

Effect of Introducing Written Tests in Continuous Assessment for Improving Performance in Terminal Exam of Anatomy

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Abstract: According to recent MCI guidelines internal assessment has become crucial in deciding whether the student would be eligible to appear in professional exam or not. In our setup internal assessment consists of several viva voce exams spread throughout the course and a terminal exam consisting of written and oral sections. Our concern rose when we observed consistently poor performance in theory section of terminal exam. Poor grades in theory were adversely affecting the overall internal assessment. Lack of exposure to any written test during day to day exam probably could have been the reason for it, so, we introduced few written exams. Pattern of continuous internal assessment plays vital role in deciding learning strategies of students. Feedback of performance during day to day exam help student to improve on his weaker areas by developing proper plan for the same before final exams. This study analyses the effect of introducing written test in day to day exams on terminal theory performance. This observational study was done in the subject of anatomy for MBBS 2011 and 2012 batches. One written exam was introduced for 2012 batch, replacing one viva voce exam in each region. The pattern of written test was subjective (short answer type questions) and was kept similar to that of terminal exam. Mean and categorical scores of two batches were compared and statistically analyzed. Mean marks of 2012 batch in theory, practical and total (18.87, 27.09 & 45.96) were more in comparison to 2011 batch (11.87, 25.09 & 36.13). In theory, number of poor performers in boys group was drastically decreased from 84.86% to 45.83%, whereas inflation in 16 to 25 marks category was from 11.89% to 44%. Among girls, percentage of poor performers decreased from 38.09% to 9.21% whereas noteworthy raise was observed in good and very good category (from 12.69% to 38.15% and 0% to 10.52% respectively). Both boys and girls performed slightly better in practical but the increase was statistically insignificant. In year 2011, only 5.6% students were passed in theory, whereas in 2012 batch, this figure raised to 20.08%, suggesting a clear benefit of introducing written assessment in day to day exams.

Keywords: Anatomy, Internal assessment, Theory, Terminal exam, Written test

I. Introduction

Medical Council of India (MCI) has placed a lot of emphasis on internal assessment. According to MCI guidelines, internal assessment shall be based on day to day assessment. Weightage for the internal assessment is kept at 20% of the total marks in each subject (40 marks out of 200). Student must secure at least 35% marks of the total marks fixed for internal assessment in a particular subject in order to be eligible to appear in final university examination of that subject [1]. Internal assessment thus has become extremely important as student who fails to clear internal assessment will be debarred from appearing in the final examinations [2].

For teaching gross structure of human body we follow regional approach. Human body is divided into 6 regions viz. upper limb, lower limb, thorax and back, abdomen and pelvis, head and neck, and neuro-anatomy. Our continuous internal assessment program (or day to day exams) of each region consists of several viva voce during the course at regular intervals (stage viva). After completion of every region a part completion viva comprising of various stations on osteology, gross anatomy, surface anatomy and radiology is conducted. Marks of all day to day assessment are finally reduced to 20. A terminal assessment consisting of written and practical exam is organized during second semester of the course. This assessment carries 50 marks for each component i.e. theory and practical. Total marks of terminal examination are reduced to 20. Therefore, 40 marks of internal assessment are contributed by terminal exam scores (20) and day to day viva voce scores (20).

It was observed for long that our students were not performing adequately in terminal written exams. Because of obtaining fewer marks in theory of terminal exams, the internal assessment of students was suffering adversely. Many of these students however, used to appear in professional exam by fulfilling the criterion of

minimum 35% but were not able to obtain passing marks in finals. Reason being the passing criterion in summative examination is 50% and not 35%. A student, who obtains 14 marks (35%) in internal assessment, has to work harder to compensate the deficit of 15% in summative exam to get the passing marks.

It is a universally accepted fact that students are under severe stress and anxiety during professional exams as compared to day to day exams. Studies have proven that exam anxiety interferes with academic performance [3]. It is observed that under more demanding situations like professional exams the anxiety plays a detrimental role on performance [4]. Some of the factors that cause test anxiety are related to lack of preparation for the test and or inappropriate test preparation, fear of negative evaluation, bad experience on previous test, time limitation and pressure, number of items included in the test and the difficulty of course content. Anxiety poses difficulty in recalling facts and increases errors during exams [5]. So, in order to improve internal assessment, we planned to introduce written test in day to day exams, presuming that this practice might help students to perform better in terminal exams and henceforth in summative exams as well. The present study was based on comparison analysis of marks of terminal exams of two groups to adjudge the intervention.

II. METHODS

This observational study was conducted in the Department of Anatomy, King George's Medical University, Lucknow, Uttar Pradesh in 2013. Marks obtained in the terminal exams of MBBS 2012 and 2011 batches were compared using appropriate statistical tests. One written exam was introduced for 2012 batch, replacing one viva voce exam in each region. Usually 3 to 4 stage viva are conducted in each region. The pattern of written test (short answer, draw diagrams type questions) was kept similar to that of terminal exam. Question paper of terminal exam was prepared by the same faculty for both sessions. Examiners for checking answer sheets were also same. Approval was sought from appropriate institutional and departmental authorities before analysis.

III. Results

Assessment modification in form of introducing one written test in day to day exam in 2012 batch was successful in increasing the percentage of students securing passing or above passing marks in theory during their terminal exams when compared with earlier batch [Table 1, Fig. 1]. The gain in theory also reflected as improved overall performance while practical component was less deflected between two years. Mean marks in theory, practical and total were raised from 11.28, 25 and 36 to 18.87, 27 and 45.96 respectively [Table 1]. Performance of students was further analyzed by categorizing the marks as poor (0-15); average (16-25); good (26-30) and very good (≥ 31). Gender wise performance was also taken into consideration.

In theory, number of poor performers in boys group was drastically decreased from 84.86% to 45.83%, whereas inflation in 16 to 25 marks category was from 11.89% to 44%. Whereas achievement in good and very good category was not remarkable [Table 2, Fig. 2a]. Among girls, percentage of poor performers decreased from 38.09% to 9.21% whereas noteworthy raise was observed in good and very good category (from 12.69% to 38.15% and 0% to 10.52% respectively) [Table 2, Fig. 3a]. On the contrary effect on average group was not notable. Both boys and girls performed slightly better in practical but the increase was statistically insignificant [Table 2, Fig. 2b & 3b].

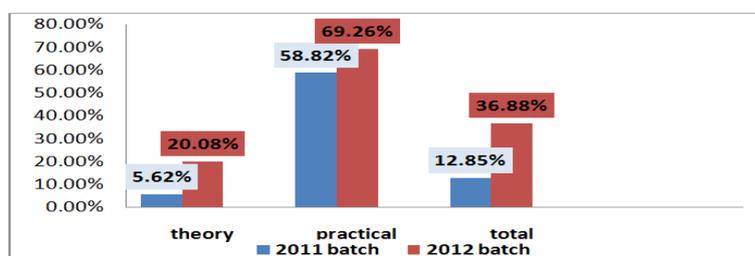


Fig1: Comparison of percentage of students of two batches who secured passing marks in terminal exam (50% or above).

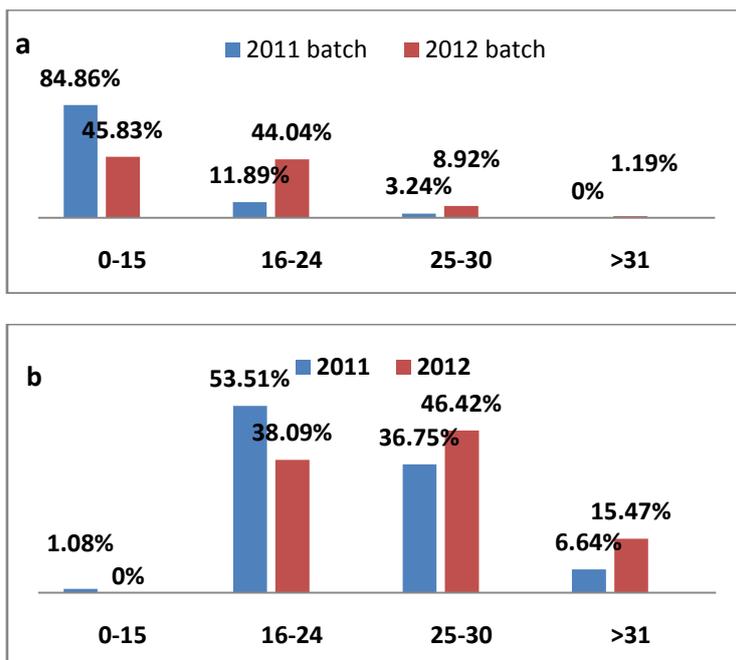


Fig 2: Comparison of percentage of boys of two batches for poor (0-15); average (16-24); good (25-30) and very good performance (>31) in (a) theory and (b) practical.

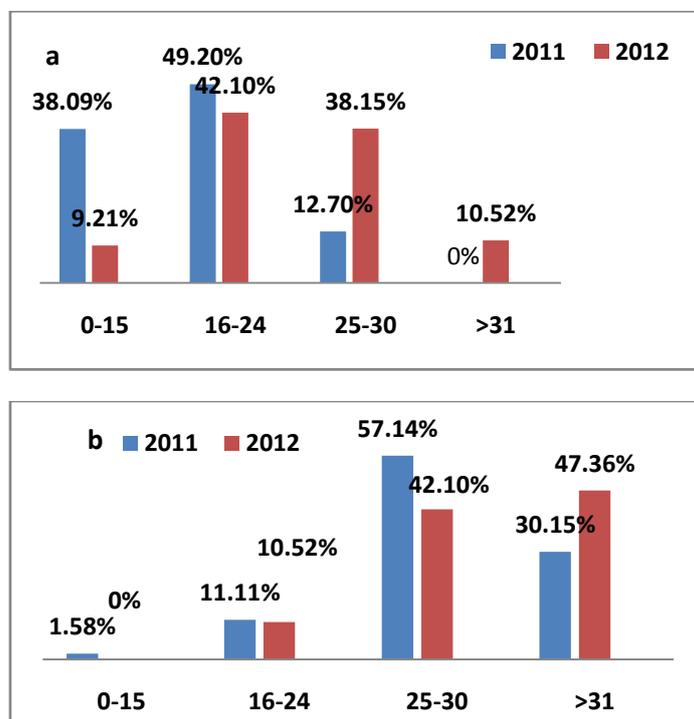


Fig 3: Comparison of percentage of girls of two batches for poor (0-15); average (16-24); good (25-30) and very good performance (>31) in (a) theory and (b) practical.

Table 1: Comparison of overall result of terminal exam of two batches.

Gender	Marks of Theory/Practical/ Total	2011batch n=248 Male=185, Female=63		2012 batch n= 244 Male=168, Female=76	
		Mean Min-max	Pass	Mean Min-max	Pass
Female	Theory (50)	16.83 (4-29)	8 (12.69%)	22.58 (7-33)	37 (48.68%)
	Practical (50)	28.05 (14.5-35)	55 (87.30%)	29.84 (18-39)	68 (89.47%)

Male	Theory (50)	10.00 (0-28)	6 (3.24%)	17.01 (4-32)	17 (10%)
	Practical (50)	23.98 (10.5-36)	84 (45.40%)	25.85 (16-37)	104 (61.90%)
Total	Theory	11.87 (0-29)	14 (5.6%)	18.870 (4-33)	49 (20.08%)
	Practical	25.09 (10.5-36)	139 (56.04%)	27.09 (16-39)	169 (69.26%)
	Theory + Practical	36.13 (14-64)	32 (12.85%)	45.96 (25-69)	90 (36.88%)

Table 2: Comparison of percentage of students of two batches performing poor, average, good and very good

Range of marks	Mode of exam	Gender	2011 (248) M=185,F=63		2012(244) M=168,F=76		p value
			N	%	N	%	
0-15 (poor)	Theory	M	157	84.86	77	45.83	<0.001
		F	24	38.09	7	9.21	<0.001
		Total	181	72.98	84	34.42	<0.001
	Practical	M	2	1.08	Nil	0	0.177
		F	1	1.58	Nil	0	0.27
		Total	3	1.2	0	0	0.085
16-24 (average)	Theory	M	22	11.89	74	44	<0.001
		F	31	49.20	32	42.1	0.402
		Total	52	20.96	106	43.44	<0.001
	Practical	M	99	53.51	64	38.09	0.004
		F	7	11.11	8	10.52	0.912
		Total	106	42.74	72	29.5	0.002
25-30 (good)	Theory	M	6	3.24	15	8.92	0.024
		F	8	12.69	29	38.15	0.001
		Total	14	5.64	44	18.03	<0.001
	Practical	M	68	36.75	78	46.42	0.065
		F	36	57.14	32	42.10	0.077
		Total	104	41.93	110	45.08	0.482
□ 31 (very good)	Theory	M	Nil	0	2	1.19	0.137
		F	Nil	0	8	10.52	0.008
		Total	0	0	10	4.09	0.001
	Practical	M	16	6.64	26	15.47	0.048
		F	19	30.15	36	47.36	0.039
		Total	35	14.11	62	25	0.002

p- value less than 0.001 is significant

IV. Discussion

Assessment impacts powerfully on students learning. Researchers have considered it as the most powerful tool that the teachers have at their disposal to influence students learning [6,7].The feedback in terms of grades is a strong determinant for deciding future strategies for both. Student tries to improve or strengthen his weaker areas accordingly. Continuous assessment plays a vital role in influencing the summative exam performance. Santra et al(2014)found a strong correlation between internal assessment marks and professional exam marks [8].Therefore, an assessment plan should lay out a well thought out selection of assessment methods that must be aligned to the objectives and outcomes of the subject or programme.Effective assessment is inseparable from good teaching and learning.

Despite of conducting regular day to day assessment exam only 12.85% students of 2011 batch could obtain passing marks in terminal exam. On analysing the situation further it was observed that only 5.6% students were passed in theory whereas 56.04% in practical, suggesting a great discrepancy [Table 1]. We were missing something somewhere, which was reflected as poor marks in theory section of term end exam. This was an eye opener feedback for us, which revealed that as these students were exposed to regular viva voce pattern of examination in their day to day assessments, 56.04% students performed well in practical and lack of exposure to any written test was reflected in their theory marks. The pattern of day to day assessment should synchronize with that of professional exam. The terminal exam is a mirror image of professional exam and is considered as a rehearsal for that. Therefore the pattern of day to day exam should also match with that of terminal exam. In our setup, there was a clear cut disharmony between the two. Our day to day assessment focused only on viva voce and practical component. Kerdijk et al (2013) also emphasized that test planning, repeated testing and compensation, when combined, helps in improving the performance of initially low scoring students [9].

Assessment is driving force for student learning. The study pattern of students depends upon the type of assessment they are exposed to. Newble and Jaeger(1983) in a study, confirmed the dominant role of

examination on student learning and demonstrated the distortion that occurs when there is a mismatch between the faculty's real objectives and the objectives expressed in its assessment schemes [10]. Duffield and Spencer (2002) observed that assessment is a major determinant of how students learn [11]. Inuwa et al (2011) observed that students changed their pattern of preparation from study of dissected specimen to images atlas in anatomy, when they started giving computer based exams in practical [12]. The present study further strengthens the above view because when written test was introduced in day to day assessment, students started preparing for written examination as well, which lead to their improved performance in terminal theory section. The percentage of pass students increased from 5.6% to 20.08%.

In depth analysis of theory marks revealed drastic drop in the percentage of poor performers (from 72.98% to 34.42%). On the other hand, there was sweeping rise in the number of average, good and very good performers after introducing written test [Table 2].

An interesting finding of the score analysis of two batches needs a thorough discussion i.e. gender wise differences of performance following intervention. Percentage of poorly performing girls dropped to 9.21% from 38.09% in comparison to 45.83% from 84.86% among boys, suggesting a greater decline of poor performers among girls than boys. In year 2012, almost similar percentage of boys (44%) and girls (42.1%) lied in average performing group. Whereas in higher performing groups, girls (38.15% and 10.52%) outnumbered boys (8.92 & 1.19%). Therefore, it is clearly defined that females responded much better than males. Several studies in medical education have proved this. Kelly and Dennick (2009) found that females perform better when the assessment contained short answer questions [13]. Few other studies also provided strong evidence that female medical students are better than males in OSCE and other type of clinically based performance examinations [14,15]. In another study, a meta-analysis showed that not only females do better than males in clinical training and assessment but are also more likely to obtain honors degree [16].

Underperformance in written section of terminal exam in our setup could also be attributed to lack of practice of writing subjective answers. Authors want to remind the fact that these students were habitual of solving MCQs. Most students have a lapse of minimum 1-2 years after they had appeared in their 12th standard subjective pattern written exam. Firstly, objective pattern of medical entrance exam would have led them to lose their habit of writing down ideas. Secondly, none of the day to day exam in any semester was subjective in pattern, which further graved the situation. As, first written exam in terminal was very near to summative exam, feedback that they need to improve upon their writing skills could not helped them much. Another factor for low scores could have been attributed to the strict marking pattern in internal assessment. One would argue that the underperformance of students could have been rectified easily by lenient marking. Well, assessment reflects performance and drives student to perform better and therefore helps in learning. It would be unjustified if students' scores do not reflect true picture.

For writing, strong thinking is needed to convert thoughts into facts. While preparing for written exam, students pay more stress on practice of making diagrams; more concentration on facts and concepts of the subject as they have to be reproduced in written exam. While writing for exam, practice of writing itself helps to develop confidence. Students get idea for their pace and gradually learn to adjust timings. Result of the current observations strongly suggests that students must be accustomed of those activities more frequently on day to day basis for which they will be adjudged in their summative exams.

V. Conclusion

In year 2011, only 5.6% students were passed in theory, whereas in 2012 batch this figure raised to 20.08%, suggesting a clear benefit of introducing written assessment in day to day exams.

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References

- [1]. Medical Council of India. Guidelines on Graduate Medical Education. New Delhi, 1997.
- [2]. Singh T, Singh D & Natu MV. A suggested model for internal assessment as per MCI guidelines on graduate medical education, 1997. *Indian Pediatrics*. 1998; 35: 345-347.
- [3]. Everson H & Millsap R. Isolating gender differences in test anxiety: confirmatory factor analysis of the Test Anxiety Inventory. *Educational & Psychological Measurement*. 1991; 51: 243-251.
- [4]. Zeidner M. *Test Anxiety: The State of the Art*. New York: Plenum Press, 1998.
- [5]. Anisa Triphoni, Shahini M. How does exam anxiety affect performance of university students? *Mediterranean Journal of Social Sciences*. 2011; 2(2): 93-100
- [6]. Elton LRB & Laurillard, DM. Trends in research on student learning. *Studies in Higher Education*. 1979; 4: 87-102.
- [7]. Boud D, Cohen R, & Sampson J. Peer learning and assessment. *Assessment & Evaluation in Higher Education*. 1999; 24: 413-426.

- [8]. Santra R, Pramanik S, Mandal A, Sengupta P, Das N, RaychaP. A study on the performance of medical students in internal assessment and correlates to final examinations of 2nd MBBS Pharmacology curriculum in a college of eastern India. *J ClinDiagn Res.* 2014; 8(12): HC01-HC02.
- [9]. Kerdijk W, Tio RA, Mulder BF, Cohen- Schotanus J. Cumulative assessment: strategic choices to influence students' study efforts. *BMC medical education* 2013, 13: 172.
- [10]. Newble DI & Jaeger K. The effect of assessments and examinations on the learning of medical students. *Med Edu*, 1983; 17: 165-171.
- [11]. Duffield KE & Spencer JA. A survey of medical students' views about the purposes and fairness of assessment. *Med Edu.* 2002; 36: 879-86.
- [12]. Inuwa IM, Taranikanti V, Al- Rawahy M, Habbal O. Perception and attitude of medical students towards two methods of assessing practical anatomy knowledge. *Sultan qaboosUniv Med J.* 2011; 11(3): 383-390.
- [13]. Kelly S &Dennick R. Evidence of gender bias in true-false-abstain medical examinations. *BMC Medical Education.* 2009;9:32. doi: 10.1186/1472-6920-9-32.
- [14]. Wiskin CM, Allan TF, Skeleton JR. Gender as a variable in the assessment of final year degree-level communication skills. *Medical Education.* 2004; 38: 129-137.
- [15]. Haq I, Higham J, Mirris R, Dacre J. Effect of ethnicity and gender on performance in undergraduate medical education. *Medical Education.* 2005; 39: 1126-1128.
- [16]. Ferguson E, James D, Madeley L. Factors associated with success in medical school: systematic review of literature. *British Medical Journal.* 2002; 324: 952-957.