Impact of ability-weighted team-based learning on performance in introductory physiology laboratory classes in year 2 tertiary education

N.Y. Marden,[1] L.G. Ulman,[1] G.M. Velan[2] and G.D. Housley,[1] [1]Department of Physiology, School of Medical Sciences, University of New South Wales, NSW 2052, Australia and [2]Department of Pathology, School of Medical Sciences, University of New South Wales, NSW 2052, Australia.

Team-based learning is an educational method in which students are organised into small working groups with the intent to foster active collaborative learning. While team-based learning has been employed as an active learning strategy in medical education for over a decade, formal evidence supporting its impact on student learning is limited. This study evaluated whether the introduction of team-based learning into Physiology laboratory classes has had an impact on the learning experience and outcomes of Introductory Physiology students at UNSW Australia. In session 1 2015, students were organised into laboratory class teams of between 4 to 6 students on the basis of their academic standing such that each team contained a mix of higher-performing, middle-performing and lower-performing students. Teams remained fixed throughout the entire duration of the course and students performed all of their laboratory work within these set teams for the 6 laboratory sessions of the course, typically on a fortnightly basis. Students were given a series of pre-laboratory quizzes consisting of questions that assessed the pre-reading material for the laboratory they were about to undertake, as well as questions that assessed their understanding of the previously completed laboratory class. Students attempted these quizzes individually first, and then within their laboratory teams. Both individual and team marks contributed towards the overall grade for the course. The final end-of-course examination contained multiple choice questions that specifically assessed the laboratory component of the course.

To determine the impact of the ability-weighted team-based laboratory learning initiative, anonymous online evaluation surveys were conducted to gather students' perceptions of the approach. We also compared performance in the laboratory component of the end-of-course examination by the 2015 cohort with performance by the 2014 cohort, where the students were not formally assigned into teams. While there were no overall significant differences in the laboratory component of the end-of-course examination between the 2015 (593 students) and 2014 (634 students) cohorts, plotting of the ranked scores for the end-of-course laboratory component showed an extended tail in the scores for the 2014 student cohort. We then focused our analysis on the bottom quartile of student performance. This showed a statistically significant improvement in the median score achieved by the 2015 cohort compared to the 2014 cohort (P=0.01; Mann-Whitney Rank Sum Test). Results from the online evaluation survey were generally favourable, with the majority of students indicating that working in assigned laboratory teams enhanced their understanding and learning in laboratory classes. These findings suggest that team-based learning has had a positive impact on the learning experience in Introductory Physiology laboratory classes, and that our strategy of ability-weighted teams may be particularly beneficial in improving the learning outcomes of lower-achieving students.