

Using a Common Pedagogy Across Multiple Disciplines to Improve Student Learning

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ABSTRACT

This study includes findings from a university-wide instructional improvement project conducted across multiple disciplines in undergraduate and graduate courses. The project was constructed around a common pedagogy, Michaelsen's Team-Based Learning [1]. The purpose of the project was to improve several outcomes based on the constructs of critical thinking, collaboration, engagement and persistence. Data indicated a positive impact on each of these outcomes with a number of statistically significant findings.

Keywords: Critical Thinking, Collaboration, Persistence

INTRODUCTION

Assessment of the project was guided by a modified action-research cyclical framework. Assessments included the Student Learning Target Mastery Report, Critical Thinking and Collaboration Pre- and Post-Test, Student and Faculty Satisfaction Surveys, the California Critical Thinking Skills Test, and the Teamwork Interaction Faculty Observation Report. Additionally, withdrawal and grade distribution data were gathered from the university data management system.

METHODOLOGY

Participants

Participants consisted of 49 instructors from computer science, computer information systems, emergency medical services, English as a second language, engineering, geography, geology, government, language arts, literature, medicine, nursing, occupational therapy, psychology, physical therapy, sports and human behavior, and statistics. These instructors served 1,513 students in 67 undergraduate and graduate classes with enrollments of 6-90 each.

Assessments

The Student Learning Outcome Target Mastery Level Report consisted of 3-6 student-learning outcomes that were matched with assessments and a target mastery level, or benchmark, established by the instructor. This report was developed submitted at the beginning of the semester. At the end of the semester, instructors reported benchmarks that were met and those that were not. A brief narrative was provided for all benchmarks that were not met including a rationale and

improvement plan. Student learning outcomes found in the Target Mastery Report were based on higher order thinking aligned with Bloom's revised taxonomy [2]. The Critical Thinking and Collaboration Pre- and Post-Test consisted of 20 Likert scale survey questions. Ten questions pertained to critical thinking and 10 pertained to collaboration. Students enrolled in participant courses were sent the survey at the beginning and again at the end of the semester using a web-based software system called Class Climate. Student and Faculty Satisfaction Surveys consisted of Likert scale and open-ended questions. The survey was distributed, also through Class Climate, to all instructors and students at the end of the semester. The California Critical Thinking Skills Test [3], a standardized test normed with other four-year universities located in the United States, was administered at the end of the semester to students enrolled in participant courses and those who were not. The information was then used for comparison purposes. The Teamwork Interaction Faculty Observation Report was an observational instrument designed to measure the level of collaboration within student teams by instructors. It consisted of 25 Likert scale questions based on teamwork constructs. Persistence was determined through the calculation of course withdrawals of students enrolled in project courses and those who were not. Grades and cumulative grade point averages were also calculated for comparison purposes using students enrolled in project courses and those who were not. All questions were rated using the following Likert scale: 5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree.

Critical thinking was assessed through the use of direct assessments including the Student Learning Target Mastery Report and the California Critical Thinking Skills Test, and indirect assessments including the Critical Thinking and Collaboration Pre- and Post-Test and questions found on the Student and Faculty Satisfaction Surveys. Collaboration was assessed through the Teamwork Interaction Observation Report, a direct assessment, along with indirect assessment questions found on the Student and Faculty Satisfaction Surveys. Engagement was assessed through questions found on the Student and Faculty Satisfaction Surveys. Persistence was assessed using withdrawal data and grade distribution reports found within the university data management system.

Data Analysis

Frequencies were reported for items in the Student Learning Outcome Target Mastery Level Report, Student and Faculty

Satisfaction Surveys, the Teamwork Interaction Faculty Observation Report, the Critical Thinking and Collaboration Pre- and Post-Tests the California Critical Thinking Skills Test and the student persistence report. An Analysis of variance (ANOVA) treatment was used to determine statistical significance of items in the Critical Thinking and Collaboration Pre- and Post-Tests, the California Critical Thinking Skills Test, the Student Persistence report and grade comparisons. Descriptive data, generated through open-ended questions in Student and Faculty Satisfaction Surveys, were analyzed by using a selective coding technique to develop topical categories for each qualitative response set and a nominal ordinal method recording the relative frequency for each response category to quantify responses [4].

Findings

Findings were disaggregated and reported by constructs. The critical thinking construct included the following findings:

a) 82% of Student Learning Outcome Mastery Targets were met.

b) Mean scores of questions pertaining to critical thinking were 2.7% higher on the post-test as compared to the pre-test. There were also statistically significant differences in the evaluating and analyzing domains when comparing pre- and post-test scores.

c) The percentile and mean scores of the California Critical Thinking Skills Test (CCTST) were higher for students enrolled in participant classes as compared to those who were not. There were also statistically significant differences in student scores in all constructs between project participants and non-participants. The CCTST consisted of the following constructs: Induction, Deduction, Analysis, Inference, Evaluation, Interpretation and Explanation.

d) Students cited critical thinking, problem-solving and deeper understanding as the most beneficial aspects of Team-Based Learning on the student satisfaction survey.

e) The scores of items pertaining to deeper understanding and problem-solving were higher than the mean score for all critical thinking items on faculty and student satisfaction surveys.

Findings regarding the collaboration construct included:

a) Mean scores were 5.3% higher on the post-test as compared to the pre-test. There were also statistically significant differences in all items pertaining to collaboration when comparing pre- and post-test scores.

b) Collaboration was cited as the 2nd most beneficial aspect of Team-Based Learning on the student satisfaction survey. Only critical thinking and deeper understanding of content received a greater percentage of responses.

c) The "TBL strategies increased collaboration" item score was higher than the mean score for all collaboration items on the faculty satisfaction survey.

Findings regarding the engagement construct included:

a) The "TBL strategies helped increase student engagement" item score was higher than the mean score for all other engagement items on faculty and student satisfaction surveys.

Findings regarding the persistence construct included:

a) Student withdrawals from non-participant courses (7.8%) were twice as high student withdrawals from participant courses (3.6%). There was also a statistically significant difference in withdrawals between participant and non-participant courses.

b) There were more A's and B's, and less D's and F's in participant courses as compared to identical or similar non-participant courses. The cumulative grade point average of students in participant courses were also higher than the cumulative grade point average (GPA) of students in identical or similar non-participant courses. Furthermore, there was a statistical significant difference in student grades and the mean GPAs for students in participant courses as compared to students in identical or similar non-participant courses.

DISCUSSION

Statistical significance and growth were found in a number of data sources, but the most important finding may be related to persistence. Student withdrawals from non-participant courses (7.8%) were twice as high student withdrawals from participant courses (3.6%) and there was a statistically significant difference in student withdrawals when comparing participant and non-participant course withdrawals. Research indicates that when compared with lecture-based instruction, all forms of small-group learning methods, including Team-Based Learning, have a positive impact on student achievement, attitude, and persistence [5, 6, 7, 8, & 9].

Roberts and Styron [10] also found that students with high levels of social connectiveness were more likely to persist until graduation. It is logical to deduce that students are more likely to accomplish difficult tasks when they are in the company of others who are like-minded and facing similar challenges. Furthermore, Kuh and Love [11] noted that students who belonged to common groups helped provide them with the security they needed to bond with other students to achieve common goals. Working in teams may be one of the most important ingredients in determining student persistence and ultimately graduation.

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