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Horizontal Integrated Teaching for First-Year MBBS Students

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Original Research Article

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Abstract: This comparative, before-and-after study (without controls) was conducted between February 2018 and April 2018 at Rajiv Gandhi Medical College, Maharashtra, India, to compare the cognitive domain scores obtained by first-year Bachelor of Medicine, Bachelor of Surgery (MBBS) students after traditional didactic lectures with that obtained after integrated teaching. After obtaining permissions from the Institutional Ethics Committee and institutional authorities, the purpose of the study was explained to first-year MBBS students. Those who had given written informed consent and were present for traditional didactic lectures, integrated teaching, pre-test and post-test were included in the study. Traditional didactic lectures were conducted as per the syllabus for the first-year MBBS course. The pre-test, conducted after traditional didactic lectures, consisted of ten questions (two mark per question; total 20 marks). After the pre-test, integrated teaching was conducted by the same set of teachers. The post-test was conducted after integrated teaching, using a questionnaire that was identical to that of the pre-test. A total of 62 students (29 females; 52.54% and 33 males; 47.46%) participated. The overall mean scores (out of 20) increased from 11.53 +/- 3.59 (95% CI: 10.64 - 12.43) in the pre-test to 13.31 +/- 3.16 (95% CI: 12.52 - 14.09) in the post-test, exhibiting high statistically significant ($Z= 2.921$; $p= 0.003$) difference. In the pre-test, the gender differences in scores were statistically significant for two questions, while in the post-test, the statistical significance was observed only for one question. Despite time constraints in the teaching schedule for first-year medical students, it is possible to conduct integrated teaching, which increased cognitive domain scores. However, a larger study on integrated teaching would be necessary in order to generalize the results.
Keywords: First-year MBBS, Integrated teaching, Traditional didactic lectures.

INTRODUCTION

Integrated teaching (IT) necessitates combining and inter-relating different aspects of the same topic, which is routinely taught by separate academic departments as parts of separate subjects [1]. "Horizontal integration" entails synthesis of teaching in two or more disciplines that are taught concurrently in the same phase of the curriculum, while "vertical integration" is between subjects taught in the different phases of curriculum [2]. The Medical Council of India has recommended IT between conventional subjects using a setting of clinical relevance to achieve both horizontal and vertical integration in different phases of the Bachelor of Medicine, Bachelor of Surgery (MBBS) course with the intention of providing medical students with holistic learning perspectives [3]. Typically, the topics for IT are chosen on the basis of interdisciplinary nature, preventability, conditions that portray basic science concepts [4], and "must know" component [5].

Since the dissemination of information from diverse subjects is synchronized, IT saves time and efforts of teachers [6], provides learners with a holistic outlook and enables them to comprehend new perspectives [7], prevents the patchy attainment of isolated, disjointed and segregated bits of information and alters knowledge into handy tools for learning new know-how [8], and facilitates applied learning and constructive clinical reasoning [9,10]. The challenges in implementing IT include defining the core curriculum, sequencing content, faculty interest and expertise, and interdisciplinary integration [11,12].

Harden's integration ladder [13] visualizes curricular integration as an eleven-step ladder, wherein subject-based isolated teaching comprises the first four steps and rising levels of cross-disciplinary integration are represented in the upper six steps. In the final eleventh step of the ladder, the student takes more responsibility for the integration and is empowered with

the necessary tools [13]. IT has been extensively implemented after realizing that the long-established style of teaching pre-clinical subjects as water-tight compartments devoid of cross-links and clinical applications often fail the students when they proceed to clinical clerkships [14,15].

The objective of this study was to compare the cognitive domain scores obtained by first-year MBBS students after traditional didactic lectures (TDLs) with that obtained after IT.

MATERIALS AND METHODS

This comparative, before-and-after study (without controls) was conducted between February 2018 and April 2018 at Rajiv Gandhi Medical College, located about 30 kms from Mumbai city in Maharashtra, India. The participants included all first-year MBBS students, aged 18 years and above, of either sex, who gave written informed consent. Those students who did not give written informed consent or those who were absent during the TDLs or IT or pre-test or post-test were excluded.

After obtaining permissions from the Institutional Ethics Committee and institutional authorities, the purpose of the study was explained to first-year MBBS students and written informed consent was obtained from those willing to participate in the study. TDLs were conducted by on the topic "Visual System", as per the syllabus for the first-year MBBS course. The pre-test, conducted after TDLs, consisted of ten questions (two mark per question; total 20 marks). After the pre-test, IT was conducted on the same topic by the same set of teachers from departments of Physiology, Anatomy and Community Medicine. The post-test was conducted after IT, using a questionnaire that was identical to that of the pre-test. The outcome studied was the difference in cognitive domain scores after attending TDLs (by a pre-test) and IT (by a post-test).

The data were statistically analyzed using EpiInfo Version 7.0 (public domain software package from the Centers for Disease Control and Prevention, Atlanta, GA, USA). Data were presented as mean and standard deviation (SD). The 95% confidence interval (CI) was presented as: [Mean-(1.96)*Standard Error)] - [Mean+(1.96)*Standard Error)]. Standard error of difference between two means was computed. Statistical significance was determined at $p<0.05$.

RESULTS AND DISCUSSION

A total of 62 students (29 females; 52.54% and 33 males; 47.46%) participated. The overall mean scores (out of 20) increased from 11.53 +/- 3.59 (95% CI: 10.64 – 12.43) in the pre-test to 13.31 +/- 3.16 (95% CI: 12.52 – 14.09) in the post-test, exhibiting high statistically significant ($Z= 2.921$; $p= 0.003$) difference. In the pre-test, the minimum, first quartile, third quartile and maximum scores (out of 20) were identical for participants of either gender. In the post-test, male students obtained higher minimum, first quartile, third quartile and maximum scores as compared to their female counterparts. The median pre-test score was higher for female students while the median post-test score was identical for both males and females. (Fig. 1) Similar results have been obtained by other researchers [16-18].

In the pre-test, the gender differences were statistically significant for Question Nos. 1 & 9, while in the post-test, the statistical significance was observed only for Question No. 7. Similar results have also reported by other studies [18,19]. Several studies [20-22] have revealed gender differences in learning styles. Teachers who are aware of the diversity of learning styles can augment student motivation and performance by devising suitable learning approaches to suit the learning style preferences of students [23].

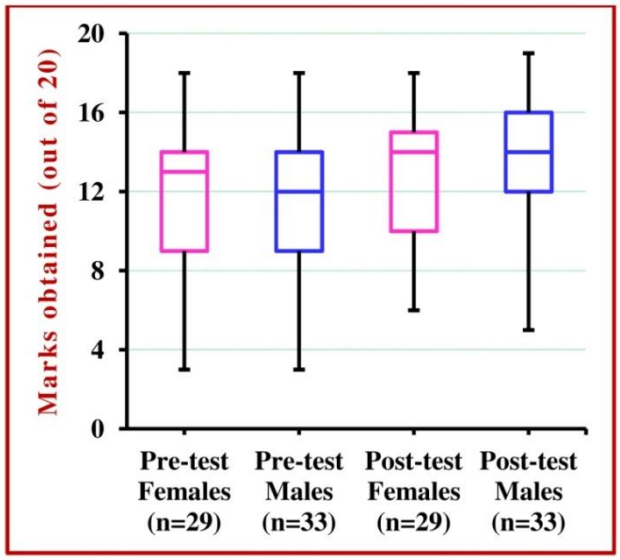

Fig-1: Boxplot of scores obtained in pre- and post-tests

Table-1: Gender differences in pre-test scores

Q. No.	Females (n=29)		Males (n=33)		Z value	p value
	Mean	SD	Mean	SD		
1	0.66	0.94	1.18	0.99	2.119	0.034 *
2	0.76	0.99	1.21	0.98	1.794	0.072
3	0.76	0.87	0.66	0.86	0.454	0.649
4	1.52	0.78	1.48	0.87	0.190	0.849
5	1.17	0.89	1.34	0.77	0.798	0.424
6	1.66	0.61	1.65	0.67	0.061	0.951
7	0.34	0.61	0.52	0.78	1.017	0.309
8	1.83	0.54	1.90	0.41	0.568	0.570
9	1.24	0.99	0.62	0.94	2.519	0.011 *
10	1.52	0.87	1.41	0.91	0.486	0.626

SD = Standard deviation; Z = Standard error of difference between two means
*Statistically significant

Table-2: Gender differences in post-test scores

Q. No.	Females (n=29)		Males (n=33)		Z value	p value
	Mean	SD	Mean	SD		
1	0.62	0.94	1.03	0.98	1.679	0.093
2	1.10	1.01	1.52	0.87	1.742	0.081
3	0.76	0.83	0.83	0.85	0.327	0.743
4	1.45	0.83	1.55	0.78	0.486	0.626
5	1.45	0.74	1.52	0.57	0.412	0.680
6	1.72	0.59	1.66	0.61	0.393	0.694
7	0.79	0.98	1.28	0.92	2.021	0.043 *
8	1.83	0.54	1.62	0.78	1.244	0.220
9	1.17	1.00	1.28	0.90	0.452	0.651
10	1.79	0.62	1.66	0.77	0.176	0.860

SD = Standard deviation; Z = Standard error of difference between two means
*Statistically significant

CONCLUSION

Integrated teaching increases cognitive domain scores. In spite of time constraints in the teaching schedule for first-year medical students, it is possible to conduct integrated teaching. However, a larger study on integrated teaching would be necessary in order to generalize the results.

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