PROBLEM BASED LEARNING: AN EFFECTIVE PEDAGOGY FOR PRE-SERVICE TEACHER EDUCATION IN PAKISTAN

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Abstract

In the education process both teaching and learning are fundamental. One school of thought says that effective teachers can bring good results whereas another school of thought claims that success depends mostly upon the learners' effort and potential. There has been a variety of teacher training strategies and models and at the same time there are different theories and strategies of learning. In Problem-Based Learning (PBL) a teacher has to play the role of facilitator/moderator and students have to present/explore/create knowledge. The current experimental study was conducted to explore the effectiveness of Problem Based Learning for Teacher Education in Pakistan. One group Pre-test, Post-test design of experiment was utilized for the study. The course of "Educational Research" was taught through PBL to 35 MA Education female students at International Islamic University Islamabad. After administering the pre-test the students were taught the course for 8 weeks by using PBL and the post test took the form of a mid-term exam. The data were analyzed using the t-Test. There was significant difference in the mean scores of pre-test and post test, which strengthens the notion that PBL promotes effective learning in teacher education. The results pave the way for the implementation of PBL as an effective pedagogy for teacher education programs in Pakistan.

Keywords: *Teacher Education, Problem Based Learning (PBL), Pedagogy, Experimental Study, Pakistan*

1. Introduction

The National Education Policy, (GoP, 2009) indicates that the curriculum should reflect the major social problems; provide more space for the development of critical thinking, problem solving skills, inquiry habits, self-directed learning abilities and collaborative work among

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learners. There is a need for introducing reforms in teacher preparation programs as well. Prospective teachers struggle with theoretical issues and they feel less motivated to learn as there is gap between theory and practice and one reason may be that they are trained mostly through traditional teaching methods. They are seldom prepared to solve and face the real problems of practical life. So there is a need for the educational environment that uses the real problems in which prospective teachers are exposed to problems which they have to deal with when they enter their professional life as teachers in private or public setup.

Problem-Based Learning (PBL) was designed for promoting various desired learning outcomes, which would help students to: develop skills to solve problems, development of self-directed learning skills, become effective collaborative learners, create a flexible knowledge base and become intrinsically motivated to learn (Barrows, 1986; Norman & Schmidt, 1992). PBL is an approach to education in which complex problems act as a framework and motivation to learn. In PBL, students work in groups to take care of one or more perplexing issues related to real life. They develop skills in the gathering, blending and assessment of resources to characterize issues first and afterwards working on the problems to reach a conclusion or arrangement of the issue. Students also summarize the material and develop clear understanding of the concepts. Unlike a traditional classroom, a faculty member is not the only deliverer of the huge bulk of knowledge, but his/her role is to facilitate the students in their search for adequate resources (Schmidt et al, 2009).

1.1. Statement of the Problem

There is evidence from an international literature (e.g. Major & Palmer, 2001; Hmelo-Silver, 2004) that PBL can be an effective strategy for teaching and has become popular worldwide (Barrows, 1996). PBL is used widely in schools and universities, medical and engineering colleges of Pakistan. It is therefore expected that the education system in Pakistan will also adopt this new culture to improve learning outcomes and outputs of education in the country (Yeo, 2005). Therefore, it was felt justified in adapting and adopting this student centered and innovative method for learning of prospective teachers so that they may be able to develop skills

related to it and may be able to use this strategy in their future career as teachers.

1.2. Objective of the Study

The study had the following objective:

1. To identify the effectiveness of Problem Based Learning for effective learning in pre-service teacher education program.

1.3. Significance of the Study

It is hoped that the results of the present study will add to the existing body of knowledge related to use of PBL in Pre-Service Teacher Education. This research can serve as a guideline for the introduction and utilization of PBL in Pre-service teacher education in Pakistan.

2. Review of Related Literature

Traditional lecturing method is content-driven and has been prevailing in many classrooms. These customary methodologies were seen to be suitable methodologies in the past but these techniques do not prepare learners with the abilities and qualities they require in their future workplaces. Conventional techniques for teaching neglect to motivate students in the learning procedure or support them to become dynamic learners (Duch, Groh, & Allen, 2001).

2.1. Problem Based Learning

PBL is an instructional method that confronts students with techniques of "how to learn?" through working in collaborative groups for finding the solutions to real world problems (Duch, Groh, & Allen, 2001). PBL uses problems of the "real world" as a context for students to learn critical thinking and problem-solving skills, and gain knowledge of the basic concepts of the subject. Through the use of PBL, students acquire the skills of lifelong learning, including the ability to find and use appropriate learning resources. PBL represents a major advance in educational practice that still affects the courses and disciplines all over the world (Werth, 2009).

PBL initiates learning from exposure to problems instead of content knowledge. Students gain knowledge and skills through a series of steps in the context of the problems, along with accompanying educational materials and support from tutors who act as facilitators (Boud & Feletti, 1997). The problem is the first input for the students during the learning

process. These problems arise in professional practice; in other cases, refer to events or problems typical to a particular field of study (Norman & Schmidt, 1992).

PBL includes the development of curricula and strategies to develop the educational system to solve the problem on the one hand and disciplinary knowledge and skills on the other hand by placing students in an active role for the solution of ill-structured problems that reflect real-world problems (Finkle & Torp, 1995). Problems are structured in a way that students can retrieve their prior knowledge, work on the problems and thus provoke discussions. Retrieval of prior knowledge is crucial for linking new information to it. Problems can incite debate when it contains references as opposing views, allowing students to generate arguments for and against each view and discuss which the best opinion is. Literature referred to what extent the problem can generate debate is the distinction between the well-structured and unstructured problems (Bruggen & Kirschner, 2003).

Learning difficulties created in the group and activities guide students' self-study in PBL. PBL is not suitable when huge quantities of knowledge have to be delivered to students. The exercise of exposure to problems is essential to bridge the gap between formal institutional learning and more practical activities the learners may encounter in real practical life (Hmelo, 2004). A key element in the PBL approach is the level of cooperation in small groups. Groups usually consist of tutorial of 6-10 students who meet 2 to 3 hours per session, usually twice a week (Schmidt et al, 2007).

In PBL, learning is instigated by the students. The most common function at the level of the student in PBL is the self-directed learning (SDL). Savin and Claire (2000) noted that the feeling of being in charge and having an impact on learning situation is the main ingredient in the SDL. As for the learning tasks are concerned, easy to complex tasks sequence is used in the design of PBL to solve problems, so that students begin from the easier problem and move gradually to more complex problems or similar experts (Van Merrienboer & Kirchner, 2007).

The ‘Problem’ in PBL is the description of a set of phenomena or events that require an explanation in terms of the basic process, and the mechanism or principle. A group of students work together to explain the

phenomena or events specified in the particular problem. Small group discussions in PBL enhance interaction among peers. Students answer a series of questions and give explanations and discuss the differences in opinions and understanding the concepts. These processes stimulate a deep knowledge of the subject. The cooperative and collaborative work in small groups also increases the ability to work in teams, a necessary skill in professional practice (Norman & Schmidt, 1992).

In order to introduce PBL, institutions will need to take into account changes in the schedule of teaching, class size, and the form of delivery to accommodate this pedagogical approach.

PBL can be implemented through utilizing different approaches but one of the most widely used processes is the 7 Steps (sometimes called 7-jump) Maastricht PBL approach. This approach provides the application of the principles of education in a systematic way to guide students to generate learning difficulties of this problem.

The Maastricht PBL approach has the following steps:

1. Illustrating concepts (defining terms)
2. Defining the problem
3. Problem analysis / brainstorming
4. Classification
5. The formulation of learning difficulties
6. Self-study
7. Discussing new knowledge

The first phase includes step 1-5 and lasts 1-2 hours. This phase starts with definitions of terms and concepts which helps the group to start with a clear understanding of the terminology and concepts common to the problem. Then the students identify the problem or put a specific definition of the problem. The problem is clearly defined which helps to establish the limits of the problem under discussion. After that, analysis of the problem is done to update the current knowledge of the group and activate prior knowledge. The students interpret important points contained in the classification and it helps to identify the interrelationships between the concepts and problems. Group builds a coherent description of the operations of logic and reasoning in the group. Learning disabilities may develop at this stage. The second phase includes self-study and it

helps the students to locate the relevant literature and provides students with a list of items that are related to the problem. Students prefer to make a selection from a list of suitable materials. They connect the prior knowledge with new knowledge and prepare a report. The third phase includes the discussion of the newly acquired knowledge and generally, this phase is scheduled after a few days to allow time for personal study. This session lasts 1-2 hours. In this step the participation of all members of the group is required to respond to the learning issues generated previously. Students can ask questions and clarify the details of the new knowledge and test the depth of understanding and insight into these issues (Schmidt, 1983).

At the end of the tutorial groups and the reactions of the strengths of the group process and the issues that need to be improved are discussed in the group. Providing information and being well organized and timely feedback helps fruitful cooperation and aids to get more in-depth discussions. It is assumed that learning is an active process of building knowledge, rather than passive memorization process. In PBL students are encouraged to build their own knowledge, because students are actively discussing the topic at hand, asking and answering questions. The interaction of an active group encourages students to a deeper understanding (Endrogen**,** 2014).

In the context of the problems in learning, PBL, students are free to study and identify resources and relevant literature (i.e. internet resources, articles, books or book chapters) in the library and / or electronic databases. Search of the literature and other resources is an important skill for professionals, and is a constituent of Self-Directed Learning skills students must master especially in higher education. The scaffold is provided for students through a limited set of resources that can be selected. It is expected that more advanced students rely increasingly on their own skills to find relevant resources (Jeong & Hmelo-Silver, 2010).

Research on PBL in medical education contexts (e.g. Albanese & Mitchell, 1993; Vernon & Blake, 1993) mainly make a comparison between the results of PBL methods with more traditional teaching methods. Research has continued on the PBL as a means to prepare professionals. These studies provide an idea of how PBL may be

compared with traditional methods. However, PBL presents some unique challenges for evaluation. Because the focus of PBL is primarily to learn how to learn and less on mastering a body of knowledge and traditional methods of evaluation, such tests may not be very effective (Major, 1999). If traditional assessment is a good measure of traditional pedagogy, it is logical that the alternative assessment techniques could be a better measure for assessment in PBL settings. The use of alternative assessment in the case of PBL can help in bridging the gap between education and evaluation (Nightingale et al, 1996). There are some signs of a movement in this direction. Recent studies have begun to investigate the results of PBL, such as teamwork and presentation skills that cannot be associated with traditional classroom methods. Cockrell, Caplow and Donaldson (2000) conducted a study on the prospects of the students in their learning as members of the cooperative groups. The researchers, using interpretive methods, found that cooperative groups promote a sense of ownership of the knowledge that was created during the semester for the students. The researchers also indicate that within the groups, the leadership moved from one student to situations as they arise and resolve. Ajmal (2016) found that prospective teachers had good and valuable experience of the course through Problem Based Learning.

3. Research Methodology

3.1. Research Design

The present study was a one shot experimental study, without the use of a control group. One group of students enrolled in "Educational Research" was taken for the study. PBL was practiced through multiple group meetings as depicted in the Maastricht seven steps approach to PBL outlined above for eight weeks. Prospective teachers were allowed to change their roles as leader, recorder, moderator, board writer or discusser during their weekly group discussions based on the PBL 7 step approach. They were given the basic concepts and they went for independent study followed by group study and sharing the ideas of their group with other class fellows during next session.

3.2. Sample and ethical considerations for sample

A sample of 35 female students studying in Department of Education, International Islamic University Islamabad was taken for the study. The

students were aware that they were going to experience an innovative learning in the course of study. They were told that their identities of data will not be depicted and the data would be used for research purpose only.

3.3. Data Collection and Analysis

- After administering the pre-test the students were taught the course for 8 weeks by using PBL and the post test was a mid-term exam.
- The pre-test was based on 30 MCQs items related to Educational Research. It included items on concept of research, educational research and types of research in education. The items were related to knowledge, comprehension and application. The test was developed by the researcher who was teaching that subject to them as her regular assignment.
- The post test was a mid-term exam of 30 marks based on the contents taught in 8 weeks. It included the units based on research, educational research and types of research in education. The data were analyzed by using paired sample t-Test.

3.4. Limitation

The study although prove PBL as an effective methodology yet it has certain limitation i.e. the design was only one group and there is no comparison with the other group.

4. Findings

Table 1. Difference between scores of Pre-Test and Post Test

		Numbers of Prospective teachers	Mean score	Standard Deviation	p value
Knowledge Items	Pre-test	35	44.27	8.994	0.0486
	Post-test	35	48.03	4.870	
Comprehension Items	Pre-test	35	33.67	7.144	0.0308
	Post-test	35	35.97	4.012	
Application Items	Pre-test	35	26.45	5.050	0.001
	Post-test	35	30.00	3.691	

Df=69 Sig.(2tailed)= 0.05

The Table shows the mean scores of students on pre and post-tests regarding the knowledge, comprehension and application level items, the post test mean scores of all levels are higher than the pre-test scores. Paired sample t-test was applied in order to check whether the mean scores of pre and post-test are considerably different or not? The results of the t-test shows a considerable difference in the scores of mean for pre and post-test on all levels as p values 0.04, 0.03 and 0.001 are lesser than α=0.05.

5. Conclusions

Based on the results of applying the t-Test to the pre and post test data of 35 students in this class it was concluded that:

1. Problem Based Learning proved to be an effective method for developing knowledge of prospective teachers.
2. Problem Based Learning proved to be an effective method for developing comprehension of prospective teachers.
3. Problem Based Learning proved to be an effective method for developing application of prospective teachers.
4. Problem Based Learning proved to be an effective method for effective learning of prospective teachers.
5. This provides some evidence that PBL can be effective when introduced for pre-service teacher education programs.

6. Discussion

Problem Based Learning can change view of Learning by utilizing creative ideas, activity based learning, involving learners in different tasks and solving problems. According to Albanese and Mitchell (1993) it has been reported by many learners that Problem Based Learning courses are more satisfactory based on their experiences in comparison to other students who were not interested to attend Problem Based Learning courses. It is concluded about this study that Problem Based Learning is beneficial for enhancing cognitive performance of prospective teachers. Problem Based Learning has been experimented as pedagogy in various disciplines and contexts around the world and recognized as effective teaching-learning method (Dastageer, 2015) and results of current study are also supporting this. The current study provides evidence that PBL can

be utilized in teacher education programmes which is supported by Endrogen (2014) that despite some limitations it is an effective pedagogy.

7. Recommendations

The following recommendations are made after the study;

As PBL has been tentatively shown to be an effective method for effective learning of prospective teachers, it is recommended that it may be adopted and adapted much more widely across pre-service teacher education programs in Pakistan. Together with evidence from further research into how best to use and assess PBL it may contribute to improving the quality of teachers of Pakistan, hence improving National Education System in Pakistan.

Suggestions for Future Researches

Similar studies may be conducted for gauging the effectiveness of teacher education programs through:

1. Utilizing PBL with different levels of learners
2. Utilizing PBL in different courses
3. Using a true experimental design, and
4. Making gender wise comparisons

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