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Training tutors for implementing problem-based learning at a private medical college of Nepal

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ABSTRACT

Introductions: Problem based learning (PBL) is an innovative approach of teaching learning methodology in which, instead of traditional lectures, students are divided in small groups and provided with a problem which they try to solve. It has been used in different medical schools around the world for over 50 years. In Nepal, the use of PBL methodology is gradually increasing.

Methods: Three experts on PBL content and process provided interactive lectures, hands-on exercises and plenary discussion sessions in 2014 at Lumbini Medical College. Effectiveness of the workshop was assessed by validated retro-prequestionnaire at the end of the workshop. Paired t-tests were used to test the differences between before and after scores on knowledge, application and opinion on PBL. Effect size was also calculated to determine the size of the difference between before and after the workshop.

Results: The PBL training was effective as it increased knowledge, application and opinion on PBL of most of the participants. The workshop benefitted the most to the experienced male basic sciences faculty. However, clinical sciences faculty were skeptical of its application and their opinion on PBL did not change much whereas nursing faculty had some reservation on their opinion about PBL only.

Conclusions: As PBL is implemented during the basic sciences years only, the concerned faculty benefitted the most from the workshop. Further such trainings are advocated to increase the pool of trained tutors for effective implementation of the PBL.

Keywords: faculty training, Kathmandu University, Lumbini Medical College, Nepal, PBL problem-based learning

INTRODUCTIONS

Problem based learning (PBL) is a method of learning in which the learners first encounter a problem, followed by a systematic, student-centered enquiry process[1]. Students' learning is initiated by an authentic problem or puzzle that the learner wants to solve and find solutions.[2] It is one of the innovative themes in medical education.[3]

In order to use PBL as a teaching tool, faculty must be familiar with PBL and comfortable with the transition of role from 'teacher' to 'facilitator' or 'tutor'.[4] This transition is critical for the success of PBL.[5] A good tutor should know the goals of the curriculum and learning objectives, group dynamics, problem solving, critical thinking, conflict resolution and assessment of the students individually and as group.[6]

Thus, PBL training workshop was done to train the tutors in the process and skills of PBL tutoring using a well-tailored module at Lumbini Medical College, Nepal.

METHODS

Three founding faculty and experts on PBL content and process from Patan Academy of Health Sciences (PAHS) conducted a 3-day long, in-depth workshop in 2014, on PBL at Lumbini Medical College (a private medical college affiliated to Kathmandu University) by sharing experiences in designing, executing and assessing the hybrid PBL curriculum; and teaching/learning methods used at Kathmandu University School of Medical Sciences and School of Medicine, PAHS (PAHS-SOM).

The workshop used few interactive lectures to clarify the key concepts followed by hands-on exercise on PBL case selection, PBL tutorial session using volunteer medical and nursing students and, PBL process assessments using Tutor Assessment of Students (TAS) tools used at PAHS-SOM. After each small group sessions, issues and concerns were discussed and clarified in a plenary session.

Effectiveness of the workshop was assessed using a pre-validated 20-item retro-pre questionnaire using a rating scale of 0 to 100, after the workshop. It also contained personal (age and gender) and academic (discipline and work experience) information. Knowledge, application and opinion scales were constructed adding the corresponding items afterwards. Filling the evaluation form was voluntary and once filled it was taken as implied consent leading to publication.

RESULTS

There were 21 participants in the workshop where 12 were male and 9 were female. The mean age of the participants was 39 years, with a large variation i.e. standard deviation was 18.11 years. Thus, minimum age was 24 and maximum was 78 years. There were 7 participants below the age of 30 years, 8 were between the age of 30-39 years and the rest were above 40 years. Among them 8 were from nursing background, 9 were from basic sciences background and 4 from the clinical sciences background; 6 participants had academic experience less than 2 years, 8 had 2 to 4 years and 7 with more than 5 years of experience.

Table 1 shows item-wise knowledge, application and opinion scores on problem based learning; table 2 shows change in summated knowledge, application and opinion scores (scales) on problem based learning and table 3 shows change in knowledge, application and opinion on PBL by participant's background characteristics.

There was an overall increase in mean scores for all the items (Table 1). The mean score for lifelong learner increased from 38.8 to 69.0 regarding knowledge; and it was even more significant in terms of application and opinion, which increased from 34.3 to 70.4 and 44.0 to 68.2 respectively. There were similar differences in the domain of adult learners, use of PBL in integrated curriculum, retention

Table 1. Knowledge, Application and Opinion Scores on Problem Based Learning, Lumbini Medical College, Palpa, Nepal, 2014

Domain	Knowledge Scores				Application Scores				Opinion Scores			
Test	Pre-Test		Post-Test		Pre-Test		Post-Test		Pre-Test		Post-Test	
Items	Mean	CV*	Mean	CV*	Mean	CV**	Mean	CV*	Mean	CV*	Mean	CV*
Lifelong learning	38.8	68.4	69.0	24.3	34.3	94.9	70.4	30.3	44.0	64.7	68.2	29.7
Students as adult learners	41.0	74.8	71.2	30.7	32.2	65.5	66.1	30.6	45.0	58.9	68.6	33.8
Use of PBL in the integrated curriculum	34.8	71.6	71.0	30.4	25.0	99.0	62.1	42.9	42.4	69.4	63.8	41.6
Higher knowledge retention in small group session	54.0	45.1	75.8	22.4	49.5	45.1	72.0	24.3	60.2	47.9	81.0	21.5
Use of clinical scenario for contextual learning in PBL	39.0	81.4	67.0	42.2	38.8	80.5	64.0	47.9	51.5	71.4	68.8	44.6
Active learning in the PBL	49.8	56.3	74.4	24.8	50.2	58.2	72.0	29.4	57.4	50.0	76.3	31.9
Self-directed learning sessions within academic schedule	40.7	74.1	69.2	28.9	41.0	69.8	62.3	38.7	48.1	57.8	67.8	35.8
Criteria for PBL case selection	20.5	125.7	62.7	43.3	32.4	110.8	56.3	52.3	26.2	112.9	61.8	48.4
Selection of PBL case for each week after group discussion	19.0	133.8	64.8	38.3	22.9	136.2	62.0	44.6	23.8	131.1	60.0	54.3
PBL covering the tutorial objective	22.6	116.7	61.7	39.2	24.8	126.3	59.5	49.1	26.0	120.4	63.6	48.2
PBL should not be used as mini lecture	25.2	101.7	71.9	32.6	27.3	108.2	72.0	34.0	27.8	105.5	72.6	42.0
The step by step process for conducting PBL tutorial	21.4	113.9	72.4	31.8	26.2	114.8	70.5	42.8	32.4	91.0	73.9	40.6
Ground rules for PBL tutorial	15.2	165.2	78.3	28.9	25.7	116.9	81.7	26.7	30.0	101.2	78.1	37.1
Tutors role in PBL tutorial	28.1	86.0	80.2	26.0	36.0	78.6	78.6	29.9	37.4	80.3	75.2	39.1
Students role in PBL tutorial	42.6	67.9	84.0	19.1	38.6	75.4	76.2	32.0	38.6	78.3	75.2	39.5
Self, peers and tutors reflection for PBL tutorial	30.7	78.5	75.8	24.9	30.5	90.0	73.6	27.2	33.1	87.8	74.9	35.6
Role of constructive feedback for PBL process	29.0	93.0	78.2	19.7	31.7	98.6	77.6	26.4	28.1	104.8	73.2	38.4
Importance of one to one formative feedback for PBL	27.9	98.9	77.1	26.8	26.0	115.7	71.7	34.6	32.6	107.1	74.5	37.2
Assessment of values/conduct/behaviour in PBL	21.0	121.4	66.8	29.7	26.2	117.8	74.9	27.8	28.1	113.9	73.0	39.3
Importance of summative process assessment in PBL	27.9	102.4	72.9	21.1	28.1	109.6	68.8	38.3	30.0	103.8	72.9	38.5
Criteria for PBL case selection	20.5	125.7	62.7	43.3	32.4	110.8	56.3	52.3	26.2	112.9	61.8	48.4
Selection of PBL case for each week after group discussion	19.0	133.8	64.8	38.3	22.9	136.2	62.0	44.6	23.8	131.1	60.0	54.3
PBL covering the tutorial objective	22.6	116.7	61.7	39.2	24.8	126.3	59.5	49.1	26.0	120.4	63.6	48.2
PBL should not be used as mini lecture	25.2	101.7	71.9	32.6	27.3	108.2	72.0	34.0	27.8	105.5	72.6	42.0
The step by step process for conducting PBL tutorial	21.4	113.9	72.4	31.8	26.2	114.8	70.5	42.8	32.4	91.0	73.9	40.6
Ground rules for PBL tutorial	15.2	165.2	78.3	28.9	25.7	116.9	81.7	26.7	30.0	101.2	78.1	37.1
Tutors role in PBL tutorial	28.1	86.0	80.2	26.0	36.0	78.6	78.6	29.9	37.4	80.3	75.2	39.1
Students role in PBL tutorial	42.6	67.9	84.0	19.1	38.6	75.4	76.2	32.0	38.6	78.3	75.2	39.5
Self, peers and tutors reflection for PBL tutorial	30.7	78.5	75.8	24.9	30.5	90.0	73.6	27.2	33.1	87.8	74.9	35.6
Role of constructive feedback for PBL process	29.0	93.0	78.2	19.7	31.7	98.6	77.6	26.4	28.1	104.8	73.2	38.4
Importance of one to one formative feedback for PBL	27.9	98.9	77.1	26.8	26.0	115.7	71.7	34.6	32.6	107.1	74.5	37.2
Assessment of values/conduct/behaviour in PBL	21.0	121.4	66.8	29.7	26.2	117.8	74.9	27.8	28.1	113.9	73.0	39.3
Importance of summative process assessment in PBL	27.9	102.4	72.9	21.1	28.1	109.6	68.8	38.3	30.0	103.8	72.9	38.5

**CV=coefficient of variation

Table 2: Change in knowledge, application and opinion scales on Problem Based Learning, Lumbini Medical College, Palpa, Nepal, 2014

Domain Scale	N	Pre-Test Mean	Pre-Test CV	Post-Test Mean	Post-Test CV	p-value	Effect Size (Cohen's d)*
Knowledge Scale	21	31.37	58.26	72.05	18.62	<0.001	2.52
Application Scale	21	32.21	68.60	69.45	26.11	<0.001	1.83
Opinion Scale	21	37.01	59.64	70.99	31.81	<0.001	1.52

*=Corrected effect size for paired t-test

Table 3. Change in knowledge, application and opinion on PBL by participant's background characteristics, Lumbini Medical College, Palpa, Nepal, 2014

Background Characteristics		Knowledge Scale (Mean score)			Application Scale (Mean score)			Opinion Scale (Mean score)		
	N	Pre	Post	p-value	Pre	Post	P-value	Pre	Post	p-value
Age Groups										
<30	7	34.46	66.03	<0.001[a]	37.80	63.86	0.002[a]	42.32	65.07	0.004[b]
30-39	8	28.31	74.49	<0.000[a]	37.80	70.89	<0.001[a]	34.21	71.32	0.004[b]
40+	6	31.83	75.83	<0.011[b]	30.17	74.07	<0.009[a]	34.54	77.48	0.011[a]
Gender										
Male	12	33.02	74.59	0.000[a]	35.59	74.61	0.000[a]	40.97	78.79	0.000[a]
Female	9	29.17	68.67	0.000[a]	27.69	61.25	0.001[a]	31.72	60.61	0.007[b]
Discipline										
Nursing	8	26.19	66.49	0.001[a]	21.51	58.41	0.001[a]	29.00	57.69	0.006[c]
Basic Sciences	9	29.94	72.29	0.000[a]	32.06	72.86	0.000[a]	35.69	76.17	0.001[a]
Clinical Sciences	4	44.94	82.65	0.047[b]	53.81	83.89	0.130[c]	56.00	85.97	0.146[c]
Experience										
<2 years	6	28.79	66.90	0.001[a]	38.48	70.39	.0100[b]	42.20	71.80	0.018[b]
2-4 years	8	32.78	76.01	0.001[a]	28.19	69.88	0.001[a]	34.59	68.52	0.008[b]
5+ years	7	31.96	71.95	0.004[a]	31.43	68.16	0.006[a]	35.32	73.14	0.005[a]
Clinical Sciences	4	44.94	82.65	0.047[b]	53.81	83.89	0.130[c]	56.00	85.97	0.146[c]
Experience										
<2 years	6	28.79	66.90	0.001[a]	38.48	70.39	.0100[b]	42.20	71.80	0.018[b]
2-4 years	8	32.78	76.01	0.001[a]	28.19	69.88	0.001[a]	34.59	68.52	0.008[b]
5+ years	7	31.96	71.95	0.004[a]	31.43	68.16	0.006[a]	35.32	73.14	0.005[a]

Note: a =d>1.3 (very large); b=0.8<d<1.3 (large); c=0.5<d<0.8 (medium); d=0.2<d<0.5 (low)

of knowledge and use of clinical scenario. All the participants had increased understanding of PBL being a self-directed active learning process. The knowledge, application and opinion regarding selection criteria for PBL cases increased from 20.5 to 62.7, 32.4 to 56.3 and 26.2 to 61.8 respectively. The coefficient of variation (CV) decreased suggesting the decreased variation between before and after scores.

The mean of summated knowledge, application and opinion scores increased from 31.4 to 72.1 (129.7%), 32.2 to 69.5 (115.6%), 37.0 to 71.0 (91.8%) respectively, before and after the workshop, (Table 2).

The differences between the pre and post test scores of three domain scales were found to follow the normal distribution as Shapiro Wilk test were not statistically significant. Thus, parametric test for dependent samples i.e. paired t-test was used. Knowledge, application and opinion scales were found to be statistically significant using this test. Further, the knowledge, application and opinion scales also had high effect size (Cohen's d > 1.3) (Table 2).

Increase in the overall knowledge, application and opinion among the participants in terms of their age, gender, discipline and teaching experience as the mean of knowledge, skill and opinion scales increased among each category of these variables before and after the workshop (Table 3). These results were statistically significant ($p<0.05$) for all the sub-groups except for application and opinion of PBL among the clinical sciences faculty.

The effect sizes were high ($d>1.3$) and large ($0.8<d<1.3$) for most of the scores in age group, gender, discipline and experience. The opinion scores in younger age groups, less than 5 years of teaching experiences and female respondents were large with the range of 0.8 to 1.3 whereas it was only medium with range of 0.5 to 0.8 for nursing faculty.

DISCUSSIONS

The PBL training was effective as it increased knowledge, application and opinion on PBL based on the 20-items retro-pre questionnaire used after the workshop. Similar result was also observed for the tutor training program conducted at Suez Canal University, Egypt[6] and BP Koirala Institute of Health Sciences, Nepal.[7] Most importantly, it was able to normalize the knowledge, application, and opinion of PBL among the participants as coefficient of variation (CV) decreased drastically after the workshop thus enabling them to come to a similar understanding to implement PBL at their institute as mandated by the university they are affiliated with.[8,9]

Increment in the knowledge, application and opinion scores were not only statistically significant (p-value<0.05), the differences were also very large or large as Cohen's d (corrected for dependent samples) were greater than 1.3 and between 0.8 and 1.3 for most of the sub-groups as well[10] indicating that these scores were indeed significantly different even for small samples.

However, clinical sciences faculty were still skeptical of its application and their opinion on PBL did not change statistically after the workshop as the difference was not statistically significant. Younger faculty, faculty with low teaching experiences, female gender and nursing background had medium effect size suggesting that they still had doubts about effective implementation of the PBL at their institute compared to the experienced, basic sciences and male faculty.

As the PBL was advocated at basic sciences phase of the MBBS curriculum by the Kathmandu University,[8,9] the 21 tutors trained for it had all to implement it effectively at the Lumbini Medical College; and similar results were recorded at a deemed health sciences university situated at the eastern part of Nepal[7] and Suez Canal University, Egypt[6].

The main limitation of this study was its inability to include the analysis of post implementation phase of the hybrid PBL curriculum at Lumbini Medical College to show its effectiveness in terms of actual application and behavior levels of faculty.[11]

CONCLUSIONS

The study concluded that there was significant increase in knowledge, application and opinion of participants regarding PBL after the workshop. The tutor training workshop was effective in improving tutor facilitation skills in the areas of active learning, self-directed learning, collaborative learning, group skill, and increase educational effectiveness of the PBL sessions based on self-evaluation of the participants. The workshop increased tutors' understanding of the philosophy of PBL and the importance of different aspects of PBL tutorial process.

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