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### A STUDY TO ASSESS THE EFFICIENCY OF PROBLEM BASED LEARNING (PBL) IN TERMS OF ENHANCING CRITICAL THINKING SKILLS AND PROBLEM SOLVING ABILITY AMONG NURSING STUDENTS

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#### ABSTRACT

This present study was done to evaluate the efficiency of problem-based learning (PBL) over Lecture method in terms of enhancing critical thinking skills and problem solving ability among nursing students in selected Nursing Institutions of Coimbatore, Tamil Nadu. A Quasi Experimental study with control group pre test and post test design was adopted to determine the effectiveness of PBL in enhancing critical thinking skills and problem solving ability among nursing students. A total sample of 260 sample were included in this study, out of which 130 were allotted to the interventional group and the remaining 130 to the control group(Traditional Lecture Method) using purposive Sampling Technique. A structured questionnaire developed by the researcher to assess the higher level of cognitive skills was used to assess critical thinking skills and problem solving ability of nursing students. The result of the present study revealed that there was a significant increase in the overall level of critical thinking skills and problem solving ability in the interventional group than in control group.

#### KEYWORDS

Problem – Based Learning, Critical Thinking and Problem Solving.

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#### INTRODUCTION

In today's fast paced, technologically advanced world, the challenge for nursing faculty is to teach students critical thinking (CT) skills and the ability to practice competently in a variety of situations. The rapidly changing nature of the health care system presents nurses with varied complex practice issues with no clear solutions. These health care problems require nursing students and nurses to have CT skills<sup>1</sup>. Educators have to equip nursing students with skills that promote their CT to solve complex issues. The development of CT skills requires students to

engage in discussions to become active participants in their own learning<sup>2</sup>. Education with an active learning will result in significant increase between the education and medical practice<sup>3</sup>. Unfortunately, traditional undergraduate exercise science courses using lecture based instruction are often content driven, emphasizing abstract concepts over concrete examples and application<sup>4</sup>. Nurse educators in academia have long supported the notion of self-directed problem-based learning (PBL). Problem-based learning originated in the late 1960s at McMaster University in Ontario, Canada. Howard Barrows, the founder of this educational methodology, developed the self-directed model to improve education in the school of medicine<sup>5</sup>. It was developed to improve medical education by moving from a subject and lecture-based curriculum to an interdisciplinary one guided by 'real-life' problems<sup>6</sup>. Its effectiveness has been well documented in medical education research. Along with self-directed learning, the development of critical thinking and problem solving skills is the main goal of PBL.

#### **The Objectives**

To assess level of critical thinking skills and problem solving ability of nursing students among the control and the interventional groups.

To determine the effectiveness of PBL on critical thinking skills and problem solving ability of nursing students.

#### **MATERIAL AND METHOD**

A Quasi Experimental study with control group pre test and post test design was adopted to determine the effectiveness of PBL in enhancing critical thinking skills and problem solving ability among nursing students. A total sample of 260- II year B.Sc Nursing students from selected colleges of Nursing in Coimbatore were included in this study, out of which 130 were allotted to the interventional group and the remaining 130 to the control group. Purposive Sampling Technique was adopted for this study. A structured questionnaire consists of 40 multiple choice questions was developed based on Bloom's Taxonomy in the areas of Knowledge, Comprehension, Application, Analysis and Synthesis in order to assess the higher level of cognitive skills.

A teaching module on PBL process was developed using power point. A problem scenario on Diabetes Mellitus was developed which need to be solved through PBL Process. In this process, after administering pretest to the interventional group, the group was divided into small groups (8-10 students / Group). Each group selected a leader and a scribe for recording the learning issues. The problem scenarios were given to the students and were asked to brainstorm and formulate learning objectives using PBL methodology. Students undertook self-directed learning for 5 days to inform their identified learning objectives. During those days, each group met daily as planned by their group leader in order to discuss the learnt issues. Then on the fifth day, each PBL group gave a formal, timed presentation to, and responded to questions from the whole group. This was followed by a brief summary and discussion led by the facilitator to highlight the integrated approach in the case. After that post test was administered to assess their critical thinking skills and problem solving ability. A post- interventional follow-up was done after 3 months after the intervention using the same questionnaire to see if the effect of the intervention (PBL) is retained after an intervening period.

#### **Lecture method (Administered to the control group)**

Control group was taught on diabetes mellitus using traditional lecture method as a routine method of teaching by their concerned subject faculty. Pre test, post test and post-interventional follow-up were done using the same tool. After the post-interventional follow-up, the control group students and the faculty were taught about PBL methodology for ethical reasons.

#### **RESULTS**

Table No.1 shows percentages of students' level of critical thinking skills and problem solving ability for both study groups. It was observed that in the pre test of control group, the highest score was 80(62%) for moderate skill, and the lowest score being 2(2%) for excellent skill. In the pre test of interventional group, the highest score was 78(60%) for moderate skill, and the lowest score of 23(18%) for well skill

and none of them had excellent skill. In the post test-1 of control group, the maximum sample 66(51%) possessed excellent skill and in post test-2 the highest score was 57(44%) for well skill, and the score for excellent skill was reduced to 18(14%), which is evident for having reduced in the level of critical thinking skills and problem solving ability in the post test-2 period. Whereas, it was amazing to note that in the post test-1 and post test-2 of experimental group, none of the subjects had neither low nor moderate skill. In post test-1, out of 130 subjects, 84(65%) had well skill, 46 (35%) had excellent skill and in posttest-2, the level of critical thinking skills and problem solving ability in excellent skill had hiked to 57(44%), which is higher than that of the post test-1.

Table No.2 reveals that in the post test-2 of interventional group, the overall mean was 76%, which is higher, compared to the overall mean score of control group (54%). Further, the mean percentage was higher in all the areas of post test-2 in the interventional group than in the control group, which proves a significant gain in critical thinking skills and problem solving ability in the interventional group after undergoing PBL process.

Table No.3 reveals that there is a significant difference between post test-2 of control group and post test-2 of interventional group in the level of critical thinking skills and problem solving ability. The obtained overall 't' value 12.17, is higher than the table value, which is highly significant at 0.001 level of significance. Thus, the research hypothesis is accepted. It can be concluded that the interventional group, who underwent PBL process scored higher in critical thinking skills and problem solving ability than the control group, who were taught in lecture method. Hence, it was revealed that the highly significant result was by true difference, not by chance.

## **DISCUSSION**

One of the major objectives of nursing education is teaching critical thinking to its students. Nurses are responsible for assessing, diagnosing, prescribing and implementing plans of care. Hence, it is essential that nurses possess critical thinking skills and are

prepared to respond to unfamiliar situations by applying principles and lessons learned from similar clinical situations to the one presently faced. Studies focusing on finding an effective approach to teaching critical thinking and clinical decision-making are found in the literature and are ongoing in nursing, medical and other clinically focused professions. PBL was developed in the mid-sixties as a useful instructional alternative to conventional (lecturing) teaching. It is designed to help students construct an extensive and flexible knowledge base, develop self-directed learning skills, and become intrinsically motivated to learn. The PBL in fact, establishes a format through which students learn. In recent decades, PBL has been proposed as an alternative to learning by the traditional lecture method. Many studies confirm that learning by the PBL method improves critical thinking skills, clinical reasoning skills, clinical knowledge, learning motivation, and learning autonomy. Increasing retention, interest, and motivation are some of the benefits of PBL. Based on many supportive studies, the author has taken up an initiative to implement PBL method of teaching as an innovative method to increase critical thinking skills and problem solving ability among nursing students. In Indian context, maximum student learning is achieved through lecture method of teaching, which suppresses the critical thinking skills of students. It was observed in this study that the majority of the subjects 80(62%) had moderate skill and only 2(2%) had excellent skill in the pre test of control group. In the pre test of interventional group, majority of the subjects 78(60%) had moderate skill, and 23(18%) had well skill and none of them had excellent skill. In the post test -1 of control group, the maximum sample 66(51%) possessed excellent skill and in post test-2 the highest score was 57(44%) for well skill, and the score for excellent skill was reduced to 18(14%), which is evident for having reduced in the level of critical thinking skills and problem solving ability in the post test -2 period. Whereas, it was amazing to note that in the post test -1 and post test -2 of interventional group, none of the subjects had neither low nor moderate skill. Through this study, it was evident that the PBL method of teaching was not

only effective in enhancing critical thinking skills and problem solving ability of nursing students, but also the retention power as the post test-2 level in interventional group was higher than post test-1 level. The finding was supported by the study done by Sendaq and Odabas<sup>7</sup>. These authors had used an exact instrument in measuring students' critical thinking changes in PBL experiment. The result, students in PBL approach increased in their critical thinking ability compared to the students in the traditional learning approach. Comparing the post test -2 scores of interventional and control groups, the overall mean was 76% in interventional group ,

which is higher, compared to the overall mean score of control group (54%). Further, the mean percentage was higher in all the areas of post test-2 in the interventional group than in the control group, which proves a significant gain in critical thinking skills and problem solving ability in the interventional group after undergoing PBL process. Similarly Koleini *et al*<sup>8</sup>. Showed that there was a significant difference between the traditional-based learning and PBL, in which it was noted that PBL led to better learning than to the lecture method.

**Table No.1: Pre test and post test levels of critical thinking skills and problem solving ability of nursing students between control and the interventional groups**

S.No	Level of critical thinking	Control group n =130						Interventional group n =130					
		pre test		Post tes-1		post test -2		pre test		post test-1		post test-2	
		f	%	f	%	f	%	f	%	f	%	f	%
1	Low	11	8	4	3	10	8	29	22	-	-	-	-
2	Moderate	80	62	42	32	45	34	78	60	-	-	-	-
3	well	37	28	18	14	57	44	23	18	84	65	73	56
4	Excellent	2	2	66	51	18	14	-	-	46	35	57	44

**Table No.2: Area wise distribution of mean, SD and mean percentage of post test-2 scores of interventional and control groups**

S.No	Area	Max score	Control group Post test-2 scores n=130			Interventional group Post test-2 scores n=130			Difference in mean %
			Mean	SD	Mean %	Mean	SD	Mean %	
1	Knowledge	8	5.26	1.49	66	6.52	1.21	82	16
2	Comprehension	8	4.13	2.05	52	5.64	1.18	71	19
3	Application	8	4.34	1.95	54	5.99	0.95	75	21
4	Analysis	8	3.83	2.35	48	5.9	1.13	74	26
5	Synthesis	8	4.16	2.09	52	6.26	1.01	78	26
6	Overall	40	21.73	7.55	54	30.31	2.73	76	22

**Table No.3: Un-paired ‘t’-test for post test-2 of control group and post test-2 of interventional group on the level of critical thinking skills and problem solving ability among nursing students  
n =130**

S.No	Area	‘t’-test	P-value
1	Knowledge	7.46	<b>0.000***</b>
2	Comprehension	7.26	<b>0.000***</b>
3	Application	8.64	<b>0.000***</b>
4	Analysis	9.054	<b>0.000***</b>
5	Synthesis	10.28	<b>0.000***</b>
6	Overall	12.17	<b>0.000***</b>

\*\*\* P<0.001

### CONCLUSION

In the light of the findings, there is a positive effect on the influence of PBL in enhancing critical thinking skills and problem solving ability among nursing students. It offers several advantages over traditional lecture methods. It is based on principles of adult learning theory, including motivating the students, encouraging them to set their own learning objectives, and giving them a role in decisions that affect their own learning. So, it was concluded that PBL is a potentially powerful and essential approach to promote quality in nursing practice, which is dependent upon the educational preparation of nurses to think critically and solve problems.

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### CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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