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Experiences in Teaching and Learning

Evaluation of modified team-based learning activities on student performance on therapeutic assessments

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ABSTRACT

Background and purpose: To determine if changing the focus of team-based learning (TBL) grading from written to verbal responses impacted students' exam performance in those subjects and to assess student perception of utilization of course time.

Educational activity and setting: Assessment data from two consecutive respiratory therapeutics semesters was analyzed. These were the classes immediately before and after the TBL structural change. All data were de-identified, and student performance was assessed based on exam scores in each major subject that was covered by a TBL activity. Letter grades and student course evaluations were also compared.

Findings: One hundred fifty-two students were assessed. There was no significant difference in overall course grades between semesters. There was improvement in exam scores for allergic rhinitis and chronic obstructive pulmonary disease ($p = 0.001$) and a decrease in exam scores for respiratory devices ($p = 0.03$). Total exam scores and other therapeutic topic scores demonstrated no differences. Student satisfaction in regard to having sufficient course time improved ($p = 0.016$).

Discussion: Overall, students performed equally well in the class when removing the graded written portion of the TBL activity. There was also a trend towards improved student satisfaction after this modification.

Summary: The change in TBL grading was successful in improving students' perceptions of the course without impacting their overall course grades, demonstrating that the TBL structure can be altered without losing the positive learning outcomes.

Background and purpose

The active learning style known as team-based learning (TBL) provides a systematic approach to practicing the application of therapeutic knowledge. It was first developed and utilized in business school curriculums several decades ago but has more recently been incorporated worldwide into health professional programs such as medicine and nursing.¹ One noted advantage of using TBL over other group formats such as problem-based learning (PBL) is that only one facilitator is needed even with larger class sizes, which cuts down on faculty facilitation time.^{2,3} It is cited as being a beneficial group learning style as "high performers" are still challenged from this type of learning experience due to its structure to hold all learners accountable for the material presented. This style of teaching also motivates students to take ownership of their education and be accountable for their work.⁴

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The key components of a TBL activity include preparation outside of class, readiness assurance tests (RATs) at the beginning of class, and application of the material by working on a problem during the remainder of class. The problem and potential solutions are evaluated in teams and then discussed as a class with the facilitator.¹ Within this structure, four core principles have been identified to create a successful TBL session: teams are strategically formed and incorporate student diversity; students are accountable as an individual and as a team member; students are provided with timely formative assessment; and team activities are developed to “promote both learning and team development.”⁵ Michaelsen et al.^{5,6} also discuss the “4S’s” (significant, same problem, specific choice, and simultaneous report) as the best method for creating and implementing the TBL activity, to maximize student learning.

The incorporation of TBL in schools of pharmacy has increased in recent years to provide more opportunities for active learning, and this pedagogy has demonstrated improvement of students’ critical-thinking and interpersonal communication skills.⁷ The TBL format is designed to include student preparation outside of the classroom in order to foster effective group participation during class activities.⁸ These skills are an integral part of the pharmacy curriculum. Other health professions have adopted this rapidly growing teaching strategy and have been analyzing the benefits of TBL activities to better prepare their students for a career focused on interprofessional communication skills.⁹

At Shenandoah University’s School of Pharmacy (SOP), TBL activities have been incorporated into the integrated therapeutic course series, *ICARE*, for the past four years. It was noted in written student course evaluations that submitting team written responses for grading during TBL sessions caused additional stress as students wanted more time to complete the written activity. One student wrote, “The TBLs were stressful due to the time restrictions when answering the group questions, but overall a great learning experience.” Another stated, “I wish there [were] a few more minutes on each TBL case. It is very stressful to discuss, and then type what the group members are saying while making sense.” This was a common theme throughout the spring 2016 course feedback. This trend was also seen as the response to the course evaluation question “Sufficient time was given to complete the work” was lower than other pertinent questions, as illustrated in Table 1. Additionally, it was noted that the “scribe” who was responsible for writing the team responses was not able to be fully engaged in the case discussion with their team as they were focused on writing all of the information for the graded response. This feedback was counterintuitive to previous educational studies suggesting that students learn and retain more information when writing out information.¹⁰ A study by Linton et al.¹¹ suggests that individual writing during active learning sessions may be the key to improving students’ metacognition when measuring student performance on major assessments. Our TBL sessions have focused on one person writing on behalf of the team.

This method for assessment also imposed a high time requirement for faculty to grade and provide timely formative feedback after the TBL session was complete. These were identified as potential barriers to the learning process, as it violates the third and fourth core TBL principles mentioned above. Because of the aforementioned reasons, the TBL session was changed to focus grading on verbal, rather than written, responses in an attempt to decrease student stress, increase all team-member participation, and improve team formative feedback frequency and timeliness, without sacrificing the knowledge reinforced from the written component of the TBL session. Students were no longer required to write down and turn in their case responses; instead, teams were only graded on their verbal response during the TBL session and were evaluated by the TBL coordinator for appropriateness in real-time. The primary objective of the study was to determine if changing the TBL grading to assessing verbal rather than written responses negatively impacted students’ exam performance in those subjects. The secondary objective was to assess if student perception of utilization of course time improved as evaluated by written course feedback.

Educational activity and setting

The *ICARE: Respiratory Therapeutics* is a two-credit, team-taught course given to second-year (P2) student pharmacists in a four-year doctor of pharmacy (PharmD) curriculum. In 2016, the course was moved from the P2 spring semester to the P2 fall semester due to recommendations to start therapeutic courses earlier in the curriculum. In both iterations, this course was the students’ first exposure to a therapeutics course as well as to TBL. Assessment data from students enrolled in the *ICARE: Respiratory Therapeutics* course in the spring and fall course offerings in 2016 were analyzed. These were the classes immediately before and after the TBL modification. Corresponding exam questions from the following therapeutic areas were assessed: asthma ($n = 15$); chronic

Table 1
Course evaluations.

Evaluation question	Semester	Number. of responses ^a						Median score
		SD ^b	D	N	A	SA	N/A	
“Assignments helped me learn the material”	Spring	0	1	0	4	11	0	5
	Fall	0	0	2	8	34	0	5
“Sufficient time was given to complete the work”	Spring	1	1	2	4	8	0	4
	Fall	0	0	0	10	34	0	5 ^c
“I have become more competent in this area due to the course”	Spring	0	0	0	4	12	0	5
	Fall	0	0	0	6	38	0	5

^a Spring: $n = 16$; Fall: $n = 44$.

^b 1 = strongly disagree (SD); 2 = disagree (D); 3 = neutral (N); 4 = agree (A); 5 = strongly agree (SA); N/A = not applicable.

^c $p < 0.05$.

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