

## SAIT Polytechnic, Alberta, Canada

### Two Year • More than 20,000 Students • MyMathLab for Calculus

A pilot project was conducted in fall 2008 to test the MyMathLab program prior to the school's adoption of Allyn J. Washington's *Basic Technical Mathematics with Calculus* for fall 2009. Faculty was specifically interested in the new algorithmically-generated testbank and new utilities such as custom instructor-built algorithmically-generated questions, as well as the program's ability to determine at-risk students, save marking time for assigned work, and act as a motivational tool for the course. A hypothesis test of linear correlation between the student grades obtained through MyMathLab and those obtained via testing in the course was conducted.

#### Study Methods

A sample of 80 students in three academic sections was required to complete online examinations related to the learning objectives covered in the course and contributing 10 percent of the overall grade. Students were allowed three attempts on a quiz-type exercise using MyMathLab; each attempt had different algorithmically-generated values and a randomized question order. Students could use the Help Me Solve This and See an Example features in Review Mode only after each attempt. Since MyMathLab does not allow for rounding or other minor errors, a decision was made at the outset of the course to alter student grades from MyMathLab in the following ways:

1. If a student submitted a correct answer but had a small rounding error or number of decimals error, then the grade for that question would be altered to give partial credit.
2. If a student submitted a functional solution and only had minor errors or the answer was correct but merely unreduced, then the grade for that question would be altered to give partial credit.

MyMathLab results were obtained from the average of eight quizzes of 6 to 15 questions. Course grades were obtained from written exams marked primarily on the basis of methodology of solution (a midterm, final, and six handwritten quizzes throughout the term).

Data was analyzed with MS Excel. A linear regression line and linear correlation coefficient was calculated for the bivariate set. Data for the overall student course grade has had the 10 percent online testing component removed to keep the variables independent and not artificially inflate any resulting correlation.

#### Data and Analysis

A traditional two-tailed hypothesis test for linear correlation was conducted; the Pearson moment correlation coefficient  $r$  was determined from the data and compared to the critical values for this test statistic. See figure 1.

**Claim:** There is a linear correlation between MyMathLab scores and course grades.

**Claim:**  $\rho > 0$  (a significant linear correlation exists)

$$\begin{array}{l} H_0: \rho = 0 \\ H_1: \rho > 0 \\ \text{sample } r^2 = 0.6678 \\ \text{then } r = 0.817 \end{array}$$

For  $n = 80$ , the critical value for a 0.05 level of significance is  $r_{crit} = 0.220$

The sample value is in the right-hand critical region, therefore the null hypothesis  $H_0$  is rejected, so there is sufficient evidence to support the alternative hypothesis  $H_1$ , the original claim that a significant linear correlation exists.

The 95% confidence interval for the linear correlation coefficient is  $0.60 \dagger r \dagger 0.85$ , which illustrates that the positive linear correlation is likely real.

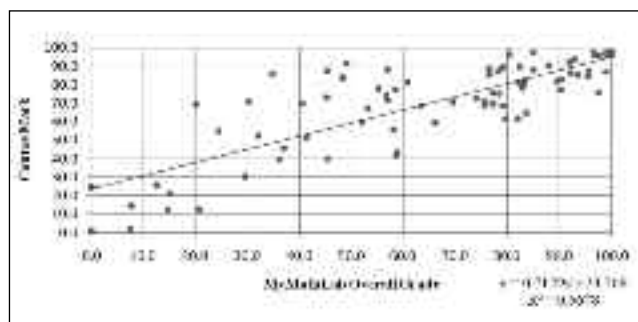


Figure 1. Correlation between Course Mark and MyMathLab Grade for Calculus Pilot Project, Fall 2009

## Conclusion

The results show that a significant positive linear correlation exists between grades obtained using MyMathLab and those derived from class tests. It is important to state that this test only illustrates a correlation between the MyMathLab grades obtained with this particular method of evaluation and the specific methodology-focused marking of handwritten examinations.

The results also gave the instructor an additional tool to identify at-risk students prior to in-class examinations. MyMathLab exercises were useful to students in that they offered the types of questions students were likely to see on subsequent examinations. The ability to administer individual algorithmically-generated tests motivated students to participate in assignments. The observed correlation at the very minimum shows that MyMathLab is a valid assessment tool for calculus, at least under the conditions and methodology outlined in this paper.

—Submitted by Kerry E. Kijewski, Instructor, Mathematics and Physics