

# USE OF MOODLE TO DEVELOP ONLINE TRAINING PACKAGE ON PROBLEM BASED LEARNING STRATEGY (PBLS) FOR STUDENT TEACHERS

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# ABSTRACT

It is the need of today's society that people are able to solve complex problems efficiently. Being able to solve problems successfully is more than just accumulating knowledge- it involves development of flexible, cognitive strategies that help analyze different problem situations to produce meaningful learning outcomes. Online training package on Scaffolded Problem Based Learning Strategy using the learning management system, MOODLE is planned to guide student teachers to become experts in the field of study, proficient in identifying the problems based on the domain knowledge of the discipline and analyzing and contributing to the solutions in a completely online mode.

The online training package, designed on the lines of ADDIE model is assigned four credits and student teachers need to put in 120 hours of study for completion of the training. The package incorporates PBLS, follows collaborative approach and has provision of scaffolds. The study was carried out on forty-one student teachers of a College of Education. The student teachers were selected on the basis of their competence in the use of computer and internet. The student teachers undertook the online training in Scaffolded Problem Based Learning strategy (PBLS) wherein the student teachers had to solve ten problems related to difficulties faced by school teachers and administrators in the implementation of various aspects of PBLS.

Effectiveness of the online training package was measured in terms of formative and summative achievement in the theory of PBLS. Findings indicate more than 80% of the student teachers scored more than 80% marks each in the formative and summative achievement tests on the theory of PBLS.

Keywords: Online, Learning Management System, MOODLE, teacher training, Problem based learning, Scaffold

# Introduction

People typically face a web of simple and complex decisions, daily hassles, and stressful and even traumatic life events. How people respond to difficult life problems is an exceedingly complex process (Heppner & Krauskopf, 1987) and seems to depend on many personal and environmental factors (Zeidner & Endler, 1996). Some people bring many skills and strengths to how they approach problems, whereas others have significant problem-solving deficits.

Researches on problem solving appraisal indicates that the effective problem solvers have better psychological and physical health, better coping effectiveness and better vocational adjustment. Ineffective problem solvers have shown (a) fewer social skills and (b) more social uneasiness/distrust/distress (Heppner & Peterson, 1982). It is the need of today's society that people solve complex problems efficiently. This necessitates the need for competence in problem solving, thus leading to a demand for problem solving skills to be taught in schools and colleges so that the future generation can lead happy and fulfilling lives.

Problem Based Learning Strategy (PBLS), based on the premise of constructivist epistemology, represents a major development in higher education practice that continues to have a large impact across subjects and disciplines around the world and engages the learners in the problem-solving process. Problem Based Learning Strategy (PBLS) is an instructional strategy that initiates students' learning by creating the need to solve authentic problems collaboratively.

In the Indian context the use of Problem Based Learning Strategy (PBLS) is attempted in the disciplines of Medicine, Nursing, Pharmacy and very rare studies conducted in the field of Engineering, Teacher Education and School Education.

Researches conducted on the effects of Problem Based Learning Strategy (PBLS) compared with those of traditional approaches on measures of knowledge application and acquiring content knowledge favored students involved in Problem Based Learning Strategy both in face-to-face as well as online mode. This is reflected in studies conducted by Dochy et al. (2003); Fasko (2003); Miller (2003); Beers and Bowden (2005); Linda and Bethany (2008); Hmelo-Silver et al. (2009); Lin et al. (2010); Celik et al. (2011); Chen and Chen (2012); Karami et al. (2013); Hamdan et al. (2014); Crowley (2015); Gould et al. (2015); Jansson et al. (2015); Wijnen et al. (2015); Abdullah et al. (2016); Baran (2016); Botty et al. (2016); Caesar et al. (2016) and Paternite (2016).



Researches conducted on the effects of Problem Based Learning Strategy (PBLS) compared with those of traditional approaches on measures of knowledge application and acquiring content knowledge did not favor students involved in Problem Based Learning. This is reflected in studies conducted by Webster (2006); Witte and Rogge (2012) and Liu (2013).

Training teachers in effective use of PBLS to improve the capacity and motivation of teachers to develop and integrate such problem-solving skills into their classroom practice should be the focus in today's context. Technology comes as an effective aid for providing training for professional development to in-service and preservice teachers.

Online Training Package on Scaffolded Problem Based Learning Strategy (PBLS) is planned to lead student teachers to become experts in their domain of knowledge, proficient in identifying the problems based on the knowledge of the discipline and analyzing and contributing to the solutions. Online Training Package is the strategy of instruction used so as to produce learning experiences that lead to pre-specified learning goals through the learning management system, MOODLE. Effectiveness of Online Training Package on Scaffolded Problem Based Learning Strategy is assessed in terms of Achievement in the theory of Problem Based Learning Strategy (PBLS).

## **Objective of the study**

To study the effectiveness of Online Training Package on Scaffolded Problem Based Learning Strategy (PBLS) for student teachers in terms of achievement in the theory of Problem Based Learning Strategy (PBLS)

## Hypothesis of the study

After training 80% and more student teachers will be able to achieve at least 80% and more scores in the theory of Problem Based Learning Strategy (PBLS).

## Method and Instrumentation

For the present study, the researcher used pre-experimental category of experimental design. Since online learning is available to student teachers  $24 \times 7$ , mastery learning is expected to be the criteria of judging effectiveness of learning. Also, the hypothesis of this study is mastery learning. Hence the pre-experimental category was selected by the researcher.

The study was carried out on forty-one student teachers of a College of Education. The student teachers were selected based on their competence in the use of computer and internet. The student teachers were not exposed to online training and most of them were unaware of Problem based learning as well the scaffolding. The student teachers undertook the online training in Scaffolded Problem Based Learning strategy (PBLS) wherein the student teachers had to solve ten problems related to difficulties faced by school teachers and administrators in the implementation of various aspects of PBLS.

The Online training package on Scaffolded Problem Based Learning Strategy (PBLS) used the technique of Scaffolded Problem Based Learning Strategy (PBLS) to sensitize the student teachers to the Problem Based Learning Strategy (PBLS).

The Online training package is assigned four credits and student teachers need to put in 120 hours of study for completion of the training. Since Problem Based Learning is a novel and complex task for the student teachers who are novices in area of constructivism, they need to be provided with scaffolds for Problem Based Learning Strategy (PBLS). The scaffolds provided help in reducing the cognitive load of learners as they encounter the problems to be resolved leading to effective learning. Also, the various online resources available for interaction and collaborative work act as scaffolds which is possible only in an online mode.

The salient features of the Online Training Package on Scaffolded PBLS are as follows:

- It is designed on the lines of ADDIE model,
- It incorporates Problem Based Learning Strategy
- It is based on constructivist approach
- It has provision of variety of Scaffolds
- It is available 24×7
- It makes good use of Activity features of MOODLE and
- It has provision for collaborative learning.



For the present study, the researcher constructed a) Formative achievement tests based on the theory of PBLS using the activity features of MOODLE b) Summative achievement test to study the effectiveness of Online Training Package in terms of achievement in theory of PBLS

The achievement test on theory of PBLS was prepared in following manner:

- 1) The content related to the theory of PBLS was analyzed
- 2) The instructional objectives based on the content identified were written
- 3) The blueprint based on identified content, instructional objectives and types of questions was prepared.

The formative achievement tests comprised of contribution to the discussion forum, glossary, quiz activities and assignments. The formative and summative achievement tests were subjected to content validity to check the clarity and appropriateness of the questions in accordance to the objectives. The five experts gave suggestions regarding the test after which the test was refined. The experts gave suggestions with respect to modifying certain words in the questions. The student teachers were expected to undertake formative achievement test at the end of every problem and the summative achievement test was given on the completion of the ten problems. The percentage of problem wise scores on formative and summative achievement test are as follows:

Table 1 gives percentage of problem wise scores on formative achievement tests in the theory of PBLS using activity features of MOODLE

# TABLE 1 PERCENTAGE OF PROBLEM WISE SCORES ON FORMATIVE ACHIEVEMENT TESTSIN THE THEORY OF PBLS USING ACTIVITY FEATURES OF MOODLE

Problem wise Formative	Number of student teachers who	Percentage of students who	
Achievement tests in the theory of PBLS	scored more than 80% (Out of 41 student teachers)	scored more than 80% score	
Problem 1- Discussion	38	92 68%	
Forum activity feature	50	,2.00/0	
Problem 2- Discussion	39	95%	
Forum activity feature			
Problem 3- Quiz and	37	90%	
Discussion Forum activity			
feature			
Problem 4- Assignment	39	95%	
activity feature			
Problem 5- Glossary activity	34	82.92%	
feature			
Problem 6- Discussion	38	92.68%	
Forum activity feature			
Problem 7- Quiz activity	34	82.92%	
feature			
Problem 8- Quiz activity	33	80.48%	
feature			
Problem 9- Quiz activity	34	82.92%	
feature			
Problem 10- Discussion	39	95%	
Forum activity feature			

Table 2 gives the percentage of posttest scores achieved by student teachers on the summative achievement test on the theory of PBLS



# TABLE 2 PERCENTAGE OF POSTTEST SCORES ACHIEVED BY STUDENT TEACHERS ON THESUMMATIVE ACHIEVEMENT TEST ON THE THEORY OF PBLS

Student	A abiavament Test	A abiayament Test	Total Soore	Danaanta aa
Number	Theory (Out of 50)	Achievement Test Practical (Out of 10)	(Out of 60)	Percentage
1	111eory (Out 01 50)		(Out 01 00)	020/2
2	40	10	50	9370
2	42	10	32	8/%
3	40	9	49	82%
4	36	9	45	/8%
5	40	10	50	83%
6	37	10	47	78%
7	38	10	47	78%
8	41	8	49	82%
9	40	9	49	82%
10	36	9	45	78%
11	41	10	50	83%
12	42	10	52	87%
13	39	10	49	82%
14	38	10	48	80%
15	45	10	55	92%
16	42	9	51	85%
17	41	9	50	83%
18	43	10	53	85%
19	42	9	51	85%
20	38	10	48	80%
21	39	10	49	82%
22	41	9	50	83%
23	42	10	52	87%
23	44	9	53	88%
25	44	9	53	88%
26	42	10	52	87%
20	43	9	52	87%
27	42	0	51	85%
20	41	10	51	85%
29	30	0	18	80%
21	29	9	48	780/
22	30	9	47	/ 0 /0
32	41	10	51	05%
24	42	9	52	83%
25	43	10	33	80%
35	40	9	49	<u>8∠%</u>
30	41	10	50	85%
3/	42	9	51	83%
38	41	9	50	82%
39	42	10	52	87%
40	43	10	53	88%
41	43	10	53	88%

# Findings of the study

Table 1 reveals that more than 80% i.e., 80.48% (33 student teachers out of 41 student teachers) of the student teachers scored more than 80% marks on the ten formative achievement tests in the theory of PBLS using activity features of MOODLE. Hence after the training, 80% and more student teachers are able to achieve at least 80% and more scores on the formative achievement tests in the theory of PBLS using activity features of MOODLE.

Table 2 reveals that more than 80% i.e., 90.24% (37 student teachers out of 41 student teachers) of the student teachers scored more than 80% marks on the summative achievement test on the theory of PBLS. Hence after the training, 80% and more student teachers are able to achieve at least 80% and more scores on the summative achievement test on PBLS.



### **Analysis and Discussions**

The analyses of findings show that the Online Training Package on Scaffolded PBLS can positively influence the achievement of student teachers. Student teachers who experienced the Online Training Package gained thorough knowledge about PBLS. According to Fullon (1990), Teachers of today and tomorrow need to do much more learning on the job, or parallel with it- where they can constantly test out, refine and get feedback on the improvements they make. Fullon's view is reflected in this study wherein the student teachers were exposed to problems during the online training that they would face on job, they had to work out solutions for the problems, refine and receive feedback from both mentor and peers. Thus, formal training of PBLS has the potential of professionally preparing teachers of tomorrow.

There is ample empirical research evidence to suggest that students' achievement is significantly related to the professional preparation of teachers (Darling-Hammond, 2000; Goldhaber & Brewer, 1999). The Online training helped the student teachers in achieving mastery of PBLS which in turn would put the student teachers in a position to plan and deliver content using PBLS. The Online Training Package on Scaffolded PBLS provided for an experiential approach to understanding the theory of PBLS thus enabling the learners to construct knowledge by their own experiences.

The paradigm shift in professional development suggests a change in emphasis from transmission of knowledge to experiential learning; from reliance on existing research findings to examining one's own teaching practice; from individual focus to collaborative learning and mimicking best practice to problem focused learning. The Online Training Package on Scaffolded PBLS enriched the students' knowledge on PBLS wherein the student teachers had to indulge in problem discussion, raise learning issues collaboratively, find answers individually to the issues and then finally arrive at the solution to the problem collaboratively. This is in agreement with the views put forth by Schmidt (1983) that a PBLS environment enables students to draw upon their prior knowledge and skills, bring real-world context in the classroom and reinforce the knowledge through both independent and cooperative group work.

According to Schmidt (1983), Learning in a PBLS curriculum is more effective than in a traditional classroom setting due to the emphasis on the activation of prior knowledge in PBLS. This is seen through the mastery learning criteria fulfilled by the students on formative and summative achievement tests on the PBLS theory. Utecht (2003) observed that students of a PBLS curriculum develop better analytical skills and apply the knowledge gained in meaningful and productive ways. The student teachers acquired mastery in the theory of PBLS by indulging in finding solutions to ten real life contextual problems. This has ensured that the students' learning was not just theoretical but application based and student teachers would retain the knowledge gained through the package.

The package also provided the student teachers with resource material which enabled them to search for the answers to learning issues and also use it in different situations. This is seen in the high scores obtained by student teachers in the summative practical test on identifying resources for the problems given. The Training Package demanded the active and total involvement of student teachers through the individual and group tasks that had to be completed.

### Conclusion

The Learning Management Systems such as MOODLE have provision of a variety of features that can be used to provide learning experiences in an online mode. This study indicates that varied activity features of MOODLE may be used to design courses using constructivist learning strategies like PBLS to ensure effective learning. Since the strategies such as PBLS impose heavy cognitive load on students', scaffolds may be provided to ensure that students experience a reduction in the complexity felt due to the deep learning possible. The study implores the need for more research on a variety of constructivist learning strategies delivered through activity features of MOODLE.

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