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Team Based Learning Strategy Applied to Pharmacy Based Courses

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Abstract

Objective: To assess students' performance in courses of the school of pharmacy's curriculum.

Design: The Team-Based Learning strategy was used as a means to instruct students compared with the Traditional Learning strategies of instruction for two courses in the school's curriculum.

Assessment: There was a significant difference (p 0.048 to ≤ 0.001) in grades A to C for the Complementary/ Alternative Medicine and Nonprescription Drugs course in academic year 2014-2015 compared with the previous year. A significant difference (p ≤ 0.002) was only observed in grades B and C for the Immunology and Microbiology course relative to the previous year.

Conclusion: The Team-Based Learning strategy may account for the observed differences in the grades. It is hoped that students are better able to retain and recall the course content as they progress in the curriculum. This may ensure that learning outcomes are achievable and/or demonstrative when students enter the practice environment.

Keywords: Team based learning; Teaching and learning strategy; Learning outcomes; Problem based learning; Pharmacy education

Introduction

The School of Pharmacy (SOP), in the Faculty of Medical Sciences, The University of the West Indies (UWI), St. Augustine Campus is one of two Pharmacy Schools located in the Caribbean. The SOP is located in the twin island Republic of Trinidad and Tobago. Education in Trinidad and Tobago is free up the tertiary level. Students transition seamlessly from the primary to secondary and then to tertiary levels of education.

Students have been conditioned to pass multiple choice examinations in primary and secondary school, but they have not been taught to be critical thinkers. So upon entering university, students are expected to apply the strategy learnt from the primary and secondary levels. However, no one takes the time to assist them in making the transition for study at the university level.

Team-based learning (TBL) is a recent phenomenon in medical education to replace or supplement large group lectures [1, 2]. TBL utilizes an active small-group based instructional strategy that is applied to large groups; it is teacher-directed, good for any skill-based information and encourages team development. In TBL, tests (multiple choice questions [MCQs]) are given to students individually, followed by the same test taken as a team on the scheduled lecture day. The tests are based on an assigned reading of the course content. This exercise is completed at the start of the class and forms the basis for the discussion thereafter. It is essential that the teams are formed so each team is composed of students of varied intellectual abilities and/or experiences given the context of the material to be studied. The team usually consists of five (5) to seven (7) students.

The process culminates with the introduction of an application assignment (such as a clinical vignette or a problem), where the teams are encouraged to use the knowledge gained to complete the assignment. The process of defending and discussing the feasible answers contributes to increased learning. A range of weighting is set for each test. Peer evaluation is an important aspect of the grading criteria and is applied at the end of the semester. Students will complete a peer evaluation based on: contribution to the team, attendance, preparation for the activity, and respect for the ideas of others; a minimum amount of points is distributed among the members of the team. Therefore, TBL is based on the following four principles:

- Teams must be carefully formed and managed
- Students must be accountable for individual and team work.
- Students must receive frequent and timely feedback from the faculty.
- Teams must use their collective knowledge, skills, and values to choose a specific solution and defend their choice.

While the TBL Strategy was not executed explicitly in principle, an adaptation was deliberately applied in the instruction of two courses in the SOP curriculum in the academic year 2014-2015 to ensure that students engage the material as the semester progressed. Traditional teaching methods were used (in previous years) in both courses and included the powerpoint lecture format; while multiple choice questions, extended matching questions and/or short answer questions constituted the methods of assessment for the Immunology and Microbiology (IM), and the Complementary/Alternative Medicine and Nonprescription Drugs (CAMND) courses [3-credits each]. In addition, a project is normally included in the CAMND course and a laboratory in the IM course.

The teaching strategy was changed (i.e. TBL replaced the powerpoint lecture format) in these two courses in an attempt to ensure that students kept abreast of the course content, particularly in IM. For although the pass rate was high in both courses, failures were primarily registered in these courses relative to other courses in the school curriculum.

Instructional Design and Assessment Methodology

The TBL strategy was implemented in semester I, academic year 2014-2015 for the IM and CAMND courses. Students were advised verbally at the first meeting of the class of the teaching strategy to be used, and were also explained in the written course outline. It was the students' responsibility to read the assigned material and be prepared for an independent and team test on the designated lecture days.

Data Collection and Analysis

Data were analysed using IBM SPSS Statistics, version 21 (IBM Corp., Armonk, NY). Student performance on examination questions was analyzed using univariate analysis of variance, chi square tests and descriptive statistics. Estimates for differences were made between years for each examination, e.g. examinations in the academic year 2013 to 2014 were compared to examination in 2014-2015. An a priori alpha of 0.05 was used for all analyses.

Students were tested weekly, the same test (15 MCQs) written independently and then collectively as a team, on the assigned readings at the start of the class session. To facilitate the team tests, students were placed into teams; the teams were formulated based on the performance of the class in a previous prerequisite course so that each team was composed of bright and not-so-bright students. The students took the independent test, followed by the team test at the start of the class session. This exercise took about 40 minutes to complete; the rest of the class time was consumed with answering the questions with a focus on explaining concepts, particularly those questions that proved most difficult to answer. Additional questions that could have been asked based on the assigned readings, were also fielded. On the penultimate class session, students were given a review in the form of a Jeopardy (reverse) Game. The sixty (60) questions that made up the game were of the same theme as the questions in the final examination paper. This was deliberate as the students were offered another opportunity to focus on the content and to review any areas that they experienced difficulty. Students were not prevented from taking notes of the discussion and/or copying the questions, as well as making an appointment to consult with the faculty for clarity. In each course, the continuous assessment examination (CA) was also tested independently and collectively as a team. The CA constituted 40% of the total score for the course, the final examination 60%. The final examination was tested (independently) in the traditional manner.

Assessment

There was a significant difference (p 0.048 to ≤ 0.001) in grades A to C for the CAMND course compared with the previous year (Table 1). A significant difference (p ≤ 0.002) was only observed in grades B and C for the IM course compared with the previous year.

However, unlike the CAMPD course, a significant difference was only observed in the mean and standard deviation for the IM course (Table 2).

Immunology & Microbiology				Complementary/Alternative Medicine & Nonprescription Drugs			
	2013- 2014	2014 -2015		2013 - 2014	2014 - 2015	
Grade	Old GPA	New GPA	p value	Old GPA	New GPA	p value
	n = 88	n = 50		n = 57	n = 86	
A	11	3	0.162	29	12	≤ 0.001
B	21	30	≤ 0.001	25	61	0.003
C	47	14	0.002	3	13	0.048
F	9	3	0.364			

Table 1: Student Performance using the Traditional and Team-Based Teaching Strategies for Academic Years 2013-2014 and 2014-2015, Respectively, for the Immunology and Microbiology, and the Complementary/Alternative Medicine and Nonprescription Drugs Courses.

Course	Mean (Std. Deviation) 2013 - 2014	Mean (Std. Deviation) 2014 - 2015	p value
CAMND	66.72	66.25	0.56
	-7.19	-7.75	
IM	55.33	63.49	≤ 0.001
	-9.97	-11.61	

Table 2: The Mean and Standard Deviation in Student Performance using the Team-Based Teaching Strategy for the Academic Year 2014-2015 compared with the Traditional Teaching Strategy of 2013-2014 for the Immunology and Microbiology, and the Complementary/Alternative Medicine and Nonprescription Drugs Courses.

Discussion

It is indeed commendable that more students earned a higher B grade in both courses than in previous years. The higher grades are important, given the change in the GPA system that became effective in the academic year 2014-2015. In addition, there was more dialogue among students for the team-based assessment as compared to the traditional teaching strategy. Students were forced to read and assimilate the information for the weekly tests. So that at the end of the

testing period, the team scores approached 100% relative to the independent test scores. Students were, therefore, better prepared for the final examination paper. It is somewhat disappointing that failures were registered in both courses. How many different ways can questions be formulated to cover the same content? It may allude to the fact that not all students are suitable to a particular profession or that they may need additional time to master the study material.

These results were not entirely surprising as other faculty observed similar results. Punja et al. reported that TBL improved student engagement and enhanced performance [3] when applied to the medical school curriculum. As a consequence, these researchers have planned to incorporate TBL in didactic lectures. Johnson et al demonstrated the value of team performance over individual performance, as well as comparable performance compared with previous teaching [4]. Finally, Letassy et al confirmed that course grades were higher after the introduction of the TBL method of instruction compared to the traditional lecture-based format. [5].

Problem-Based Learning

Another popular strategy that is used at the SOP upon admission in the first year is Problem-Based Learning (PBL) [6]. A problem drives the learning process in the PBL model, i.e. before students acquire some knowledge they are given a problem to solve. The problem is posed so that the students discover that they need to learn some new knowledge before they can solve the problem. However, PBL is not continued beyond the first year of university teaching. This is unfortunate as the gains achieved from the PBL strategy during the first year of university teaching is not capitalized and sustained thereafter, as all subsequent classes are taught using the didactic format of teaching. The opportunity to use TBL was to ensure that assessment [7] for learning (formative assessment) and assessment of learning (summative assessment) occurred, and confirmed what students have learned and can do at the end of instruction. The use of team-based learning improves student engagement, communication, team-building, and knowledge retention [2].

The Government Assistance for Tertiary Expenses Programme

Within recent years and certainly since the commencement of free tertiary education (called The government Assistance for Tertiary Expenses [GATE] programme), students who have been accepted to study for the Bachelor of Science degree in Pharmacy do not seem to understand that a degree is earned. University education calls for critical thinking, particularly in professional programmes when graduates are expected to be practitioners on the first day of employment. Free tertiary education may correlate, in the students' mind, with the automatic award of a degree in the absence of performance. It was indeed a privilege to benefit from a university education, particularly when that education was NOT FREE, such as prior to the commencement of GATE. In such circumstance, students understand that privilege and study go hand in hand with commitment to earn their degree. It seems that the award of the degree is guaranteed (with free tertiary education) once an individual is permitted to enter the hollowed walls of the university, and performance does not seem to be a criterion for success (anymore). This philosophy in professional programmes is not congruent with excellence (the learning outcome), considering that students are expected to perform on day 1 of practice.

It should be the duty of faculty to ensure that graduates achieve competencies (knowledge, skills and attitudes/professionalism) to practice from day 1 upon entering the workplace. Faculty members should ensure that students attain the necessary competencies so that upon graduation, our graduates represent the UWI model. What type of model should that be? Students should be encouraged to achieve the competencies that they have the potential to acquire and sustain.

Centre for Education in Teaching and Learning

Understandably, the Centre for Education in Teaching and Learning at UWI appraises the faculty of New Teaching Strategies as a required condition of employment for new staff. This is certainly commendable, but where is the obligation to assist students to be better learners. New strategies to engage the material does not pre-empt the need to communicate to students the importance of knowing their various styles of learning. The course content must be understood and applied as education is more than the regurgitation of information. So that no amount of new strategies, however excellent, surpasses the old paradigm of burning the midnight oil. Students need to understand that a university degree is earned by hard work.

A university student should be encouraged to be critical thinkers, particularly in a professional programme where students are expected to perform on Day 1 of practice. Professionalism DOES NOT MEAN encouraging mediocre performance of any kind: cheating, awarding failure [<50%] with a passing grade, making deals with students for favoured evaluations, among so many other indiscretions. A university is distinguished by the calibre of its output (competencies of students) and character of the faculty.

Limitation

It was not possible to include student evaluations in the discussion as these are still outstanding.

Conclusion

Student performance was certainly enhanced as reflected by the higher number of grade obtained with the adaption of TBL. In subsequent offerings of these courses, peer evaluation would be included. It is hoped that the students stand a better chance of retaining and recalling the material as they progress in the school's curriculum. This may augur well to ensure that learning outcomes are achievable, and demonstrative when the students enter the practice environment.

Acknowledgment

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