

Performance based assessment by introducing active learning in second MBBS students in pharmacology

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ABSTRACT

Background: Currently internal assessment by Maharashtra University Health Science, Nashik is being calculated purely on terminal exams performances, in traditional way which does not reflect active performances by participation in seminar, quiz, problem bases learning, research methodology, individualization of therapy etc.

Methods: 35% score in internal assessment is required for eligibility to appear in final exam. On the principle of active participation by pupils while undergoing the training in pharmacology, 83 willing participants from different batches were subjected to the study on their performance scores. Passing criteria was arbitrarily ascertained i.e. either 50% or percentile 60. Percentage was calculated from sum of the scores out of total maximum of different heads, whereas percentile was calculated from sum of the scores out of collective maximum scores.

Results: We have observed 73 out of 83 passed on percentage criteria and 74 out of 83 had 60 percentile above scores. The remaining students (10 and 9 respectively) could not reach above said passing criteria due to their non-participation in some of the exercises. Simultaneously using this active participation technique the hidden talent of different abilities can be identified in individual student. Similarly weak areas can also be identified which require improvements.

Conclusions: The technique can be useful alternative to final exams in case promotion pattern of assessment is to be applied by institution or if approved, by universities.

Keywords: Active learning, Co-curricular activity, Continued medical education, Immediate recall, Problem based learning, Psychomotor domain, Research project, Rational use of medicines,

INTRODUCTION

Current teaching and learning methodology as per Maharashtra University Of Health Science, Nashik curriculum mostly includes one way delivery and passive learning without development of psychomotor and affective domain in Under-graduate MBBS students. Active learning in pharmacology and therapeutics is the need of hour for the purpose of deep learning and identification of the talent and skill in students relevant to academics.

Learning is defined as modification in behaviour as a result of exercise, practice or experience.¹

Acquisition of predetermined desirable behaviour, dealing more with abilities to be achieved is target under active learning. As per theory of meaningful verbal learning, many basic facts of medical sciences have to be

presented.² Learner explores relationship between received elements and deduces strategy to solve problems. This is possible by linking surface & deep learning.³

Traditionally in medical schools there is growing dissatisfaction over quality of learning.⁴ It has been found at many instances that, medical teachers in India have not joined the profession for the love of teaching.⁵ In an attitudinal study⁶ less specificity and adequacy of knowledge to be gained by learner has been identified. Change in cognitive structure of learner can be indirectly inferred from ability to think, feel or do the task.⁷

Rational drug prescribing for illness is dealt with in Pharmacology and therapeutics. The link of pharmacokinetics and dynamics with therapeutics and toxicology has to be developed in trainees. They must learn topics actively and by deep learning. Then only they

can select medicinal preparation skilfully, based on their detailed knowledge and instant recall ability. Common entrance exam based admission system for postgraduate courses, has diverted MBBS trainees' interest to gain specific and adequate knowledge. Commercialization of medical education has additional adverse impact.

As per Maharashtra University of Health Science, Nashik internal assessment has been limited to scores of students in term-ending exams. In Pharmacology subject, there is no experimental exercise to be done by students themselves during practical classes, and examination. Present system of internal assessment under Maharashtra University of Health Science syllabus carries a flaw of poor identification of the talent in particular trainee and lack of useful skill development in students.

It does not reflect ability of a student to deliver a public speech, to exhibit instant recall, ability to analyse a situation. Their ability to undergo problem solving, to undertake research project, to fix priority out of multiple options in unprecedented situation, all these are not developed. Practical examination exercise is framed from exercises which are spoon-fed to them during their routine curriculum. They write answer in table work format. In practical exam, it is the testing of the conditioning only and not of psychomotor skill. Viva-voce scores are added to theory scores which has its own drawbacks- of biasness, subjectivity, and non-reproducibility.

Many topics are too long to be covered justifiably on adequacy of knowledge. In present scenario, vertical integrated teaching therefore implemented limitedly at undergraduate training level. Similarly, symposia are impracticable on daily basis for undergraduate training.

We have designed active learning method in form of competitive co-curricular activity. In this format, consideration of attendance, scores in term ending exams, with performance in other co-curricular activities and academics are given due weightage. When assessment is done in this way, it will reflect development of skill and also will reveal the talent in each student. This can be of great help to learner for deciding his/her future.

METHODS

Willing students (n=83) pooled from different batches at 3 medical colleges in Vidharbha region of Maharashtra underwent active learning exercises on following criteria:

- **For sincerity:** Record of their attendance in theory, practical, extra and active learning classes (n=83)
- **For developing public speech ability:** Scores in performance activities i.e. Microteaching out of 10, short topic out of 65, and seminar out of 125 marks (n=27).

- **For testing immediate recall ability:** Scores in tutorials out of 10 and Quiz out of 50 marks- to these are added scores in Viva I, II and III of term-ending exams 7+7+14 marks respectively. (n=43)
- **For cognitive and psychomotor skill development:** Scores out of 180 in terminals theory, out of 92 in practical exams. Internal assessment score calculated out of 15 each for theory and practical (as per university directives) were compared with active learning scores.(n=83)
- **For development of ability:** The scores in class work, homework, rational use of medicines, problem based learning giving them therapeutic problems, analytical skill development by experimental graph exercises, fish bowl task and priority fixation task to test their group dynamism, research methodology, protocol design, protocol approval by ICMR/IEC and its completion / publication, and score in individualized drug therapy exercise. All these were covered as continued medical education (CME) related topics. (n=22)
- **For testing psychomotor and affective domain:** Scores in research methodology, protocol submission, approval from either ICMR(Indian Council of Medical Research) or institutional ethic committee, completion of project, publication. All these are included under CME. (n=8)

The assessment in these aspects was done by one teacher, and formatting was done by other teacher. Total scores in different group of activities were taken as criteria to explore hidden talent in students. Grand total scores were used for purpose of calculating percentage. Percentile was arrived by calculating percentage score out of maximum collective score total. With low and high scores of percentage and percentile was tabulated group wise. Group 1 included students attendance and scores in terminal exams and their internal assessment- 11 students of 2013 batch and 8 students of 06,07,08 batches. Group 2A inclusions 18 students of 2004 batch and 9 students of 2009 batch additionally participated in quiz. Group 2B inclusions 3 students from 2005 batch and 8 students from 2009 batch performed in seminars / short topics / microteaching. Group 2C inclusions 10 students from 2013 batch participated in CME activities. Group 3 inclusions 2 students from 2005 batch participated in quiz and seminars.

Group 4 inclusions 8 students from 2009 batch participated in quiz, seminar and research. Group 5 inclusions 6 students each from 2011 and 2012 batch participated in internal exam and all other activities except research. 50% and or 60 percentile were considered as passing criteria. At the end, top three scorers were given trophies and certificates for their respective performances.

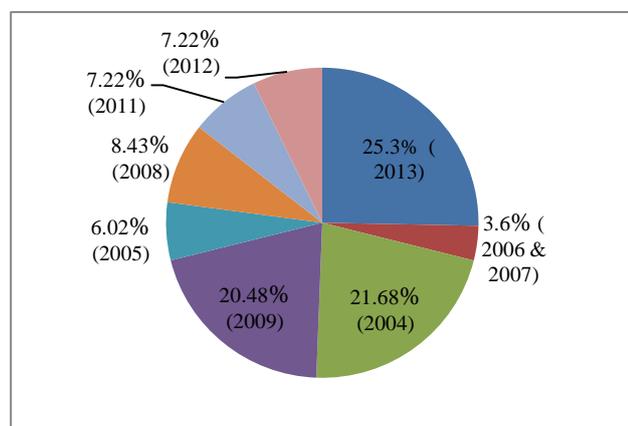
There was no need of getting clearance from Institutional ethics committee as most exercises were curriculum and academics based, without interventional or invasive technique.

RESULTS

On sincerity criteria: Attendance of participants wherever was found to be less than 75% in theory and 80% in practicals, was compensated by extra classes and presentations to fulfil the criteria of minimum required attendance for eligibility to appear in final examination.

Table 1: Maximum and minimum scores of students participated in active learning methods.

Groups	Batch No	n	% Score low	% Score High	Percentile low	Percentile high	Remarks
Group 1	13	11	60.46	73.47	75.89	92.21	Attendance > 75%
	06, 07, 08	8	57.91	68.8	80.33	95.42	
Group 2A	04,	18	60	75.06	75.48	92	
	9	9	42.65	56.37	55.19	72.93	
Group 2B	5	3	55.6	57.9	70.8	73.8	
	8	2	59.39	59.65	84.02	84.39	
Group 2C	13	10	50	74.79	64.01	95.76	
Group 3	05,	2	64	64.53	81.7	82.2	
Group 4	9	8	46	73.77	61	95	
Group 5	11	6	63	76.35	76.72	92.97	
	12	6	40.24	66	54.14	89	



Numerical in bracket showing batch year

Figure 1: Batch wise percentage of students.

On development of public speech ability criteria: Participants from 2005 and 2009 batches performed better than the other batches in presentation activities. Respective performers were labelled as better orators and were presented with trophy or shield.

On immediate recall ability criteria: Some of the participants were better than best performers and were asked to share the secrets to improve this facet in others. This immediate recall ability is important from patient health care related bedside teaching and learning ability.

On cognitive skill development: The scores in terminal examination of 9 students (3 each from 2009, 2011, and 2012 batches) were better than others. 8 students participated in research methodology activity.

On testing and development of ability criteria: 2 students from 2012 batch attended all activities and were high scorers.

On psychomotor and affective domain criteria: Three students attended research methodology introductory orientation. None of them could submit research protocol for approval by institutional ethics committee. They proceeded on preparation leave for final examination. These three were advised to design protocol and submit it for approval after undergoing necessary prerequisites. (Table 1.)

Overall 88% of students scored more than 50% and 89% students scored more than 60 percentile. These results are encouraging as this can be set a criteria for passing in performance based active learning in pharmacology (Figure 1).

DISCUSSION

Brings et al has already defined instructions, which provide controlled environment to mould learning in pre-decided way.⁸ There are recommendations that a complex

task should be broken down into smaller simpler tasks to achieve improvement in teaching learning process.⁹

Continuous internal assessment means, “Acquisition of predetermined desirable behaviours, dealing more with abilities, which cannot be tested in summative evaluation while learner are under continuous observation”. Such a formative evaluation however should never be taken for final pass/fail decision.⁹ In active learning eligibility criteria for appearing in final exam is 50% or 60 percentile. 11% to 12% students became could not passed due to non-participation in number of activities. This was because the participation was not given due importance as it has not currently been made mandatory by respective university. While all the participants scored more than 35% eligibility criteria in mandatory exam based traditional internal assessment.

Implementations: Whole of the batch can similarly undergo active learning. The batch can be divided in small batches equally, assigned to separate faculty member teacher to carry out assessment. This will keep all teachers equally engaged in very fruitful and most needed work.

As these students are the clinicians of future, those who are weak in immediate recall activities and CME can be distinctly separated. These can be trained to improve in their weak areas by repeated exposures to immediate recall exercises, problem based learning and research activities. Presentation skill can be improved by repeated exposures to microteaching thus preparing good speakers for future.

Wherein continuous internal assessment has drawback of not useful for final pass/fail decision, active learning can be useful for this. Can it replace the university exam remains the matter of debate. In case we want to introduce promotion pattern for passing students without final examination, performance bases active learning is definitely of great utility. When active learning is made mandatory by university, all students will participate in most framed exercises and activities.

Above said results of those who attended most activities indicate that there are least chances of adverse impact on learning. There will be great saving of time, money and manpower. Time so saved can be utilized for completion of research projects by students. There will be much reduction in stress/anxiety which prevails amongst students before and during traditional final examination. Moreover improvement in student teacher relationship is also possible.

Inclusion of active learning method in syllabi/curricula and change in examination pattern for pharmacology subject can improve effective learning by keeping students focused on their primary work of learning therapeutics.

To develop interest in teachers, such types of activities can be accredited with credit hours by regional and/or national medical council. This will save them from getting engaged in workshops which are of no utility for undergraduate students training purposes.

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