

Developmental Mathematics Assessment of Student Learning Project

Murray State College

Spring 2011 Update

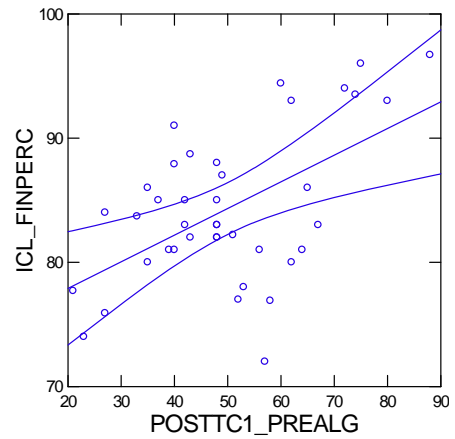
Bruce G. Stewart, Chair of the Department of Science and Mathematics

Assessment data for all developmental mathematics courses at Murray State College have been collected on a continuing basis since the Fall 2009. Some of these data are reported by faculty members who complete portions of an Excel report form while additional data is added to these files as time allows with the help of the Director of Academic Advisement. The goal is to collect the following information about each course:

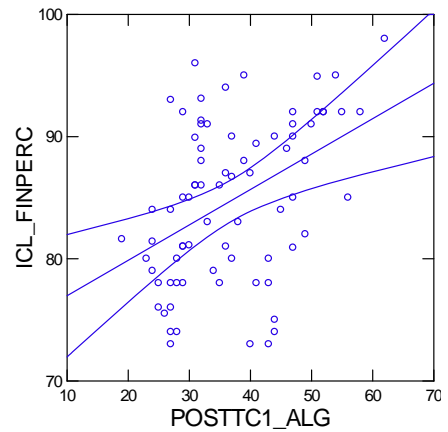
- Course (i.e. MTH0303)
- Section((i.e. 01)
- Time (8AM, AM, 1PM, or PM)
- Instructor
- Student
- PreTC1_PreAlg ("PreT = original COMPASS placement score)
- PreTC1_Algebra
- PreTC1_COLALG
- ICL_YN (Y if ICL % is 73% or higher; N if % is below 73%)
- ICL_FINPERC (percent for ONLY those students who completed the course with an F or higher; no percentages for Ws; list to tenth of a percent, i.e. 74.1)
- PostTC1_PreAlg
- PostTC1_Algebra
- PostTC1_COLALG
- and these if available (though they are not common):
- PostTC2_PreAlg ("2" refers to second attempt after failing on first attempt)
- PostTC2_Algebra
- PostTC2_COLALG
- PostTC3_PreAlg ("3" refers to third attempt after failing on second attempt)
- PostTC3_Algebra
- PostTC3_COLALG
- Final Grade in Course (S, U, W, AW)

Of primary interest have been the I CAN LEARN® student scores and their relationships to students' end-of-course COMPASS© scores (or appropriate pre-algebra and algebra subscores. Additional work will be done regarding pre- and end-of-course changes in COMPASS© subscores. We now have literally hundreds of lines of data for each student in each course since Fall 2009. The following graphs (see next page) show regression results and scatterplots for the Spring 2011 semester for MTH0103 (Introductory Mathematics), MTH0303 (Beginning Algebra), and MTH0403 (Intermediate Algebra). These results show that there are fairly strong positive correlations that are highly significant ($p < 0.002$ or less for all three) between student performance in the course content in comparison to COMPASS end-of-course subscores. This has improved since the Fall 2009 when some of these correlations were much weaker and some were non-significant. We have made many changes in course structure and delivery during this time to try to improve these relationships.

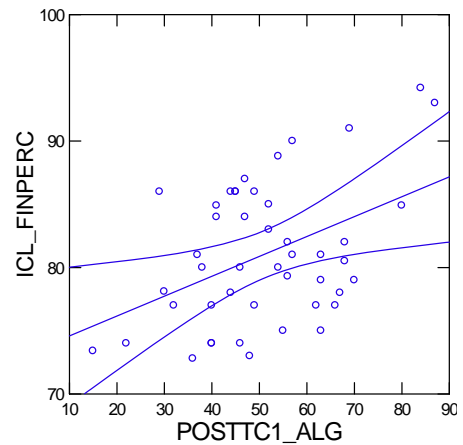
Introductory Mathematics Linear Regression of Compass Pre-Algebra Subscores (Independent Variable) against ICanLearn Course Final Percentages (N=40, Multiple R = 0.548, p = 0.000)



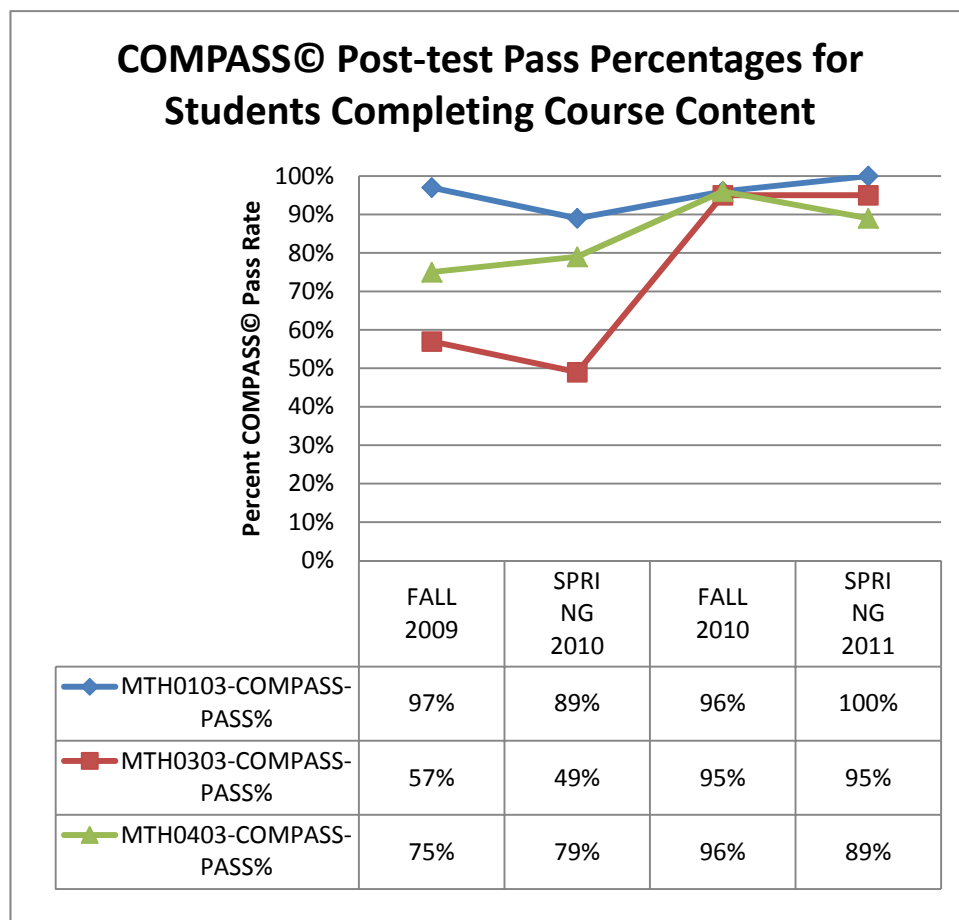
Beginning Algebra (MTH0303) Linear Regression of Compass Algebra Subscores against ICanLearn Course Final Percentage (N=77, Multiple R = 0.432, p = 0.000)



Intermediate Algebra (MTH0403) Linear Regression of Compass Algebra Subscores against ICanLearn Final Course Average (N = 44, Multiple R = 0.436, p = 0.002)



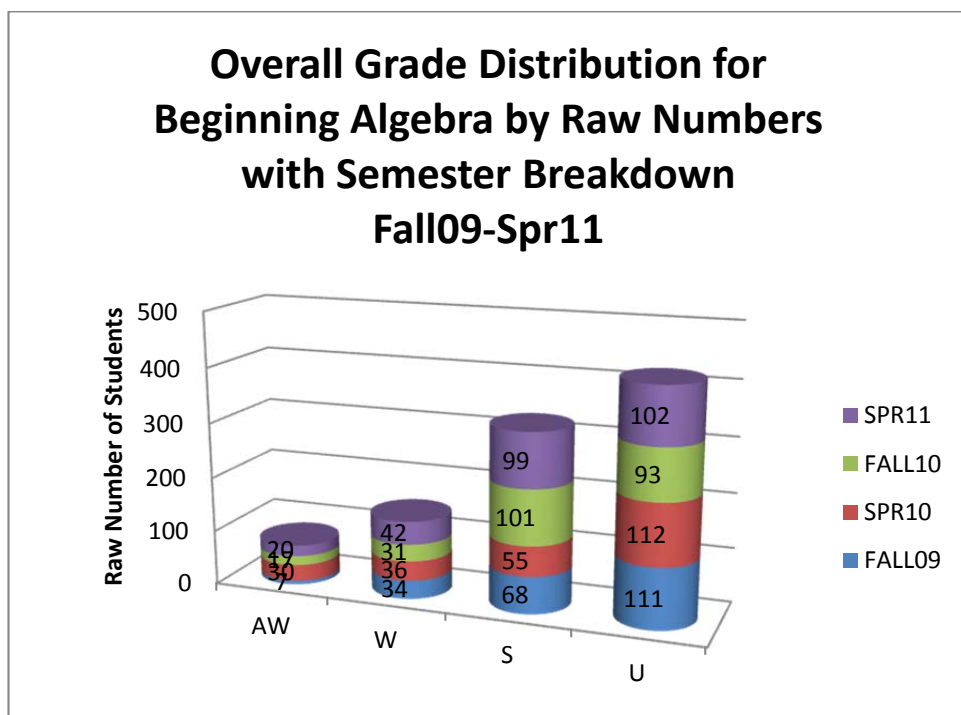
Numerous changes have been implemented on an ongoing basis in response to semester-by-semester evaluation since 2008. These include a variety of efforts to increase student success by emphasizing attendance and participation, instituting the end-of-course exam requirement, raising the course pass percentage from 70% to 73%, closing some loopholes that “enabled” students to perform at a lower level and still pass, changing the method of administering the COMPASS© tests, etc. Overall pass rates of those students who complete the I CAN LEARN® materials have increased dramatically since the institution of the end-of-course requirements. The following table shows the changes in these pass rates which have been most dramatic in MTH0303 (Beginning Algebra).



While results have been promising over the past two years, faculty members have been extremely dissatisfied with certain aspects of the I CAN LEARN® system, and they expressed the desire to review and adopt another system. They believed that we had done as much as possible with the current system, but that we needed to do more. After a year of review, workshops, and presentations representing various systems (some eight primary ones), the faculty chose a system called Hawkes Instructional Systems to replace I CAN LEARN®. This system is being piloted in the Summer 2011 semester and will be fully implemented in the Fall 2011. Now with the two-year database under the I CAN LEARN® system, we will be in a position to determine if the new Hawkes system provides any improvements. Hawkes provides additional resources for students with different learning styles, and it provides significant improvements for access for non-traditional students who may or may not have Internet access. While our COMPASS© pass rates have improved dramatically, there remain issues of

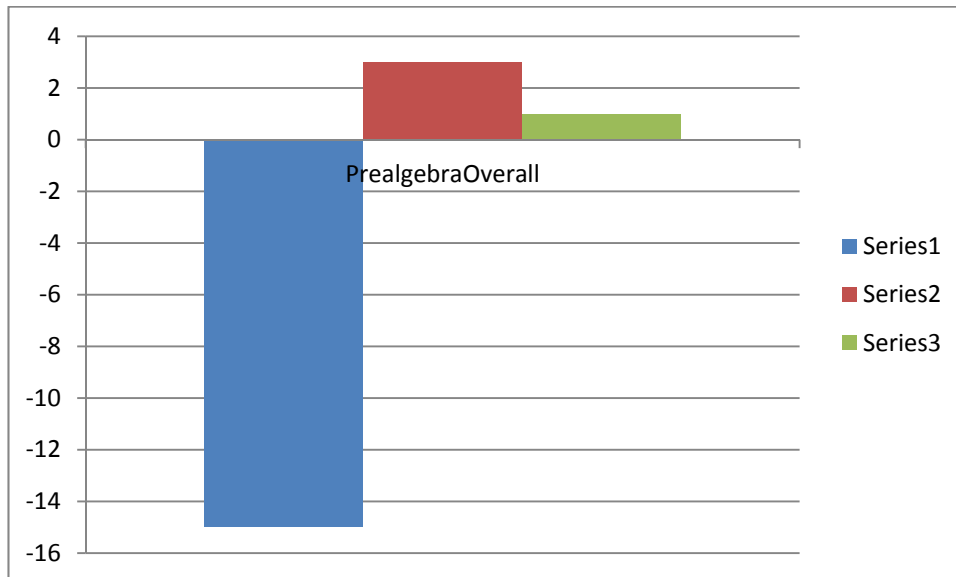
retention in classes where as many as two-thirds of the students never finish the course materials to reach the end-of-course testing stage.

The following table is an example that illustrates the retention problem (which is not new and not worse than “normal” patterns of the past and even in other disciplines). The distributions for all courses pooled between campuses and viewed by individual campus (Ardmore versus Tishomingo) show essentially the same pattern. Statistical tests comparing the grade distributions between campuses show no statistically-significant differences. Nearly all of the U’s, AW’s, and W’s in these tables represent students who simply did not complete the course for various reasons. Faculty have suggested various issues as contributing factors including social problems, financial problems, student immaturity and lack of self-responsibility, difficulty with multi-course class times (each class has students enrolled in any one of the three developmental levels in the same classroom), and access to computer labs to do homework and study outside of classes.



We will be monitoring the retention figures over upcoming years of implementation of the Hawkes Instructional Systems program to see if there is any improvement in the course retention rates. Meanwhile, we will be working with the administration to try to implement other changes to address the instructional atmosphere in the classrooms, particularly to limit individual class to students from a single course (MTH0103, MTH0303, OR MTH0403) as in other normal course setting. Developmental students, of all of our campus students, are in greatest need of a structured environment, uninterrupted class time, instructor presentation time, etc. Our current arrangement with three separate courses being taught at the same time in the same room is not conducive to providing the best student learning environment. We hope to begin a campus discussion on how to address this issue in the face of continuing budgetary constraints.

Finally, we will be watching the CAAP graduation exit scores in mathematics to see if there is any long-term pattern of change. Of course, many factors are at play in producing these scores, but below is one graph that represents what we would hope to see in all other mathematics areas over time:



These represent the pre-algebra CAAP scores for 2008 (prior to implementation of our development mathematics project to 2010 (the latest summary data available to me.) The “series” represent 2008 (1 blue), 2009 (2 red), and 2010 (3 green) respectively. The “0” line represents the national norm. It would be tempting to say that our developmental mathematics project has had a positive effect on these scores; however, results for “elementary algebra” and “intermediate algebra” are not so clear. Nonetheless, the CAAP scores may provide yet another independent way to monitor the mathematics educational programs at Murray State College over the long-term.

In summary, the Murray State College HCL Learning Academy inspired project on assessment of student learning has produced some useful data, and several positive changes and modifications to our teaching have been made in response to this project. Time constraints make the data analysis slow and there is much more to be completed even from the 2009 data. Yet, what we have done has been extremely instructive as it stands. Data collecting and analysis will continue as we move into the “Hawkes Instructional Systems” era.