Perception of Medical Students towards Teaching of Pharmacology through Reinforcing Learning Model.

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Abstract: Background: There is need of novel methods of teaching subject of pharmacology, which will increase curiosity and retention of knowledge. At the same time, the new method should be student friendly and well accepted. Hence reinforcing learning model (RLM) was developed and current study is conducted to assess perception of students about this method. Methodology**:** The perception of students was assessed on Likert scale using a 15 point questionnaire. The data was analysed descriptively. Results: Majority of the students (more than 50 %) gave favourable opinion about the module. Majority of them gave neutral opinion (40 %) when asked whether the session should be optional in the curriculum. Conclusion**:** RLM followed by discussion can be a valuable tool to reinforce didactic method of teaching pharmacology. [Sarkate P NJIRM 2015; 6(2):101-104]
Key Words: Reinforcing learning module, frequent classroom testing, didactic lectures, student perception

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Introduction: Pharmacology is a vast, ever expanding and volatile subject. There is a need to supplement the traditional teaching learning methods by techniques, which will reinforce the learning of students.

A student of medicine in India first comes across the subject of pharmacology after he passes his first professional examination. In addition to basic knowledge of pharmacology, students are expected to imbibe the concepts of rational use of medicine, drug dosing and principles of clinical pharmacology. At this stage, he is hardly exposed to any clinical medicine. To this untrained student, it is but natural that the subject of pharmacology appears to be dry, volatile, and having huge volumes of information with mostly unheard, and often difficult to remember, drugs. Even though the mechanism of action and other information are best learnt by understanding the rationale, a huge section of learning of pharmacology is supposed to happen by the method of memorizing, especially the names of the drugs.

With this background, it becomes an important task for the instructor to reinforce those portions of the subject in clinical practice. One such tool to achieve this objective is to expose the student to frequent tests.[1] Though frequent classroom testing (FCT) provides reinforcement of important topics to the students, it has been reported that too frequent testing is not beneficial. There is also the issue of acceptability by the students.

Keeping these facts in mind, the department has decided to implement a reinforcing learning module (RLM) as routine part of the curriculum. The objective of the present study was to evaluate the perception of students towards the "Reinforcing Learning Module".

A "Reinforcing Learning Module" (RLM) was implemented within the course of pharmacology of these students. The RLM consisted of periodic assessment of the students by administering 35 to 50 MCQs (multiple choice questions) of single best answer type, covering the topics which were taught by traditional didactic lectures in the preceding period. Thirty percent of the MCQs were of recall type and 70 % were framed to assess applied knowledge of pharmacology and therapeutics. After the test, the ideal answers to each of the questions were displayed over screen, and the students were encouraged to discuss and clarify their doubts. Each such session was facilitated by a senior instructor from the department of Pharmacology. Not only the correct answer, but why other options are incorrect were also discussed, and special emphasis was given on the clinical application of the topic being discussed. Eight such sessions of "test followed by discussion" were conducted for 2 successive batches of students after completion of major systems, during years 2011-12 and 2012-13.

Material and Methods: The study was undertaken at the department of pharmacology in Seth GS

Medical College and KEM Hospital, Mumbai, India, and involved students studying in second professional year of the MBBS course.

At the end of the 5th semester, feedback was taken from the students, in an anonymised manner, to evaluate their perception about the RLM. For this, a pre-validated questionnaire consisting of 15 questions was administered to the students, to collect their feedback regarding their perception of the RLM, including the tests and the subsequent discussions, and regarding the benefits of the RLM from the students' point of view. Each question in the questionnaire used a 5 point Likert scale (Strongly Agree to Strongly Disagree) for assessment.

Descriptive statistics was used to analyse the data obtained from the study, and the information was presented as percentages.

Results: A total of 367 students returned the perception questionnaires for analysis. The responses obtained to each of the fifteen questions in the questionnaire, represented as percentages, are depicted in figure 1.

Figure 1: Response Of Students To The Perception Questionnaire Regarding Reinforcing Learning Model

Most students chose the 'Agree' option (either 'Agree' or 'Strongly Agree' on Likert Scale) to the
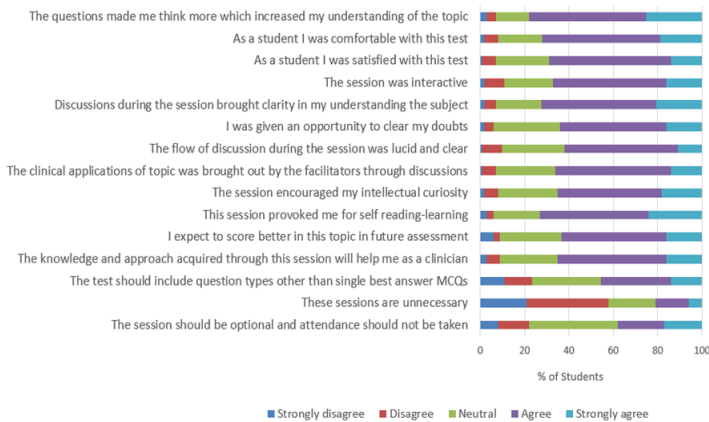
following 12 questions:
Regarding the questions:
- The questions made me think more, which increased my understanding of the topic (53%)

- As a student I was comfortable (53%) and satisfied (55%) with the test
- The test should include question types other than single best answer MCQs (42%)

Regarding the discussion session:
- The discussion session was interactive (51%) and brought clarity in my understanding the subject (52%)
- The flow of discussion during the session was lucid and clear (48%)
- I was given an opportunity to clear my doubts (51%)
- The clinical applications of topic was brought out by the facilitators through discussions (52%)

Regarding outcome of the RLM:
- The session encouraged my intellectual curiosity (47%) and provoked me for self reading-learning (49%)
- I expect to score better in this topic in future assessment (47.5%)
- The knowledge and approach acquired through this session will help me as a clinician (49%)

A majority (67%) disagreed to the question which asked them that whether this session of testing followed by discussion was unnecessary. Finally, the majority of students (40%) remained neutral to the question which asked whether the session should be optional and attendance should not be taken.

Discussion: The medical education system in India classifies the medical subjects into three groups: pre-clinical, para-clinical and clinical subjects. While the teachers of clinical subjects have the luxury of teaching the students with patients, the teachers of pre-clinical and para-clinical subjects have to confine themselves to the classroom and the practical laboratories. The restrictions with regards to the status of animal usage in practical pharmacology have further reduced the scope of novelty in the teaching of pharmacology. This, coupled with the fact that the subject of pharmacology is vast, ever-expanding and volatile, has prompted the experts in medical education to look for innovative techniques in imparting education in pharmacology to students in a

manner that is equally approved by the students and teachers alike.

The early researchers believed that FCTs stimulated rehearsal of newly learned material and inhibited the normal decay of memory. Soon, there was increasing evidence that students who faced daily tests studied more consistently than did students who were tested less frequently.[2] In addition, FCT was also credited to have indirect positive effects of motivating the students and leading them to space out periods of study.[3] However, there were also studies which suggested that frequent tests could result in negative outcomes in the students: in an analysis of 16 studies of FCT, 8 studies found that frequent testing had positive effects on student achievement measured immediately after a course, but 2 studies found negative effects, and 6 studies reported either mixed or no effects.[1] Thus, it can be safely said that though FCT has its own benefits, too frequent testing can hamper the performance of the students.

FCT has been shown to benefit students of subjects as diverse as language[4,5], marketing[6,7] social science, philosophy, mathematics, psychology, accounting, geography, law, engineering, veterinary science, statistics, government studies and business studies.[1] The technique, in the form of frequent quizzes, was also found to be useful in high-school students in Iran[8]. In the field of medicine, Mueller S et al opined that the students and the teachers favoured multiple smaller exams during the semester rather than one big exam at the semester end, because of the tendency of the students to study just prior to the exam.[9] This is also a pertinent observation because, unlike in most other fields of science and other disciplines, in medical education, learning a particular subject does not 'end' with the examination in that particular subject. Without a proper and thorough understanding of the pre- and para- clinical subjects, and without a constant revision of these subjects even after giving the final examinations in these subjects, a medical student will find it difficult to comprehend the intricacies of the clinical subjects. Thus, constant revisions and reinforcements become necessary in these non-clinical subjects.

Although there is ample evidence with respect to frequent revision tests improving scores of students, there are no studies that have reported the perception of the students with regard to the RLM method. This prompted us to undertake this study in which we first designed a RLM module containing post-lecture MCQ testing involving questions which tested both the recall capacity and the subject understanding of the student, after the lecture in the particular major topic was taken. To make the session more meaningful, we also conducted a thorough discussion of all the questions at the end of the test session. It was made a point to not score the students at this level, since we were aiming to improve the understanding of the students in the particular topic by means of reinforcement in a stress free learning environment. Also, during the discussion session, the students were encouraged to participate freely and to clear their doubts with an experienced teacher who facilitated the discussion. We also made sure that the teacher provided adequate focus upon the clinical implications of the topic being discussed. At the end of the semester, we circulated a pre-validated questionnaire which contained questions which sought to understand the perception of the students towards three major aspects: the test, the discussion, and the overall RLM technique.

The results suggest that the students are overwhelmingly in favour of the new technique. Most of the responses are in favour of the technique, as displayed in the results section. Further, the students felt that this technique motivated them to do self-reading, which is an encouraging sign: it is a common fact that not all the aspects of a topic can be covered in the didactic session due to time restrictions and heterogeneity of the intelligence in the classroom.
While our results can be compared to those reported in the study by Mueller S et al[9], the major difference is that the Mueller study suggested that single term-end examination be replaced with multiple examinations within the semester. We are of the opinion that such smaller tests should only supplement the existing didactic system of imparting medical education, in order to achieve, by the technique of reinforcement, a better understanding of important aspects of topics that

would have been covered by the instructor during the lecture. We gave more emphasis on the discussions and eliminated the aspect of scoring, with an objective of creating a stress free and practical learning environment.

Through our study we have been able to describe that the students favour the RLM technique. However, RLM through FCT significantly increases the burden on the teachers as the teacher is expected to frame questions pertinent to the objectives of the RLM.

The next concern is regarding the scoring of the students' performance in these tests. If a scoring system is followed, the students can be expected to take these tests seriously and be more attentive during the class. However, it is feared that such a step may shift the students' emphasis from learning to scoring.[1] On the other hand, if such a scoring system is not followed, though there will be no stress on the students to perform in these tests, some students may not take the tests seriously. Thus, a balance has to be struck in this aspect.

The limitations of our study are that we did not do an objective analysis of the performance of the students by RLM model. However, this aspect has been studied and it is well established that frequent revision tests improve the performance and scores of students[6,7,8]. Further, a comparative study between one group which received reinforcement and another which did not would have provided more authentic information about the efficiency of the RLM technique. Finally, our study did not include the teacher perception towards this technique.

Conclusion: RLM using MCQs, followed by apt discussion, can be a useful supplement to the existing didactic system of imparting medical education. Such a technique effectively provides reinforcement to the knowledge gained by the students during the lecture. This technique is well-received by the students, and is expected to facilitate a better understanding of a vast and volatile subject like pharmacology, while at the same time providing a platform for the active participation of the students in the discussion, thus benefiting them immensely.

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