile Phone Application, Landscape Design Ability

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Huangfu Zhounan

## TABLE OF CONTENTS

	<b>Page</b>
ABSTRACT (THAI) .....	C
ABSTRACT (ENGLISH).....	D
ACKNOWLEDGEMENTS.....	E
TABLE OF CONTENTS.....	F
LIST OF TABLES.....	H
CHAPTER 1 INTRODUCTION.....	1
1.1 Introduction.....	1
1.2 Research questions.....	2
1.3 Research Objectives.....	2
1.4 Research hypothesis.....	2
1.5 Delimitation of study.....	3
1.6 Conceptual framework.....	5
1.7 Operational definition.....	5
1.8 Practical Application.....	7
CHAPTER 2 REVIEW OF LITERATURE.....	8
2.1 Basic information.....	8
2.2 Independent variable: Learning management using problem-based learning together with the mobile phone application.....	8
2.3 Dependent variable.....	14
2.4 Related research (about 5-10 reseaches, both in China and others) (should range from 2011-2021).....	15
CHAPTER 3 RESEARCH METHODOLOGY.....	20
3.1 Population and samples.....	20
3.2 Quasi-Experimental design.....	20
3.3 Research instruments.....	20
3.4 Data collection.....	29

3.5 Data analysis.....	29
CHAPTER 4 RESULTS .....	30
4.1 The results of research objective 1 .....	30
CHAPTER 5 DISCUSSION .....	34
5.1 Research conclusion .....	34
5.2 Research discussion.....	35
5.3 Recommendation.....	36
REFERENCES .....	38
APPENDIX.....	40
APPENDIX A EXPERT WHO EXAMINED THE RESEARCH INSTRUMENTS .....	41
APPENDIX B THE INSTRUMENTS OF RESEARCH.....	43
APPENDIX C THE QUALITY OF INSTRUMENTS RESEARCH.....	63
CURRICULUM VITAE.....	77



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## LIST OF TABLES

	<b>Page</b>
Table 1 Criterion of the evaluation form about the ability of landscape design.....	25
Table 2 Statistical symbols .....	30
Table 3 The result of comparing the different scores of the learning achievement of the students about landscape design before and after learning through the learning management using problem-based learning together with the mobile phone application.....	31
Table 4 The result of comparing the different scores of the ability of landscape design of students after learning through the learning management using problem-based learning together with the mobile phone application with the criteria set at 70 percent. ....	32
Table 5 The result of comparing the different scores of the student's satisfaction on using problem-based learning with the mobile phone application .....	32

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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

With the rapid development of Internet technology and application, cyberspace has changed from text environment to multimedia environment, and from man-machine interaction to social interaction. The use of new media, especially mobile social media, is inevitably integrated into the invisible background of contemporary college students' growth, life and social interaction.

In the traditional landscape design teaching classroom where teachers impart knowledge, students are exposed to the knowledge imparted by teachers in a boring way, and students' interest in learning is not very positive. The books students read are theoretical and professional books, and they can't get access to the latest design concepts or new and good design schemes in the world. Unable to improve students' landscape design ability.

In March 2020, China issued The guiding opinions of the Ministry of education on strengthening the application of "three classrooms", which pointed out that teachers should be encouraged to use information technology to improve the efficiency and quality of classroom teaching, strengthen the deep integration of information technology and teachers' teaching, and promote the change of teachers' teaching methods and students' learning methods, Provide teachers with interactive multimedia teaching equipment, common office software, multimedia production software and instant messaging software, pay attention to the development of personalized learning and evaluation system represented by mobile intelligent network terminal, big data analysis technology and virtual reality technology, promote classroom revolution, innovate education and teaching mode and promote the transformation of education mode, We should support the construction of a new ecosystem of "Internet plus education", develop more equitable and quality education, and accelerate the modernization of education.

With the rapid development of information network technology and the continuous popularization of mobile terminal equipment, using mobile phone application to learn has gradually become a new way of learning. The use of mobile phone application can provide new forms for college classroom teaching, promote the innovation of classroom teaching in training students' interest in learning, training students' thinking ability, strengthen students' autonomous learning ability, improve the learning efficiency has incomparable role, at the same time also can promote the new technology, new equipment support for learning.

Therefore, a study is carried out in this paper. Using problem-based learning to assist classroom teaching through mobile phone application to improve students'

landscape design ability. In class, the teacher explains the questions, and the students search the relevant contents through mobile phone applications according to the questions, and get the answers through group discussion. In class and after class, students can get in touch with many of the world's latest design concepts and methods at anytime and anywhere through the function of mobile phone applications. Students can improve their learning achievement and design ability by learning these excellent design projects.

## **1.2 Research questions**

1.2.1 How does the learning achievement of the students about landscape design before and after receiving learning management using problem-based learning together with the mobile phone application?

1.2.2 How does the ability of landscape design after receiving learning management using problem-based learning together with the mobile phone application?

1.2.3 How does the satisfaction of the students after receiving learning management using problem-based learning together with the mobile phone application?

## **1.3 Research Objectives**

1.3.1 To compare the learning achievement of landscape design before and after receiving using problem-based learning with the mobile phone application in classroom for the dependent samples.

1.3.2 To compare ability of landscape design with the determined criteria set at 70% by using evaluation form for one sample.

1.3.3 To compare mean of the satisfaction of the students after receiving learning management using problem-based learning together with the mobile phone application.

## **1.4 Research hypothesis**

1.4.1 The learning achievement of the students about landscape design after receiving Learning management using problem-based learning together with the mobile phone application is higher than before.

1.4.2 The ability of the students about landscape design after receiving Learning management using problem-based learning together with the mobile phone application is higher than the established 70% criterion.

1.4.3 The satisfaction of the students after receiving learning management using problem-based learning together with the mobile phone application is a high level.

### 1.5 Delimitation of study

#### 1. Population and sample

Population of this study was 100 sophomore students (3 class) from Zhoukou Normal University majoring in Environmental Design.

The sample was 30 sophomore students (1 class) from Zhoukou Normal University majoring in Environmental Design which were selected by using cluster random sampling.

#### 2. Variables

Independent variable Learning management using problem-based learning together with the mobile phone application.

Dependent variable

(1) Learning achievement of the students about landscape design.

(2) Ability of landscape design of students.

(3) Students' satisfaction on learning management using problem-based learning together with the mobile phone application.

#### 3. Area of content

Venue: School of Design, Zhoukou Normal University.

Course: Principles of Landscape Design.

Content:



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Course: Principles of Landscape Design

Level: sophomore

Total class hours : 56 hours (4 weeks)

In this course, problem-based learning adopts real or classic landscape design projects, which can be text-based or atlas based. In class, the students are divided into several study groups. The teacher puts forward the possible problems in the design through the description and display of the design project. Guide students to use the mobile phone application to find a lot of relevant content. Guide the students to analyze and discuss the theoretical knowledge contained in the landscape design problem and the design methods used by the designer in the design project. Students discuss in the same group. The teacher will participate in the discussion with the students in the group. The students will put forward questions and the teachers will put forward suggestions to solve the problems, so that the students can think critically through the design project. Then use the mobile phone application to find a lot of relevant content and find out the solution to the problem.

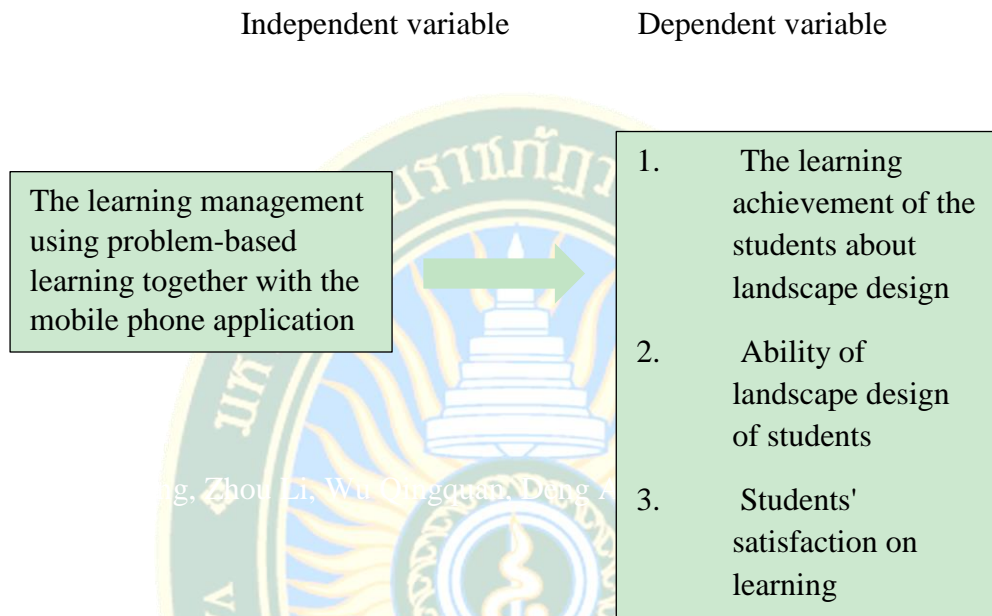
Through the method of combining classical projects analysis and theoretical knowledge teaching, the teacher will teach students the analysis and design of design scheme, the establishment of design thinking, the skills of landscape design, and the production of the post-effect drawings of landscape design. Through learning, students can communicate with their classmates and teachers, develop critical thinking, creative thinking and communication skills. Through the cooperation of project team, students' individual project skills, design, expression and communication skills are cultivated. Through group cooperation training, students' creative thinking, communication skills, cooperation and teamwork ability are cultivated.

4. Time duration

September-October 2021.

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## 1.6 Conceptual framework



## 1.7 Operational definition

### 1.7.1 Definition of the problem-based learning

Problem-based learning refers to Taking questions as the carrier runs through the teaching process, so that students have the motivation and desire of autonomous learning in the process of setting and explaining questions, so as to gradually form the habit of autonomous learning, continuously optimize the methods of autonomous learning in practice and improve the ability of autonomous learning. The problem-based teaching method fully reflects the main position of students and can effectively stimulate students' initiative and enthusiasm in autonomous learning.

### 1.7.2 Definition of the mobile phone application

Mobile phone application refers to the software installed on the smart phone to improve the shortcomings and individuation of the original system. It is the main means to improve the functions of mobile phones and provide users with richer use experience. Application is the abbreviation of application program. An application program usually refers to a software program that can perform a certain function. For example, word processing programs, database programs, web browsers, development tools, drawing, image editing tools and communication tools can be applications.

### 1.7.3 Definition of the problem-based learning together with the mobile phone application

Learning management using problem-based learning together with the mobile phone application refers to the researcher use problem-based learning to teach the

students and students use the mobile phone application as the tools for learning about the principles of landscape design and able to design landscape.

Steps of teaching in accordance with lesson plans:

Step 1: Determine the knowledge and content of each course.

Step 2: Send the content of this class to the students for preview in advance by using the mobile phone.

Step 3: After the teacher has finished the basic knowledge, ask the students questions to understand the students' mastery.

Step 4: Through the project, students put forward the problems existing in the project and have a group discussion. After network search by using the mobile phone and discussion, they get the final solution.

Step 5: Students presentation their problems and solutions.

Step 6: Teacher evaluation.

#### 1.7.4 The learning achievement of the students about landscape design

The learning achievement of the students about landscape design refers to the knowledge of landscape design principles measured by achievement test which was multiples choice test covered. The achievement test use the multiple choice questions, the total score is 30, and one point for a correct answer, no point for a wrong answer. The test include definition of landscape design and garden design urban planning and design. The main content is the basic theoretical knowledge of landscape design that sophomore landscape design major students need to understand.

#### 1.7.5 Ability of landscape design of students

Students' ability of landscape design refers to master the basic knowledge of landscape design, can independently complete design works, have creativity in design works, and can independently use hand-painted skills and software skills to express design works measured by evaluation form, cover ability's:

1. Proficiency in the basic knowledge and skills of the course;
2. Proficiency in applying course knowledge and strong design application skills;
3. Active design thinking, strong creativity and outstanding innovation ability;
4. Very good compliance with the requirements of the subject, good visual effect of the picture, complete work, and serious learning attitude.

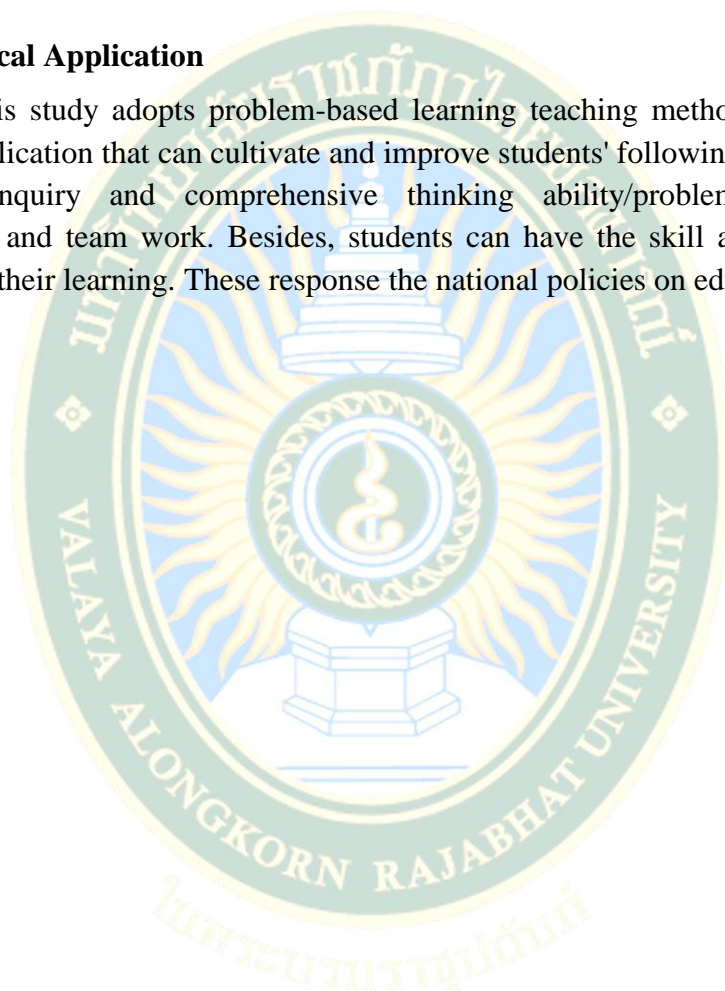
1.7.6 Students' satisfaction on the problem-based learning together with the mobile phone application refers to their opinions about like or dislike on their learning activities with the problem-based learning together with the mobile phone application. The purpose of using a questionnaire was to collect data regarding the students' opinion toward the instruction such as the content of curriculum, learning activities, and the instruction materials.

The questionnaire consisted of three sections: Section 1 recorded the students' personal information. Section 2 was the five-point scale Likert questionnaire ranging from very high, high, moderate, low, and very low. This section of the questionnaire

consisted of 14 questions or statements asking about students' opinions toward the instruction. Section 3 was open-ended questions, also provide space was provided for additional opinions or other suggestions.

### **1.8 Practical Application**

This study adopts problem-based learning teaching method with the mobile phone application that can cultivate and improve students' following abilities: learning initiative/Inquiry and comprehensive thinking ability/problem solving ability /creativity and team work. Besides, students can have the skill about using mobile phone for their learning. These response the national policies on educational reform.



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## **CHAPTER 2**

### **REVIEW OF LITERATURE**

#### **2.1 Basic information**

Curriculum/Course relevant to research topic: Principles of Landscape Design.

##### **2.1.1 The major of Landscape design**

Landscape design refers to the planning and design of landscape and garden. Its elements include natural landscape elements and artificial landscape elements. With the integration of planning, ecology, geography and other disciplines, it has different significance in different disciplines.

Landscape design mainly serves: urban landscape design (city square, commercial street, office environment, etc.), residential landscape design, urban park planning and design, waterfront green space planning and design, tourism resort and scenic area planning and design, etc.

##### **2.1.2 Course information**

The course involved in my research is “Principles of Landscape Design”.

Principles of landscape design is one of the important main courses of landscape design specialty. By understanding the overview of landscape design, understand the principles of landscape design and master the methods of landscape design. It is of great significance for students to systematically master the basic knowledge and design methods of landscape, improve students' design ability and cultural quality, establish correct landscape design concept and cultivate students' comprehensive ability.

##### **2.1.3 Students' information**

Students majoring in landscape design need to have basic design concepts and design ability to adapt to the post of designer after graduation. However, they still lack design ability. Therefore, I want to take the “Principles of Landscape Design” as the carrier and use problem-based learning together with the mobile phone application to improve students' landscape design ability.

#### **2.2 Independent variable: Learning management using problem-based learning together with the mobile phone application.**

##### **2.2.1 Definition of learning management**

2.2.1.1 It refers to the use of management methods to program, process and standardize learning through planning, organization, leadership, control and other means, so as to create and update the best scheme, so as to achieve the purpose of efficient learning. (Zhiku, 2020)

2.2.1.2 Learning management is a new management thought and method emerging in the era of knowledge economy. It integrates modern information technology, knowledge economy theory, enterprise management thought and modern management concept.

#### 2.2.2 Definition of problem-based learning

2.2.2.1 Problem-based learning is different from the traditional teacher centered teaching model, problem-based learning teaching model is a student-centered teaching method. It is a process in which students propose, discuss and learn problems around a complex, multi scene and practical problem-based topic in the form of group discussion under the participation and guidance of tutors. Its core is problem-centered, students' discussion is the main body, and teachers are the guides. (Haiyun, 2020)

2.2.2.2 The problem-based learning teaching model was initiated by barrows, an American professor of Neurology, at McMaster University in Canada in 1969. At present, it has been adopted by many medical colleges in the world. According to the WHO report, at present, more than 1700 medical schools around the world adopt problem-based learning teaching mode, and this number is increasing. In recent years, some medical colleges and universities in China have made beneficial exploration and attempts and gained some experience. This new teaching mode can greatly stimulate students' interest in learning, cultivate students' autonomous learning ability and improve their learning ability students' comprehensive thinking and innovation ability have incomparable advantages over traditional teaching methods, and meet the requirements of the training mode of medical students in the ongoing comprehensive reform of clinical medical education in China. (Zhanci, 2014)

2.2.2.3 Problem-based learning is a teaching concept (guiding principle) put forward by French educator Célestin Freinet in the 1920s. The application in medical teaching was first developed by McMaster University Medical School (a research public university located in Hamilton, Ontario, Canada) in the late 1960s. problem-based learning is a complete teaching process, not a specific teaching link. (Xuefengpan, 2019)

2.2.2.4 Problem-Based Learning (PBL) is a teaching method in which complex real-world problems are used as the vehicle to promote student learning of concepts and principles as opposed to direct presentation of facts and concepts. In addition to course content, PBL can promote the development of critical thinking skills, problem-solving abilities, and communication skills. It can also provide opportunities for working in groups, finding and evaluating research materials, and life-long learning. (Duchetal, 2001)

2.2.2.5 Problem-based learning (PBL) is a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem. This problem is what drives the motivation and the learning. Rather than teaching relevant material and subsequently having students apply the knowledge to solve problems, the problem is presented first. PBL assignments can be short, or they

can be more involved and take a whole semester. PBL is often group-oriented, so it is beneficial to set aside classroom time to prepare students to work in groups and to allow them to engage in their PBL project. (Nilson, 2010)

2.2.2.6 Problem-based learning (PBL) is a student-centered pedagogy in which students learn about a subject through the experience of solving an open-ended problem found in trigger material. The PBL process does not focus on problem solving with a defined solution, but it allows for the development of other desirable skills and attributes. This includes knowledge acquisition, enhanced group collaboration and communication. The PBL process was developed for medical education and has since been broadened in applications for other programs of learning. The process allows for learners to develop skills used for their future practice. It enhances critical appraisal, literature retrieval and encourages ongoing learning within a team environment. (Duchetal, 2001)

2.2.2.7 Seven-steps of PBL: logic and potential practical shortcomings:

- 1) Clarification of terms and concepts
- 2) Formulation of Problem Statement
- 3) Brainstorm
- 4) Categorising and Structuring of Brainstorm
- 5) Formulation of Learning objectives
- 6) Self-study
- 7) Post-discussion (Heidi Maurer & Christine Neuhold, 2011)

2.2.2.8 PBL (Problem-based Learning) that is based on the problem of Learning, addresses the issue of real and open, higher-order thinking for the development of the students has a unique advantage and value, teachers can make use of teaching material selection and the plait problem for PBL Learning style, and guide students to continue to explore the use of these problems, construction of core knowledge, to carry out the cooperation study, train students in the process Analysis, evaluation, innovation and other higher-order thinking. (Shen QI, 2021)

2.2.2.9 The basic elements of PBL are as follows:

- 1) Take problems as the starting point of learning; All the learning content of students is based on the main axis of the structure;
- 2) The problem must be a "real world" unstructured problem that the student is likely to encounter in his or her future field of expertise, with no fixed solution or process;
- 3) Emphasis on group cooperative learning and independent learning, less narrated teaching; Learners can develop their abilities and collaboration skills through social interaction;
- 4) With students as the center, students must shoulder the responsibility of learning;
- 5) The role of the teacher is to coach cognitive learning skills;



6) Conduct self-evaluation and group evaluation at the completion of each question and at the end of each course unit. (Yu Tong, 2006)

2.2.2.10 PBL teaching method for students to create a relaxed, active learning atmosphere, so that students can speak freely and actively, fully express their own views, but also can easily obtain information from other students and teachers; Secondly, the problems related to the course can be exposed on the spot as much as possible, in the discussion can deepen the understanding of the correct theory, but also can constantly find new questions, answer new questions, shorten the learning process, more impressive; Third, it is not only of great benefits to theoretical study, but also exercise the students ability in many aspects, such as literature search, the ability to access, sum up, the ability of comprehensive understanding, logic reasoning, oral expression ability, and the dominant learning, the ability of lifelong learning, etc., which will lay a good foundation for future design work. (Yu Tong,2016)

### 2.2.3 Definition of mobile phone application

In China, there are a lot of mobile phone software, you only need to take a mobile phone to go out and do all the things. People often use WeChat/QQ/Weibo and so on. These apps have many additional features in addition to their basic im functions. For example, WeChat has a function called circle of friends, people can share everything about themselves in the circle of friends. There is also a function called public account, is the developer or business in the WeChat public platform application account, can be on the platform and specific groups of text, pictures, voice, video all-round communication and interaction. In the public platform, there are a lot about the landscape design of the public, are run by famous design studio or well-known designers, can at any time to upload some of the latest design concept and the latest good design plan for everybody to learn. Since the knowledge is immediate, while the knowledge in books is not, students can use mobile phones at any time and place to learn a lot about the most cutting-edge international design concepts and get access to the latest excellent design schemes through these public accounts. Students can also share these articles so that everyone can see the cutting edge design. If students have any ideas about these cases, they can communicate with the teacher in real time through the software to learn.

2.2.3.1 APP is the abbreviation of the English word "Application", which is the meaning of the application. Mobile phone APP, that is, mobile phone software, mainly refers to the software installed on the smartphone, which is used to perfect the original system function of the mobile phone and provide users with a richer personalized experience. (Link: <https://baike.baidu.com/item>)

2.2.3.2 App refers to focusing on mobile application software development and services. App is the abbreviation of application, which usually refers to full screen reading on the mobile phone or mobile client. In addition, there are many online app development platforms. Mobile Internet Era is the era of the whole



people, everyone and every enterprise. App facilitates everyone's life. App development enables every enterprise to start the process of mobile informatization.

#### 2.2.3.3 Education APP

Educational APP in a broad sense can be understood as applications running on mobile smart devices that support the teaching and learning of educators and learners. When a APP is introduced into the teaching and learning process of educators and learners and plays a positive role, but the APP is not specially designed for the needs of a teaching activity at the beginning, it can also be called an educational APP. A narrow educational App refers to an application designed by a software developer for teaching and has a special function to support a teaching activity or teaching link.

#### 2.2.3.4 Wechat

WeChat is a free application launched by Tencent on January 21, 2011 to provide instant messaging services for smart terminals. WeChat support across different communication operators, operating system platform through the network fast send free (need to consume a small amount of network traffic) voice messaging, video, images and text, at the same time, also can use the information through Shared streaming media content and location based social plugins "shake", "friends", "platform", "public speech notepad" services such as plug-ins. WeChat provides public platform, circle of friends, news push and other functions. Users can add friends and follow public platform through "shake", "search number", "people nearby" and scanning QR code. At the same time, WeChat will share content with friends and wonderful content that users see to WeChat circle of friends.

#### 2.2.3.5 Weibo

Weibo is a social media platform based on user relationship. Users can access it through various mobile terminals such as PC and mobile phone to realize instant sharing, communication and interaction of information in the form of text, pictures, videos and other multimedia. [1] Based on the open platform architecture, Microblog provides a simple and unprecedented way for users to publish their content publicly and in real time. Through the transformative propagation, it enables users to interact with others and closely connect with the world. [2] As a new Internet entrance after portal and search, microblog has changed the way of information dissemination and realized the instant sharing of information.

#### 2.2.3.6 QQ

QQ, short for Tencent QQ, is an internet-based instant messaging software. QQ has covered Windows, macOS, iPadOS, Android, iOS, Windows Phone, Linux and other mainstream platforms. Its logo is a little penguin wearing a red scarf. Tencent QQ supports online chat, video call, point-to-point breakpoint file continuation, file sharing, network hard disk, custom panel, QQ mailbox and other functions, and can be connected with a variety of communication terminals.

#### 2.2.4 Problem-based learning with the mobile phone application

2.2.4.1 Asking a challenging question, continuing to explore, operating with real materials based on real scenarios, making a real impact; In the process, students have the full right to speak and choose, and constantly reflect; Then the project results are evaluated and modified, and finally the public display and sharing are not limited to the classroom.

2.2.4.2 Problem-based learning teaching mode assisted by smart phones has achieved good results in the implementation of teaching. It not only improves students' interest in learning and promotes students to study actively in the classroom, but also helps to cultivate students' awareness of finding problems, autonomous and interesting learning, cooperative analysis and problem solving, etc. At the same time, learning in the process of discovering and solving problems and thinking repeatedly helps to improve students' thinking ability. (Zhao ruixue, 2019)

#### 2.2.5 Role of teacher and learner in problem-based learning with the mobile phone application

Teaching activities are student-centered. The dominant position of the teacher in the classroom is challenged. This is because in "problem-based learning". In this paper, students must drive their learning motivation, choose their own learning content, and regulate their learning strategy, self-management of learning time, self-use of learning resources, self-evaluation of learning results. Finally enable students to achieve the "ability to learn" based on the development of self-awareness: based on having "Want to learn" based on intrinsic learning motivation; It is based on mastering certain learning strategies to "learn"; "Keep learning" on the basis of will effort. By this autonomous by studying, students become independent learners and thinkers. Teacher's "sage" horn color has retreated to the other side in students' independent learning.

#### 2.2.6 Synthesizing of independent variable innovation

Using mobile phone application in class has gradually become a new kind of study way. Using problem-based learning together with the mobile phone application is the new teaching method, broke the traditional teaching mode, to provide new forms for college classroom teaching, promote the innovation of classroom teaching in training students' interest in learning, training students' thinking ability, strengthen students' autonomous learning ability, and improve the learning efficiency of the role of to be reckoned with, and at the same time with the development of times, Promote the support of emerging technologies for learning.

Learning management using problem-based learning together with the mobile phone application refers to the researcher use problem-based learning to teach the students and students use the mobile phone application as the tools for learning about the principles of landscape design and able to design landscape.

Steps of teaching in accordance with lesson plans:

Step 1: Determine the knowledge and content of each course.

Step 2: Send the content of this class to the students for preview in advance by using the mobile phone.

Step 3: After the teacher has finished the basic knowledge, ask the students questions to understand the students' mastery.

Step 4: Through the project, students put forward the problems existing in the project and have a group discussion. After network search by using the mobile phone and discussion, they get the final solution.

Step 5: Students presentation their problems and solutions.

Step 6: Teacher evaluation.

## **2.3 Dependent variable**

2.3.1 Definition of the learning achievement of the students about landscape design

2.3.1.1 When designing a landscape type, students should understand the characteristics of growth, development, and extinction of the functional areas that make up the landscape group. Such as forest landscape design. To understand the types of elements that make up the forest landscape and their function in the forest. To combine the terrain, the common screen, the best, or skillfully borrowed and used.

2.3.1.2 Beautifying the environment, improving the quality of human living space and creating harmony between man and nature and between man and man are the ultimate goal and the most important role of landscape design. Another function of landscape design is to bring maximum enjoyment of beauty to mankind. Landscape design allows people living in noisy cities to get close to nature and enter nature. (Jiahe, 2016)

2.3.2 Definition of ability of landscape design

2.3.2.1 Hand-drawing ability and master a vector drawing software. The utility model relates to a graphics processing software and a 3d animation software; With the increase of design scale, future designers will need to master a kind of GIS software.

2.3.2.2 First of all, landscape designers should be thoughtful authors, have creativity and long-term vision, and avoid copying. Second, to be a competent designer, this ability is multifaceted. One is professional skills, the other is the ability of analysis and creation, as well as the ability of communication and integration. The designer does not need to study very deeply in every aspect, but he needs to know something. In addition, our designers should have a broad vision and keep learning. Third, we should be a cultured designer. Fourth, to be a designer with professional ethics, including how to face the competition in this industry and how to have a



responsible attitude towards some specific projects we do? Only in this way can we design a beautiful work. (Li Jianwei, 2016)

2.3.3 Definition of students' satisfaction on learning management using problem-based learning together with the mobile phone application

After the course, the satisfaction of the student samples is evaluated. The main evaluation content is to compare the expected learning effect of researchers' landscape design ability with the actual learning effect of problem-based learning with the mobile phone application in this course, and the students' satisfaction with using mobile phone application to search relevant knowledge in the classroom.

#### **2.4 Related research (about 5-10 reseaches, both in China and others) (should range from 2011-2021)**

Liu Yazhao (2020) 's research is Research on the Impact of Mobile App on College Students' Academic Engagement and Achievements--In the Course of Intercultural Communication. The purpose of this study is to explore the impact of the blended teaching model based on mobile app on academic engagement, including behavioral engagement cognitive engagement and emotional engagement Secondly analyze the effectiveness of the teaching model on learning achievements from the perspective of knowledge, ability and attitude; Finally, analyze the reasons, explain the results, and further explore the relationship between academic engagement and achievements.66 juniors in the intercultural Communication class of a university in northeast China were selected as the research samples. Combining with this teaching mode, the author conducts an empirical study of this teaching mode in the course of" Intercultural Communication" based on the characteristics of learners, teachers' need s and the content of the curriculum.

In the process of practice, questionnaire survey, interview and teaching observation are used to obtain data, and the online and offline data of daily teaching are counted. NVivo, SPSS, Excel and other software are used to analyze the experimental data. The results show that although there are some differences in the process of learners' behavioral engagement, cognitive engagement and emotional engagement, the final teaching mode based on mobile app can significantly improve learners academic engagement. The blended teaching based on mobile app extends the learning time and space to a certain extent. The results show that the model changes the students learning habits and can effectively improve the achievements in different levels of knowledge. Ability attitudes and so on. In addition, there is a distinct gap between the learners with low academic engagement and the learners with high academic engagement. Through the research of this topic, it is helpful to summarize the successful teaching mode, to have a more profound analysis and summary of the connotation and extension of blended teaching to have a further



exploration of blended teaching based on mobile app, which is also of great significance to the development and use of such mobile app.

Lee Conghao (2018)'s research is on application status and Countermeasures of Mobile phone APP in chemistry teaching. The study found that to explore the application value of chemistry APP in teaching and how to better serve the teaching of chemistry APP are the main problems that this study tries to solve. Firstly, this paper analyzes and evaluates the application value of various chemical APPS in teaching, which lays a solid foundation for the application of chemical apps in the teaching of chemistry. Then, through student questionnaire, teacher questionnaire and teacher interview, the status quo and attitude of teachers and students on using educational APP to support chemistry teaching in middle school were studied. Finally, a case study of application of chemical APP in teaching is carried out. The research samples are three grades of senior high school in a municipal key school in Binhai New Area of Tianjin. Ten classes are randomly selected, including four classes of senior one and four classes of senior two and two classes of senior three. Through the research, the following main problems are found: The content quality of chemical APP is uneven; Students use narrow scope, a single way; Chemistry APP is not closely combined with classroom, and is in the exploratory stage; Teachers lack of relevant equipment and technology; School and parent restrictions on equipment; When students use educational apps, there are many external disturbances. According to the problems reflected in the investigation and research, this study puts forward the following countermeasures: Government departments should strengthen hardware investment and supervision, and carry out popularization and publicity of educational apps; Schools should support the use of equipment and improve management; Developers, academics and basic educators need to step up research; Strengthen the construction of teachers and enhance their ability; Student reasonable use, self-monitoring, etc. With the advent of the age of ARTIFICIAL intelligence, the integration of technology and education will be further deepened. In the face of this irresistible trend, acceptance, adaptation and innovation are the attitudes that every educator should have.

Long Xiuyan, & Liu Zhiqiang (2020) investigated Construction and Practice of Mobile APP Quality Evaluation System for Classroom Teaching in Colleges and universities -- Taking China University of Mining and Technology as an example. The study found that college classroom teaching quality evaluation is an important link in college education and teaching quality work. Colleges and universities have always been committed to improving and improving the construction of teaching quality assurance system, and pay attention to the impact of big data mining era on classroom teaching quality evaluation work. At present, with the rapid development of network and information technology, mobile client has been widely popularized and applied, and information-based teaching means are gradually flooding into the evaluation of teaching quality in college classroom. As a modern teaching method, the

mobile APP quality evaluation system of classroom teaching in colleges and universities can be applied to teaching practice, which can timely improve and improve the quality of teaching, and help to improve and perfect the construction of the school teaching quality assurance system. Using the method of literature research, combined with the practice of classroom teaching quality evaluation of China university of mining work, from the system structure and composition, user role set and distribution, function and use, and so on to build the APP of classroom teaching quality evaluation system in colleges and universities, and briefly expounds the value of the construction, puts forward Revelations to the classroom.

Sattarova, Groot & Arsenijevic (2018) investigated Student and Tutor Satisfaction with problem-based learning in Azerbaijan. This article examines tutors' and students' satisfaction with the implementation of problembased learning (PBL) at the Azerbaijan University of Architecture and Construction. A total of 28 pilot academic staff members and their students participated in PBL during one semester and received a questionnaire about their experiences at the end of the semester. In total, 649 students were involved in the intervention. Descriptive statistics and factor analyses were used to analyze the data. In total, the response rate among students was 61.7%, and 82.1% among tutors. More than 83% of the students thought that the PBL should be kept as part of the module. A total of 91.3% of tutors agreed that PBL is a great tool for student learning. According to the factor analysis, tutors believed that PBL can develop students' ability for group/team work. Tutors also identified some barriers in applying PBL. For example, they mentioned a lack of relevant skills to apply PBL in higher education. Both students and tutors found the PBL to be a suitable learning tool for their curriculum.

Munawaroh (2020) investigated The Influence of Problem-Based Learning Model as Learning Method, and Learning Motivation on Entrepreneurial Attitude. Problem based learning model has been widely implemented in various fields and educational contexts since it challenges students to learn through engagement in a real problem. The purpose of this study was to investigate the influence of a Problem-Based Learning (PBL) model, learning method, and learning motivation on entrepreneurial attitudes. This was a quantitative study of a random sample of 250 students of class XI SMK PGRI 1 Jombang. The data were collected by observation and distribution of a questionnaire and were analyzed using multiple linear regression. The results of the multiple linear regression analysis gave a F value of 16,732 and significance 0.000. Therefore, it was concluded that the PBL model as learning method, and learning motivation had an influence on entrepreneurial attitudes.

Oderinu, Adegbulugbe, Orenuga & Butali (2020) investigated Comparison of students' perception of problem-based learning and traditional teaching method in a Nigerian dental school. To evaluate the perceptions of dental students on problem-based learning, PBL, in comparison with the traditional lecture (TL) method. The study found that the highest mean scores for all six perceived factors were observed in

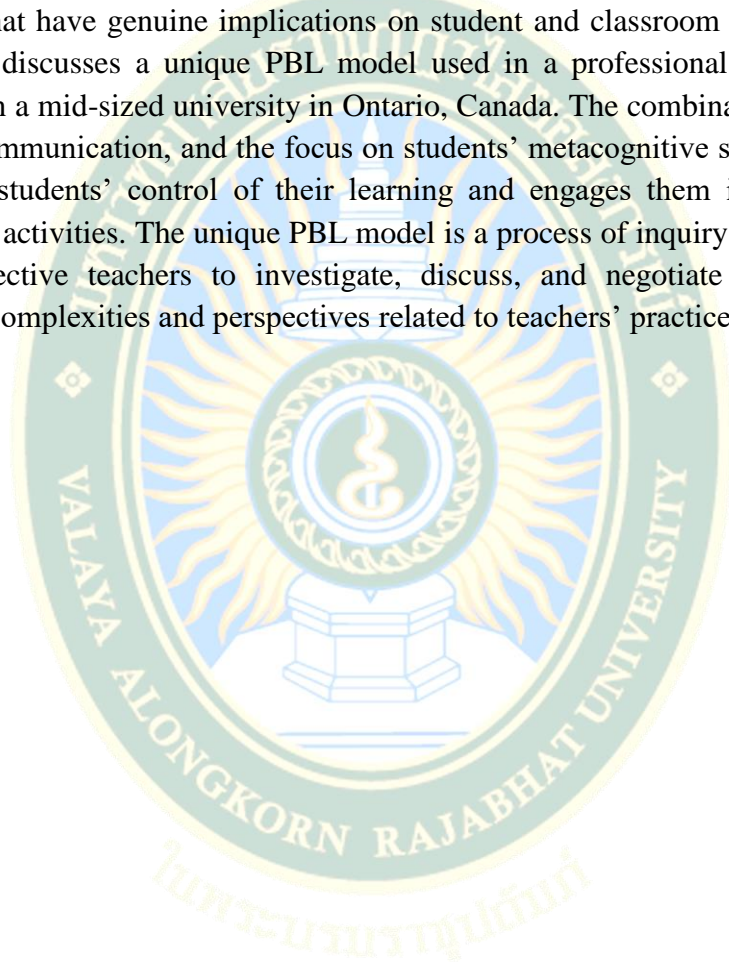
the PBL method. There were statistically significant differences ( $P < .05$ ) between PBL and TL teaching methods for all the perceived factors; ("Challenge critical thinking," "Communication with peers," "Usefulness as pedagogical method," "Organization" and "Interaction between students and tutors") except for the perceived factor "Adequacy of teaching." The mean for most of the perception items was highest in the PBL method compared to TL. The perception item "Able to provide intellectual stimulation" had the highest mean score ( $4.21 \pm 0.76$ ) for the PBL method, whilst it was "Laboratory exercise" ( $4.14 \pm 0.68$ ) for TL.

Jos Moust, Peter Bouhuijs & Hans Schmidt (2017) investigated Introduction to problem-based learning. The study found that Introduction to Problem-based Learning teaches students how to work with the problem-based learning method, which requires to learn mainly self-directed. Particular attention is given to the necessary skills to apply this method effectively. Why Introduction to Problem-based Learning? Comprehensible introduction in the problem-based learning method /enables students to experience the full potential of this concept/discusses the use of digital devices Introduction to Problem-based learning provides students with the necessary skills to operate within as well as outside problem-based groups. It discusses issues like: How do you take on a problem? How do you collaborate with others? How do you deal with cultural diversity? How do you lead a tutorial group? How can you organize your studies best? Special attention is given to the use of computers, tablets and internet in a problem-based environment.

Munawaroh (2020) investigated The Effect of problem-based learning Method on Students Critical Thinking Skills on Entrepreneurship Practice Course (A Study on Economics Education Department in the College of Education and Teachers Training Pgri Jombang East Java Indonesia). The study found that problem-based learning method is designed to provide knowledge and skills demanded for a job requirement. The ability to continuously learn is needed in solving new problems and challenges, and thus an ever-evolving ability is absolutely needed. This study aims to reveal the effect of the problem-based learning on students' critical thinking ability in entrepreneurship practice course at Economics Education Department of the College of Education and Teachers' Training PGRI Jombang East Java Indonesia. It employed quantitative research. The data was collected by observation and questionair. The sample in this research was 32 college students majoring in Economics Education Department of 2015 batch at the College of Education and Teachers' Training PGRI Jombang. It applied simple linear regression test for data analysis. The finding showed that the significance of ttest and Ftest is less than Alpha coefficient,  $0.000 < 0.05$ . It implied that there is significant effect of problem-based learning method on students' critical thinking ability on entrepreneurship practice course of Economics Education Department of the College of Education and Teachers' Training PGRI Jombang East Java Indonesia.



Lorenzo Cherubini (2020) investigated A Unique Hybrid Problem-Based Learning Model: Prospective Teacher Education and Development. The literature points to the fact that PBL, as a case-based platform, is highly applicable to teacher education and professional development. Social-constructivist learning invites prospective teachers to participate thoughtfully in inquiry-based problems and analysis that have genuine implications on student and classroom issues. This paper, therefore, discusses a unique PBL model used in a professional teacher education program in a mid-sized university in Ontario, Canada. The combination of case-study, on-line communication, and the focus on students' metacognitive skills and processes increases students' control of their learning and engages them in meaningful and functional activities. The unique PBL model is a process of inquiry that creates spaces for prospective teachers to investigate, discuss, and negotiate the multiple and pertinent complexities and perspectives related to teachers' practice.



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## CHAPTER 3

### RESEARCH METHODOLOGY

This chapter describes the research design and methodology which are used in the conduction of the study. Since this study aims to study the influence of college students' use problem-based learning together with the mobile phone application on landscape design teaching class. The description of population and samples, experimental design, research instruments, data collection, and data analysis are brought to be presented.

#### 3.1 Population and samples.

3.1.1 The population of this study was 100 sophomore students (3 classes) from Zhoukou Normal University majoring in Environmental Design in the academic year 2021.

3.1.2 The samples were 30 sophomore students (1 class) from Zhoukou Normal University majoring in Environmental Design which were cluster sampling.

#### 3.2 Quasi-Experimental design.

This study used one group pretest-posttest design shown in the below figure

O1	X	O2
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O1 was measurement of the learning achievement before an experiment.

X was problem-based learning activities in combination with the mobile phone application instruction.

O2 was measurement of the learning achievement and the ability of landscape design after an experiment.

#### 3.3 Research instruments

3.3.1 Construction and examining the quality of lesson plan

3.3.1.1 Lesson plan of Principles of Landscape Design Principles of Landscape Design

### Curriculum Objectives

(1) Through the study of this course, students can understand the meaning of landscape design and master the principles and skills of landscape design.

(2) Let students can find excellent design documents skillfully through the mobile phone application, and learn the latest design concepts from the documents.

(3) Let students to skillfully use the methods and skills of landscape design in actual projects.

(4) Like environmental design and landscape design.

Step of teaching :

Step 1: Determine the knowledge and content of each course.

Step 2: Send the content of this class to the students for preview in advance.

Step 3: After the teacher has finished the basic knowledge, ask the students questions to understand the students' mastery.

Step 4: Through the project, students put forward the problems existing in the project and have a group discussion. After network search and discussion, they get the final solution.

Step 5: Students presentation their problems and solutions.

Step 6: Teacher evaluation.

In the class, students carry out the theoretical knowledge of the course of landscape design principles, and raise their own problems through the analysis of excellent landscape design projects, and communicate with the students and teachers in the group to find out the solutions to the problems. Teachers assign homework, and students find the answers to the questions after class by searching the Internet and using mobile phone application to find relevant materials. During the search for relevant materials, the students consulted a large number of excellent landscape design works. In this process, they improved their design ideas, enriched their horizons, and mastered some methods of landscape design. After communicating with teachers, the students can gain systematic theoretical knowledge and practical experience.

#### 3.3.1.2 Construction and examining the quality of lesson plan

Step 1: Studying the construction of the lesson plan and the relevant documents. Consideration was focus on objectives, contents, instructional strategies, media and learning resources measurement and evaluation of the lesson plan. The construction of the lesson plan involving item analysis in order to clarify the item validity of the lesson plan.

Step 2: Constructing 4 lesson plans.16 hours in total.

Step 3: The draft lesson plans were presented to thesis advisors for their advice on the appropriateness, precision, accuracy, ambiguity and wording of the lesson plans. After that the draft lesson plans were revised according to the thesis

advisors' suggestions. The lesson plans and the evaluation form of researcher's lesson plans were offered to the three experts for the content validity check and suggestions. The quality of the lesson plans were considered from Index of Item Objective Congruence (IOC) obtained from the evaluation form of researcher's lesson plans.

Step 4: Revising the lesson plans according to the experts' comments and suggestions.

Step 5: Analyzing the IOC index of the lesson plans. The formula used to calculate the IOC index is:

$$IOC = (\sum R)/N$$

Where

IOC means Index of Item Objective Consistency

$\sum R$  means Summation of experts' opinion marks

N means A number of experts

If the Index of Item Objective Congruence (IOC) of each item of the lesson plans is higher than 0.8 that means it can be used in the lesson plans. The result of analyzing the IOC index showed that all lesson plans were appropriate and could be used in the lesson plans.

It was found that the lesson plan index of Item Objective Congruence (IOC) of each item is by three experts with an IOC of 1.00, it's higher than 0.8, the result of analyzing the IOC index showed that all the items were appropriate and could be used in the lesson plan.

### 3.3.2 Learning achievement test

The steps of constructing the instruments for collecting data and measuring of learning achievement test

3.3.2.1 Instruments for collecting data of the learning achievement of the students about landscape design.

There are 30 multiple-choice questions in total, for a total of 30 points. One point for each correct question, no points for incorrect. The total score will be used as the student's learning achievement score.

#### 3.3.2.2 Instrument for measuring of learning achievement test

Step 1: Studying the construction of the achievement test and related documents, focus on the purposes, types, and contents of the test. The construction of the test involving the validity and reliability of the test as well as to clarify the difficulty (p) and the discriminability (r) of the items.

Step 2: Through the construction of the course analysis table, the course objectives and the coverage of the course content are analyzed, and the course contents and learning objectives are analyzed. Then, the researcher constructed the test



include four types of cognitive domains: 1) knowledge, 2) understanding, 3) application, and 4) analysis.

Step 3: The draft of achievement test was presented to thesis advisors for their advice on the appropriateness, precision, accuracy, ambiguity and wording of the test. After that the draft of achievement test was revised according to the thesis advisors suggestion. The test document and the test evaluation form were sent to the three experts for checking content validity and gave recommendations on question types, test accuracy, wording, etc. The content validity of the test was considered through Index of Item Objective Consistency (IOC)

Step 4: Analyzing the IOC index of the test items. The formula used to calculate the IOC index is:

$$IOC = (\sum R)/N$$

Where

IOC means Index of Item Objective Consistency

$\sum R$  means Summation of experts' opinion marks

N means A number of experts

If the Index of Item Objective Congruence (IOC) of each item of the test is higher than 0.8 that means it can be used in the test. The result of analyzing the IOC index showed that all test items were appropriate and could be used in the test.

It was found that the learning achievement test had 30 items, and the Index of Item Objective Congruence (IOC) of each item of the learning achievement test was higher than 0.8, so the result of analyzing the IOC index showed that all the items were appropriate and could be used in the learning achievement test evaluation form.

Step 5: Revising the test according to the experts' comments and suggestions.

Step 6: Measuring the item difficulty (p) and item discriminability (r) including reliability by trying out the draft test to 30 students who had learned these content previous semester.

Step 7: Analyzing each item of the test to find out the item difficulty (p) and item discriminability (r) including reliability. The reliability of the test was calculated by using the Cronbach's Alpha Coefficient and the value should be more than 0.8. Item difficulty (p) should range from 0.20-0.80 and item discriminability (r) should be more than 0.20.

It was found that according to the analysis of each item tested, the difficulty of the items (p) were all range from 0.2-0.8, and the discriminability of the items (r) were all more than 0.2, which met the requirements. The reliability of the test was also calculated by using the Cronbach's Alpha Coefficient is 0.963, and the



obtained value was greater than 0.8, which met the requirements and could be used for testing students.

### 3.3.3 Ability of landscape design evaluation form

The steps of construct the instruments for collecting data and measuring of ability of landscape design evaluation form



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3.3.3.1 Instruments for collecting data of ability of landscape design evaluation form.

**Table 1** Criterion of the evaluation form about the ability of landscape design

Evaluation items	Percentage score	100points	80-89 points	70-79 points	60-69 points	Below 60 points
Basic knowledge and skills	14% (10 scores)	Proficiency in the basic knowledge and skills of the course	More comprehensive mastery of the basic knowledge and skills of the course	Basically understand the basic knowledge and skills of this course	Insufficient mastery of the basic knowledge and skills of the course	Failure to understand the basic knowledge and skills of the course
Comprehensive application capability	29% (20 scores)	Proficiency in applying course knowledge and strong design application skills.	More comprehensive application of course knowledge, with good design application skills.	Apply course knowledge with average design skills.	Initial application of course knowledge for design.	Cannot apply course knowledge to design.
Creativity (innovation) ability	43% (30 scores)	Active design thinking, strong creativity and outstanding innovation ability.	Good design thinking, with good design ability and innovation sense.	General design thinking, with some design ability and sense of innovation.	Poor design thinking, but with some design ability and creative sense.	Poor design thinking, poor design skills and innovation.

Table 1 (Cont.)

Evaluation items	Percentage score	100points	80-89 points	70-79 points	60-69 points	Below 60 points
Picture completion	14% (10 scores)	Very good compliance with the requirements of the subject, good visual effect of the picture, complete work, and serious learning attitude.	Meet the requirements of the subject, the visual effect of the picture is good, the work is complete, and the learning attitude is serious.	Basically meets the requirements of the subject, the visual effect of the picture is average, but the learning attitude is serious.	Basically meets the requirements of the subject, the visual effect of the picture is poor, but the learning attitude is serious.	Does not meet the requirements of the subject, poor visual effect of the picture and poor learning attitude.

explain:

"Evaluation items" shall be formulated according to the requirements of the curriculum syllabus and curriculum assessment scheme "Score" refers to the proportion of each assessment item. In the table, the standards that each assessment item should meet shall be clearly listed below the five grades below 90-100, 80-89, 70-79, 60-69 and 60, which is an important basis for the evaluation of professional examination papers "Assessment method "closed book, open book, homework, thesis or report.

### 3.3.3.2 Instrument for measuring of ability of landscape design evaluation form

Step 1: Studying the construction of the evaluation form and related documents, focus on the purposes, types, and contents of the evaluation form. The construction of the evaluation involving the validity.

Step 2: To construct an evaluation form about the ability of landscape design, using Rubric Score Criterion through four aspects: Basic knowledge and skills/Comprehensive application capability/Creativity (Innovation) ability/Picture completion learning attitude.

Step 3: The draft of evaluation form was presented to thesis advisors for their advice on the appropriates, precision, accuracy, ambiguity and wording of the test. After that the draft of evaluation form was revised according to the thesis advisors suggestion. The evaluation form document were sent to the three experts for checking content validity and gave recommendations. The content validity of the evaluation form was considered through Index of Item Objective Consistency (IOC).

Step 4: Analyzing the IOC index of the evaluation forms. The formula used to calculate the IOC index is:

$$IOC = (\sum R)/N$$

Where

IOC means Index of Item Objective Consistency

$\sum R$  means Summation of experts' opinion marks

N means A number of experts

If the Index of Item Objective Congruence (IOC) of each item of the evaluation is higher than 0.8 that means it can be used in the If the Index of Item Objective Congruence (IOC) of each item of the evaluation. The result of analyzing the IOC index showed that all test items were appropriate and could be used in the If the Index of Item Objective Congruence (IOC) of each item of the evaluation.

It was found that the evaluation form about the abilities of landscape design had 4 items each, and the Index of Item Objective Congruence (IOC) of each item was higher than 0.8, the result of analyzing the IOC index showed that all the items were appropriate and could be used in the evaluation form about the abilities of landscape design.

Step 5: Revising the evaluation forms according to the experts' comments and suggestions.

### 3.3.4 Students' satisfaction on learning management using problem-based learning together with the mobile phone application

The steps of constructing the instruments for collecting data and measuring of questionnaire for students' satisfaction on learning activities questionnaire



The purpose of using a questionnaire was to collect data regarding the students' opinion toward the instruction such as the content of curriculum, learning activities, and the instruction materials.

The steps of constructing the questionnaires:

Step 1: Studying documents related to constructing questionnaires.

Step 2: Constructing a questionnaire. The questionnaire consisted of three sections: Section 1 recorded the students' personal information. Section 2 was the five-point scale Likert questionnaire ranging from very high, high, moderate, low, and very low. This section of the questionnaire consisted of 14 questions or statements asking about students' opinions toward the instruction. The statements of the questionnaire in this section were adapted from the student opinion questionnaire developed by the Department of General Education, the Ministry of Education (1999). Section 3 was open-ended questions, also provide space was provided for additional opinions or other suggestions.

Step 3: The draft questionnaire was presented to thesis advisors for their advice on the appropriateness, precision, accuracy, ambiguity and wording of the questionnaire. After that the draft questionnaire was revised according to the thesis advisors' suggestions. The evaluation form were offered to the three experts for the content validity check and suggestions. The quality of the questionnaire was considered from Index of item objective congruence (IOC) obtained from the achievement test evaluation form.

Step 4: Analyzing the IOC index of the questionnaire items. The formula used to calculate the IOC index is:

$$IOC = (\sum R)/N$$

Where

IOC means Index of Item Objective Consistency

$\sum R$  means Summation of experts' opinion marks

N means A number of experts

If the Index of Item Objective Congruence (IOC) of each item of the questionnaire is higher than 0.8 that means it can be used in the questionnaire. The result of analyzing the IOC index showed that all questionnaire items were appropriate and could be used in the test.

It was found that the questionnaire for students' satisfaction had 14 items each, and the Index of Item Objective Congruence (IOC) of each item was higher than 0.8, the result of analyzing the IOC index showed that all the items were appropriate and could be used in the questionnaire.

Step 5: Revising the questionnaire according to the experts' comments and suggestions.

Step 6: Measuring the item reliability by trying out the questionnaire to 30 students who had learning management using problem-based learning together with the mobile phone application to enhance their landscape design skills.

Step 7: The reliability of the questionnaire was also calculated by using the Cronbach's Alpha Coefficient should be more than 0.8.

It was found that the reliability of the questionnaire was calculated by the Cronbach's Alpha Coefficient is 0.864, and the value obtained was greater than 0.8, which met the requirements and could be used to the questionnaire.

### **3.4 Data collection**

1. The samples were pretested for learning achievement before teaching according to the lesson plans.
2. The samples were taught according to the lesson plans using Problem-Based Learning activities in combination with the mobile phone application in classroom.
3. After teaching according to the lesson plans, the samples were post-tested for learning achievement.
4. Measure the ability of landscape design by using the evaluation form evaluate the students' project.
5. Measure the student's satisfaction of questionnaire on the learning activity.

### **3.5 Data analysis**

In this study, data were analyzed by using the statistical package program according to the research objectives.

1. To compare the learning achievement of landscape design before and after receiving using problem-based learning with the mobile phone application in classroom for the dependent samples.
2. To compare ability of landscape design with the determined criteria set at 70 % by using evaluation form for one sample.
3. To compare mean of the satisfaction of the students after receiving learning management using problem-based learning together with the mobile phone application.

## CHAPTER 4

### RESULTS

This chapter presents the findings related to the objectives of the research. The objectives of this research were as follows:

1. To compare the learning achievement of landscape design before and after receiving problem-based learning with the mobile phone application in classroom for the dependent samples.

2. To compare ability of landscape design with the determined criteria set at 70% by using evaluation form for one sample.

3. To compare mean of the satisfaction of the students after receiving learning management using problem-based learning together with the mobile phone application.

The findings of this research were analyzed through descriptive statistics and t-test by using statistical package program to answer the progress of participants after its implementation. The findings were described as follows.

**Table 2** Statistical symbols

Statistical symbols	Description
$\bar{X}$	Mean scores
S.D.	Standard deviation
t	T statistics
p	Significance level

#### 4.1 The results of research objective 1

The result of comparing the different scores of the learning achievement of the students about landscape design before and after learning through the learning management using problem-based learning together with the mobile phone application. The below table showed descriptive statistics and t-test dependent as analyzed by statistical package program. This table aimed to answer the research objective about whether the learning management using problem-based learning together with the mobile phone application was able to enhance the learning achievement of the students about landscape design.



**Table 3** The result of comparing the different scores of the learning achievement of the students about landscape design before and after learning through the learning management using problem-based learning together with the mobile phone application.

Group	N	Pretest		Posttest		t	p
		$\bar{X}$	S.D.	$\bar{X}$	S.D.		
Experimental group	30	13.13	1.25	29.06	0.98	-55.437*	0.000

\*  $p < .05$

As presented in Table 1, the mean scores of pretests of students' learning achievement of the students about landscape design was  $\bar{x}=13.13$  (S.D.=1.25) and posttest of students' learning achievement of the students about landscape design was  $x=29.06$  (S.D.=0.98).

Moreover, it aimed to examine the different scores of before and after using the learning management using problem-based learning together with the mobile phone application to enhance the learning achievement of the students about landscape design. The result of this table showed that after learning through the learning management using problem-based learning together with the mobile phone application in the classroom, posttest scores of students' learning achievement of the students about landscape design was greater than pretest scores at .05 level of statistical significance ( $t_{29} = -55.437, p < .05$ ). The average scores of the study developed increasingly higher than pretest.

#### 4.2 The results of research objective 2

The result of comparing the different scores of the ability of landscape design of students after learning through the learning management using problem-based learning together with the mobile phone application with the criteria set at 70 percent. The below table showed descriptive statistics and t-test as analyzed by statistical package program. This table aimed to answer the research objective about whether the learning management using problem-based learning together with the mobile phone application was able to enhance the ability of landscape design of students.

**Table 4** The result of comparing the different scores of the ability of landscape design of students after learning through the learning management using problem-based learning together with the mobile phone application with the criteria set at 70 percent.

Group	N	Full score	Criteria score	$\bar{X}$	S.D.	t	p
Experimental group	30	100	70	92.03	10.00	12.062*	0.000

\*  $p < .05$

As presented in Table 2, the mean scores of the students' the ability of landscape design of students after learning through the learning management using problem-based learning together with the mobile phone application was  $\bar{x}=92.03$  from a possible full marks of 100 and the S.D. was 10.00 which was statistically higher than the criterion of 70% at .05 level of statistical significance ( $t_{29} = 12.062, p < .05$ ).

#### 4.3 The results of research objective 3

The result of comparing the different scores of the student's satisfaction on using problem-based learning with the mobile phone application in classroom by using arithmetic mean and standard deviation. The below table showed descriptive statistics. This table aimed to answer the research objective about whether the learning management using problem-based learning together with the mobile phone application was able to enhance student's satisfaction on using problem-based learning with the mobile phone application in classroom.

**Table 5** The result of comparing the different scores of the student's satisfaction on using problem-based learning with the mobile phone application

Group	N	Full score	$\bar{X}$	S.D.	Level of satisfaction
Experimental group	30	5.00	4.98	0.46	highest

As presented in Table 3, the mean scores of the students' satisfaction of landscape design of students after learning through the learning management using problem-based learning together with the mobile phone application was  $x=4.98$  from a possible full marks of 5.00 and the S.D. was 0.46 which was a high standard. So we can concluded that the student's satisfaction after the students use the learning management using problem-based learning together with the Mobile phone application was the highest level.



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## **CHAPTER 5**

### **DISCUSSION**

This research aimed to research 1) To compare the learning achievement of landscape design before and after receiving using problem-based learning with the mobile phone application in classroom for the dependent samples. 2) To compare ability of landscape design with the determined criteria set at 70 % by using evaluation form for one sample. 3) To compare mean of the satisfaction of the students after receiving learning management using problem-based learning together with the mobile phone application. The samples was 30 students (1 class) from Zhoukou Normal University majoring in Environmental Design which were selected by using cluster random sampling. The experimental design was one group pretest-posttest design. The research instruments were test, evaluation form and questionnaires. Data collection were 1) The samples were pretested for learning achievement of landscape design before teaching according to the lesson plans. 2) The samples were taught according to the lesson plans using problem-based learning activities in combination with the mobile phone application in classroom. 3) After teaching according to the lesson plans, the samples were post-tested for learning achievement, ability of landscape design and answer students' satisfaction on the learning activity questionnaire. Data analysis were using the statistical package program according to the research objectives.

#### **5.1 Research conclusion**

5.1.1 The result showed that the mean scores of posttest of students' learning achievement about landscape design was higher than pretest scores at .05 level of statistical significance. The average scores of the study developed increasingly higher than pretest.

5.1.2 The result showed that the mean scores of the students' the ability of landscape design of students after learning through the learning management using problem-based learning together with the mobile phone application was higher than the criterion of 70% at .05 level of statistical significance.

5.1.3 The result showed that the mean scores of the students' satisfaction of landscape design of students after learning through the learning management using problem-based learning together with the mobile phone application was the highest level at .05 level of statistical significance.

## 5.2 Research discussion

A study is carried out in this paper. Using problem-based learning to assist classroom teaching through mobile phone application to improve students' landscape design ability. In class, the teacher explained the questions, and the students searched the relevant contents through mobile phone applications according to the questions, and got the answers through group discussion. In class and after class, students could get in touch with many of the world's latest design concepts and methods at anytime and anywhere through the function of mobile phone applications. Students could improve their learning achievement and design ability by learning these excellent design projects.

The following points based on the research results were discussed:

5.2.1 This study is based on a random sample of tests. By organizing t-tests and questionnaires on the sample, it provides reliable data for developing methods suitable for them to improved their landscape design ability.

5.2.2 Through the t-test, students' score of the students' learning achievement of landscape design was relatively low before the students learning through the learning management using problem-based learning together with the mobile phone application in the classroom was adopted, but after the students learning through the learning management using problem-based learning together with the mobile phone application in the classroom, students' score of the students' learning achievement of landscape design was improved.

5.2.3 The students' ability of landscape design after using the pedagogy was significantly higher than the previous landscape design competencies. Test findings indicate that more than 70% of students have improved their ability of landscape design.

5.2.4 The lesson plans, the test of the students' learning achievement of landscape design, the students' ability of landscape design and questionnaire of the course were highly evaluated by the three experts, and the students' satisfaction with learning management using problem-based learning together with the mobile phone application in the classroom method was very high, so it can be concluded that the learning management using problem-based learning together with the mobile phone application in the classroom can meet the students' learning for the landscape design courses.

5.2.5 Which was congruent with Nilson (2010) that problem-based learning teaching method can improve students' autonomous learning ability in class, and which was congruent with (Duch et al, 2001) that problem-based learning can promote the development of critical thinking skills, problem-solving abilities, and communication skills. It can also provide opportunities for working in groups, finding and evaluating research materials, and life-long learning.

Which was congruent with XIN Lin (2019) that the application of "mobile phone App+ multimedia" mode not only provides convenience for classroom teaching

and speeds up the process of classroom reform, but also fully mobilizes the subjective initiative of students' learning, so that students can get rid of the shackles of time and space and study anytime and anywhere. Finally, a student-centered and teacher-led mobile teaching space is formed. In this mode, teachers can have more time to lead students to carry out scientific research, and cultivate more high-level undergraduates who love scientific research, are diligent in research, have active thinking and have solid foundation.

### **5.3 Recommendation**

#### **5.3.1 Recommendation for implication**

1) Before teaching with the problem-based Learning method, students are taught to acquire knowledge using online learning platforms, various databases and libraries, and are trained to master the problem-based learning method in terms of assessment of learning styles, learning requirements, the role of the teacher, the role of the students, organization and introduction.

2) Teachers should have a deep understanding of problem-based learning, understand its essence and adapt to the change of teachers' role under problem-based learning teaching method, so as to reflect the characteristics of this teaching mode. Teachers should take the initiative to participate in seminars and training courses on problem-based learning teaching, and take the initiative to communicate with other teachers to learn from each other's advanced experiences, so as to improve the level of problem-based learning teaching.

3) Establish a reliable, consistent, objective and comprehensive evaluation system that is compatible with the problem-based learning teaching method, so as to ensure the diversity of evaluation contents, evaluation methods and evaluation subjects. Strengthen collaboration, organize experienced teachers, combine with students' characteristics, and develop syllabus and teaching materials of problem-based learning teaching method based on the framework of competencies that students should master, so as to ensure the standardization and clarity of teaching ideas.

#### **5.3.2 Recommendation for further research**

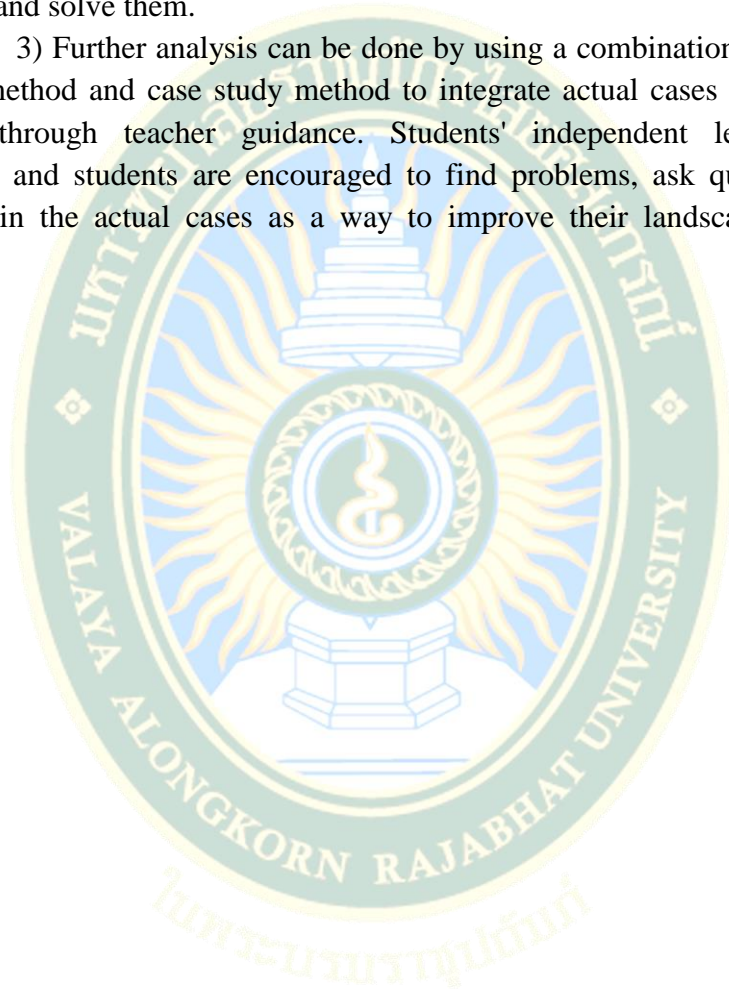
1) Further analysis can be done by using a combination of problem-based learning teaching method with project-based learning teaching method. Project-based learning teaching method in the landscape design classroom can increase the opportunities for students to learn practical projects. Combined with the problem-based learning teaching method, it cultivates students' awareness of problems in practical projects and their ability to discover, propose, solve problems and apply them to practical projects.

2) Further analysis can be done by using a combination of problem-based learning teaching method and flipped classroom teaching method. The flipped



classroom teaching model focuses on flipping the teaching process and expanding the learning space for students. Combined with the problem-based learning teaching method, the classroom is given to students to be the master of the classroom and to develop students' problem awareness and the ability to identify problems, ask questions and solve them.

3) Further analysis can be done by using a combination of problem-based learning method and case study method to integrate actual cases into the classroom teaching through teacher guidance. Students' independent learning ability is cultivated, and students are encouraged to find problems, ask questions and solve problems in the actual cases as a way to improve their landscape design ability.

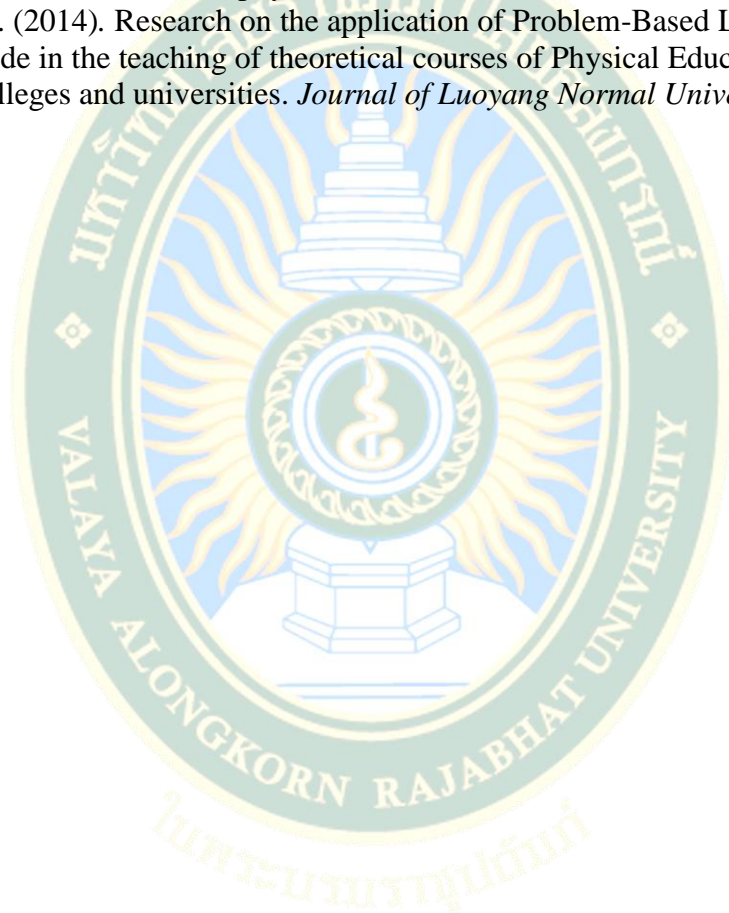


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**APPENDIX**

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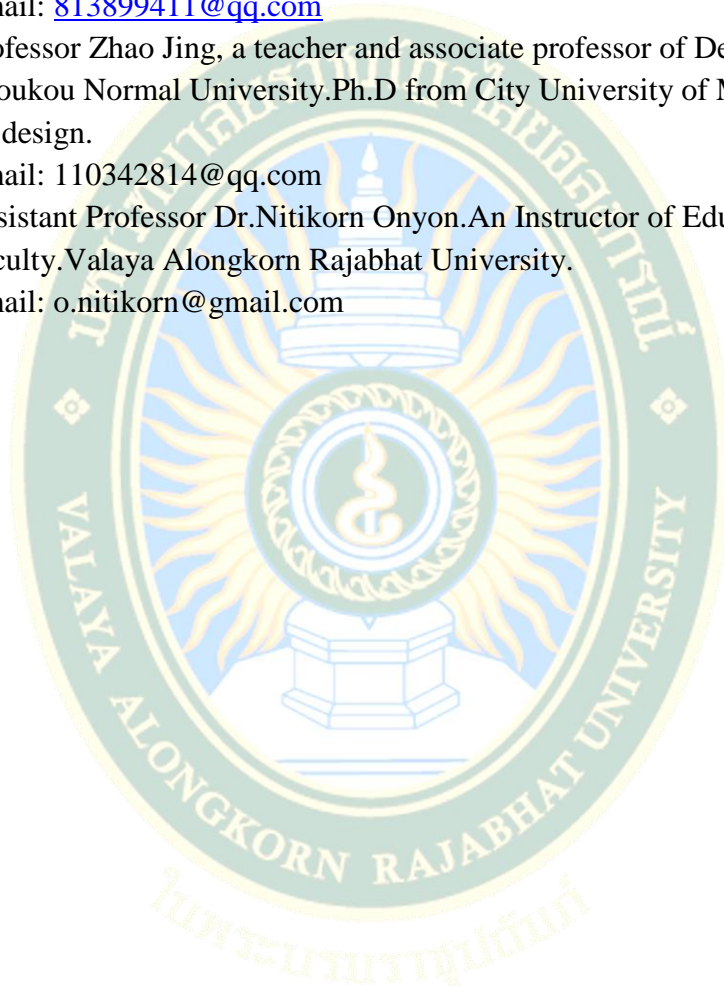


**APPENDIX A**  
**EXPERT WHO EXAMINED THE RESEARCH INSTRUMENTS**

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**Expert who examined the research instruments**

1. Professor Zhou Lei, the vice president and associate professor of the school of Art Design college, Henan University of Engineering.Ph.D from City University of Macau, majoring in urban planning.  
Email: [813899411@qq.com](mailto:813899411@qq.com)
2. Professor Zhao Jing, a teacher and associate professor of Design School of Zhoukou Normal University.Ph.D from City University of Macau, majoring in art design.  
Email: 110342814@qq.com
3. Assistant Professor Dr.Nitikorn Onyon.An Instructor of Education Faculty.Valaya Alongkorn Rajabhat University.
4. Email: o.nitikorn@gmail.com



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**APPENDIX B**  
**THE INSTRUMENTS OF RESEARCH**

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## 1. Lesson plan

### LESSON PLAN 1 (3.5 hours)

Course / Subject: Principles of Landscape Design

Instructional Topic: Definition of landscape design

Class Level: Sophomore

Time for Instructional Thursday morning of the first week

Instructor's name: Huangfu Zhounan

### 1. Objectives

- 1.1 Students can explain the definition of landscape design.
- 1.2 Students can report the definition of landscape design by themselves.
- 1.3 Students can analyze the definition of landscape design of landscape design projects.
- 1.4 Students can present the latest design concepts by search excellent design documents skillfully through the mobile phone application.

### 2. Content

Definition of landscape design:

Landscape design refers to the planning and design of landscape and gardens. Its elements include natural landscape elements and artificial landscape elements. It is integrated with planning, ecology, geography and other disciplines, and has different significance in different disciplines.

Landscape design mainly serves: urban landscape design (urban square, commercial street, office environment, etc.), residential landscape design, urban park planning and design, waterfront green space planning and design, tourism resort and scenic spot planning and design, etc.

### 3. Instructional Strategies (Problem-Based Learning together with the mobile phone application methods)

- 3.1 Clarification of terms and concepts (20 minutes)
  - 3.1.1 Assume prior knowledge
    - 3.1.1.1 Before class, students will study the projects that the teacher will talk about.
    - 3.1.1.2 Students have learned about the history of landscape development.
  - 3.1.2 Students ask for explanation of words or concepts that are not understood.
  - 3.1.3 The teacher answers the students' questions about the words they don't understand and guides the students into the class of this course.
- 3.2 Problem statement (10 minutes)
 

Teacher asked the questions about definition of landscape design.

What is landscape?

What is the most important thing in landscape design and why?

3. Where does landscape design mainly appear in life?

3.3 Brainstorming for analyzing the problem (10 minutes)

3.3.1 Students are divided into groups of five. Each student finds out the key words he is interested in from the questions.

3.3.2 Students make questions according to their own keywords.

3.4 Formulation of learning issue (20 minutes)

Students make their own learning plans according to the questions raised by the teacher and the questions set by themselves:

1. Which app to use to search the answers of relevant contents?

2. How long to use to search the answers?

3. Discuss with the students in the same group after the search is completed.

4. Summarize the answers.

3.5 Self-study by mobile phone application and discussion in group (70 minutes)

Students use their mobile phone application to search for relevant content on the Internet according to the questions, discuss and think about it.

3.6 Reporting (1 hour)

Students answer questions and presentation their viewpoint about the examples of landscape design mainly appearing in life.

3.7 Teacher summarize and reflection on learning Process(20 minutes)

Landscape design is to solve all the problems related to outdoor space design, such as the relationship between architecture and architecture, architecture and plants, architecture and people, people and plants in outdoor space. The ultimate mission of landscape design is to integrate modern people's life with nature, history and culture. Therefore, the highest level of landscape design is to help human beings coexist harmoniously with the surrounding buildings, communities, cities and all life bodies on the earth where they live.

Landscape design involves a wide range of knowledge, including literature, art, biology, ecology, engineering, architecture and many other fields. At the same time, it requires the integration of the knowledge of various disciplines into the garden art. Therefore, landscape design is a subject that studies how to apply artistic and technical means to deal with the complex relationship between nature, architecture and human activities, so as to achieve the realm of harmony and perfection, good ecology and picturesque scenery.

#### 4. Media and Learning Resources

Media: The PowerPoint of 《landscape design》 by the teacher.

Learning Resources:

(1) 《Principles of landscape architecture design》

<https://www.icourse163.org/course/SEU-1449641166?from=searchPage>



(2) 《Landscape design preliminary》

<https://www.icourse163.org/course/NJAU-1206900802?from=searchPage>

(3) 《Landscape Design - Urban park design》

<https://www.icourse163.org/course/BFU-1206303812?from=searchPage>

### 5. Measurement and Evaluation

The teacher determine whether the students have learned the definition of landscape design by the students answering the questions raised by the teacher.

Question:

- ① What are the basic theories of landscape design?
- ② In landscape design, the best way to understand the proportions and effects of landscape is?
- ③ Known as the "kidney of nature" is?
- ④ What is the purpose of landscape design?
- ⑤ Landscape architecture has two major orientations. What are they?

2. According to the students' presentation, the teacher evaluates whether the students understand the content learned today from three aspects: power point design, explanation of theoretical knowledge and depth of design project analysis.

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**LESSON PLAN 2 (3.5 hours)**

Course / Subject : Principles of Landscape Design

Instructional Topic : Definition of landscape design skills

Class Level : Sophomore

Time for Instructional : Thursday afternoon of the first week

Instructor's name : Huangfu Zhounan

**1. Objectives**

- 1.1 Students can report the skills of landscape design by themselves.
- 1.2 Students can analyzes the design process of landscape design.
- 1.3 Students can have the landscape design skills to design a small landscape.

**2. Content**

Definition of Landscape Design skills:

When we design a type of landscape, we should understand the growth, development and extinction characteristics of each functional area of the landscape group. Such as forest landscape design. Understand the types of elements that make up the forest landscape and their functions in the forest. It can be combined with the terrain. If it is popular, it can be displayed, if it is good, it can be collected, or it can be used by skillful borrowing.

Mastering a landscape spatial analysis language not only analyzes and evaluates the landscape, but also when different landscape designers master the similar analysis and evaluation language, they can communicate with the public, and it is also easy to build a bridge for communication with the public.

**3. Instructional Strategies (Problem-Based Learning together with the mobile phone application methods)****3.1 Clarification** of terms and concepts(10 minutes)

3.1.1 The teacher tells the students the main relationship between landscape design skills and landscape design, and guides the students to understand it by themselves.

3.1.2 Students ask for explanation of words or concepts that are not understood.

3.1.3 The teacher answers the students' questions about the words they don't understand and guides the students into the class of this course.

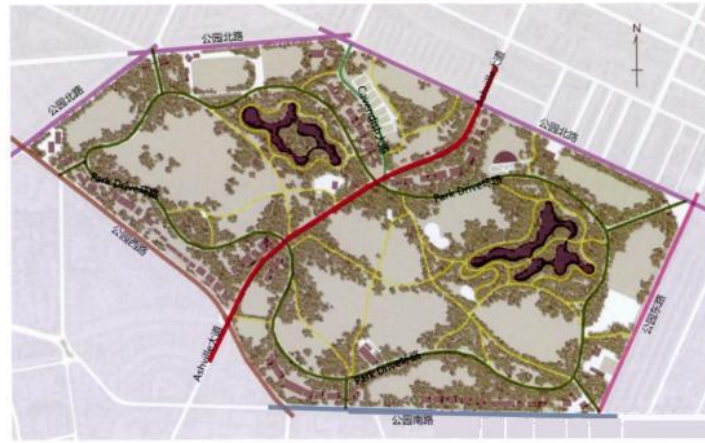
**3.2 Problem statement**(10 minutes)

3.2.1The teacher asked the question about definition of landscape design skills.

3.2.2 The teacher proposed Hyde Park and told the students that it was the first real urban park in the world.The teacher asked the questions about Hyde Park.

Question:1.When,where and why Hyde Park was built?

2. Who is the designer of Hyde Park and what works have been designed?
3. What design method does Hyde Park use?



## Hyde Park

### 3.3 Brainstorming for analyzing the problem(10 minutes)

3.3.1 Students are divided into groups of five. Each student finds out the key words he is interested in from the questions.

3.3.2 Students make questions according to their own keywords.

### 3.4 Formulation of learning issue (10 minutes)

Students make their own learning plans according to the questions raised by the teacher and the questions set by themselves:

1. Which app to use to search the answers of relevant contents?
2. How long to use to search the answers?
3. Discuss with the students in the same group after the search is completed.

## 4. Summarize the answers.

3.5 Self-study by mobile phone application and discussion in group (90 minutes)

Students use their mobile phone application to search the information for Hyde Park on the Internet according to the questions, discuss and think about it.

### 3.6 Reporting (1 hour)

Students answer questions and presentation their answers about Hyde Park.

### 3.7 Teacher summarize and reflection on learning Process(20 minutes)

Landscape design skills is refer to a ability to see deeper problems and essence from the surface requirements, formulate solutions, and then express them in landscape language.

### Media and Learning Resources

Media: The PowerPoint of 《landscape design》 by the teacher.

Learning Resources:



(1) 《Principles of landscape architecture design》

<https://www.icourse163.org/course/SEU-1449641166?from=searchPage>

(2) 《Landscape design preliminary》

<https://www.icourse163.org/course/NJAU-1206900802?from=searchPage>

(3) 《Landscape Design - Urban park design》

<https://www.icourse163.org/course/BFU-1206303812?from=searchPage>

### **5. Measurement and Evaluation**

1. According to the students' presentation, the teacher evaluates whether the students understand the content learned today from three aspects: power point design, explanation of theoretical knowledge and depth of design project analysis.

2. According to the students' design projects, the teacher evaluates whether the students understand the process of landscape design from three aspects:

Innovation ability, analysis ability, design expression ability.



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### **LESSON PLAN 3 (3.5 hours)**

Course / Subject : Principles of Landscape Design

Instructional Topic : Definition of Landscape Design elements

Class Level : Sophomore

Time for Instructional : Friday morning of the first week

Instructor's name : Huangfu Zhounan

#### **1. Objectives**

- 1.1 Students can explain the definition of landscape design elements.
- 1.2 Students can report the definition of landscape design elements by themselves.
- 1.3 Students can analyze the definition of landscape design elements of landscape design projects.
- 1.4 Students can present the latest design concepts by search excellent design documents skillfully through the mobile phone application.

#### **2. Content**

Definition of landscape design elements:

(1) Function and positioning

Features: it is the key to the success or failure of the garden landscape project, the key to distinguish the garden landscape from pure art design, and the guiding core of the direction of garden landscape design.

(2) Theme and intention

Features: it is the main factor to form the characteristics of garden landscape.

(3) Space and scale

Features: the environmental positioning of composite projects generally focuses on comfort and pleasant, and a few mainly reflect the simplicity of atmosphere.

(4) Materials and elements

Features: including the use of greening seedlings, hard landscape materials and decorative sketches. The feature is to emphasize the characteristics of the project, consider humanization, economy, safety, rationality and the application of new materials and technologies.

(5) Modeling and details

Features: it is the key to reflect the design value and quality of the project and the highlight.

(6) Art and culture

Features: it is the focus of the long-term value of garden landscape. Only garden landscape works with high artistry and cultural connotation can break through the limitations of visual perception and achieve durable classic works from innovation.

(7) Adjust measures to local conditions

Features: it is one of the basic principles of landscape design (in addition to humanization and economy), and it is also the key point that landscape design must pay attention to.

(8) Place perception

Features: it is the focus of landscape design to finally create a scene atmosphere. It should go beyond a single visual perception, so that the works can be perceived in many aspects in time and space.

### **3. Instructional Strategies (Problem-Based Learning together with the mobile phone application methods)**

3.1 Clarification of terms and concepts(10 minutes)

3.1.1 Assume prior knowledge

How to use landscape design elements is learned by themselves before class.

3.1.2 Students ask for explanation of words or concepts that are not understood.

3.1.3 The teacher answers the students' questions about the words they don't understand and guides the students into the class of this course.

3.2 Problem statement(10 minutes)

Teacher asked the questions about definition of landscape design elements.

Question:1.What are the elements of landscape design?

2.What are the most common landscape design elements?And illustrate with examples.

3.3 Brainstorming for analyzing the problem(10 minutes)

3.3.1 Students are divided into groups of five. Each student finds out the key words he is interested in from the questions.

3.3.2 Students make questions according to their own keywords.

3.4 Formulation of learning issue (10 minutes)

Students make their own learning plans according to the questions raised by the teacher and the questions set by themselves:

1. Which app to use to search the answers of relevant contents?

2. How long to use to search the answers?

3. Discuss with the students in the same group after the search is completed.

4. Summarize the answers.

3.5 Self-study by mobile phone application and discussion in group (70 minutes)

Students use their mobile phone application to search for relevant content on the Internet according to the questions, discuss and think about it.

3.6 Reporting (70 minutes)

Students answer questions and presentation their viewpoint about the examples of landscape design elements.

### 3.7 Teacher summarize and reflection on learning Process (30 minutes)

The landscape includes many elements. On a large scale, there are: paving, greening, roads, garden construction, sketches, water system, etc. Subdivide: paving includes paving materials (such as stone, red brick, sand, etc.) and paving styles; Greening: flowers and trees garden construction: pavilions and pavilions sketch: flower bowl sculpture, Ting bu railing, seats, etc. Using different elements in the design will create different styles.

## 4. Media and Learning Resources

Media: The PowerPoint of 《landscape design》 by the teacher.

Learning Resources:

(1) 《Principles of landscape architecture design》

<https://www.icourse163.org/course/SEU-1449641166?from=searchPage>

(2) 《Landscape design preliminary》

<https://www.icourse163.org/course/NJAU-1206900802?from=searchPage>

(3) 《Landscape Design - Urban park design》

<https://www.icourse163.org/course/BFU-1206303812?from=searchPage>

## 5. Measurement and Evaluation

1. The teacher determine whether the students have learned the definition of landscape design by the students answering the questions raised by the teacher.

Question:

① What are the elements of landscape design?

② What are the most common landscape design elements?

③ What is the landscape design process?

④ What the landscape includes?

⑤ What are the ways of landscape design?

2. According to the students' presentation, the teacher evaluates whether the students understand the content learned today from three aspects: power point design, explanation of theoretical knowledge and depth of design project analysis.



**LESSON PLAN 4 (3.5 hours)**

Course / Subject : Principles of Landscape Design

Instructional Topic : Landscape design skills

Class Level : Sophomore

Time for Instructional : Friday afternoon of the first week

Instructor's name : Huangfu Zhounan

**1. Objectives**

- 1.1 Students can explain the landscape design skills.
- 1.2 Students can analyzes the skills of landscape design.
- 1.3 Students can analyzes the design process of landscape design.
- 1.4 Students can have the landscape design skills and use landscape design skills to design a project.

**2. Content**

Students use landscape design skills to design a project.

**3. Instructional Strategies (Problem-Based Learning together with the mobile phone application methods)****3.1 Clarification of terms and concepts(10 minutes)**

3.1.1 The teacher tells the students the main relationship between landscape design process and landscape design skills, and guides the students to understand it by themselves.

3.1.2 Students ask for explanation of words or concepts that are not understood.

3.1.3 The teacher answers the students' questions about the words they don't understand and guides the students into the class of this course.

**3.2 Problem statement(10 minutes)**

The teacher asked the question about Hyde Park.

Question: 1. Analysis of Hyde Park, what design elements are used in this project?

2. Analysis the design process in Hyde Park.

**3.3 Brainstorming for analyzing the problem(10 minutes)**

3.3.1 Students are divided into groups of five. Each student finds out the key words he is interested in from the questions.

3.3.2 Students make questions according to their own keywords.

**3.4 Formulation of learning issue (10 minutes)**

Students make their own learning plans according to the questions raised by the teacher and the questions set by themselves:

1. Which app to use to search the answers of relevant contents?
2. How long to use to search the answers?

3. Discuss with the students in the same group after the search is completed.

4. Summarize the answers.

3.5 Self-study by mobile phone application and discussion in group (90 minutes)

Students use their mobile phone application to search the information for Hyde Park on the Internet according to the questions, discuss and think about it.

3.6 Reporting (1 hour)

Students answer questions and presentation their answers about Hyde Park.

3.7 Teacher summarize and reflection on learning Process(20 minutes)

Through the problem-based teaching method, students can explain the definition of landscape design, skillfully analyze excellent landscape design projects, and design an excellent landscape design project by themselves.

#### 4. Media and Learning Resources

Media: The PowerPoint of 《landscape design》 by the teacher.

Learning Resources:

(1) Wang Maolin, Qin Liping, Luo You et al. Landscape Design (1st edition). Beijing: Central South University Press,2007.

(2) Residential environment landscape design (1st edition). Edited by Ma Tao. Shenyang: Liaoning Science and Technology Press,2000.

(3) Public Art design (1st edition). By Liu Lin. Shanghai: Shanghai University Press,2002.

(4) Modern Urban Landscape Design and Construction Technology (Volume 1-4). Yang Yongsheng, Jin Tao, Ed. Beijing: China City Press,2007.

(5) 《Principles of landscape architecture design》

<https://www.icourse163.org/course/SEU-1449641166?from=searchPage>

(6) 《Landscape design preliminary》

<https://www.icourse163.org/course/NJAU-1206900802?from=searchPage>

(7) 《Landscape Design - Urban park design》

<https://www.icourse163.org/course/BFU-1206303812?from=searchPage>

#### 5. Measurement and Evaluation

According to the students' design projects, the teacher evaluates whether the students understand the process of landscape design from three aspects:

Innovation ability, analysis ability, design expression ability.

## 2.The achievement test

Principles of Landscape Design》 Multiple choice questions

1. About what landscape is incorrect is (D).

A, refers to the aesthetic characteristics of the natural and artificial surface scenery, meaning scenery, scenery, scenery.

B, refers to a certain area of the scene, that is, visual effects

C, refers to the artificial or natural scenery of a place

D, landscape is garden, garden is landscape

2. What are the basic theories of landscape design (D).

A. Environmental Psychology and Ecology

B, Ecology and Behavioral Geography

C, Environmental Psychology and Behavioral Geography

D. Environmental psychology, ecology and behavioral geography

3. What kind of landscape elements do traditional Chinese gardens take as the main body :(A).

A. Landscape B. Building C. Plant D. Space

4. The following statement about the principles of landscape spatial design is not true (A)

A. Do not think too much about the terrain structure in the process of landscape space design

B. Landscape space design should take full account of human behavior, psychosocial, cultural and economic factors

C, from the functional requirements, pay attention to the suitability of space and the shaping of the overall sense of space

D, consider socio-cultural and economic factors

5. In landscape design, the best way to understand the proportions and effects of landscape is (A).

A. Experience, research, and measure in the landscape

B. Compare rectangles and formal relationships in proportion to gold

C. Measure with a fixed size

D. Compare the relationship between people and their surroundings

6. In landscape design, the separation of public and private spaces identified in material form is often in the form of (C) space

A. Public B. . Privacy C. . Transition D. . Semi-privacy



7. Known as the "kidney of nature" is (B).  
A. Urban Greenfield B. Wetland c. Water body D. Planting forests
8. The key to landscape center point design is (C).  
A. Its scale should dominate the whole design  
B. Eye-catching and the visual center of the entire design  
C. Consider its scale from the relationship between the center and the context and function  
D. Is central throughout the path
9. The ultimate goal of landscape design is (C).  
A. Beautify the living environment  
B. Reasonable use of limited resources, the ability to pose a hazard to future environmental needs  
C. To make people, buildings, communities, cities, and human life live in harmony with the earth of life  
D. Improve people's quality of life
10. Interpersonal distance can be divided into close distance, personal distance, social distance and public distance. Where the personal distance should be in (B).  
A. 0-0.45 m                      B. 0.45-1.20 m  
C. 1.20-3.60 m                  D. 3.60-7.60 m
11. A city square is a (B) space consisting of material elements such as buildings, venues, plants and public works of art  
A. Private activities              B. . Public events  
C. Of a private nature            D. . Fully open
12. For a drawing to show the accuracy of 0.1m in the field, the scale of the map must not be: (A).  
A, less than 1:1000              B, greater than 1:1,000  
C, less than 1:100                D, greater than 1:100
13. Depending on the nature, content and scale of the problem, landscape science consists of two professional directions, namely landscape planning and: (C).  
A, urban planning                B, landscaping  
C, landscape design               D, landscape resource protection





21. What are the modeling methods (A) of landscape design?
- A, by borrowing and perspective
  - B, perspective and extension
  - C, transition and perspective
  - D, extension and borrowing
22. The following is not the purpose and meaning (C) of landscape design
- A. Create an ecological balance that meets needs and can be intuitively felt
  - B, to provide high-quality outdoor space and venues
  - C, in the best interests of the premise, the completion of landscape design
  - D. Record the development of the history of human civilization and maintain a virtuous circle of ecosystems
23. What are the factors (A) that landscape design takes into account in the design of space?
- A, the rationality of space and visual requirements
  - B. The extension and transition of space
  - C, the visual requirements and rationality of space
  - D, the transition and rationality of space
24. What (D) are included in the basic elements of landscape design
- A, point
  - B, line
  - C, face, body
  - D, all of the above
25. What (D) are the elements of landscape design
1. Terrain, topography 2 Plant landscape elements and paving elements 3 Water landscape element 4 Human landscape elements and element of skit facilities
- A、 12
  - B、 23
  - C、 134
  - D、 1234
26. What are the types of landscape designs (D).
1. City roads, squares, spaces 2 Park View 3. Waterfront Space Landscape 4 Residential roads
- A、 12
  - B、 13

- C、 234
- D、 1234

27. What are the basic principles of landscape design(D).

1. Functional Principle 2 Ecological Principle 3 Cultural Principle 4 Principle 5 of Art  
Procedural principles

- A、 123
- B、 124
- C、 234
- D、 12345

28. The following are landscape ecological elements (D).

1. Water Environment 2 Terrain 3. Vegetation 4. Climate

- A、 13
- B、 23
- C、 24
- D、 1234

29. What are the(D) approaches to landscape design?

1. Ideas and Compositions 2 Pair and borrowed scene 3 Barrier and barrier 4 Texture and texture

- A、 12
- B、 234
- C、 124
- D、 1234

30. Which of the following are landscape design processes (C).

1. Planning and design 2 Scenario Design 3. Construction drawing design 4 Expand the initial design

- A、 12
- B、 23
- C、 234
- D、 1234

### 3. Questionnaire

Questionnaire on Principles of Landscape Design Students' Satisfaction with the Learning Management Using Problem-Based Learning together with the Mobile Phone Application

Course name Principles of Landscape Design

Teacher's name: Huangfu Zhounan

Please answer the following questions

Gender: ( ) a. Male b. Female

Age: ( ) a.16-18 b.18-20 c.20-22 d. Other

Are you satisfied with what you learned in this course? ( )

Strongly satisfactory

Satisfaction

Neither satisfaction nor dissatisfaction

Dissatisfaction

Strongly dissatisfaction

4. Compared with the traditional teacher-centered teaching classroom, do you think it is more advantageous to use learning management using Problem-Based Learning together with the Mobile Phone Application? ( )

- a. Strongly agree
- b. Agree
- c. Neither agree nor disagree
- d. Disagree
- e. Strongly disagree

5. Compared with the traditional teacher-centered teaching classroom, do you think the classroom atmosphere using Problem-Based Learning together with the Mobile Phone Application is better? ( )

- a. Strongly agree
- b. Agree
- c. Neither agree nor disagree
- d. Disagree
- e. Strongly disagree

6. Do you think it is easy to find relevant content on the Internet for teachers' questions in class? ( )

- A .Strongly agree
- b. Agree
- c. Neither agree nor disagree
- d. Disagree
- e. Strongly disagree



7. What Mobile Phone Application do you usually use to search for relevant content? ( )  
a. Wechat b. Weibo c. QQ d. Others
8. Compared with the traditional teacher-centered teaching classroom, do you think your interest in learning has improved? ( )  
A .Strongly agree  
b. Agree  
c. Neither agree nor disagree  
d. Disagree  
e. Strongly disagree
9. After using Problem-Based Learning together with the Mobile Phone Application, do you think your learning ability has improved? ( )  
a. Strongly agree  
b. Agree  
c. Neither agree nor disagree  
d. Disagree  
e. Strongly disagree
10. After using Problem-Based Learning together with the Mobile Phone Application, do you think your academic performance has improved? ( )  
a. Strongly agree  
b. Agree  
c. Neither agree nor disagree  
d. Disagree  
e. Strongly disagree
11. After using Problem-Based Learning together with the Mobile Phone Application, do you think your ability of landscape design has improved? ( )  
a. Strongly agree  
b. Agree  
c. Neither agree nor disagree  
d. Disagree  
e. Strongly disagree
12. Are you satisfied with the setting of classroom activities in this course? ( )  
a. Strongly satisfactory  
b. Satisfaction  
c. Neither satisfaction nor dissatisfaction  
d. Dissatisfaction  
e. Strongly dissatisfaction

13. Are you satisfied with the examination setting of this course? ( )

- a. Strongly satisfactory
- b. Satisfaction
- c. Neither satisfaction nor dissatisfaction
- d. Dissatisfaction
- e. Strongly dissatisfaction

14. Do you have any other suggestions and comments on the using Problem-Based Learning together with the Mobile Phone Application used in this course? Please write it down.

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**APPENDIX C**  
**THE QUALITY OF INSTRUMENTS RESEARCH**

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## 1.IOC

## IOC of the lesson plans

Item	Expert 1			Expert 2			Expert 3			IOC	Result
	+1	0	-1	+1	0	-1	+1	0	-1		
1	√			√			√			(1+1+1)/3=1	Quality
2	√			√			√			(1+1+1)/3=1	Quality
3	√			√			√			(1+1+1)/3=1	Quality
4	√			√			√			(1+1+1)/3=1	Quality
5	√			√			√			(1+1+1)/3=1	Quality
6	√			√			√			(1+1+1)/3=1	Quality
7	√			√			√			(1+1+1)/3=1	Quality
8	√			√			√			(1+1+1)/3=1	Quality
9	√			√			√			(1+1+1)/3=1	Quality
10	√			√			√			(1+1+1)/3=1	Quality
11	√			√			√			(1+1+1)/3=1	Quality
12	√			√			√			(1+1+1)/3=1	Quality
13	√			√			√			(1+1+1)/3=1	Quality
14	√			√			√			(1+1+1)/3=1	Quality
15	√			√			√			(1+1+1)/3=1	Quality



## IOC of the Learning achievement test

Item	Expert 1			Expert 2			Expert 3			IOC	Result
	+1	0	-1	+1	0	-1	+1	0	-1		
1	√			√			√			$(1+1+1)/3=1$	Quality
2	√			√			√			$(1+1+1)/3=1$	Quality
3	√			√			√			$(1+1+1)/3=1$	Quality
4	√			√			√			$(1+1+1)/3=1$	Quality
5	√			√			√			$(1+1+1)/3=1$	Quality
6	√			√			√			$(1+1+1)/3=1$	Quality
7	√			√			√			$(1+1+1)/3=1$	Quality
8	√			√			√			$(1+1+1)/3=1$	Quality
9	√			√			√			$(1+1+1)/3=1$	Quality
10	√			√			√			$(1+1+1)/3=1$	Quality
11	√			√			√			$(1+1+1)/3=1$	Quality
12	√			√			√			$(1+1+1)/3=1$	Quality
13	√			√			√			$(1+1+1)/3=1$	Quality
14	√			√			√			$(1+1+1)/3=1$	Quality
15	√			√			√			$(1+1+1)/3=1$	Quality
16	√			√			√			$(1+1+1)/3=1$	Quality
17	√			√			√			$(1+1+1)/3=1$	Quality
18	√			√			√			$(1+1+1)/3=1$	Quality

Item	Expert 1			Expert 2			Expert 3			IOC	Result
	+1	0	-1	+1	0	-1	+1	0	-1		
19	√			√			√			$(1+1+1)/3=1$	Quality
20	√			√			√			$(1+1+1)/3=1$	Quality
21	√			√			√			$(1+1+1)/3=1$	Quality
22	√			√			√			$(1+1+1)/3=1$	Quality
23	√			√			√			$(1+1+1)/3=1$	Quality
24	√			√			√			$(1+1+1)/3=1$	Quality
25	√			√			√			$(1+1+1)/3=1$	Quality
26	√			√			√			$(1+1+1)/3=1$	Quality
27	√			√			√			$(1+1+1)/3=1$	Quality
28	√			√			√			$(1+1+1)/3=1$	Quality
29	√			√			√			$(1+1+1)/3=1$	Quality
30	√			√			√			$(1+1+1)/3=1$	Quality

IOC of the evaluation form about the abilities of landscape design

Item	Expert 1			Expert 2			Expert 3			IOC	Result
	+1	0	-1	+1	0	-1	+1	0	-1		
1	√			√			√			$(1+1+1)/3=1$	Quality
2	√			√			√			$(1+1+1)/3=1$	Quality
3	√			√			√			$(1+1+1)/3=1$	Quality
4	√			√			√			$(1+1+1)/3=1$	Quality

Item	Expert 1			Expert 2			Expert 3			IOC	Result
	+1	0	-1	+1	0	-1	+1	0	-1		
											y

IOC of the questionnaire for students' satisfaction

Item	Expert 1			Expert 2			Expert 3			IOC	Result
	+1	0	-1	+1	0	-1	+1	0	-1		
1	√			√			√			$(1+1+1)/3=1$	Quality
2	√			√			√			$(1+1+1)/3=1$	Quality
3	√			√			√			$(1+1+1)/3=1$	Quality
4	√			√			√			$(1+1+1)/3=1$	Quality
5	√			√			√			$(1+1+1)/3=1$	Quality
6	√			√			√			$(1+1+1)/3=1$	Quality
7	√			√			√			$(1+1+1)/3=1$	Quality
8	√			√			√			$(1+1+1)/3=1$	Quality
9	√			√			√			$(1+1+1)/3=1$	Quality
10	√			√			√			$(1+1+1)/3=1$	Quality
11	√			√			√			$(1+1+1)/3=1$	Quality
12	√			√			√			$(1+1+1)/3=1$	Quality
13	√			√			√			$(1+1+1)/3=1$	Quality
14	√			√			√			$(1+1+1)/3=1$	Quality

## 2. Item Difficulty(p) and Item Discriminability(r)

Item difficulty(p) and item discriminability(r) of the learning achievement test Pre-test.

Item (full score)	Total scores of High score group	Total scores of Low score group	$p_H = \frac{\Sigma H}{\Sigma T_H}$	$p_L = \frac{\Sigma L}{\Sigma T_L}$	Difficulty $P = \frac{PH+PL}{2}$	Discrimination $r = PH-PL$
Item1 (1 score)	14	0	0.467	0	0.2335	0.467
Item2 (1 score)	12	0	0.4	0	0.2	0.4
Item3 (1 score)	14	0	0.467	0	0.2335	0.46
Item4 (1 score)	13	0	0.433	0	0.2165	0.45
Item5 (1 score)	12	0	0.4	0	0.2	0.4
Item6 (1 score)	14	0	0.467	0	0.2335	0.46
Item7 (1 score)	15	0	0.5	0	0.25	0.5
Item8 (1 score)	13	0	0.433	0	0.2165	0.42
Item9 (1 score)	15	0	0.5	0	0.25	0.5
Item10 (1 score)	13	0	0.433	0	0.2165	0.42



Item (full score)	Total scores of High score group	Total scores of Low score group	$p_H = \frac{\Sigma H}{\Sigma T_H}$	$p_L = \frac{\Sigma L}{\Sigma T_L}$	Difficulty $P = \frac{PH+PL}{2}$	Discrimination $r = PH-PL$
Item11 (1 score)	13	0	0.433	0	0.2165	0.42
Item12 (1 score)	14	0	0.467	0	0.2335	0.48
Item13 (1 score)	12	0	0.4	0	0.2	0.42
Item14 (1 score)	12	0	0.4	0	0.2	0.4
Item15 (1 score)	13	0	0.433	0	0.2165	0.42
Item16 (1 score)	14	0	0.467	0	0.2335	0.46
Item17 (1 score)	12	0	0.4	0	0.2	0.4
Item18 (1 score)	15	0	0.5	0	0.25	0.5
Item19 (1 score)	13	0	0.433	0	0.2165	0.42
Item20 (1 score)	12	0	0.4	0	0.2	0.4
Item21 (1 score)	14	0	0.467	0	0.2335	0.44

Item (full score)	Total scores of High score group	Total scores of Low score group	$p_H = \frac{\Sigma H}{\Sigma T_H}$	$p_L = \frac{\Sigma L}{\Sigma T_L}$	Difficulty $P = \frac{PH+PL}{2}$	Discrimination $r = PH-PL$
Item22 (1 score)	13	0	0.433	0	0.2165	0.42
Item23 (1 score)	13	0	0.433	0	0.2165	0.42
Item24 (1 score)	13	0	0.433	0	0.2165	0.42
Item25 (1 score)	14	0	0.467	0	0.2335	0.46
Item26 (1 score)	13	0	0.433	0	0.2165	0.44
Item27 (1 score)	12	0	0.4	0	0.2	0.42
Item28 (1 score)	12	0	0.4	0	0.2	0.4
Item29 (1 score)	13	0	0.433	0	0.2165	0.42
Item30 (1 score)	12	0	0.4	0	0.2	0.4

## Post-test

Item (full score)	Total scores of High score group	Total scores of Low score group	$p_H = \frac{\Sigma H}{\Sigma T_H}$	$p_L = \frac{\Sigma L}{\Sigma T_L}$	Difficulty $P = \frac{PH+PL}{2}$	Discrimination $r = PH-PL$
Item1 (1 score)	30	0	1	0	0.5	1
Item2 (1 score)	27	0	0.9	0	0.45	0.9
Item3 (1 score)	27	0	0.9	0	0.45	0.9
Item4 (1 score)	30	0	1	0	0.5	1
Item5 (1 score)	30	0	1	0	0.5	1
Item6 (1 score)	27	0	0.9	0	0.45	0.9
Item7 (1 score)	30	0	1	0	0.5	1
Item8 (1 score)	30	0	1	0	0.5	1
Item9 (1 score)	27	0	0.9	0	0.45	0.9
Item10 (1 score)	30	0	1	0	0.5	1
Item11	30	0	1	0	0.5	1

Item (full score)  (1 score)	Total scores of High score group	Total scores of Low score group	$p_H = \frac{\Sigma H}{\Sigma T_H}$	$p_L = \frac{\Sigma L}{\Sigma T_L}$	Difficulty $P = \frac{PH+PL}{2}$	Discrimination $r = PH-PL$
Item12 (1 score)	30	0	1	0	0.5	1
Item13 (1 score)	27	0	0.9	0	0.45	0.9
Item14 (1 score)	27	0	0.9	0	0.45	0.9
Item15 (1 score)	30	0	1	0	0.5	1
Item16 (1 score)	30	0	1	0	0.5	1
Item17 (1 score)	27	0	0.9	0	0.45	0.9
Item18 (1 score)	30	0	1	0	0.5	1
Item19 (1 score)	30	0	1	0	0.5	1
Item20 (1 score)	27	0	0.9	0	0.45	0.9
Item21 (1 score)	30	0	1	0	0.5	1
Item22	30	0	1	0	0.5	1



Item (full score)  (1 score)	Total scores of High score group	Total scores of Low score group	$p_H = \frac{\Sigma H}{\Sigma T_H}$	$p_L = \frac{\Sigma L}{\Sigma T_L}$	Difficulty $P = \frac{PH+PL}{2}$	Discrimination $r = PH-PL$
Item23 (1 score)	30	0	1	0	0.5	1
Item24 (1 score)	30	0	1	0	0.5	1
Item25 (1 score)	30	0	1	0	0.5	1
Item26 (1 score)	30	0	1	0	0.5	1
Item27 (1 score)	27	0	0.9	0	0.45	0.9
Item28 (1 score)	30	0	1	0	0.5	1
Item29 (1 score)	30	0	1	0	0.5	1
Item30 (1 score)	30	0	1	0	0.5	1



## → T-Test

### Paired Samples Statistics

Pair 1	Mean	N	Std. Deviation	Std. Error Mean
	Pretest	13.1333	30	1.25212
Posttest	29.0667	30	.98027	.17897

### Paired Samples Correlations

Pair 1	N	Correlation	Sig.
Pretest & Posttest	30	.021	.914

### Paired Samples Test

Pair 1	Pretest - Posttest	Paired Differences		95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Lower	Upper			
		-15.93333	1.57422	-16.52116	-15.34551	-55.437	29	.000

## 2. T-Test about ability of students about landscape design

→ **T-Test**



**One-Sample Statistics**

	N	Mean	Std. Deviation	Std. Error Mean
Posttest	30	92.0333	10.00511	1.82668

**One-Sample T Test**

Test Value = 70

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Posttest	12.062	29	.000	22.03333	18.2974	25.7693

→ **T-Test**

**One-Sample Statistics**

	N	Mean	Std. Deviation	Std. Error Mean
Posttest	30	4.9833	.04611	.00842

**One-Sample Test**

Test Value = 3.5

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Posttest	176.187	29	.000	1.48333	1.4661	1.5006

3. T-Test about the student's satisfaction



# CURRICULUM VITAE

NAME

Huangfu Zhounan



# GRAD VRU