ISSN: 2091-2749 (Print)
2091-2749 (Print)

Preparing faculty for problem-based learning curriculum at Patan Academy of Health Sciences, Nepal

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ABSTRACT

Introductions: Patan Academy of Health Sciences (PAHS) in Nepal has adopted problem-based learning (PBL) as principal pedagogy to foster attributes predefined for its medical graduates. This study evaluates reaction of participants in PBL tutor-training program focused on PBL process and its assessment.

Methods: An orientation program was organized separately for 24 faculty members and 45 higher secondary science majoring students prior to conduction of real-time PBL tutorial sessions. Faculty's reaction as PBL tutors was collected before and after the orientation program using a 13-item self-administered questionnaire. Internal consistency reliability of the questionnaire items and outcome of the training program were assessed using Cronbach's alpha, coefficient of variation, Shapiro-Wilk test, paired t-test and adjusted effect size for dependent samples.

Results: The pre-test internal consistency reliability was high (0.89) whereas it was acceptable (0.69) for post-test. The average score increased from 26.50 to 34.55 and standard deviation decreased from 5.39 to 2.70 between pre- and post-test. Difference between post- and pre-tests total scores followed normal distribution and suitable parametric test (paired t-test) revealed the difference was highly significant ($p < 0.0001$). The adjusted effect size was high (1.65) for small dependent samples.

Conclusions: The faculty training for PBL and assessment was helpful in implementing PBL pedagogy at PAHS.

Keywords: Nepal, PAHS, problem based learning, process assessment, tutor training program

INTRODUCTIONS

Patan Academy of Health Sciences (PAHS) has adopted innovative strategies including problem-based learning (PBL) for fostering predefined attributes[1] in medical graduates. The problem based learning is principal pedagogy for six-month long introductory and two years of integrated basic sciences courses for undergraduate medical students. The PBL is helpful to instill important generic skills and behaviors: self-directed learning, good communication, team leading, critical and reflective thinking among the learners.[2-5] Therefore, PAHS has incorporated the measurement of such skills and behaviors observable during PBL sessions into its summative assessment.[6]

Adoption and successful implementation of innovative approaches like PBL requires robust faculty development program to reduce faculty apprehension, enhance understanding and facilitation skills on PBL.[7-9]

The aim of this study was to evaluate the reaction of faculty on PBL tutor-training program with focus on PBL process and its assessment prior to start of the program.

METHODS

In April 2010, one day orientation program on PBL principles, process and assessment with emphasis on Tutor Assessment of Students Tool (TAS-Tool) was organized at PAHS separately for faculty as well as students prior to conducting the real-time PBL tutorial sessions. A total of 24 PAHS faculty members trained *a priori* in PBL facilitation process and 45 higher secondary science students participated in it.

A 13-item questionnaire dealing with various aspects of PBL mainly focusing on assessment was finalized by the PBL committee. It was self-administered to the participants before (pre-test) and after (post-test) the orientation program. The items were scored with 4-point forced Likert scale viz. 0 = Strongly Disagree, 1 = Disagree, 2 = Agree and 3 = Strongly Agree. The data entry and analysis was done using SPSS software version 15.0. Internal consistency reliability and outcome of the training program were assessed using Cronbach's alpha, coefficient of variation, Shapiro-Wilk test, paired t-test and effect size.

This was followed by real-time PBL sessions: consisting of 3 tutorial sessions each of 2 hours duration, conducted in six PBL groups over a week with an alternate day between two tutorials for self-directed learning for students. Six faculty members with past PBL experience facilitated the six PBL tutorial groups while others divided into different groups observed the PBL process silently. All 24 tutors evaluated the students attending 3 tutorial sessions in their respective groups using the TAS-Tool for its validation at PAHS PBL settings starting with the pioneer cohort of medical students.

Additional time was given to faculty for completing the PBL assessment at the end of the third tutorial session. A wrap-up session followed thereafter in an open and interactive manner amid the presence of all students, tutors, and content experts to clarify issues not resolved during group discussions.

A reflection meeting was held with faculty and students separately to share their insights and experiences. Written consent from students and verbal consent from faculty was taken.

RESULTS

The 24 faculty members comprised of basic (9), clinical (9), community health (2) and general science (4). Twenty faculty members completed both pre- and post-test questionnaires and, thus, the analysis was based on 20 samples. Pre and post test score (Table 1), pre-test mean score was >2 for 8-items, <1.5 for "types of process assessment used in the PBL tutorials" (item 10), and 1.5-2.0 for characteristics, importance, types of assessments and checklists used in the PBL tutorial sessions (items 6, 8, 9 and 12). The coefficient of variation (CV) showing the inter-person variation of each item ranged from 44.91% for "importance of PBL assessment for individual student" (item 9) to 17.41% for role of students in PBL (item 4). The Cronbach's alpha was 0.89.

Post-test mean score for 12 out of 13 items were >2.5 and item 10 it was 2.0-2.5, the highest % difference in pre and post-test. The CV decrease for each item but was still high for item 6 (24.28) i.e. Characteristics of Learner Centered Assessment. The post-test internal consistency reliability or Cronbach's alpha was 0.69, (Table 2).

The post- and pre-tests difference in total scores had normal distribution on Shapiro-Wilk test (SW = 0.985, p-value = 0.982) and paired t-test revealed highly significant difference, $p<0.0001$. The effect size for small dependent samples was 1.85.

Table 1. Pre-and Post-Test Scores of PBL Faculty Orientation Workshop at PAHS

Items	N	Pre-Test			Post-			% Diff
		Mean	SD	CV	Mean	SD	CV	
1. Learning Principle behind PBL	**20**	2.40	0.50	20.96	2.90	0.31	10.62	17.24
2. Characteristics of PBL	**20**	2.15	0.75	34.65	2.75	0.44	16.15	21.82
3. Basic Steps of PBL Process	**20**	2.50	0.61	24.28	2.85	0.37	12.84	12.28
4. Student's Roles in PBL	**20**	2.70	0.47	17.41	2.90	0.31	10.62	6.90
5. Tutor's Roles in PBL	**20**	2.50	0.51	20.52	2.85	0.37	12.84	12.28
6. Characteristics of Learner Centered Assessment	**20**	**1.70**	0.66	38.65	2.50	0.61	24.28	32.00
7. Rationale behind PBL Tutorial Evaluation	**20**	2.00	0.65	32.45	2.55	0.51	20.00	21.57
8. Types of Assessment in PBL	**20**	**1.70**	0.57	33.59	2.35	0.49	20.81	27.66
9. Importance of PBL Assessment for Individual Student	**20**	**1.75**	0.79	44.91	2.65	0.49	18.45	33.96
10. Types of Process Assessment used in PBL Tutorials	**20**	**1.35**	0.59	43.48	2.30	0.47	20.43	41.30
11. Importance of Self and Peer Assessment in PBL Tutorials	**20**	2.10	0.72	34.19	2.75	0.44	16.15	23.64
12. How to Use Different Types of Checklist to Assess Students in PBL Tutorials	**20**	**1.70**	0.66	38.65	2.55	0.51	20.00	33.33
13. Importance of Feedback and How to Provide Feedback in PBL Tutorials	**20**	1.95	0.69	35.18	2.65	0.49	18.45	26.42
Cronbach's Alpha		**0.89**				**0.69**		

Table 2. Descriptive statistics of summated pre- and post-test scores, PAHS, 2010

		Mean	N	Standard Deviation	Standard Error of Mean	P value	Effect size
Score	Post Test	34.55	20	2.70	0.61	< 0.0001	1.85
	Pre-Test	26.50	20	5.39	1.20		

DISCUSSIONS

Eight out of thirteen items had pre-test mean score >2 indicating acceptable level of prior understanding on those items among the faculties. However, most faculty were not sure about the types of process assessment used in the PBL tutorial process (with lowest pre-test mean of 1.35) despite their previous training exposure to PBL. This may be due to lack of specific focus on process assessment in past PBL trainings and workshops, thus, requiring special focus on the present PBL training program. Pre-test internal consistency reliability was very high, Cronbach's alpha of 0.89, which is higher than the minimum level of 0.70 suggesting positive correlations among the questionnaire items. However, CV showing inter-person variation of each item revealed highest variation for item 9 (44.91) i.e. "importance of PBL assessment for individual students" and lowest for item 4 (17.41) i.e. "role of students in PBL" suggesting the need for more focused training on certain aspects

and the training program was modified accordingly, as suggested by other researchers.[10]

Post-test mean scores were >2.5 for 12 out 13 items suggesting training program was effective. However, faculties were not able to understand fully about the types of process assessment used in the PBL tutorial process (item 10) as the score was still between 2.0 and 2.5. This could be because of the training program placing higher emphasis on the tutor assessment of students as compared to other types of process assessment namely self-assessment of students and peer assessment of students done by the students. Post-test internal consistency reliability decreased to 0.69 but this was in the acceptable range (~ 0.7).[11] The main reason for this decrement was the homogenous scoring by the faculty in one or more items in the post-test.

Post-test results showed positive % difference from pre- and post-test scores among all the items scored by faculties. However, item 10, 9 and 12 showed the highest, second highest and third highest % difference respectively (41.30; 33.96; 33.33). This was because the inherent purpose of this training workshop was to validate the TAS-Tool[6] for use at PAHS starting with the pioneer cohort of undergraduate medical students. Training faculties with hands-on PBL sessions has positive influence to assume the role of assessors.[12,13] Further, knowledge on various aspects of PBL was normalized among the trainees as the coefficient of variation on each item were reduced significantly between pre- and post-tests.

The increase in pre- and post-test average score from 26.50 to 34.55 and decrease in standard deviation indicates the reduction in the variation of knowledge on PBL and PBL process assessment among the faculties. Most importantly, the highly significant result with $p< 0.0001$ indicates the difference between pre- and post-test scores was not by chance. Even though the sample size was small, the effect size for dependent samples was >1.3, meaning the difference was real.[14] In other words, the post-test score was significantly higher than the pre-test scores indicating the success of the intervention program among 20 faculty members involved.

Studies done in other settings were suggestive of similar findings of such workshops positively influencing faculty understanding and appreciation of PBL, its philosophy and rationale, basic steps and group dynamics, greater understanding of students' role in PBL, inculcation of new competencies including that of facilitators and assessors required for implementing PBL-based curriculum.[15,16,17,18] The results of this training program were, thus, indicative of being helpful in preparing faculties for implementing PBL at PAHS. However, it will be crucial for institution like PAHS, which is embarking on implementing an innovative curriculum, to give high emphasis on faculty development program including PBL trainings to help the staff members understand teaching-learning practices aligned with its adopted pedagogic strategies as emphasized by studies.[19,20]

Reflection and feedback session with faculty showed that they have gathered hands-on experiences on PBL and were more confident in facilitating and assessing PBL tutorials as shown by similar study done in Nepal.[18] Likewise, most students expressed that they found PBL process a participatory, interactive, and allowing their role in setting the target and achieving them together.

Small number of faculties, voluntary participation and non-implicative tutorial assessment of students were some of the limitations of this study. Hence, the impact of such training program regarding the lasting change in participation level, effective facilitation and assessment skills of faculties in actual PBL sessions with PAHS' own medical students needs to be evaluated with larger number of faculties.

CONCLUSIONS

The faculty training for PBL and assessment adopted at PAHS was helpful to the staff members in implementing PBL pedagogy at PAHS.

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