

Paper title: Using Reading Journals in Calculus

Tara C. Davis
Hawaii Pacific University

Anneliese Spaeth
Huntingdon College

We study the effects of using reading journals in a first semester calculus class. Students were given instructions on how to read the textbook before class, including keeping a reading journal. The student quiz scores were compared on weeks that journals were due and on weeks they were not due. We found inconclusive results, including some evidence suggesting that students score higher on quizzes when they are required to submit reading journals. Many students also indicated on surveys that the journals were beneficial to their learning and to their completion of pre-class reading assignments, although some felt otherwise.

Key words: Calculus, Quizzes, Reading, Journals

Introduction

This study explores the use of reading journals in a first semester calculus class. Our goals were to find a way to get calculus students to read the textbook before class, and to do so in such a way that requires more effort than just skimming the pages. In addition to studying whether students actually read the textbook when we ask them to, we were further interested in whether doing so has any effect upon their course performance. We identified the following research question: Does the use of reading journals affect student performance or experience in Calculus? We also gave students surveys and final course evaluations where they had a chance to offer their opinion on their experience with the journals and whether they felt that their use was beneficial for learning. This study is based on a pilot study done in 2009 at Vanderbilt University.

The Math Course and Teaching Methods

The course that we are implementing the journals in is Calculus I. This is the first semester of the calculus sequence. The course begins with the idea of average rate of change, and develops the concepts of limit, continuity, the derivative (instantaneous rate of change), antiderivative, and the definite and indefinite integral, including the Fundamental Theorem of Calculus and some applications of derivatives and integrals. The course is both a general education elective and a required course for many majors including math, and computer and natural sciences. The students at Hawaii Pacific University (HPU) are academically, culturally and ethnically diverse. HPU is one of the most culturally diverse universities in the world, with students from more than 80 countries. Huntingdon College is located in Alabama and has approximately 1100 students, many of whom are from Alabama. We will combine the data collected in Fall 2015 from parallel studies that took place at both schools.

Intervention: Journals

The purpose of the study is to determine whether pre-class reading journals have an impact on student performance. Every other week the students were given daily journal assignments. The journal was an aide to assist students in reading slowly and comprehending the textbook. The section in the textbook that was assigned reading as part of the journal was the section that would be discussed in the lecture during the class day that the journal was due. Therefore, the students were reading a preview of the material that they had not learned

yet. The journal consisted of a reading assignment in the textbook, to be covered in class the next day. Additionally the journal assignment instructed the student to take notes on the reading, including writing down all the important points covered in the text. Lastly, the journal instructed students to answer an open-ended conceptual question about the reading. The students also had the opportunity to ask the instructor questions.

The instructor gave the students a verbal explanation on the first week of class about how to properly read a mathematics textbook. It was explained that it is different from reading a novel or a history book in that one cannot skim the pages and expect to understand them. The purpose of taking notes is to get the students to slow down and think about what they are reading. It was noted to the students that the journals can be useful later for studying for tests and quizzes, and it was suggested that students do not copy all the words and examples in the section, but rather just the most important formulas and definitions. A sample journal assignment was provided to students so they understood what was expected of them. After this initial explanation, no further instructions were given.

The journals had to be submitted on time or they were not accepted. They were graded on a scale of 0, 1 or 2. A 0 score meant the journal was not submitted. A score of 1 meant that the journal was incomplete. A score of 2 meant the entire journal assignment was completed. The score of 2 did not necessarily mean that the notes were high quality or that the answer provided to the conceptual question was correct. However, the students did receive minimal written feedback on the journals they submitted. If a student asked a clarifying question or mentioned that something confused them, the instructor provided a written response. Most student journals took up approximately one page of loose-leaf paper, double sided.

The journal assignments were given daily, but only every other week. On the weeks that no journal was assigned, students were not given any explicit instructions to read the textbook, but of course they were not prevented from doing so either. Every week in class the students took a quiz. The reason that we chose to compare quiz scores instead of scores on midterm and final tests had to do with the study design. We want to compare individual students to themselves and to distribute the difficulty of the materials relatively evenly. Sometimes the quiz and the journal questions were similar or related, but other times they were less so. The students were informed about what sections of the textbook would be on the quiz, the quizzes were announced ahead of time in the syllabus and during class, and again, the quiz questions were always similar to problems that were discussed in class and/or given on the online homework.

In addition to collecting journals and quizzes, we did administer intake and exit surveys. The intake and exit surveys contained some paired questions, and the exit survey contained additional questions specifically about the journals and the student experience reading mathematics. The questions were given on a Likert scale, from Strongly Disagree, Disagree, Agree to Strongly Agree. These responses were coded into numbers from 1-4 when entered into data. Students were also given the opportunity on the exit survey to respond to open-ended questions.

Conclusions and Implications

We will do an overall analysis of the data collected during 2015 in the parallel studies. In particular we will focus on analyzing whether student quiz scores appear to be improved by the use of journals to conclude whether this intervention is helpful to students and whether it should be adopted by calculus teachers to improve student learning. We will also analyze the results of the surveys to determine the student's perspective on how the journals aided their learning.