

# A Study to Evaluate the Effectiveness of Open Book Tests Over Close Book Tests and Perception of Medical Students in Physiology

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## Abstract

**Introduction:** At present, the Medical knowledge is expanding and changing rapidly and there is increasing need to concentrate on education based on competencies. Closed book exam is an established approach to assessment in medical education which is widely accepted method of superficial learning. Adding open book test to the formative assessment can assist in handling this growth of knowledge.

**Objectives:** To evaluate the effectiveness of open book test on student's performance in summative assessment and to know the perception of students on open book test.

**Methodology:** The study was conducted on I MBBS students (n=150), who were divided into 2 groups, Group I: subjected to open book test for 4 weeks and Group II : subjected to closed book tests for 4weeks. There was a cross-over of the two groups and Group I were subjected to the closed book test and Group II students were subjected to open book tests. The mean marks obtained in summative assessment were statistically compared. Perception of the students was taken through feedback questionnaire.

**Results:** The mean marks obtained by the students (n= 141) in the summative assessment after open book test (Mean± SD =26.37±6.235) are statistically significant than those after closed book tests(mean± SD =24.09± 6.3513(p value< 0.005).

**Conclusion:** 71% of students recommended open book tests for the formative assessment. Hence, adding open book test to the medical curriculum along with regularly used closed book test are expected to stimulate deep learning.

**Keywords:** *Open book tests, Closed book test, formative assessment, deep learning, medical education.*

## Introduction

At present, the medical education has to deal with two important trends: The first is that the medical knowledge is expanding and changing rapidly<sup>(1)</sup>and second is there is increasing need to concentrate on education based on competencies and integration of knowledge, skill and attitudes. It is neither possible for the medical students to master all the knowledge nor desirable to remember this growing information and by the time they have done so, this knowledge would have expanded or changed in content. Therefore, it is important that medical students are able to use and manage knowledge when dealing with new problems

and situations appropriately. The medical colleges also have the responsibility to manage this growing amount of knowledge by looking for doctors who have a variety of skills and attributes along discipline based knowledge and skills. The learning outcomes are now formulated as competencies- integrating knowledge, skills and attitudes based on the new curriculum for undergraduates going to be introduced by the Medical Council of India from 2019 . This change in learning objectives implies change in assessment, because assessment drives students learning behaviour<sup>(2-4)</sup>. Two types of learning approaches are consistently distinguished in literature: Deep learning and surface learning. Closed book

test(CBT) is an established approach to assessment in medical education which is widely accepted method of superficial learning. It basically tests how well a student recalls his knowledge.

Open Book Tests (OBTs) permit the use of different kinds of course related resource materials during the exam under test conditions. While studying for open book test, students read and think rather than read and memorize. Therefore, it is expected to stimulate deep learning<sup>(5,6)</sup> and to assess higher cognitive levels. Students have to find the right information at the right moment and apply this information properly. Adding open book tests to the formative assessment program in the medical curriculum can assist in handling this growth of knowledge<sup>(7)</sup>. Additionally, open book tests might be the format that best suits these developments as they are expected to stimulate deep learning and reduce the need for cramming and memorization of facts which is considered preferable to surface learning approach<sup>(8,9)</sup>. Using open book tests along with the traditional close book test might help in assessing a broader body of knowledge than when using only close book tests.

### Aim of the Study

-To know the perception of students on Open book tests compared to closed book test.

-To evaluate whether open book tests significantly impacted student's performance in summative assessment.

### Materials and Methodology

After obtaining the Institutional Ethics Committee clearance and written consent from the head of the department of physiology and the students, this study was conducted in first year medical students of 2017-18 batch (n=150) at Kamineni Academy of Medical Sciences, L B Nagar, Hyderabad. Study design: Cross-sectional study

The students were divided into 2 groups.

Group I: 75 students

Group II: 75 students

In order to compare the influence of open book versus closed book tests, I focused our study on 4 examinations conducted once every week after covering

4 topics in didactic lectures in physiology. Group I students (n= 75) were subjected to open book test at the end of every week for 4 weeks on the topic covered in didactic lectures in the respective weeks followed by discussion in small groups of 7-8 students and each small group was provided with a facilitator who was subject expert in the given topic and Group II students (Control group, n=75) were subjected to closed book test on the same topic once every week for 4 weeks on the same topics. At the end of 4 weeks, a summative assessment was conducted for both group I and group II students. Both open and closed book tests were conducted in the form of theory exams containing short analytical type of open-ended questions which assessed comprehension and application with a time limit. The marks of the summative assessment of both group I and group II were compared statistically.

There was a cross-over of the two groups and this time Group I students(n=75) were subjected to the closed book test and group II students (n=75) were subjected to open book test followed by small group discussions, each small group of 7-8 students provided with a facilitator, at the end of every week in the topics covered in didactic lectures. At the end of 4 weeks, another summative assessment in the form of theory exam was conducted for both the group I and group II students and the marks of the students of both the groups were compared statistically and analyzed.

Perception of the students of both the groups (Group I and Group II) on open book test and closed book test was taken using a pre-validated standard feedback questionnaire consisting of 10 questions using 5 point likert scale and 4 themes for free comments (table 1). The data was entered in MS office and analyzed by software SPSS 19.0 statistically and compared using paired t-test. The values  $p < 0.005$  was considered as significant.

### Results

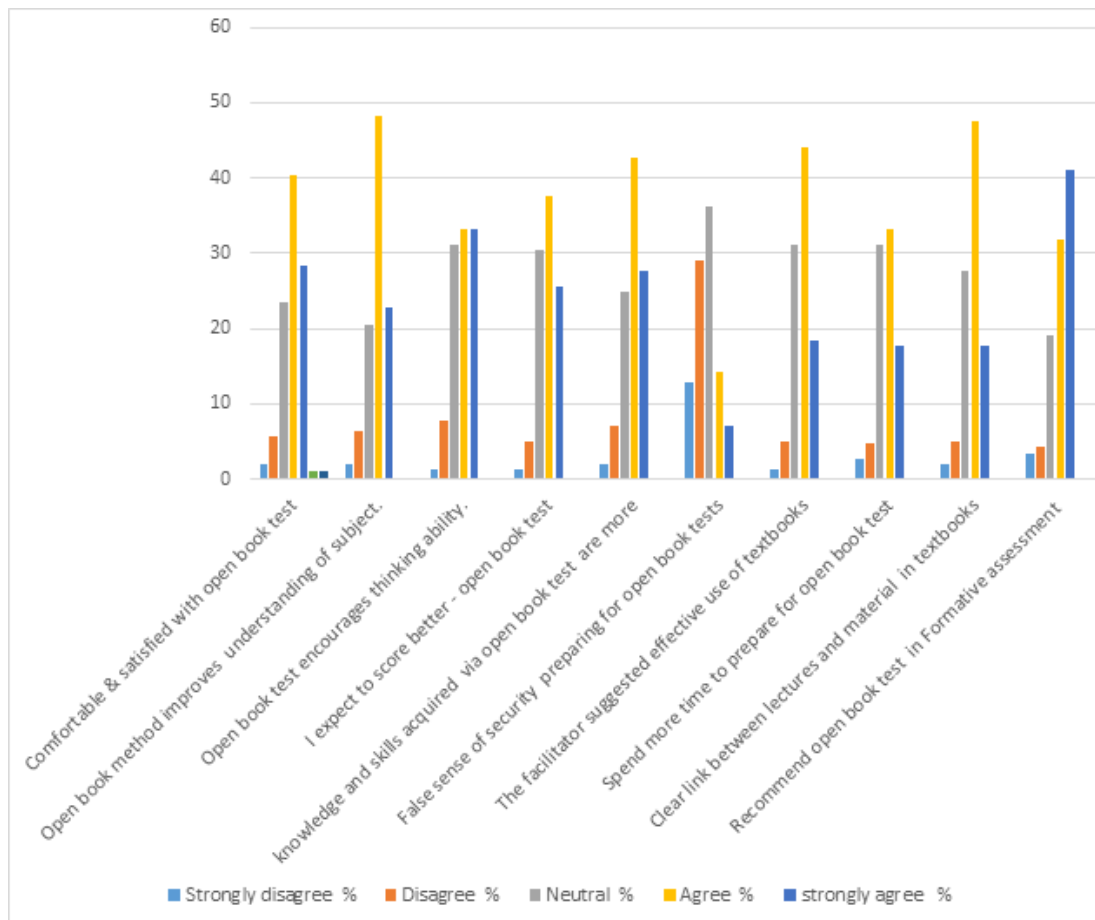
The Results of the study show that the mean marks obtained by the students (n=141)(7 students were absent for the test) in the summative assessment after open book test (Mean $\pm$  SD = 26.37 $\pm$ 6.235) are statistically significant than those obtained by the students in summative assessment after closed book tests(Mean  $\pm$  SD= 24.090 $\pm$ 6.3513) (P value < 0.005)(table 1). This shows that open book tests are a better discriminator among the students than closed book tests.

**Table 1: Comparison of Mean marks of Summative assessment after Open book test and Close book test (n=141)**

	Mean	Std. Deviation	Std. Error Mean	T value	Significance (P value)
Total marks after closed book test	24.090	6.3513	0.5330		0.000
Total marks after open book test	26.37	6.235	0.523	-8.903	

The results of the feedback from the student’s feedback questionnaire show that open book tests received the highest rating for the assessment of conceptual knowledge. Majority of the students i.e: 22% strongly agreed and 48% of them agreed that open book method improves understanding of the subject and most of the students ,43% agree and 27% strongly agree that knowledge and skills obtained about the topic is more via open book test and will help them in clinical practise. A major portion, 41% strongly agreed and 32% agreed for recommending open book test approach in formative

assessment before the summative assessment (Graph 1). 37% of the students agreed and 25% strongly agreed that they expect to score better in the relevant topic as a result of open book test. Many of the students 44% agreed and 18% strongly agreed that the small group discussions after open book tests were very useful and the facilitators provided suggestions on how to effectively use textbooks. 20% of the students agreed that they do not have any false sense of security preparing for open book tests.



**Graph 1: Responses of the students on feedback questionnaire on 5 point likert scale (n=141)**

There are some drawbacks of the open book tests. The results of the study show that 50% of the students agreed that they spend more time working on problems and exercises to prepare for open book test.

The students indicated through their free comments that many of the students felt that the concept of open book test is innovative and open book tests improves better understanding of topic and correlation. Most of the students commented they were able to make connections not only on that particular topic but also beyond that area covered in didactic lectures and they felt that open book tests should be implemented as a routine before internal assessment.

### Discussion

Present day students have grown up with technology who are accustomed to multi-tasking and can deal with information differently compared with the past. Perhaps, the traditional way of learning is no longer appropriate for today's students.

The results of the study show that mean marks of the students obtained in summative assessment after OBTs (Mean $\pm$  SD = 26.37 $\pm$ 6.235) are statistically significant than those obtained after CBT (Mean  $\pm$  SD= 24.090 $\pm$ 6.3513). This shows that OBTs are a better discriminator among students than closed book tests. While the literature on the benefits of OBT versus CBT is highly variable, the results of our study are similar to the results obtained in the study done by P.A. Phiri.<sup>10</sup>

Open-book tests seem to represent the professional setting better than closed-book test, because students have full access to their references to find answers to the questions and solutions for the given problems, just as they would in practise. Majority of the students in my study agreed that open book method improves understanding of the subject and that conceptual knowledge and skills obtained about a particular topic is more via open book test which will help them in their clinical practise. Similar results were obtained in the study done by Bouman and Reichelman<sup>11</sup> who compared essay questions from closed and open book test and concluded that open book tests provide opportunity to stimulate deeper understanding and assess this.

Through the free comments, the students in this study indicated that open-book tests offered an opportunity to apply knowledge they gained during the course in a

creative manner and they were able to demonstrate a true understanding of the topics covered in didactic lectures. Students also indicated that they experience less stress before and during an open book test and open book test reduce the need for cramming and memorization of factual material. These results are in congruence with those in study done by Tussing L<sup>12</sup>

In this study, many of the students also indicated that open-book tests offered an opportunity to apply knowledge they gained during the course in a creative manner and they were able to demonstrate a true understanding and a clear link between the topics covered in didactic lectures and the text books as also suggested by Theophilides C<sup>13</sup> in their study. In addition, open book tests seem to represent the professional setting better than closed book tests because students have full access to their references to find answers to the questions and answers for the given problems, just as they do would do in clinical practise.

There are some disadvantages of open book tests. Several previous studies revealed that students underestimate the time and effort needed to prepare for open-book tests. The results of this study also show that the students agreed that they spend a considerable less amount of time preparing and writing, consulting notes and texts for the OBT. These results are in accordance with the results of other studies done by Kountselini MK<sup>14</sup> and Lubawy W.<sup>15</sup>

### Conclusion

Open book tests are not generally accepted in public examinations but there are no clear reasons for that. In this study, 41% of students strongly recommended and 32% of the students recommended open book tests for the formative assessment. In my opinion, students who prepared for OBTs seem to develop high-order thinking and study the course material in-depth. Hence, they scored more marks in summative assessment. OBTs should not be thought as an alternative to CBTs but their value may be expanding beyond what is measured by CBT.

Adding open book tests to the formative assessment program in the medical curriculum can assist in handling the expanding and constantly changing knowledge as they are expected to stimulate deep learning and reduce the need for cramming and memorization of facts which is considered preferable to surface learning approach.

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