MODIFIED TEAM-BASED LEARNING: A NEW DELIVERY METHOD FOR CONCEPT LECTURES IN FAMILY MEDICINE MODULE

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Abstract

Traditional didactic lectures have the disadvantage of being non-interactive and less effective to stimulate the learning process among students. A modified team-based learning method was designed to replace the didactic method of delivery four concept lectures in family medicine module. This paper describes the implementation and student feedback regarding the new method used.

The four lectures are 'Concepts of family medicine', 'Communication and consultation skills', 'Primary care approach to chronic disease' and 'Introduction to palliative care'. The new method incorporated pre-learning from online materials, individual and team-based concept application tests (iCAT and tCAT) and feedback. Each session catered for groups of 50 to 55 students. Pre-learning materials were accessible to students via Schoology® learning management system. Students were required to attempt iCAT prior to the formal session. During the formal session, the students discussed the answers as a team (tCAT) and defended their answers. The other groups were allowed to challenge the answers with their own justification. The facilitator for the session would provide feedback and conclusion for the session.

Students' feedback has been very encouraging. The interactivity of the sessions was useful to facilitate better understanding of the core concepts. Discussions for each group were unique based on the students' prior experiences and ideas, making the sessions less monotonous than didactic lectures. Only one to two facilitators were required to deliver the session to a large group of students compared to similar small group discussions.

In conclusion, the modified team-based learning focusing on concept application is a more interactive and engaging teaching method. It is a sustainable and practical approach to maximise benefits of the allocated time for teaching.

INTRODUCTION

Traditional lectures have commonly been used to introduce concepts to large groups of students. However, they are less favoured by teachers and students alike because it is passive, lacks teacher-student interaction and is less effective for retention of taught content. Team-based learning has emerged as an innovative teaching strategy characterised by self-directed learning teams. It has been successfully used for medical education in various countries. The Department of Family Medicine of UKM had adapted elements of team-based learning for its concept lectures meant for final year undergraduates in the Family Medicine module.

Previously, four concept lectures were delivered via traditional lectures within the module. They covered four topics, which were “Concepts of Family Medicine and Genograms” (CL1), “Communication and consultation skills in Family Medicine” (CL2), “Primary Care Approach to Chronic Diseases” (CL3) and “Introduction to Palliative Care” (CL4). Each session consisted of a 2-hour lecture delivered to a group of 50 to 55 students. This method however, limited the amount of time for students to ask questions and for teachers to test their understanding of the content given. The teachers were unable to determine whether the students were able to apply the concepts to their clinical postings at the primary care setting. Hence, a new strategy for implementing the concepts was required to replace the traditional lecture methods. In line with the Faculty of Medicine’s initiative to introduce team-based learning into its curriculum, the department had decided to implement team-based learning as a teaching strategy.

There are 3 phases in team-based learning as described by Michaelsen. The first phase is the preparation phase, where students are given some materials to study prior to the formal contact hours. The second phase is the readiness assurance process, which is done both at the individual and team levels. During this phase, the students are given questions that test their knowledge, based on the materials provided earlier, to ensure that they have learnt and are ready to proceed to the application phase. The final phase, the application exercises, provides the teams with a question or task designed to test their ability to apply the knowledge obtained. Michaelsen also described 4 essential elements required for successful implementation of team-based learning: 1) properly formed and managed groups, 2) students’ accountability to self and group for their learning, 3) provision of frequent and immediate feedback, and 4) team assignments that promote both team learning as well as team development.

We had limitations in terms of grouping and time for the full team-based learning format. Each group consisted of 50 to 55 students who were randomly assigned by the faculty’s Undergraduate Secretariat and thus, we were unable to implement ideal grouping strategies as suggested by Michaelsen. The students had only 5 weeks with the department and group development was hence restricted by the duration of the posting. Available time for each concept lecture was limited as the 5-week schedule was already packed. Hence, we modified the original team-based learning format to cater for our logistic limitations. We focused on concept application, rather than testing their initial knowledge. Furthermore, we incorporated role play in two of the sessions, as a way for students to demonstrate their

skills. We did not incorporate the marks obtained during the team-based learning sessions into their final assessment marks for this posting.

This paper aims to describe our experience of implementing the modified team-based learning strategy and the students' feedback.

METHODS

Settings and participants

The family medicine module in the UKM undergraduate medical program is carried out during final year. This evaluation was done on the feedback from final year medical students of the academic year 2015/2016. The whole cohort of final year students was divided into 5 groups consisting of 50 to 55 students. These groups were rotated throughout the academic year to various clinical postings, including 5 weeks of family medicine posting. There were 16 lecturers with teaching experience ranging from 2 to 15 years.

Concept lectures, which cover core topics in family medicine, had been one of the teaching and learning methods for this module. These concept lectures were carried out once a week in a large lecture hall. Each concept lecture had a pool of three to four assigned lecturers, who would take turns to deliver the lectures. Hence, different groups may be taught by different lecturers for the same concept lecture. A total of 20 sessions were conducted in this academic year.

Revised teaching-learning method

We replaced traditional didactic lecture format in delivering these concept lectures to modified team based learning. In general, all the lectures had four conceptual components, which were properly formed teams, online pre-reading materials, concept application tests (CATs) and feedback.

For most sessions, students were divided into six teams consisting of 7-8 members each. Only one concept lecture had divided students into two bigger teams with 25 to 26 students each. The pre-reading materials were available to students via the Schoology® learning management system. Among the materials used were lecture slides, relevant articles on the topic, chapters from books and video clips.

In contrast to the original TBL method which uses the readiness assessment tests (RATs) as part of the readiness assurance process, our sessions introduced CATs which emphasised on the application of the concepts learned through their pre-reading materials. CATs were designed to test application of the concepts in solving clinical problems. The CATs were attempted individually (iCAT) first, before it was attempted as a team (tCAT). Some of the lectures included both the iCAT and tCAT, while some only included the tCAT. Marks obtained from the iCAT and tCAT do not contribute to their overall module marks. The CATs provided students with opportunities for immediate feedback on their application of concepts.

The details of each lecture session are described below. Each of the sessions lasted about one to 2 hours.

There were slight differences in the method of delivery between the 4 concept lectures. Each concept lecture will be described in detail in the subsequent section.

CL 1: Concepts of Family Medicine and Genograms

The learning objective of this lecture is to introduce students to the basic principles of family medicine. For the pre-class preparation, students were required to read relevant materials provided, which included the lecture slides, text on principles of family medicine and to watch two video clips. For the tCAT, each team was required to discuss management principles for a given clinical scenario, applying the concepts of family medicine. In total, there were 6 different scenarios. Each team would then present their answers with their justification. There was no iCAT for this session. Discussion and feedback were given by the lecturer at the end of the presentation.

CL 2: Communication and consultation skills

This lecture aims to teach students on good and effective communication skills and introduce Stott and Davis's model of primary care consultation. [7] Pre-reading materials included video clips showing both good and poor communication skills during consultation with patients, and articles on communication skills in health care. Students were required to attempt iCAT before the formal session and submit their individual answers at the beginning of the formal session. The iCAT answers were not accorded any marks. During the session, the video clips were replayed for emphasis. For the tCAT, each team had to discuss their iCAT answers among themselves. They would then role-play to demonstrate their team's agreed answer to the clinical problem. At the end of the session, the students received immediate feedback from their facilitator.

CL 3: Primary care approach to chronic disease

The objective of this lecture is to teach the students on the role of family physicians in the management of patients with chronic disease. For the pre-class preparation, students were required to read up the relevant materials provided which included lecture notes and short notes on comprehensive care. For the iCAT, students were required to come up with the problem list and management plan of 2 clinical case scenarios. They had to hand in their answer sheets at the beginning of the class, however similarly no marks or assessment were given for the iCAT. For the tCAT, the students were divided into 2 large teams consisting of 25 to 26 students and they were required to discuss their iCAT answers within the team. The teams then role-played the consultation session based on their agreed plan of management. At the end of the session, the facilitators gave feedback on the management of the students on both scenarios.

CL 4: Introduction to palliative care

The aim of this lecture is to introduce basic concepts of palliative care, available treatment and community resources. The pre-reading materials included lecture notes and video clips on principles of palliative care. The students attempted the iCAT individually, which consisted of 6 single best answer questions on concepts of palliative care. During the formal session, the students were divided into 6 teams and given 15 minutes to discuss their iCAT answers within their team (tCAT). Subsequently, each team presented their answers with justifications. Other teams were allowed to challenge the answers and justification. The facilitator for the session would then wrap up the session by providing the correct answers to the SBA, feedback regarding justifications for the answers and take-home messages for the session. During the feedback session, the students were also shown the marks generated from the SBA questions and how they fared compared to the other members of the group. However the marks did not contribute to their final assessment marks.

A summary of the differences between the original TBL method and the modified TBL method are illustrated in Table 1.

Table 1: Comparison between modified TBL method and TBL

Original TBL components	**Modified TBL**			
	CL 1	**CL 2**	**CL 3**	**CL 4**
Essential elements				
Groups -properly formed and managed	√ (6 groups, new group)	√ (6 groups, pre-assigned)	√ (2 groups, self-assigned)	√ (6 groups, pre-assigned)
Accountability -quality of individual and group work	x	x	x	partial
Feedback	√	√	√	√
Assignment design- to promote both learning and team development	partial. no marks	partial. no marks	partial. no marks	partial. marks given not contributing to final assessment
Specific components of readiness assurance process (RAP)				
Assigned reading	√	√	√	√
iRAT	x	x	x	x
tRAT	x	x	x	x
Appeals process	x	x	x	x
Instructor feedback	x	x	x	x
Other components				
Time allocation				
• Pre class preparation	√ (not specified)	√ (not specified)	√ (not specified)	√ (not specified)
• RAP (45-75 mins)	x	x	x	x
• Application oriented activities (1-4 hours)	√	√	√	√

Number of sessions- multiple units/sessions (6-10hrs)	x (single session)	x (single session)	x (single session)	x (single session)
Content				
Application oriented activities- 4s	√	√	√	√
• Significant problem- students	√	√	√	√
• Same problem- all groups	x	x	x	√
• Specific choice- use core concept to make choice	√	√	√	√
• Simultaneous report	x	x	x	x

CL 1- Concept of Family Medicine and Genograms
CL 2- Communication & Consultations Skill in Family Medicine
CL 3- Primary Care Approach to Chronic Disease
CL 4- Introduction to Palliative Care

The essential components used in the modified TBL method are shown in Table 2.

Table 2: Components of modified TBL method in four concept lectures

Modified TBL components	CL 1	CL 2	CL 3	CL 4
Assigned pre-reading	√	√	√	√
iCAT	x	√	√	√
tCAT	√	√ (role play)	√ (role play)	√
Appeals process	√	√	√	√
Instructor feedback	√	√	√	√

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Outcomes

We evaluated students' learning experience using a standard feedback form at the end of their module. The feedback form was designed to measure students' satisfaction levels for all the teaching-learning sessions. Students rated their satisfaction level for each individual session based on a Likert scale of 1 through 5 (1-poor, 2- unsatisfactory, 3- adequate, 4-good, 5- excellent). The students were also invited to give specific comments in an open-ended section of the form. We compared their feedback for four concept lectures between the lectures, as well as between the groups.

Analysis

The data was analysed using SPSS software version 22. Student's satisfaction scores were tabulated and described using means, medians and modes. Categorical data were described using frequencies and percentages.

RESULTS

A total of 245 students' feedbacks were collected. The mean overall feedback scores for concept lecture 1 to 4 ranged from 4.17-4.28 (over a maximum score of 5), indicating the concept lecture session had "good" to "excellent" rating. (Table 3) Majority of the students gave "good" ratings to the concept lectures. CL 4, had the highest mean scores (4.28) and CL 1 has the highest median scores (4.19). These differences were due to the skewed distribution of the responses, with higher proportion of students rated "excellent" in CL 4. (Table 4)

Table 3: summary descriptive statistics of students' feedback rating scores four concept lectures

		Concept Lecture 1		Concept Lecture 2		Concept Lecture 3		Concept Lecture 4	
Overall	Mean (SD)	4.19	(0.683)	4.17	(0.708)	4.17	(0.696)	4.28	(0.664)
	Mode	4.00		4.00		4.00		4.00	
	Median	4.19		4.00		4.00		4.00	
Group 1	Mean (SD)	4.31	(0.643)	4.38	(0.599)	4.29	(0.642)	4.27	(0.635)
	Mode	4.00		4.00		4.00		4.00	
	Median	4.00		4.00		4.00		4.00	
Group 2	Mean (SD)	4.02	(0.699)	4.13	(0.672)	4.10	(0.592)	4.29	(0.617)
	Mode	4.00		4.00		4.00		4.00	
	Median	4.00		4.00		4.00		4.00	
Group 3	Mean (SD)	4.29	(0.757)	4.33	(0.769)	4.30	(0.785)	4.38	(0.777)
	Mode	4.00		5.00		5.00		5.00	
	Median	4.00		4.00		4.00		5.00	
Group 4	Mean (SD)	4.22	(0.468)	4.18	(0.486)	4.22	(0.422)	4.20	(0.577)
	Mode	4.00		4.00		5.00		4.00	
	Median	4.00		4.00		4.00		4.00	
Group 5	Mean (SD)	4.12	(0.791)	3.82	(0.842)	3.92	(0.891)	4.25	(0.717)
	Mode	4.00		4.00		4.00		4.00	
	Median	4.12		4.00		4.00		4.00	

CL 1- Concept of Family Medicine and Genograms
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Table 4: Overall and breakdown rating of students' feedback for four concept lectures

		Concept Lecture 1 n (%)		Concept Lecture 2 n (%)		Concept Lecture 3 n (%)		Concept Lecture 4 n (%)	
Overall	Unsatisfactory	5	(2.0)	6	(2.4)	6	(2.4)	5	(2.0)
	Adequate	23	(9.4)	26	(10.6)	24	(9.8)	14	(5.7)
	Good	137	(55.9)	134	(54.7)	138	(56.3)	133	(54.5)
	Excellent	80	(32.7)	79	(32.2)	77	(31.4)	92	(37.7)
Group 1	Unsatisfactory	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
	Adequate	5	(9.6)	3	(5.8)	5	(9.8)	5	(9.8)
	Good	26	(50.0)	26	(50.0)	26	(51.0)	27	(52.9)
	Excellent	21	(40.4)	23	(44.2)	20	(39.2)	19	(37.3)
Group 2	Unsatisfactory	1	(2.0)	3	(5.9)	3	(5.9)	1	(2.0)
	Adequate	10	(19.6)	14	(27.5)	13	(25.5)	5	(9.8)
	Good	22	(43.1)	23	(45.1)	20	(39.2)	25	(49.0)
	Excellent	18	(35.3)	11	(21.6)	15	(29.4)	20	(39.2)
Group 3	Unsatisfactory	1	(2.0)	0	(0.0)	0	(0.0)	1	(2.0)
	Adequate	36	(73.5)	2	(4.1)	0	(0.0)	1	(2.0)
	Good	22	(43.1)	36	(73.5)	38	(77.6)	34	(69.4)
	Excellent	18	(35.3)	11	(22.4)	11	(22.4)	13	(26.5)
Group 4	Unsatisfactory	2	(4.4)	2	(4.4)	2	(4.3)	2	(4.4)
	Adequate	2	(4.4)	2	(4.4)	3	(6.5)	2	(4.4)
	Good	22	(48.9)	20	(44.4)	20	(43.5)	18	(40.0)
	Excellent	19	(42.2)	21	(46.7)	21	(45.7)	23	(51.1)
Group 5	Unsatisfactory	2	(4.2)	1	(2.1)	1	(2.1)	1	(2.1)
	Adequate	5	(10.4)	5	(10.4)	3	(6.3)	1	(2.1)
	Good	31	(64.6)	29	(60.4)	34	(70.8)	29	(60.4)
	Excellent	10	(20.8)	13	(27.1)	10	(20.8)	17	(35.4)

CL 1- Concept of Family Medicine and Genograms
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Further breakdown on the feedback scores revealed two deviations from the general trend. (Table 3) We also noted majority of students in Group 3 rated CL 2, CL 3 and CL 4 as "excellent". The mean scores of Group 3 for these concept lectures (CL2=4.33, CL3=4.30 and CL4=4.38) were higher than the overall mean scores. In group 5, the mean scores for CL2 (3.83) and CL3 (3.92) were lower than overall mean scores (Table 3). Inferential statistical tests were not done as the absolute differences were small.

A comparison between responses from students of different groups revealed that the responses for groups 1, 3 and 5 were more skewed towards favourable ratings. (Figure 1) There were more students who rated the lectures as "excellent" in these groups. We also took note of a slightly higher proportion of group 5 students who rated CL2 and CL3 as "adequate".

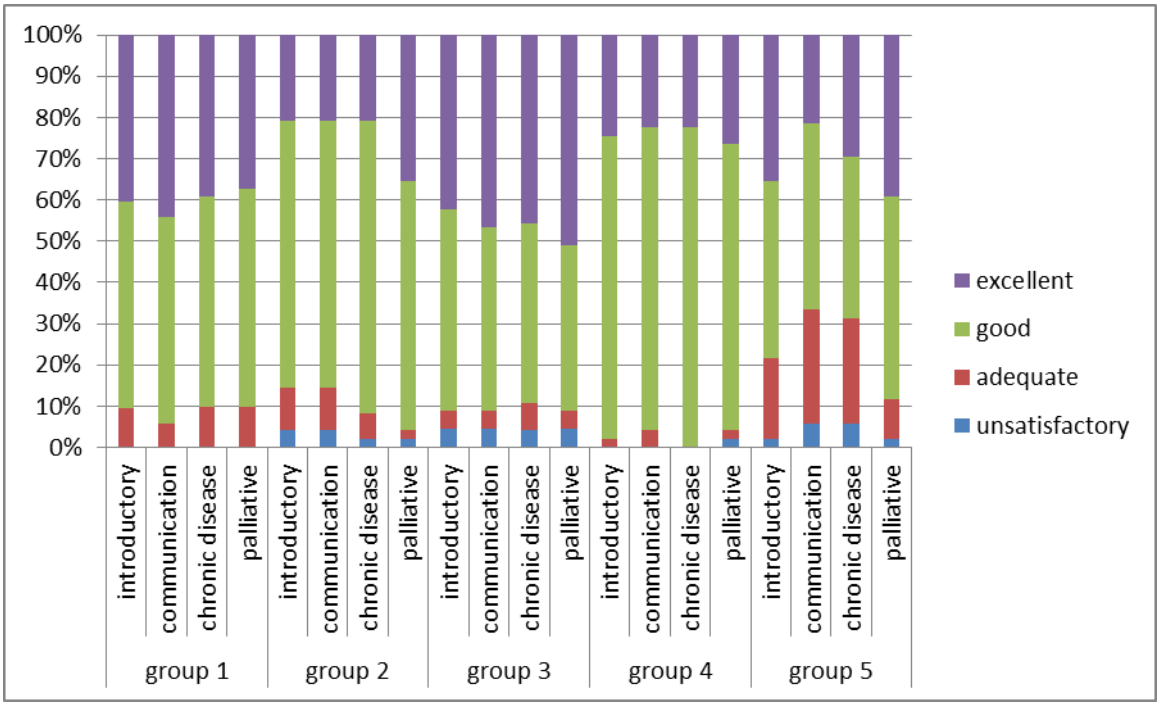

Figure 1: Comparisons of feedback ratings of students between different groups of medical students.

DISCUSSION

We had four different sessions of modified team-based learning for five groups of students within one academic year. The major change in this new teaching method was the substantial increase in opportunities for interactions and concept application tests (CAT). Better interactivity was evident among the students, as well as between the students and the facilitators. All four sessions had slight differences in timing and methods of delivering reading materials, and concept application tests. iCAT was done prior to its formal session for CL2, CL3 and CL4, whereas, CL 1 conducted CAT during the formal sessions. CL 4 used a more objective assessment for the iCAT in the form of SBA questions. CL1 and CL4 used team presentations for their tCAT, whereas CL2 and CL3 used role play. Another major change was getting students to read on relevant reference materials or watch video clips before attending the class. Despite these variations, students' feedbacks were positive across all the sessions albeit small differences in some of the feedbacks. We attributed them to variations of students' cohort and facilitators.

Assignments before attending the class

Assigning students to some tasks before attending class is a better option compared to giving information during didactic sessions. As information is easily accessible online, students only need to be directed to the relevant reading materials, to be read before the class. Hence, the modified TBL carries some elements of the flipped classroom concept. Students prepare by reading and self-testing prior to the class, and the formal contact hours

are used for clarifying doubts, giving feedback or applying concepts they have learnt. Many studies in the past have proved flipped classroom enhances learning experience and results in better achievement of learning outcomes. [8] This matches our objective of the module, where the focus is application of knowledge during day-to-day management of patients. Although we did not measure or document students' opinion regarding the assignment before class, feedback from the lecturers who were facilitators for the CATs were encouraging and reported students taking a more active role in the class. The students' active participation were likely to be due to better preparation for the tests before and during the class. Hence, it ensures that the students would go through the reading materials themselves before attending class.

Assessment test

We designed CATs to test the students' ability to apply the family medicine concepts that they have learnt. In the conventional team based learning, individual readiness assessment test (iRAT) is used to test student readiness by assessing their understanding of concepts. Because of time limitation, we have chosen to drop iRAT. Our hypothesis was that, if applications were demonstrated, substantial understanding of the concept should have already occurred. Presentations of answers to the questions and role play were the two methods of team assessment (refer methods section). Discussions and summary were then provided by the facilitators. Although these methods of delivery required similar amount of teachers' time compared to traditional lectures, however, it has the benefits of active student participation and better retention of knowledge. The encouraging and consistent feedback from the students for all four sessions demonstrated that our methods of assessment and reading materials were all acceptable to students. Nevertheless, we noted, the CL4 had a slightly higher mean score compared to the other three sessions. We postulated that opportunity for interactions were the main reason for the positive feedback and perhaps, a more objective iCAT with immediate feedback and assessment of marks was more preferred.

Inter-grouping variation in responses

A more detailed analysis on intergroup differences revealed some variations in the feedbacks from students. Students were posted to family medicine in groups in rotation sequence throughout the academic year. Some groups had gone through other clinical postings, such as internal medicine, surgery and paediatric before joining the family medicine posting. We noted that feedback was consistently similar for all four sessions within each of the groups, but there was no identifiable trend related to the timing of their family medicine posting. This suggested that the feedback was related to cohort (and possibly team dynamic) differences rather than delivery methods of the sessions. Although different lecturers were involved in facilitating the sessions (data not shown), we generally believed that variation in lecturers involved contributed little to the variations. We only noted one lecturer had slightly high proportions of "adequate" (communication and chronic disease in group 2) feedback in two out of three sessions facilitated. Asians tend to provide more positive and close to "middle" responses to Likert scale. [9,10,11] Thus, a "middle" response of "adequate" may not represent true satisfaction with the session. A score of "excellent"

may be a better indication of students' satisfaction. Thus, students from group 1 and 3 seem to be more positive on the sessions delivered compared to other groups of students.

Limitations

In this evaluation, we have analysed only the quantitative data from the students' feedback. The qualitative feedback we obtained were useful but was mainly focused on logistic issues rather than session-specific feedback. Furthermore, only 21 written comments from 245 students were related to these four sessions. Thus, we were not convinced of the representativeness of the written comments. We also assumed the quality of the delivery was similar in all four session because each session was guided by a lesson plan. However, there could be some variations in skills of the facilitators during the delivery of the teaching. Unfortunately, we did not have complete feedback from the facilitators to make any conclusions regarding this aspect.

CONCLUSION AND IMPLICATION OF THE FINDINGS

Despite the limitations, we gained two learning points from this evaluation. First, converting traditional lectures to interactive sessions using a modified team-based learning approach was feasible without increasing manpower requirements or compromising learning outcomes. Secondly, evaluations using iCAT and tCAT were relevant. iCAT should be considered an integral part of concept application tests. In order to provide a more robust evidence of these four sessions, a more thorough evaluation is needed. This should involve observation of the sessions and a more systematic collection of facilitators' feedback. Further correlations with students end of posting assessment is also needed to increase the validity of our evaluation.

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