

MAKING COURSE MANAGEMENT SYSTEMS WORK FOR YOU

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As student populations have grown and outpaced faculty and facilities at Clayton State University, it became necessary for us to experiment with various instructional formats in order to meet the demands for mathematics courses. Some of the mathematics service courses, including College Algebra and Finite Mathematics, are offered in traditional, online, and hybrid (a mixture between traditional and online) formats. Screening processes are in effect for online courses prior to registration. Students may enroll in the hybrid formatted course without screening; however, students that enroll for hybrid courses are prompted to consider the nature of the course prior to the drop/add period ending. To ensure consistency across sections, we use the same student assessments for measuring performance and content understanding.

This brief paper shares some observations on student performance in classes where Course Management Systems (CMS) are an integral part of course instruction. Comparisons of student achievement across course three instructional formats (online, hybrid, and traditional) from Spring 2006 to Fall 2008 are discussed. Data was collected to examine how the course delivery method impacted student success. Specifically, we discuss how MyMathLab, a Pearson publisher CMS (MyMathLab, 2009) has been used in two undergraduate service courses: College Algebra and Finite Mathematics.

Course Management Systems

At Clayton State University, course management systems (CMS) are used in all lower-division courses. MyMathLab, is used for many of these courses, including the College Algebra and Finite Mathematics courses. Some of the features of MyMathLab include electronic assignments, announcements, calendars, discussion boards, student collaboration areas, and a virtual classroom. Some of these options are not used in a traditional format but are critical to the success of the online or hybrid formatted course of instruction. Much of the communication, in online or hybrid courses, between student and instructor takes place through email and discussion boards. Virtual classrooms are also used to meet with students, allowing for text chatting and “whiteboard” illustrations

and equations. It is this ability for students and instructors to communicate mathematics that is so important, especially when not in a face-to-face classroom environment. CMS also offer a way for instructors to track student work and send student, problem, course, and content information upon request.

College Algebra

This course is a functional approach to algebra with emphasis placed on the study of functions and their graphs, inequalities, and linear, polynomial, rational, exponential and logarithmic functions. Students complete 24 homework assignments, 12 quizzes, 3 tests, and a cumulative final exam. Homework assignments and quizzes are administered through the CMS for all formats.

Table 1 summarizes the withdrawal and unsuccessful attempts (called DWF) rates for students taking College Algebra. The withdrawal rate is distinctively higher for the hybrid and online formats compared to the traditional course. A t-test of the proportions indicates that there exists a significant difference in the withdrawal rates. Interestingly enough, when examining the DWF rates, there is the very slight possibility of evidence towards a significant difference between the three formats of the course in the DWF rates based on the confidence level one chooses to use.

Course Format	Withdrawal Rates	DWF Rates
Traditional	6.9%	28.7%
Online	31.3%	37.5%
Hybrid	16.5%	39.2%

Table 1: College Algebra Withdrawal and DWF Rates

Table 2 displays the aggregate data on grade point averages (GPA) earned in the College Algebra courses where A = 4.0, B = 3.0, C = 2.0, D = 1.0, and F = 0.0. Overall, the mean grade points earned by students in the three various formats are similar. The medians for the three formats of the course are very close. A surprise to the authors appears in the standard deviations of the three formats where the online courses' standard deviation is smaller than the hybrid or traditional formatted courses. The distribution in the histogram of the traditional course is slightly less variable, than the other two formats. From the aggregate data, there is no significant difference in quartiles between mean GPA's for the

three formats of College Algebra. The data illustrates there exists no significant difference between mean grade points for any format of the course.

Statistic	Hybrid	Online	Traditional
N	66	11	246
Mean	2.1667	2.3636	2.3495
Median	2.000	2.000	2.500
SD	1.442	0.8090	1.284

Table 2: Grade Point statistics for College Algebra

Finite Mathematics

This course is a mathematical preparation for the understanding of various quantitative methods in modern management, information technology and social sciences. Topics include: sets, logic and circuits, basic combinatorics including permutations and combinations, probability and probability distributions, systems of linear equations, matrix theory, and linear programming using a geometric approach. Additional topics that may be included are elementary statistical distributions, Markov chains, and game theory. This course has only been offered in the traditional and online formats. Students complete homework assignments online in both formats accounting for 20% of the overall grade. Midterms and Final Exams are taken on-campus regardless of the format. MyMathLab is used in the online course as a means to deliver video lectures and content, administer quizzes, and offer communication solutions. Students in the online sections are expected to participate weekly in discussion forums and communicate regularly with the class and the instructor.

Table 3 exhibits the withdrawal and DWF rates for recent sections of Finite Mathematics. The withdrawal rates are close for the traditional and online formats. The DWF rates shows a 14% increase in the proportions from traditional to online. There is the very slight possibility of evidence towards a significant difference between the two formats of the course in the DWF rates based on the confidence level one chooses to use.

Course Format	Withdrawal Rates	DWF Rates
Traditional	5.4%	23.2%
Online	7.0%	37.2%

Table 3: Finite Mathematics Withdrawal and DWF Rates

The aggregate data for student GPAs in Finite Mathematics is displayed in Table 4. The median grade points are exactly the same in both formats. The standard deviations are similar as well. The online format does have a much lower mean grade point than the traditional course. A t-test of the means shows there does exist a significant difference in the GPA.

Statistic	Online	Traditional
N	40	53
Mean	1.95	2.4717
Median	2.000	2.000
SD	1.2184	1.1537

Table 4: Grade Point statistics for Finite Mathematics

Conclusions

Course Management Systems offer features by which delivery of courses in online or hybrid formats becomes much more manageable. As publishers recognized the importance of CMS, the continued advancements and implementations have been greatly influenced by how it had been used by educators. The differences, whether slight or large, in the aggregate data on withdrawal rates, DWF rates, means, medians and standard deviations, are the result of the inherent difficulties students have with self-motivation, self-discipline and self-learning. Borderline students are less likely to do well in the alternative formats. The largest disadvantage is the need for students to learn concepts on their own. Students, who are not self-motivated or disciplined, fail to learn and quickly become lost during the semester, as they do not have even the basic concepts to progress through the content. Students do receive several communications from instructors regarding the nature of the online and hybrid courses reinforcing the need for a high level of motivation from the students and ability to self-learn.

There are indications that certain ways in which these technology tools are being used can result positively on student success rates in some of these courses. The data definitively reveals that the hybrid format, for the College Algebra course, is a valid alternative to the traditional or online format. The sample size for the Finite mathematics courses is still small compared with that of College Algebra and therefore more data needs to be collected. However, based on the statistics from College Algebra, some consideration should be given to offering Finite Mathematics as a hybrid course as the alternative format in hopes of decreasing the high DWF rate that has been observed in the

online sections of the course. Examining the ways in which various features of CMS are used to support alternative course formats is important to promoting student success.

References

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