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**Trinity Washington University**

**College of Arts and Sciences**

**Staff Semester Report**

**Spring Semester 2013**

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1. **Introduction**

Objectives: The objective of this semester report is to assess the continuing progress of all Math 100 level courses. The report will analyze correlations between pre-tests, post-tests and the students’ final grades. Statistics will be used to correlate student outcomes in pre-requisite courses to the next sequential math courses. This report will also examine pass/fail rates of students placing into these courses with Accuplacer scores, students that are repeating a course, or in the case of courses other than Math 101S , students’ successful completion of prerequisite math courses. Additionally, the report will examine any trends in the learning outcomes that adversely affect the University’s retention goals.

Goals: The goals of this report are fivefold. The first goal is to continuously examine and re-examine Math 101S to ensure that it is meeting the needs of our incoming student population each semester so that Trinity’s retention goals are met without compromising the course integrity or the course content standards. Secondly, this report examines the content and rigor of Math 102, so that our students choosing to major in math or science are prepared not only with the proper prerequisites but the mathematical skills to be successful in the next sequential math course, Math 123. Third, this report will examine the outcomes of the Math 108 course. Math 108 was written over the summer of 2011 and its primary focus is towards the math skills needed for students majoring in the life and social sciences. Fourth, this report will examine the outcomes of the Math 109 course, which has a strong focus on those students majoring in the humanities fields. Finally, the report will examine the outcomes of the Math 110 course, which primarily focuses on our students needs to develop an understanding of introductory statistics and critical analysis of real-life applications.

Courses: Math 101S Introductory Algebra

 Math 102 Intermediate Algebra

 Math 108 Finite Mathematics

 Math 109 Foundations of Mathematics

 Math 110 Introductory Statistics

 Math 123 Pre-Calculus

**Summary of Achievement**:

A significant Math 110 achievement was the adjustment to not having the help aids provided in MyStatLab. In past semesters, many students relied solely on the aids to help solve the homework problems and missed the theory behind the problems which resulted in low exam scores. The group of students who made the adjustment to less homework assistance spent more time reading the ebook and only sought help after an attempt or two on their own. This independent learning contributed to more confidence, a better understanding of the material and stronger critical thinking. These are all necessary skills especially at this level.

The Math 101S pedagogy has finally come to fruition after the elaborate re-write of the course a couple of summers ago. The following is the abstract that was accepted by the Mathematical Association of America’s MathFest and will be presented as a paper by Dr. Kerry Luse, Chair of the Math Department, and Joseph Sheridan, Mathematics Specialist, in Hartford, CT

MAA MathFest 2013 ABSTRACT

Serving the Under-Resourced Student in a University Setting Through Mathematics

Statistics show that open-access schools enroll many students with little or no numerical competency. A report referenced in the President’s State of the Union address on January 25, 2012 states that in “many minority institutions of higher education, 80-95% of entering freshman are required to take remedial math, reading, and English. Even in these courses, the dropout rate is estimated to be around 70-80%.” Studies have shown that of the students who place into pre-foundational math courses nearly 75% either will not pass the pre-foundational course (or sequence) or, if they do pass, will fail at the next sequential credit-bearing course. At Trinity, not only did we completely redesign our pre-foundational courses, but we also limited the pre-foundational sequence to one semester, added a one-credit student-centered supplemental laboratory, incorporated a rigorous adaptation of MyMathLab pedagogy in conjunction with Visual, Auditory and Kinesthetic (VAK) styled classroom lectures, and raised the standards of the course. The curriculum redesign objectives were to (1) maintain math course content integrity, (2) develop students’ self-efficacy, and (3) improve retention. Results after several semesters have shown that, for students who complete the course, the pass rate is 80% and that the pre-foundational math students’ retention rate is 84%. Furthermore, for students who successfully complete the pre-foundational math course and move on to the sequential credit-bearing course, the pass rate is now approaching 80%. Our presentation will include a description of our standardized first year math courses, how we implemented them, and data collected over the last few semesters.

1. **Dashboard**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Students Enrolled and Registered |  | Students that Complete the Course |
| Course | Number of Student Enrolled | Pass Rate – Registered for the Course (all students) | Retention Rate – Registered for the Course |  | Number of Students that Completed the Course | Pass Rate - Completed the Course | Retention Rate – Completed the Course |
| Math 101S | 105 |  47% |  50% |  |  59 |  83% |  75% |
| Math 102 |  22 |  73% |  77% |  |  18 |  89% |  78% |
| Math 108 | 103 |  73% |  71% |  |  85 |  88% |  79% |
| Math 109 |  44 |  61% |  70% |  |  31 |  87% |  77% |
| Math 110 | 129 |  78% |  86% |  |  110 |  92% |  92% |
| Math 123 |  19 |  84% |  68% |  |  17 |  94% |  82% |

\* Pass rates are based on a grade of D or better.  For many students the requirements of their majors state that they are required to earn a minimum grade of C. Therefore, the number of students repeating certain courses is higher than the pass rate above indicates. Please see below in the narratives of each class for a full grade distribution break out.

1. **Report on Spring 2013 Semester Outcomes**

**Math 101S - Introductory Algebra**

***Grade Distribution***

The pie chart to the right reflects the grade distribution of the Math 101S classes. A mastery grading system is used; hence, there are no passing grades lower than a C recorded. In order to pass, students are required to earn at least a minimum grade of 72%.

A continued troubling factor is the significant number of students that withdraw from the course. More students withdraw (16%) from the course than actually fail (9%) the course. More troubling is that the percentage of students that quit or abandon (grade of FQ on the chart) is more than the percentage of students that withdraw (W) or fail (F), combined. 28% of students quit attending without formally withdrawing.

No formal explanations are given or recorded about why students’ quit, although this could be attributed to that fact that so many students are repeaters during the spring semester.

Repeaters are those students taking the class for the second or third time and compromise 60% of the total number of students taking Math 101S. This is down a full 20% from last spring as more students are passing this course in their first attempt during the fall semester.

***Retention***

Retention for all students that registered for Math 101S is 50% and for those students that complete the course, the rate is 75%. Both results are the lowest of all the 100 –level math classes. A fact that is not surprising as students that have already invested 30-45 credits are more likely to be retained than those that may be just testing the waters of academic life.

**Math 102 - Intermediate Algebra**

***Grade Distribution***

The pie chart to the right reflects the grade distribution of Math 102. Overall, of the students that stayed in the course the entire semester and took the final exam, 89% successfully passed the course. This continues to be a very high achieving class (all students enrolled had previously expressed an interest in majoring in a math or science field). All students placed into the class with the proper prerequisites.

***Retention***

Retention for all students that registered for Math 102 is 77% and for those students that complete the course, the rate is a slight increase to78%. The number of students enrolled in this class is low (22), thus the sample size is small. There, the retention rate is extremely sensitive to even a few students not returning.

**Math 108 - Finite Mathematics**

***Grade Distribution***

The pie chart to the right reflects the grade distribution for Math 108.

Of the students that were persistent and completed the course, 88% passed.

It should be noted that many of the students that received a grade of D (11%) would still have to repeat the course, even though they received a passing grade, because most majors require a C or better in a core requirement.

This is the newest of the math courses offered and was written primarily to serve those students majoring in the life and social sciences. Further tweaking of the course is ongoing as more data is received from students that have taken the PRAXIS and TEAS exams along with other “new” programs that the University is bringing in. Current trends in Math 110 (which this course is a prerequisite for) have already shown that introductory topics in statistics and probability may need to be worked into the curriculum.

***Retention***

The retention rate for all students that registered for Math 108 is 71% and that figure increases to 78% for those students that complete the course. Students at this point of their math sequence should be retained at a rate closer to the passing rate of those students that completed the course (85%).

**Math 109 - Foundations of Mathematics**

***Grade Distribution***

The pie chart to the right displays the grade distribution of all the students that registered to Math 109. Again, a disturbing trend that appears in this data is that the number of students who withdrew or quit (29%), is almost 3 times bigger than the number of students who attempted to complete the course requirements and failed (9%.) From the students that persisted and took the final 87% passed the course. This number is an improvement on the Fall 2012 semester in which 83% of the students who persisted passed the course. The fact that there are twice as many D grades than C grades reflects a grade distribution that is not acceptable.

***Retention***

The retention rate for Math 109 spring 2013 is 70%. This number is lower than the 75% retention rate that we had in the 2012 Fall semester. While the number of students that withdrew in the 2012 Fall semester is 19%, which is twice as large as the number of students who withdrew in the 2013 Spring semester (9%), the number of those who quit in the spring was almost twice as big. 20% of the students quit attending without withdrawing; ways to reduce this number must be discovered.

**Math 110 - Introductory Statistics**

***Grade Distribution***

The pie chart to the right reflects the grade distribution for Math 110. Of those students who registered for the course, 78% passed with a D or better. However, most students are in majors requiring a minimum grade of C. Only 55% of the total enrollment earned a C or better leaving 45% in jeopardy of having to repeat the course.

The distribution of grades is multi-modal (peaks at 3 levels) which indicates that there are students at different levels of course mastery. This can be caused by the varying levels of preparedness coming into Math 110 and the type of pre-requisite taken. In the spring semesters, there are a variety of students who have different experiences including freshmen, sophomores, juniors, seniors and a growing number of repeat students. Not all students start at the same point. This could explain the multi-modal distribution at B-, C and D. The math background of each student needs to be further evaluated.

***Retention***

Retention rates of Math 110 a students remains high which is to be expected. Other than the first year students, many of our students are upper classmen who have declared their major and understand the importance of completing their requirements at Trinity. For students whocompleted the course, the retention is 92%. However, it is important to note that there have been a few high achieving students who have chosen to transfer to other universities, primarily the University of Maryland. Several advisors have met with them to discuss all their options.

**Math 123 - Pre-Calculus**

***Grade Distribution***

The pie chart to the right reflects the grade distribution for Math 123. Of those registered for the course 84% passed and it increases 10 points to 94% for those completing the course. However, those students with grades of “D” must repeat if they are math majors, for science majors they can move on to Math 125, Calculus.

***Retention***

The retention rate for Math 123 is 68% for all students registering for the course and increases to 82% for those that complete the course. This retention rate is similar to that of Math 102. The overall enrollment numbers are small, so the data, with a slight change of one or two students, shifts the statistics quite dramatically, but change is really not significantly valid, as the sample size is too small.

1. **Key Assessments**

**Assessment 1:**

**Math 101S - Introductory Algebra**

The two most important roles of a pre-foundational course are first, whether or not the students, who take the course and pass it, can also pass the next sequential course and second, the course is not a barrier to those students that persist and complete the course, even if it may take them two semesters to do so.

Trinity has a significant number of entering freshmen that must pass through Math 101S, last fall 66% (171) of the class had to take it. Of those students, 55% (94) passed. With persistence, another 24 students passed in the spring, bringing the incoming Red Class of the fall 2012 semester to a pass rate of 63% (up from 53%) for all registered students. This would also bring the pass rate for those students completing the course up to 89% (from 87%).

Compared nationally, we are 20-25% higher than other open admissions colleges and universities.

The pass rates for all math courses in the sequence directly after it should be higher. If it is lower, or the change is not significantly higher, than the course is not meeting its objectives.

Clearly Math 101S is meeting its goals and objectives.

 **Target Topic:**

**Longitudinal Outcomes – Math 101S - Introductory Algebra**

**Comparison of Spring 2010 through Spring 2013 – All Students**

The overall pass rate (for all students that registered for Math 101S) dipped slightly from last spring to 47% (from 50%). This is due to a significant increase (doubled from 14% to 28%) in the number of students that quit or abandoned the course without formally withdrawing. This trend is unacceptable. On a positive note, the number of students that withdrew from the course decreased and the number of students that failed decreased.

**Comparison of Spring 2010 through Spring 2013 – Students That Completed the Course**

Overall for those students that complete the course, we continue to show modest but steady gains as the pass rate slightly increased and the fail rate slightly decreased. Students who are convinced to stay, are persistent, and do not quit, abandon or withdraw are passing at a rate, for this course, that is one of best in the nation when compared to statistics reported by the National Association of Developmental Education (NADE).

**Assessment 2:**

**Math 102- Intermediate Algebra**

This course is written as a pre-foundational algebra course for all math and science majors. While the numbers are small, and cannot be used to prove or disprove any statistical change – the Math 123 course had its highest enrollment is several semesters. Since greater than 90% of the students that completed the course passed, in-turn Math 125, Calculus will now have its highest enrollment in recent years.

**Assessment 3:**

**Math 108 - Finite Mathematics**

This course has a unique role in that it is a requirement for all life (pre-nursing) and social science (psychology and sociology) majors and it is also providing the math sequence for all education, business and criminal justice majors. It also serves as a prerequisite for Math 110, Introductory Statistics.

While reports from colleagues in the School of Education (PRAXIS exams) and from Nursing and Health Professions (TEAS exams) show improved scores, reports for students passing through the course and into Math 110 have some concern. It is clear that the course content summary of Math 108 needs to be further tweaked to include, at minimum, a short introduction to basic statistics and probability.

In concert with the math faculty, the math specialists are updating these curriculum needs over the summer, so that these topics are included in the Fall 2013 semester.

**Assessment 4:**

**Math 109 - Foundations of Mathematics**

Math 109 is a demanding course designed to provide students in the humanities with the kind of Math proficiency that would enable them to function successfully as college graduates in the information age. It is especially demanding for the humanity students that are averse to mathematics. While instituting past goals that aimed to adopt an educational methodology that is more similar to Math 101S by including daily quizzes and a complementary weekly ‘white board extravaganza’ math seminar, the overall passing rate including those who did not complete the course was 61%. While 87% of those who persisted passed the course, the retention rate of 70% was lower than last semester‘s 75%.

**Assessment 5:**

**Math 110 Introductory Statistics**

The goal of introductory Statistics (Math 110) has always been to sharpen students’ critical thinking and analysis skills to the point where they can effectively use statistical methodologies to analyze data. Overthe last couple of semesters, changes have been made to improve the outcomes of this course. These changes include both software adjustments as well as modifications to in-class exercises. The objective was to foster critical thinking and independent learning needed for the type of statistical analysis expected at this level. The gap between online grades and in class exams, which had been wide, was beginning to close for one section. However, the results aren’t significant enough to drastically improve the overall outcomes. Based upon exam results, some students are still struggling with basic algebraic concepts. Some haven’t demonstrated a full mastery of developmental math to a level needed to make a smooth transition to Math 110. This can result in students repeating this course which has been seen as many as 3 or 4 times for several students.

Also, it was brought to the attention of a couple of math specialists that some students who transferred to the University of Maryland were told their Math 110 credits weren’t accepted. To address this concern, the course content and objectives are being compared to other schools which will probably result in more material being added to Math 110 here at Trinity. In order to make this course comparable to other universities, the pre-requisite courses (Math 108 and Math 109) will have to be tweaked to include more probability and statistics in the curriculum. Currently, Math 108 doesn’t include these concepts; however, it is being incorporated into the course objectives for Fall 2013. Math 109 has a brief introduction to statistics, but it too will be evaluated to see if that material is sufficient.

The pre-requisite courses, as mentioned above, will be tweaked. However, there also needs to be a clearer understanding of what majors will need Math 108 versus Math 109. Once statistics is added to both, each department will be encouraged to look at the course objectives and content in detail and assess which course best serves their students. Math 108 didn’t include statistics when it was developed; however, Psychology and Sociology majors are identified as having this course as a requirement even though it lacks statistics. These students should be exposed to statistics as early as possible. This type of evaluation is underway and continued collaboration with department chairs will be beneficial.

**Target Topic:**

**Longitudinal Outcomes – Math 110 – Introductory Statistics**

The bar graph to the right shows the percentage of students earning a C or better for Math 110. Detailed data is documented in the individual outcomes assessment reports. An important observation is the drastic decline from 88% in Spring 2011 to 66% a year later of student earning a C or better. It has somewhat stabilized in Spring 2013 at 65%. However, the goal is to return to the Spring 2011 results of 88%. Typically, the outcomes in the fall aren’t as high as spring semesters. The spring semesters will have a group of strong freshmen who test directly into Math 108 or Math 109. Despite that fact, having more than half of the statistics population (as in Fall 2012) who could potentially have to repeat the course is troubling. Students’ challenges last fall semester are the same as the spring, but there were more students with these challenges in the fall. It was determined that 23% of the Spring 2013 enrollment were repeating the course which impacts the number of sections of Math 110 needed.

**Assessment 6:**

**Math 123 - Pre-Calculus**

This course had its highest enrollment in a long time (see the notes from Math 102 above), which it-turn supports Math 125, Calculus. That also means that the science majors have more students coming through the math sequence that move into their majors.

1. **Goals and Recommendations**
* Increase the percentages of students who have mastered the course content in all math courses to the point of earning a C or better.
* Continue to develop critical analysis skills and foster independent learning needed to properly draw mathematical and statistical conclusions and make sound recommendations through the appropriate math sequence.
* Assist in evaluating all Math 100-level course content summaries and make recommendations when possible and advisable about restructuring a course to keep up with Trinity’s changing student population and changing programs.
* Provide suggestions as to what mathematical/numeracy/statistics/probability content is important to the pre-requisites for subsequent math courses.
* Continue to help identify where students need additional help and collaborate with the other mathematics specialists and faculty in finding solutions.
* Collaborate with department chairs and faculty in helping to determine what is needed in the appropriate Math 100-level courses for their programs in order for all students to be successful.