

Co-teaching: Exploring an Alternative for Integrated Curriculum

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Abstract: Purpose: Currently, the curriculum of medical education is compartmentalized which makes achieving the expected outcome, a real challenge. Co-teaching, an existing concept in education, however, may be used in medical education for integrating the applied component while basic concepts are being taught. The hypothesis, "can co-teaching be an alternate for an integrated curriculum?" was explored in this study. Therefore, the present study was designed to compare the outcomes of co-teaching with the existing teaching methodology owing to the absence of integrated curriculum.

Methods: Co-teaching and conventional modules of topics Diabetes mellitus (DM) and Alcohol and liver disease (AL), were prepared and validated. 100 under graduate medical students were randomly assigned to groups A and B. Group A was taught DM by Conventional teaching (CT) and AL by Integrated Co-teaching (ICT) and Group B was taught DM by ICT and AL by CT. A knowledge assessment tool of 20 multiple choice items was administered to assess the pre, post and retention knowledge scores. Change between knowledge scores was analyzed using inferential statistics.

Results: Both conventional and co-teaching were significantly effective in increasing the knowledge scores ($p = 0.0001$) with no significant difference in learning outcomes ($p = 0.59$) between the two. However, co-teaching showed better knowledge retention compared to conventional teaching ($p = 0.008$).

Conclusions: Co-teaching could be considered as a substitute for integrated curriculum as it enabled comparatively better retention of knowledge as revealed by the findings.

Keywords: Alcohol and liver disease (AL) ■ Conventional teaching (CT) ■ Diabetes mellitus (DM) ■ Integrated co-teaching (ICT) and knowledge score

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INTRODUCTION

Presently, the medical curriculum in many medical schools is compartmentalized. Therefore, the subject teaching is conducted in isolation, which leaves considerably little scope for the students to correlate and integrate the basic subject knowledge during the clinical semesters.¹ It also fails to convey the actual relevance of the subject with its applied clinical aspects² and rarely generates the expected level of interest and curiosity in the learner.^{3,4} This holds true mainly for subjects in the basic sciences.

In an attempt to enhance meaningful learning, integrated curriculum has been proposed to be incorporated in

the medical education system which refers to combining basic sciences with clinical sciences in such a way that the traditional divide in pre-clinical and clinical subjects does not exist.⁵ This may render greater clarity of the more relevant concepts.⁶ However; very few medical schools in India could impart teaching through integrated methods even though majority of the medical schools of developed countries rely on it. Moreover, it also seems to be a long drawn process to bring change in the curriculum.

The concept of team teaching/co-teaching however, exists in education which has been found to be an innovative teaching learning methodology with many advantages in its own way.⁵ This study was an attempt to explore the possibility of a substitute (integrated co-teaching) for absence of integrated curriculum. Also to understand if integration in teaching is required across the board for all topics mentioned in the curriculum, as integration of basic subject teaching with supportive clinical inputs is a costly affair in terms of time, logistics, learning curve, retention of knowledge and feasibility. Therefore, co-teaching modules in an integrated format may be designed and their use to substitute the integrated curriculum may be rationalized.

MATERIALS AND METHODS

The chosen setting for the study was an autonomous medical institute of Government of India situated in the state of Bihar. After obtaining mandatory clearance from the Institutional Ethical Committee, the first year Under graduate Medical (MBBS) students who consented to participate in this study were drawn as sample. After a Focused Group Discussion among the faculty members of the participating departments viz, Biochemistry and General Medicine, two topics Viz; diabetes mellitus (DM) and alcohol and liver disease (AL) were selected for teaching. Modules for integrated co-teaching (ICT) and conventional teaching (CT) for the topics selected were made and contents were validated by experts of relevant fields. A questionnaire consisting of 20 items of multiple choices (single best response type) was made and validated by experts for assessment of knowledge before and after the teachings. Questions were based on the specific learning objectives of the topics to be covered in the teaching sessions. 100 students who consented to be part of the study were randomly assigned to create two groups of 50 each.

Table 1. Group assignment of students.

Group A	Conventional teaching – Diabetes mellitus
	Vertical integrated teaching – Alcohol and liver disease
Group B	Conventional teaching – Alcohol and liver disease
	Vertical integrated teaching – Diabetes mellitus

The knowledge questionnaire was administered prior to the teachings to have a baseline knowledge score to serve as a pre-test score. The teaching was carried out as planned according to the schedule (Table 1).

A post-test was conducted for both the groups for each of the two topics using the same knowledge questionnaire as used in the pre-test. At the end of exposure of both types of teaching modalities, an 8 items opinionnaire was administered to obtain the students' perception on teaching-learning experience. These questions were concerned with areas of strength of teaching methodology, aspects which facilitated their learning, time management etc. Anonymity was assured to ensure genuine feedback. Six weeks from the post-test, the same knowledge questionnaires for both topics were administered to both groups to determine the retention of knowledge.

Statistical analysis

Paired t-test was used to compare the mean pre- and post-test knowledge scores of group A and group B (intragroup analysis) for both the topics. Mean post-test knowledge scores of group A and group B (intergroup) for same topics were compared using t-test. Furthermore, knowledge retention scores obtained after six weeks were

compared with the pre-test knowledge scores for both the groups using paired t-test. Intergroup analysis (CT vs ICT) of knowledge retention scores for both the topics was compared using t-test. The results of students' perception for CT and ICT methodologies were evaluated in the form of percentage.

RESULTS AND DISCUSSION

The knowledge outcome was significantly improved by both teaching methods as reflected by paired t-test analysis between pre- and post-test knowledge scores of the two groups ($p = 0.0001$). The mean pre- and post-test knowledge scores in the CT and ICT groups for DM were 10.74 ± 2.95 ; 15.72 ± 1.91 and 10.78 ± 3.01 ; 15.46 ± 2.53 respectively. In addition, the mean pre- and post-test knowledge scores in the CT and ICT groups for AL were 10.26 ± 2.27 ; 14.42 ± 1.59 and 9.56 ± 2.55 ; 13.46 ± 2.04 respectively (Table 2) (Fig. 1). Both methodologies (ICT and CT) showed significant learning (DM by CT = 4.98 ± 2.6 , DM by ICT 4.68 ± 2.97 ; AL by CT = 3.9 ± 2.55 , AL by ICT 4.16 ± 2.3), which was significantly different from 0, $p = 0.0001$ (Fig. 2). However, learning in DM or AL was not significantly different between ICT and CT, $p = 0.59$, $p = 0.59$, respectively when compared by independent t-test (Table 3).

Knowledge retention scores for the topic of DM improved in both ICT (16.46 ± 2.06) and CT (16.82 ± 1.97) groups but the difference between ICT and CT was not significant, $p = 0.374$. However, for the topic of AL, the knowledge retention was significantly better when ICT was used (14 ± 1.95) as compared to CT (12.98 ± 1.85), $p = 0.008$ (Table 4). Therefore, both methodologies (ICT and CT) showed significant learning in terms of retention of knowledge compared to pre-test in case of DM, by CT = 6.08 ± 2.66 , by ICT 5.68 ± 3.12 : $p = 0.492$. However, in AL the retention scores as compared to pre-test were significantly better

Table 2. Comparison between mean pre- and post-test knowledge scores of CT and ICT groups respectively.

Topic/method	Pre-test score		Post-test score		p-Value
	Mean	SD	Mean	SD	
DM-CT	10.74	2.95	15.72	1.91	0.000
DM-ICT	10.78	3.01	15.46	2.53	0.000
AL-CT	10.26	2.27	14.42	1.59	0.000
AL-ICT	9.56	2.55	13.46	2.04	0.000

DM = Diabetes mellitus; AL = Alcohol and liver disease; CT = Conventional teaching; ICT = Integrated co-teaching; SD = Standard deviation, p-value <0.05 is considered significant.

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