

2017

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Recommended Citation

Sacdalan, Nicole (2017) "Peer Assisted Study Sessions (PASS) Benefit Students in Anatomy and Physiology Classes at Southern Adventist University," *Journal of Interdisciplinary Undergraduate Research*: Vol. 9 , Article 3.

Available at: <http://knowledge.e.southern.edu/jiur/vol9/iss1/3>

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Peer Assisted Study Sessions (PASS) Benefit Students in Anatomy and Physiology Classes at

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Abstract

Peer Assisted Study Sessions (PASS) is a program implemented at Southern Adventist University to lower drop, withdrawal, and fail rates. In these sessions, a student leader, who has excelled in previous sections of a particular class, help reinforce difficult concepts in hour-long meetings with currently enrolled students. Activities during PASS include worksheets, pretests and quizzes, games, and videos. In this paper, we discuss the methods used during PASS sessions within anatomy and physiology classes and present an analysis of the effect of PASS on academic performance in entry-level anatomy and physiology classes over two semesters (winter and fall of 2015) at Southern Adventist University. Our analysis showed that greater student attendance at PASS sessions predicted higher final grades while controlling for two other potentially confounding predictors of students success: high school GPA and ACT score.

Introduction

Peer teaching involves participants of similar age and academic background and is acknowledged as a valuable approach for learning within anatomy courses (Evans & Cuffe, 2009). It is most commonly considered a learning activity with benefits for both the participants and the peer teacher (Boud, 2001; Topping, 1996, 2005; Topping & Ehly, 1998). Peer teachers usually act as model students by attending lectures, taking notes, reading the materials assigned to the students, and demonstrating effective study skills (Dawson, Meer, Skalicky, &

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Cowley, 2016). Methods used by peer teachers widely vary and include one-to-one teacher-tutee interactions, group peer teaching, problem-based learning, and peer-developed learning materials (Walker-Bartnick, Berger, & Kappelman, 1984; Lake, 1999; Krych et al., 2005; Nieder, Parmelle, Stolif, & Hudes, 2005).

A framework that helps define the broad idea of peer teaching is Supplemental Instruction (SI). Programs based on SI guidelines usually evaluate their interventions by comparing grades of SI participants with nonparticipants. These comparisons usually show that SI participants do better. Extensive research has been conducted on SI and related programs with most studies showing the effectiveness of such interventions (Dawson, Meer, Skalicky, & Cowley, 2016). However, some have questioned the reliability of these methodologies because of the possibility of self-selection bias. Does SI really work, or are the higher average grades seen among those who participate in SI simply the result of such activities attracting higher achieving students who would do well in the course regardless of whether SI activities were offered or not? (Dawson, Meer, Skalicky, & Cowley, 2016).

This current study evaluates Peer Assisted Study Sessions (PASS), a program based on SI principles. PASS was initially developed by Dr. Deanna Martin at the University of Missouri-Kansas City (UMKC) in 1973. PASS sessions are held outside of class and focus on students working collaboratively through structured activities, such as discussing reading and comparing notes. PASS leaders attend all lectures and serve as a role model to the students. They organize the sessions for the selected courses and help students understand difficult concepts through different activities (Fisk University, 2016).

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Southern Adventist University implemented PASS sessions in the fall semester of 2013 in order to help reduce drop, withdrawal, and failure rates among freshmen students. At the time of writing, PASS sessions have been implemented for American history, anatomy and physiology, general biology, and general chemistry classes. This study focuses only on PASS sessions for anatomy and physiology classes with the purpose of evaluating their effectiveness using methods of analysis that control for possible self-selection bias.

Methods

Setting

The main author of this paper was a PASS leader who facilitated sessions in entry-level anatomy and physiology courses at Southern Adventist University for two semesters: Winter 2015 (Jan-May) and Fall 2015 (Aug-Dec). During the beginning of each semester, students in each class were surveyed about their available times so that PASS sessions were scheduled to allow maximum student attendance. The leader attended all lectures, and PASS sessions were held three times a week for one hour. The leader organized and created worksheets, discussions, group activities, trivia-style games, practice tests and quizzes, study tips, online videos, and kinesthetic and visual modeling. Activities focused on the content, vocabulary, and physiology concepts covered in the lectures. PASS participants not only took part in passive learning activities but also engaged in active learning that included group activities, discussions, and peer-to-peer teaching. The estimated amount of time utilized for different instructional methods is shown in Figure 1.

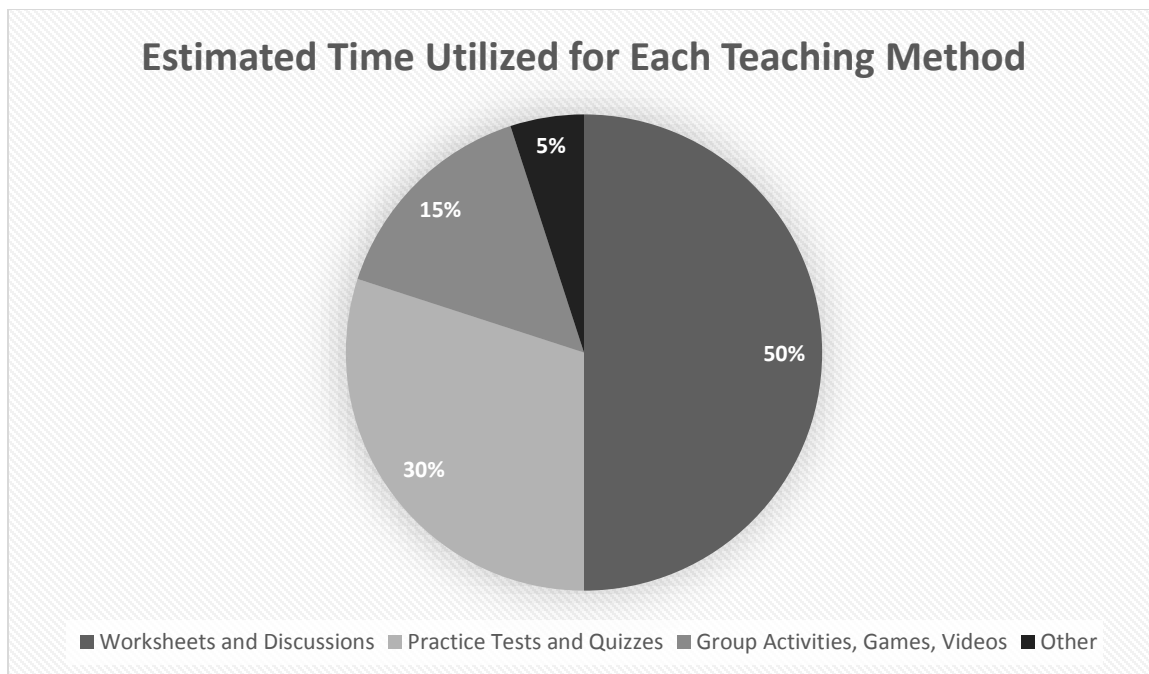


Figure 1. Estimated time utilized for each instructional method for PASS tutoring sessions supplementing an entry-level Anatomy and Physiology course across two semesters (Winter and Fall of 2015) at Southern Adventist University.

Sample

The researchers collected data from the 124 students who participated in the PASS sessions facilitated by the main author. All students were underclassmen. Information related to gender, age, ethnicity, and other demographic factors was not obtained.

Data Collection

Attendance was recorded for every PASS session. Final course grades were obtained from the professors who taught the anatomy and physiology classes the students were enrolled in. High school GPAs and composite ACT scores were obtained from the SAU records office.

Data Analysis

Data was analyzed using multiple linear regression models with final course grades (converted to numeric equivalents using the GPA scale) as the dependent variable and the number of PASS sessions attended, high-school GPAs, and ACT scores as independent

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variables. High school GPA and ACT scores were included to control for self-selection bias. The number of PASS sessions attended was log transformed to better meet parametric assumptions.

All analysis was done using R version 3.2.3 (R Core Team, 2015) with alpha set at 0.05.

Ethical Concerns

This research required the collection of student grades and other information. Our protocol was reviewed by the Institutional Review Board (IRB) who determined that we could proceed—without obtaining informed consent—provided we took appropriate steps to ensure student confidentiality.

Results

Mean numeric grade across the two sections of anatomy and physiology was 2.64 ($SD = 0.94$, approximately a B-). Mean high school GPA and composite ACT scores were 3.41 ($SD = 0.40$) and 21.75 ($SD = 3.49$) respectively. Median attendance was 2.00 (range = 0–33; median reported because of significant positive skew).

Our regression analysis was done in two stages utilizing two multiple regression models. The first model that included all of the independent variables mentioned above explained a significant proportion of the variance in the overall course grade, $R^2 = 0.12$, $F(3,98) = 4.417$, $p = 0.006$. Two of the independent variables, the number of PASS sessions attended and high-school GPA, approached significance, $\beta = 0.16$, $t(98) = 1.93$, $p = 0.056$; $\beta = 0.49$, $t(98) = 1.79$, $p = 0.077$, respectively. ACT score was not significant, $\beta = -0.003$, $t(98) = -0.12$, $p = 0.905$.

Because the ACT score was not significant in the first model, we omitted it from the second model. This second model also explained a significant proportion of the variance in overall grade, $R^2 = 0.12$, $F(2,111) = 7.50$, $p = 0.001$. This time, both the number of sessions

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attended and high-school GPA were significant, $\beta = 0.18$, $t(111) = 2.35$, $p = 0.021$; $\beta = 0.48$, $t(111) = 2.15$, $p = 0.033$, respectively.

In summary, our regression models suggested that both higher high-school GPAs and greater PASS session attendance significantly predicted higher overall grades in the course (also Figure 2). However, composite ACT scores was not found to be a significant predictor of overall course grade.

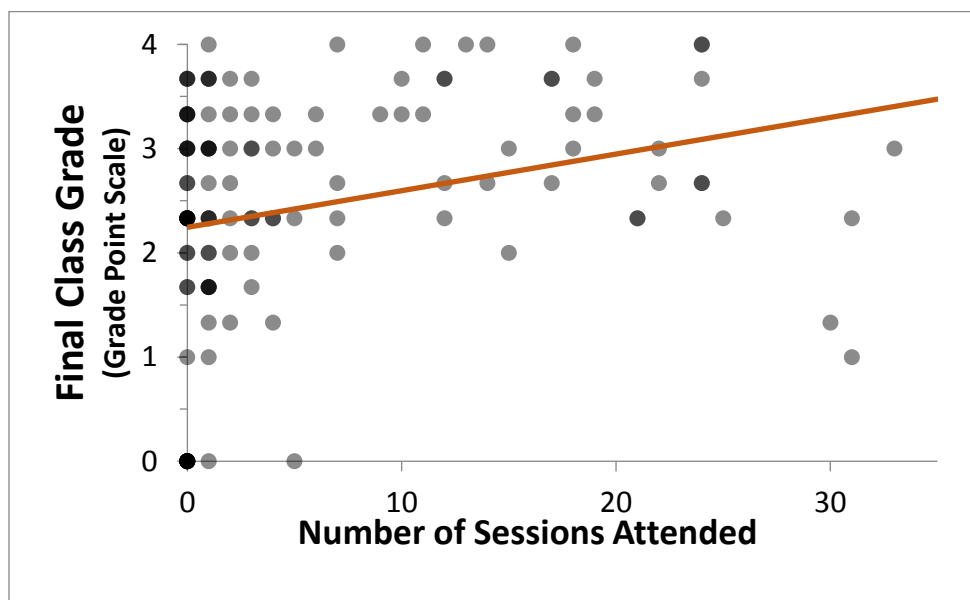


Figure 2. The relationship between the PASS session attendance and final grade (zero representing a failing grade and four an ‘A’) for students enrolled in an entry-level anatomy and physiology course at Southern Adventist University. Data is from the Fall and Winter semesters of 2015. Darker circles represent more overlapping data points.

Discussion

Our analysis supports the contention that PASS sessions can play a role in increasing student performance in entry-level undergraduate science courses like anatomy and physiology. Our use of multiple regression models allowed us to make this finding while controlling for potentially confounding variables (high-school GPAs and ACT scores) and thus strongly suggesting that this result is not due to self-selection bias.

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As expected, our analysis showed that high school GPA was a significant predictor of final course grade, with higher GPAs predicting better outcomes. However, the failure to detect an effect due to ACT score was not expected. This may suggest that high-school GPA is a better predictor of success in entry-level undergraduate science courses than ACT scores. This could be because high school GPA is a better measure of a student's tenacity and motivation than ACT scores. Currently, the only pre-requisite for the entry-level anatomy and physiology course at Southern Adventist University is an ACT of 18 or higher. Our analysis suggests that a pre-requisite based on high-school GPA might be more useful.

Since our findings suggest that PASS sessions can be a benefit to students, the major challenge for the future is to get more students in entry-level science classes to attend SI programs. Currently, the number of resources being developed for these kinds of courses, especially in the area of biology, is minimal (Hughes, 2011). Creating and making such resources available for SI programs, like PASS, may be beneficial to educators in the future, allowing them to implement more SI programs and reach more students.

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