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*“Universities for Local Development Based  
on Sustainable Development Goals”*



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## 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

Huangfu Zhounan<sup>1</sup>    Sombat Kotchasi<sup>2</sup>    Kanreutai Klangpahol<sup>3</sup>

<sup>1</sup>M.Ed. Student, Curriculum and Instruction Program,  
Valaya Alongkron Rajabhat University under the Royal Patronage, Thailand  
hhffznn@163.com

<sup>2,3</sup>Curriculum and Instruction Program, Valaya Alongkron Rajabhat University under the Royal Patronage, Thailand  
sombat@vru.ac.th  
kanreutai@vru.ac.th

### Abstract

The purpose of this research were to: 1) Compare 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; 2) Compare the ability of the students about landscape design after receiving Learning management using Problem-Based Learning together with the mobile phone application with the established 70% criterion; 3) Compare the satisfaction of the students after receiving Learning management using Problem-Based Learning together with the mobile phone application with the established 70% criterion. The sample was 30 students (1 class) from Zhoukou Normal University majoring in Environmental Design which were selected by using cluster random sampling. The research instruments used in this research were: 1) The test of the learning achievement of landscape design; 2) The evaluation form about the abilities of landscape design; 3) The questionnaire for students' satisfaction. The statistics used to analyze the data were mean, standard deviation and paired t-test and single sample test. The results revealed that after the students use the learning management using problem-based learning together with the Mobile phone application, their abilities of landscape design are all higher than the criteria of 70%, and the students' satisfaction was also at a high level.

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

### 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 any time and anywhere through the function of mobile phone applications. Students can improve their learning achievement and design ability by learning these excellent design projects.

## 2. Research Objectives

This research consisted of three objectives:

2.1 To compare 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 .

2.2 To compare the ability of the students about landscape design after receiving Learning management using Problem-Based Learning together with the mobile phone application with the established 70% criterion.

2.3 To compare the satisfaction of the students after receiving Learning management using Problem-Based Learning together with the mobile phone application with the established 70% criterion.

### 3. Research Methodology

#### 3.1 Samples

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

#### 3.2 Research instruments

The research instruments used in this research were: 1) The test of the learning achievement of landscape design;2)The evaluation form about the abilities of landscape design;3) The questionnaire for students' satisfaction.

#### 3.3 Data Collection

1. The samples were pretested for learning achievement before teaching.
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.

#### 3.4 Data Analysis

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

1. To compare the learning achievement of landscape design after receiving using Problem-Based Learning with the mobile phone application in classroom by using performance test for 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 the student's satisfaction on using Problem-Based Learning with the mobile phone application in classroom with the determined criteria set at 70 % by using arithmetic mean and standard deviation.



#### 4. Research Results

This chapter presented the findings related to the objectives of the research. 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 results were presented according to the research objectives as follows:

##### 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 pretest is  $\bar{X}=13.13$ ,  $SD=11.252$ , the posttest is  $\bar{X} =29.07$ ,  $S. D. =0.98$ ,  $t_{29}=55.437$ ,  $p=0.000$ , the posttest scores of students' learning achievement of the students about landscape design was greater than pretest scores at .05 level of statistical significance.

Table1

Group	N	Pretest		Posttest		t	p
		$\bar{X}$	S.D.	$\bar{X}$	S.D.		
Experimental group	30	13.13	1.252	29.07	0.980	55.437*	0.000

\*  $p < .05$

##### 4.2 The results of research objective 2

The result of comparing the different scores of ability of landscape design of students after learning through the learning management using Problem- Based Learning together with the mobile phone application is  $\bar{X} =92.03$ ,  $S.D.=10.005$ ,  $t_{29} = 12.062$ ,  $p=0.000$ , which was higher than the criteria at 70% (70 marks) of full marks at .05 level of statistical significance.

Table2

Group	N	Full score	Criteria score	$\bar{X}$	S.D.	t	p
Experimental group	30	100	70	92.03	10.005	12.062*	0.000

\*  $p < .05$

#### 4.3 The results of research objective 3

The result of the student's satisfaction on using Problem-Based Learning with the mobile phone application is  $\bar{X} = 4.98$ ,  $S.D. = 0.4611$ ,  $t_{29} = 176.187$ ,  $p = 0.000$ , which was the highest level compared with the criterion at 70% (3.50 marks) of full marks at .05 level of statistical significance.

**Table 3**

Group	N	Full score	$\bar{X}$	S.D.	t	p
Experimental group	30	5.00	4.98	0.4611	176.187*	0.000

\*  $p < .05$

### 5. Discussions

The following points based on the research results were discussed:

5.1 This study is based on a random sample of tests, so by organizing t-tests and questionnaires on the sample, It provides reliable data for developing methods suitable for them to improve their landscape design ability.

5.2 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.

5.3 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.

5.4 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.

### 6. Conclusion

According to the t-test, the following conclusions are drawn: 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. 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. 3) The satisfaction of the students after receiving Learning management using Problem-Based Learning together with the mobile phone application is the highest level compared with the criterion at 70%.

## 7. Recommendations

### 7.1 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 others' 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.

### 7.2 Recommendation for further research

1) Young teachers should learn more about new teaching theories, update their teaching concepts, guide their teaching practices and adjust their teaching designs to meet the needs of social and economic development for the cultivation of talents with disciplinary theories and professional abilities.

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) Adopt the teaching method of combining 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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