

A Learner Centered Approach of Teaching and Learning in Pharmacology: A Questionnaire Based Analysis of Student Cognizance and Experiences

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ABSTRACT

Background: Innovative and flexible educational methods like Problem Based Learning (PBL) and integrated teaching practices were integrated into the Pharmacology course in a manner that they complement the didactic lectures or, completely replace the lecture classes with the aim to optimize the educational atmosphere for a better learner experience. **Aim:** The present study is an attempt to gather feedback on newer teaching learning methods and audiovisual aids employed during the didactic lectures and small group teaching sessions newly introduced into the curriculum. **Methods:** The study is a cross sectional questionnaire-based analysis. The questionnaires were distributed to the second-year medical students inviting them to share their opinion on usefulness of current teaching-learning methods. The data collected was analyzed by means of descriptive statistics. **Results:** The students rated small group discussions and small tests-assessment for learning to be more useful in understanding the subject as well as scoring more marks in the examinations (Likert score of 4.5 and 4.51 respectively). Didactic lectures were less useful with a Likert score of 3.71. Both problems based learning and integrated teaching scores were equivocal with more students favoring integrated teaching. **Conclusion:** Student feedback forms the backbone for continuing revisions of undergraduate curriculum with the aim of making the subject more learner-oriented and practically relevant. Constant review of our current methodology will reflect on success of newer teaching-learning methods introduced in encouraging learning. It would enable us to incorporate appropriate changes in curricula where and when necessary.

Key words: Teaching learning methods, PBL, Integrated teaching, Student perception, Audiovisual aids, Active learning.

Submission Date: 20-06-2019;
Revision Date: 06-02-2020;
Accepted Date: 14-04-2020

INTRODUCTION

Revisiting instructional programs with constant curricular revisions is a necessity to overcome the handicaps of the current undergraduate medical education, which relies on traditional teaching methods where student learning is rote based with a short-lived memory. Teaching and learning in Pharmacology has been evolving owing to vast changes within the discipline, the methods adopted by students to learn and changes in faculty teaching methods. Earlier educational research has revealed that memorization by repetition is often a poor strategy in engaging students to learn.

Classrooms with focus on the teacher rather than on the student may defeat the very idea of a learner-centered ambience of teaching and learning. Traditional lectures with its strong proponents continue to be the core backbone of the undergraduate instruction since many years.¹ A common cited advantage of lecturing is that it is a convenient method of covering a vast amount of course content with an exquisite and fascinating lecture presentation. However, research has proved that instruction methods which promote active learning, that which engages students in the process of learning through activities and/

DOI: 10.5530/ijper.54.3.107

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or discussion in class, as opposed to passively listening to an expert has a greater impact on student learning and performance.² Innovative and flexible educational methods help us to optimize educational atmosphere for a better learner experience.³ Many new innovative strategies such as Problem Based Learning (PBL),⁴ Puzzle Based learning,⁵ small group teaching,⁶ as well as Team Based Learning⁷ and Peer Assisted learning⁸ are presently being applied to overcome the learning difficulties. Lectures are made more interactive by various methods as they are deemed an official necessity. With the escalating technological advancement audio-visual aids like blackboards have been replaced more and more with PowerPoint presentations as effective modes of delivering lectures. However, there is at present an awareness of fatalities like death of didactic lectures by power point presentations as they tend to be boring and overused at the cost of student involvement and understanding as perceived by students.⁹

The recent changes in the medical education regulations led to certain systematic changes in the course curriculum delivery in our university. Pharmacology is taught to second year undergraduate students over a period of one and half years. As a part of the systematic change, different teaching-learning methods were integrated into the course timetable in a manner that they complement the didactic lectures on a particular topic or, for some topics, completely replace the lectures classes as in case of problem based learning. Some of the innovative methodologies adopted were Case based learning, Problem based learning and Integrated classes. However, the faculty are as of now ignorant about the effect it has on students and if has made any positive impact on them.

Student perception are regarded as a favorable means of reviewing teaching methodologies and developing newer approaches to facilitate learning in undergraduate programs.¹⁰⁻¹³ These studies enable us to identify teaching strategies, which work for students and are most effective as perceived by them.¹⁴ Student feedback has been the foundation for syllabus refinement with the goal of improving student participation and applicability to clinical scenarios.¹¹ Several studies have documented the utility of student perception and correlated it to their improvement in performance through incorporation of improved pedagogies.¹⁵ Habitual exercises on student responses constitute an indispensable tool for refining students' accomplishments and facilitates constant review of the curriculum enabling us to build a learner centered knowledge building ambience.

The present study is an attempt to gather feedback on newer teaching learning methods and audiovisual aids

employed during the didactic lectures and small group teaching sessions newly introduced into the curriculum. We intend to explore the students' insight into the newer methods so that it would help us to improvise on the current methodologies and adopt newer improvisations as deemed necessary.

MATERIALS AND METHODS

The present study is a cross sectional questionnaire based study. The study was conducted after obtaining approval from the institutional ethics committee. All the second year medical students in fifth semester were invited to answer a questionnaire regarding their perception on the usefulness of the various teaching-learning methods (Appendix 1). The questionnaire is suitably adapted after referencing previous studies exploring students' perception on teaching-learning methods in Pharmacology and refined accordingly.^{11,16-19} The students were briefly acquainted with the objectives of the study. They were asked to tick the options whichever they find most appropriate. Information regarding anonymization of data and voluntary participation of the students was made evident to the students during the informed consent process and appropriate informed consents were obtained. The data collected was analyzed by means of descriptive statistics.

RESULTS

The number of students who participated in the study totaled 167.67% of the students opined that they like Pharmacology but it was a tough subject. 9.6% of the students opined that they study Pharmacology for merely passing in the examinations. 15% of the students declared that Pharmacology was their favorite subject. 3.6 % refused to opine on their choice and only 1.5% said that they hated Pharmacology.

According to the results of the present study, the average scores obtained for the teaching-learning methods employed based on the students' opinion about their usefulness in helping them understand the subject and obtaining better marks in the examination is as depicted in Table 1. Students' perception on different aspects of PBL and integrated teaching is as depicted in Table 2 and 3 respectively.

In the open-ended question section on small group discussions, the majority of the students opined that they were useful especially the repeated small unit tests and mock viva, which helped them to study and the students experienced an increase in their concentration span during these sessions. Some of the students opined that discussions were better than tests as it was non-

Table 1: Student perception of utility of the teaching learning methods.

Sl. No	Teaching-learning method	Rating for utility in understanding the subject	Rating for utility in scoring better in examinations
a.	Classroom lecture	3.71	3.57
b.	Teaching learning aid used		
	Power point (PPT)	3.84	3.82
	Black board	3.86	3.68
	Audio video demonstrations	4.27	4.02
c.	Task based learning (Pharmacovigilance- student fill in the ADR form)	3.15	2.82
d.	Problem based learning (A problem is given. A leader and a scribe is selected from the group. The group then comes up with the issues and hypothesis. They read on the subject and then come up with answers)	3.84	3.72
e.	Assessment for learning (Short test on a particular topic-one-word answers, short answers, MCQs, followed by discussion)	4.51	4.61
f.	Student seminars	3.84	3.73
g.	Small group discussion on a prescription, problem solving exercise or drug interaction	4.50	4.41
h.	Integrated teaching (multiple departments teach consecutively on a particular topic)	3.77	3.58

Table 2: Student perception on Problem based learning.

SI No	Aspects of PBL	Rating				
		Don't agree	Somewhat agree	Neutral	Agree	Strongly agree
1.	PBL improved my ability to apply concepts of basic sciences to clinical situations.	23 (13.4%)	48 27.9%	22 12.8%	62 36.1%	17 9.9%
2.	PBL studies reinforced information taught in other classes.	20 11.6%	42 24.4%	25 14.5%	66 38.3%	19 11.0%
3.	PBL increased my involvement in teaching learning process.	18 10.5%	44 25.7%	19 11.1%	64 37.4%	26 15.2%
4.	Learning of facts, diagnostic and therapeutic skills will be significantly enhanced by PBL sessions	23 13.4%	33 19.2%	40 23.3%	49 28.5%	27 15.7%
5.	PBL sessions enhanced my clinical reasoning abilities	19 11.1%	40 23.4%	30 17.5%	55 32.2%	27 15.8%
6.	The PBL sessions helped me develop skills in identifying potential drug related difficulties of the patient.	22 12.9%	45 26.3%	34 19.8%	54 31.65	16 9.4%
7.	PBL sessions improved my self- directed learning skills.	23 13.4%	36 20.9%	30 17.4%	62 36.0%	21 12.2%

threatening in nature aimed at clarifying their individual doubts and discouraged rote learning. They opined that small group teaching is more effective to help build concepts as it gives a one to one experience with the teacher and helps in better understanding of the topic. Some of the students' suggestions on small group discussions is as follows:

- Could be a little more audio/visual
- Seminars can be started. The student will get a chance to understand and take a class on a particular topic.
- Discussion on the most common drugs used for common diseases could be overemphasized.
- Require more interaction between students and faculty
- Number of classes should be increased compared to theory classes; reduce the number of theory classes
- Discuss past year's sessional question papers
- Emphasis on drug interactions
- The number of students per group can be decreased so that everybody can get more exposure
- Regarding PBL the students were of mixed opinion as some of them considered these sessions useful as their involvement or participation increases and understanding improves. However, some of them were of the opinion that students should not be forced to speak on a topic without the aid of a book. They felt that once objectives were ready they

Table 3: Student perception on integrated teaching.

SI No	Aspects of IT	Rating				
		Don't agree	Somewhat agree	Neutral	Agree	Strongly agree
a.	Integrated Teaching helps in appreciation and application of basic science knowledge in health and disease.	4 2.3%	42 24.6%	28 16.4%	83 48.5%	14 8.2%
b.	Integrated teaching improves the performance in clinics.	9 5.3%	30 17.5%	35 20.5%	78 45.6%	19 11.1
c.	I prefer traditional teaching to integrated teaching (Traditional teaching- For ex. classes on TB by pharmacology will be taken during pharmacology teaching hours and the same by community medicine during community medicine hours)	45 26.5%	27 15.9%	45 26.5%	40 23.5%	13 7.6%
d.	I prefer Horizontal integration teaching (integration between paraclinical subjects only) more than Vertical integrated teaching (integration between paraclinical and clinical subjects like pulmonary medicine + Pharmacology + Microbiology)	52 30.4%	19 11.1%	53 31%	37 21.6%	10 5.8%
e.	The topics discussed during integrated sessions were relevant.	6 3.5%	17 9.9%	23 13.5%	92 53.8%	33 19.3%
f.	The integrated teaching program improved the interaction between faculty and students.	30 17.5%	24 14.0%	54 31.6%	46 26.9%	17 9.9%
g.	The discussion on a given topic was adequate in integrated teaching	10 5.9%	24 14.1%	37 21.8%	70 41.2%	29 17.1%

were back to memorizing and the clinical part of it was forgotten.

A few suggestions were as follows

- Allow for blackboard teaching too instead of only power point and oral teaching being allowed.
- Both SGT and PBL should be optional and not given like a task.
- The diagnosis of the case given in the PBL should be made a little less obvious and emphasis should be given on the skill of narrowing down the diagnosis.
- The case that is given to the student can be more challenging which will result in a better and healthier discussion instead of giving a direct simple case scenario.
- There are too many learning objectives some times.
- By focusing more on clinical thinking rather than just taking it as a task that just needs to be get done with.

Regarding Integrated teaching the students felt that it should include clinical subjects for more and better understanding rather than just para clinical subjects. Most of them wanted more number of classes with varied other subjects.

DISCUSSION

The present study is a reflection of the students' perception on the effectiveness of the teaching learning

methods newly introduced to enhance the learning experience and improve the current curriculum. The majority of the students expressed their positive perception toward the teaching learning methods employed in Pharmacology especially the assessment tests for learning followed by small group discussions, which they opined, helped them in better understanding and enabled them to score better in examinations. These short tests were formative in nature and this further reinforces the fact that formative tests when done on regular basis helps in better retention and understanding of the subject. They encourage students' self-reflection, gives students detailed and actionable feedback, encourages interaction between the teachers and students, promote self-assurance of students and entails favorable openings to bridge the existing lacunae in their performances.²⁰

The students opine that among the audiovisual aids used audio-video demonstrations have been very useful. Earlier studies by Willmot *et al.*²¹ have documented that introduction of audio-visual media inspire learning in students and engage them positively making it a sound pedagogical tool for teachers. Interestingly in this study the students have preferred both power point presentations and blackboard teaching as equivocal in understanding the subject, however the power point presentation handouts served in addition to help them score better in examination making them prefer both during a teaching learning session. This is in accord with a few earlier studies.¹⁶

Problem based learning has evolved as an innovative pedagogical tool to enhance memory, improve basic science retentively, apply basic concepts to clinical science and whet the students' analytical skills.^{22,23} In addition, it has also been attributed in increasing skills of communication and presentation, promotion of self-directed learning and motivate the students.²⁴ However, a few studies have reported that PBL as a pedagogical tool may consume more time and does not assist in comprehension.^{25,26} In the present study, 36.1% of the students opined that PBL helped them to apply their knowledge of basic sciences to practical situations on the clinical arena and 38.3% of the students were of the opinion that it helped to reinforce information taught in other classes. 32.2% of the students felt that PBL sessions enhanced their clinical reasoning abilities and 36% of the students felt that it improved their self-directed learning skills. These results are in concordance with earlier reported surveys.²⁷ However, a few of the students' remarks suggest that the students have considerable confusion with the conduct of case based learning and problem based learning. Prior preparation and training of students forms a significant part of the success of the PBL sessions²⁸ and the present study shows a lacunae of training of the students in preparation for the PBL sessions.

In the present study, 48.5% of the students opined that integrated teaching helps in providing them with the links to correlate basic science and apply the concepts to clinical subjects both physiologically and pathologically and 45.6% of the students appreciated its importance in improving performance in clinics. The students preferred integrated teaching to traditional method and wanted more of vertical integration for important topics related to clinics as reported in earlier studies.¹⁸

CONCLUSION

To conclude, the way in which the student regards, comprehends and interprets the teaching-learning sessions forms a vital clue to academicians regarding their effectiveness and utility especially for subjects like Pharmacology, which is closely linked to clinical professions and therapeutics. The results of the present study reflects on the success of implementation of newer teaching-learning methods introduced to encouraging learning. It also serves as an impetus to improve further based on their constructive feedback to make learning an enjoyable and fruitful experience. It also encourages us to revise our curriculum further to improve upon the pedagogical methods used to encourage active participation and self- directed learning amongst students.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

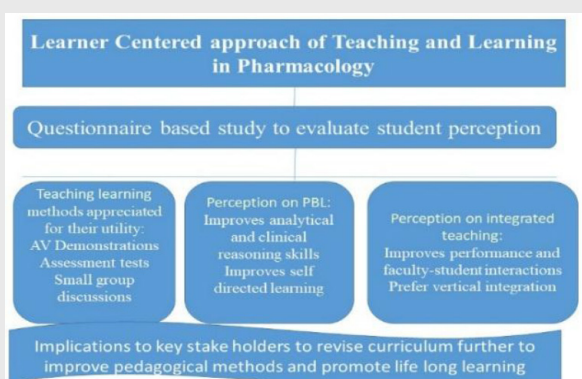
PBL: Problem Based Learning.

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PICTORIAL ABSTRACT



SUMMARY

The present study was an attempt to perceive the perception of students towards innovative methods used in pharmacology pedagogy. It reflects the utility of audio-video demonstrations, formative tests and small group discussions as powerful tools to inculcate interest in the subject and help the students to understand the subject highlighting the clinical relevance. PBL and integrated teaching help the students to apply the concepts taught in theory with vertical integration preferred by the students. Rigorous revisions in syllabus with stakeholder feedbacks help to improvise upon the existing lacunae and build a competency based curriculum catering to the needs of the present day medical education.

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Cite this article: Rao RR, Shenoy PJ, Ullal SD, Kamath A. A Learner Centered Approach of Teaching and Learning in Pharmacology: A Questionnaire Based Analysis of Student Cognizance and Experiences. *Indian J of Pharmaceutical Education and Research*. 2020;54(3):580-8.

Appendix 1: Questionnaire – Student perception of teaching- learning methods in Pharmacology.

Gender – M/F

Instructions: Use tick mark for answering all the questions

Choose only single Best opinion

1. Which of the following opinion regarding pharmacology as a second year MBBS subject is **True for You?**

(a) I hate pharmacology

(b) I have to study pharmacology because I want to pass second year

(c) I like pharmacology but it is a tough subject

(d) Pharmacology is my favorite subject

(e) I do not have an opinion regarding pharmacology as a subject

2. Rate the teaching -learning methods mentioned below based on your opinion about their usefulness in helping you

3. Understand the Subject

Sl. No	Teaching -learning method	Rating				
		Very useful	Somewhat useful	Not sure	Not very useful	Not at all useful
a.	Classroom lecture					
b.	Teaching learning aid used					
	Power point (PPT)					
	Black board					
	Audio video demonstrations					
c.	Task based learning (Pharmacovigilance- student fill in the ADR form)					
d.	Problem based learning (A problem is given. A leader and a scribe is selected from the group. The group then comes up with the issues and hypothesis. They read on the subject and then come up with answers)					
e.	Assessment for learning (Short test on a particular topic-one word answers, short answers, MCQs, followed by discussion)					
f.	Student seminars					
g.	Small group discussion on a prescription, problem solving exercise or drug interaction					
h.	Integrated teaching (multiple departments teach consecutively on a particular topic)					

4. Rate the teaching learning methods mentioned below based on your opinion about their usefulness in **Obtaining Better Marks in the Examination**

Sl. No	Teaching- learning method	Rating				
		Very useful	Somewhat useful	Not sure	Not very useful	Not at all useful
a.	Classroom lecture					
b.	Teaching learning aid used					
	Power point (PPT)					
	Black board					
	Audio video demonstrations					
c.	Task based learning (Pharmacovigilance- student fill in the ADR form)					
d.	Problem based learning (A problem is given. A leader and a scribe is selected from the group. The group then comes up with the issues and hypothesis. They read on the subject and then come up with answers)					
e.	Assessment for learning (Short test on a particular topic- one word answers, short answers, MCQs, followed by discussion)					
f.	Student seminars					
g.	Small group discussion on a prescription, problem solving exercise or drug interaction					
h.	Integrated teaching (multiple departments teach consecutively on a particular topic)					

5. Students perception on different aspects of Problem Based Learning (PBL)

SI No	Aspects of PBL	Rating				
		Don't agree	Somewhat agree	Neutral	Agree	Strongly agree
h.	PBL improved my ability to apply concepts of basic sciences to clinical situations.					
i.	PBL studies reinforced information taught in other classes.					
j.	PBL increased my involvement in teaching learning process.					
k.	Learning of facts, diagnostic and therapeutic skills will be significantly enhanced by PBL sessions					
l.	PBL sessions enhanced my clinical reasoning abilities					
m.	The PBL sessions helped me develop skills in identifying potential drug related difficulties of the patient.					
n.	PBL sessions improved my self- directed learning skills.					

6. Students perception on different aspects of Integrated Teaching (IT)

SI No	Aspects of IT	Rating				
		Don't agree	Somewhat agree	Neutral	Agree	Strongly agree
h.	Integrated Teaching helps in appreciation and application of basic science knowledge in health and disease.					
i.	Integrated teaching improves the performance in clinics.					
j.	I prefer traditional teaching to integrated teaching (Traditional teaching- For ex. classes on TB by pharmacology will be taken during pharmacology teaching hours and the same by community medicine during community medicine hours)					
k.	I prefer Horizontal integration teaching (integration between paraclinical subjects only) more than Vertical integrated teaching (integration between paraclinical and clinical subjects like pulmonary medicine + Pharmacology + Microbiology)					
l.	The topics discussed during integrated sessions were relevant.					
m.	The integrated teaching program improved the interaction between faculty and students.					
n.	The discussion on a given topic was adequate in integrated teaching					

7. What are your suggestions for improving your experience during the following teaching-learning sessions?

- Small group discussion:
- PBL:
- Integrated teaching:
- Others:

8. Kindly share any other teaching -learning methods which you have experienced in other subjects and would desire to be incorporated in Pharmacology curriculum too.