

PROBLEM-BASED LEARNING VS. TRADITIONAL TEACHING METHODS: SELF-EFFICACY AND ACADEMIC PERFORMANCE AMONG STUDENTS OF HEALTH AND REHABILITATION SCIENCES COLLEGE, PNU

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ABSTRACT: *Teaching and learning strategies have a strong impact upon the self-efficacy, motivation and performance of the students. Teaching methods can enhance the basic cognitive abilities and achievement of students. Thus, it was found essential to study the impact of problem based learning and traditional teaching methods in relation to self-efficacy and performance. The main objective of this study was to provide evidence of the effectiveness of various teaching strategies by comparing them in terms of self-efficacy and academic performance among students. This study compared two teaching methods (PBL vs. Traditional teaching style) and its impacts on self-efficacy and academic performance of College of Health and Rehabilitation Sciences. A study was conducted during the first semester of academic year (1437-1438H / Sep 2016-Jan 2017). A study was carried out in two stages, having pre/post testing (two-time point intervention) of the students. The sample of this study comprised of (n=143) students enrolled in college of health and rehabilitation sciences within 13 departments. Standardized scale of Academic Self-efficacy scale was used as a measurement tool. Moreover, the grade of the students served to measure the performance. Results showed strong positive correlation of self-efficacy and performance. There was no difference on self-efficacy for both groups of PBL and LBL. GPA was significantly higher among LBL group. The study was limited to one college only. Further studies at the Health Campus of other universities will provide chance to generalization for effective teaching strategies.*

Key words: Academic Performance, Self-efficacy, Teaching Method, Problem-based learning, Learning Science, Educational Technology

1. INTRODUCTION

Classroom instruction methods have noticeably changed over the past decades [1]. This evolution has been exhilarated by the progress of several learning ideologies and techniques of instruction, including active learning, student-centred learning, collaborative learning, experiential learning, and problem-based learning [2]. These strategies are sharing essential primary features and can be considered as complementary elements of a wider method of classroom instructions. The key drive of this study is to highlight on the differences of teaching styles that comprise the traditional teaching and learning methods with generating active interactions between teachers, students, and a shared body of knowledge to inspire student learning and personal development. Considering this viewpoint, teachers are intellectual trainers who build up groups of students who collaboratively work together with them to enhance student's skills [1]. Usually teachers adopt the role of assisting students to grasp the main course concepts. Besides this aim, teachers remain focused to increase students' personal development and attitudes toward learning. Teachers attain these goals by creating a common image for a course, delivering modelling and mastery experiences, challenging and inspiring students, personalizing attention and reaction, creating experimental lessons that go beyond the boundaries of the classroom, and promoting sufficient opportunities for reflection [3]. These approaches are strongly interrelated and, when used collectively, they advance students' latent for intellectual and personal enhancement [4].

When students are in a classroom environment; they need distinguished instructions and encouragements. Studies recommend that medical students' inspiration will increase their confidence, self-efficacy, and academic performance

[5,6]. Instructors need to use a diversity of teaching techniques in the classroom to dynamically involve students to promote effective accomplishment in advanced levels of learning. A case study done by Schmidt (2011), it was advised that there is a need to learn new strategies when integrating motivation into the teaching process [7]. Teachers are always facing matters with motivation and variations in the classroom. As emphasized by Artino (2012), the importance of instilling in students the faith in their skills and to enhance motivation both are essential [6]. Students need to be directed to focus on the strength that they own. Careful consideration to each student's abilities can strengthen a positive approach to learning. It was found that students will develop a "Can Do" attitude toward their education [8]. The relationship between self-efficacy and learning has been the topic of interest for researchers. According to Pajares (2006), people's judgments of their capabilities are to organize and execute courses of action required to attain designated types of performances [9]. Self-efficacy beliefs afford the basis for human motivation, well-being, and personal achievement. When individuals believe that their actions produce the intended outcomes they are targeting, they show little motivation to act or to continue in facing difficulties [10].

It has been revealed that the problem-based learning (PBL) is a very significant method that challenges the classical views of teaching and learning as the learner can determine with the support of a skilful instructor, on topics that to be identified, to the depth and the processes that are used. The impact of PBL was studied with the variation of group size for instance small groups, and larger groups [8, 11].

As compared to PBL, in Lecture Based Learning (LBL) method, students focus on memorising and capturing the concepts depending upon reception of information that

exclusively delivered by their teachers [12]. Many studies were conducted to compare PBL with the traditional LBL, with respect to acquiring knowledge, investigations showed different results. In some studies, PBL did not show any preference over LBL on the trainees' knowledge [13,14].

The main objective of this study is revolving around finding the evidences of the most efficient aspects of teaching strategies in relation with the development of academic self-efficacy and enhancement of performance of the Health Sciences students. The processes of PBL in the learning environment and the subsequent roles of students and teachers in the learning setting have been explored. Thus, two hypotheses were formulated, "There will be a significant difference in the level of self-efficacy and academic performance of the students receiving PBL vs. LBL" and "There will be significant difference in the level of academic performance of students taught in medium, and large PBL teaching groups".

2. MATERIAL AND METHODS:

Research design was comparative with two-time point intervention. Data was gathered by standardized self-report questionnaires and self-prepared sociodemographic information sheet. The sample of this study were students (n=143) enrolled in the Bachelors Program of the college of health and rehabilitation sciences, Princess Nourah Bint Abdulrahman University. Sample was calculated by using statistical power analysis software (by using 95% C. I.). Students from level 4, 5, 6 and 7 were included having the age range of 19 to 23 years (24.54±.803). Student from level 3 and 8 were excluded in order to avoid further psychological stress and maturity to avoid validity threat that could influence the results.

A personal information questionnaire prepared by the researchers was used to gather the demographic and academic information of the students. Self-Efficacy for Learning Form (SELF)-Abridged is self-rating scale for measuring beliefs and attitudes of self-efficacy of college students. Original scale consists of 57 items. Self-Efficacy for Learning Form is a condensed version. It contains 19 items rating from 0-100%. It measures Self-regulation of academic functioning and learning for instance note taking study patterns and test preparations. It takes maximum 4 minutes to administer. Internal consistency of the scale was found $\alpha = .97$ [8]. Grade point average (GPA) was considered as a course performance indicator. Thus, GPA was collected at the end of semester/block.

Procedure

Before starting the research project scientific and ethical permission was sought from Deanship of Scientific Research council of Princes Nourah bint Abdulrahman University. A consent form was developed and administered to the participants assuring their willingness to participate in the study and the confidentiality of their information. In the first stage of the study, after getting informed consent from the participants, scales of Self-Efficacy for Learning Form (SELF)-Abridged was administered. In the second stage, students were approached at the end of the semester or module and were requested to respond on the scale again. Further, the performance of the students was computed

through GPA to measure the effectiveness of lectures, and various Problem-based learning (medium and large groups) strategies.

Collected data was analyzed by using SPSS (V. 24). Descriptive Statistics of measures of central tendency and dispersion were calculated. Pearson's Product Moment Coefficient of Correlation was used to measure the relationship between self-efficacy, perceived performance and GPA. Inter-correlation was computed for various academic self-efficacy methods. t-test was conducted to measure the differences of performance scores of PBL and LBL students, furthermore, to measure the differences of performance of medium and large size groups of PBL.

3. RESULTS

Table 1: Sociodemographic Information and academic variables of students (N= 143)

Variable	f	%	M	SD
Age				
19 years	4	2.8 %		
20 years	79	55.2 %		
21 years	42	29.4 %	20.54	.803
22 years	15	10.5 %		
23 years	3	2.1 %		
Living Status				
With Family	137	95.8%		
At Hostel	6	4.2%		
Perceived Socioeconomic Status				
Lower	9	6.3%		
Middle	120	83.9%		
Upper	14	9.8%		
Department				
Rehabilitation	55	38.5%		
Health Sciences	48	33.6%		
Radiological Sciences	12	8.4%		
Communication Sciences	28	19.6%		
Learning Method				
PBL (Medium size groups)	26	18.2%		
PBL (Large size groups)	26	18.2%		
LBL (Traditional method)	91	63.6%		
Average Study Hours (Spent independently by student)				
1-2 hours	14	9.8%		
2-3 hours	24	16.8%		
3-4 hours	42	29.4%		
4-5 hours	31	21.7%	3.40	1.42
5-6 hours	18	12.6%		
More than 6 hours	14	9.8%		
GPA				
	Min	Max		
Current GPA of Semester	2.08	5.00	4.31	.46
CGPA				
Overall GPA	2.59	4.98	4.39	.34

Note. f= frequency, %= percentage, M=Mean and SD=Standard Deviation, Min=Minimum, Max=Maximum, PBL= Problem based learning, LBL=Lecture based learning, GPA= grade point average, CGPA= cumulative grade point average

Results in (Table1) indicated that most of the students at the College of Health and Rehabilitation Sciences who participated in this study were related to the age group of 20 years (55 %). Findings showed that 95.8% of the students were living with their families. Proportion wise, students from the Department of Rehabilitation Sciences were representing the majority (39%). Most of the students were enrolled in lecture based traditional learning method (64%). Mean Great Point Average (GPA) of the semester for students of college of Health and Rehabilitation sciences was 4.31 and Cumulative Great Point Average (CGPA) was 4.39.

Table 2. Correlation of perception of performance, self-efficacy and actual performance

Variables	Perception of Performance	Self-efficacy	GPA
Perception of Performance	-		
Self-efficacy	.360**	-	
GPA	.215**	-.007	-

**p < .01, (1), (2), (3)

Results shown in (Table 2) above; indicate the significant correlation between perception of performance with self-efficacy (r=.360, p<.01) and GPA (r=.215, p<.01).

Table 3. Inter-correlation of self-efficacy and sub-factors(N=143)

Variables	(1)	(2)	(3)	(4)
(1)	-			
(2)	.760**	-		
(3)	.839**	.527**	-	
(4)	.798**	.341**	.622**	-

**p < .01, (1) Self-efficacy, (2) Note taking, (3) Study pattern, (4) Test Preparation

Table 3 is shows statistically significant correlation between total self-efficacy and sub factors of note taking (r=.760, p<.01), study pattern (r=.839, p<.01) and test preparation (r=.159, p<.01). All the correlations are significant on .01 levels.

Table 4. Results of t-tests and Descriptive Statistics for self-efficacy, various study method and academic performance

	Group	PBL (n=52)		LBL (n=91)		t
		M	SD	M	SD	
		(1) Before	109.38	26.231	115.88	
(1) After	114.31	21.598	115.56	22.881	.321	
(2) Before	27.35	10.265	30.00	8.328	-1.589	
(2) After	30.29	9.369	32.45	8.661	-1.394	
(3) Before	35.17	10.282	38.40	8.083	-2.073*	
(3) After	36.42	8.605	37.81	7.888	-.981	
(4) Before	46.87	10.642	47.48	9.169	-.366	
(4) After	47.15	10.634	45.30	10.402	1.019	
(5)		4.19	.373	4.37	.503	2.31*

* p < .05, df=141, (1) Self-efficacy, (2) Note taking, (3) Study pattern, (4) Test Preparation, (5) GPA

Results (Table 4) shows that there is no statistically significant difference among PBL and LBL students on the pre-assessment and post-assessment scores of self-efficacy. Overall, mean score is higher among LBL students (M (before)=115.88, M (After)=115.56) during first and second assessment. In comparison scores of students of PBL on self-efficacy indicated improvement at post phase. Among various self-efficacy categories only one category of the study patterns was found statistically significant (t= -2.073, df = 141) in the first stage of assessment with LBL. Results of the two-

independent samples t-test shows that mean of GPA differs between PBL (M = 4.19, SD = .373, n = 52) and LBL (M = 4.37, SD = .503, n = 91) students at the .05 level of significance (t = 2.31, df = 141, p < .05, 95% CI for mean difference -.343 to -.027). Students enrolled in lecture based method tend to have higher GPA than problem based learning method.

Table 5. Results of t-tests and Descriptive Statistics for academic performance

CPGA	Medium group		Large group		t	df
	PBL(n=26)		PBL (n=26)			
	M	SD	M	SD		
CGPA	4.29	.278	4.23	.349	.689	50

p> .05

An independent-samples t-test was conducted to compare academic performance through cumulative grade point average in medium size PBL group (maximum 25-30 group of students) and large size PBL group (maximum 60 or more students).

4. DISCUSSION:

Wintre & Yaffe stated that good parent-child interactions can later affect students' performance and adjustment to the new college environment [15]. Results also depicted that majority of students (84%) belong to the middle socioeconomic status. Studies have frequently showed that the socio-economic status (SES) affects student results [16,17,18]. The socio-economic and educational status of a family governs the quality of academic achievement of a student. In general, it is alleged that children belonging to high and middle (SES) families are acquiring a better learning environment at home and this is due to the enhanced learning facilities [19].

It is found that institutions that depend on the LBL find it much easier as the PBL method has too many requirements on all levels being institutionalized, instructors', or on the students' level. On the institutional level, it requires more preparations in terms of the expected change in educational philosophy of instructors who are currently adopting LBL. It will also need well qualified instructors in PBL which will lead to avail continuous staff development courses. It is also required more instructors to work on small groups of students and to have spacious classrooms to accommodate these groups. On the instructors' level the PBL method requires intensive preparation time in terms of problem scenarios to be discussed in the classroom. Working with groups of students requires close supervision and intervention from the instructors. It also puts an additional burden on the instructors of how and what to assess in terms of knowledge provided to students. Coming to students who need to have more time in preparing for the tasks. The PBL method is time consuming that leaves no opportunity for students to participate in any other non-academic activities that might enhance their social skills.

This proves that there is also an advantage of the LBL. It was found in one of the studies in Asian countries that students following the PBL scored lower on basic science and felt they were less prepared than their counterpart who follow the traditional lecture method [13]. The systematic review of PBL for undergraduate medical students revealed no significant difference for knowledge acquisition, further, some difficulties in their cognitive knowledge have been seen which later affected their practical skills [20,21]. On the other hand, PBL students of Pakistan enrolled in medical sciences

reported greater healthier attitude toward their educational experience than their traditional lecture-based counterparts [14].

Since Self-efficacy revolves around the students' views about their competence to learn or to effectively accomplish higher grades (table 2); consequent expectations refer to students' beliefs about the performance. Studies showed that students with a high sense of self-efficacy tend to use cognitive and metacognitive strategies and will continue working on difficult or uninteresting tasks [22,23,24]. As stated by Bandura, people's beliefs in their efficacy characterise their styles of actions in different situations that they construct and get trained for [25]. People with a high sense of efficacy, visualize success scenarios that afford positive directions and supports for performance. Those with a frail sense of efficacy, think of unsuccessful situations and anticipate the things to go wrong. It is tough to accomplish much while struggling with self-doubts.

The LBL method is based on memorizing which means the encyclopaedic knowledge is much valued rather than the acquisition of skills. In the LBL if a student conducts a mistake or a wrong answer this might be considered a shame and might negatively affect her participation in the classroom. In the LBL the learners are passive recipients; which might lead to discouraging students from becoming active in communicating their needs to their instructor. In contrast, PBL allows learners to explore knowledge themselves through identifying the problems found in the cases or materials that will be presented to them by their instructors and students will work to bring solutions to these problems. It is also known as creating a positive relationship between students and instructors. The PBL is one of the motivating learning method for students. It enhances students' theoretical knowledge and enables them to acquire practical skills. In this method, students usually get a prompt feedback from their instructors. Students are also able to develop independent creative thinking by getting encouraged to discuss issues that are related to the topic they are studying [4].

Concerning the variation in the assessment between the PBL and the LBL that shown in table 4, this variation might be due to the structured nature of LBL that produced a difference at the beginning of the semester. Therefore, this effect of study patterns became invalid within both stages of assessment. In this study, no significant difference was found in students' GPA of those who have followed the LBL or the PBL methods. This might be due to the fact that the PBL motivates students and increases their knowledge and provides them with skills. But when it comes to the preparations for the test and answering the questions the LBL is more convenient. Students usually find it useful to have lecture notes that will help them in reviewing the topics prior to conducting the tests the thing that helps in getting good grades. Students who are in PBL group their mean score raised at test preparation due to many factors, for example the classroom discussions on the well-structured problems, that enhance the learners' reasoning strategies and assist students to share their knowledge and to exploit previous experiences in solving the problem [26]. While those who are in LBL are just preparing themselves prior to the exam that's why they might be exposed to stress more as compared to PBL.

Since students in the traditional method group scored higher on GPA than the students' GPA in the PBL a number of assumptions can be drawn. One likelihood is that the higher scores indicate a higher aptitude for learning in the traditional method group. This reflects on the students' ability of fast learning speed rather than the effectiveness of the method of teaching. Students self-efficacy is highly associated with their academic performance. The results of this study showed that both groups of PBL and LBL are having a mean GPA of 4 out of 5. It can be explained by both PBL and LBL teaching strategies. Firstly, PBL has a constructive effect on students' grades (Mean GPA 4). This was connected to their strong motivation for studying. The nature of the PBL method is having a scenario-based and interactive study method, in the presence of a tutor and other students that strengthened their motivation. In contrast, the characteristics of the LBL being systematic in providing students with resources and its organised assessment methods also enhanced the students' performance.

There was no significant difference found between two groups of PBL on CGPA (table 5). These results are consistent with the findings of table 3 as there was no significant difference between PBL and LBL groups. Same results appeared with regards to the size of the students' groups which also confirms that PBL method found effective (mean CGPA 4.23- 4.29) in medium and large size groups [4].

The findings of this study were diverging the results of studies that conducted in the Saudi context which confirmed the satisfaction of the majority of the students with the PBL and positively considered it as a method that will enhance their learning and will enable them to get well developed. This in addition to other outcomes of local research that confirmed the same results [27,28,29].

5. CONCLUSION:

As learning is considered a continuous process that entails rapid changes, educators need to examine their teaching methods frequently to see if they continue to meet the needs of learners. Any adjustment or progress in the curriculum needs to be based on a rational and investigative evidences. The utmost objective of PBL is to assist students develop problem-solving skills. Most of its supporters recognize that knowledge is needed to fill gaps in the student's knowledge base, this study highlighted on the students' experiences with regards to PBL. Results show that there is an evidence regarding the efficacy of PBL as a teaching method. Study was conducted at College of Health and Rehabilitation Sciences only. In future, other 4 colleges of Health campus can be included for in-depth insight. Moreover, inclusion of other medical universities of Riyadh can provide better chances to generalize the results.

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