Improving Retention through Placement Tests

Dr. Gavin Waters & Dr. Jennifer Hegeman
Missouri Western State University
Outline of Webinar

• Introduction
  • Missouri Western Data
    • open enrollment university
• Solution
  • Using Data driven approach
  • Vertical Integration and Placement Tests
• Nitty Gritty
College Course

- MAT 116: College Algebra
- MAT112: Finite Mathematics
- MAT110: Contemporary Problem Solving
MAT 116: College Algebra

- Successful: Obtain an A, B, C grade
MAT 116: College Algebra

Not Successful

Successful
Combined
Combined ($ACT_M > 21$)
MAT116 (ACT_M > 21)
MAT112 (ACT_M >21)
MAT110 \( (\text{ACT}_M > 21) \)
Combined
Combined $\text{ACT}_M < 20$
MAT116 (ACT_M<20)
MAT112 (ACT_M<20)
MAT110 (ACT_M<20)

Total Success rate by Semester

- success 0
- success 1

Course Densities
Combined Success

Total Success by Semester

- Not Successful
- Successful
My Course
My Course

Mathematics Discipline
My Course

Mathematics Department

Mathematics Discipline
My Course

University

Mathematics Department

Mathematics Discipline
My Course

ACT_M <= 19

ACT_M >= 20
My Course

ACT_M ≤ 19

ACT_M ≥ 20
My Course
My Course
Enrollment in MAT
New Enrollment Vision

Math Placement
Missouri Western State University
New Vision

Math Placement
Missouri Western State University

Remediation
Vertical Integration

• Previous Success Rate: 42.4%

• New Projected Success Rate: 57.4%

Using average grades from same ACT distributions
Nitty Gritty

- WeBWorK: Open Source, MAA, NSF
- Questions: Based off of Co-requisite course
- Initial Phase testing
- Resource Website
Topics Addressed in Preparation Resources for MWSU Mathematics Placement Exam

**Topic 1:** Integers and Rational Numbers
- A. Adding Integers
- B. Subtracting Integers
- C. Multiplying and Dividing Integers
- D. Order of operations with integers
- E. Simplifying fractions
- F. Adding and Subtracting fractions
- G. Multiplying fractions
- H. Dividing fractions
- I. Order of operations with fractions
- J. Evaluating expressions at specified values

**Topic 2:** Irrational Numbers
- A. Estimating square roots
- B. Simplifying square roots
- C. Writing square roots in equivalent forms
- D. Simplifying square roots involving variables

**Topic 3:** Algebraic Expressions
- A. Properties of exponents
- B. Adding and subtracting polynomials
- C. Multiplying polynomials
- D. Dividing by a monomial

**Topic 4:** Linear Equations in One Variable
- A. Solving linear equations
- B. Solving linear equations (Advanced)
- C. Solving absolute value equations
- D. Solving absolute value equations (Advanced)

**Topic 5:** Linear Inequalities in One Variable
- A. Inequalities and Interval Notation
- B. Solving Linear Inequalities
- C. Solving Linear Inequalities (Advanced)

**Topic 6:** Evaluating Functions
- A. Evaluating linear functions
- B. Evaluating linear functions involving fractions
- C. Evaluating exponential expressions
- D. Evaluating exponential expressions (Advanced)

**Topic 7:** Graphing in the Coordinate Plane
- A. Linear equations in two variables
- B. Determining the slope
- C. Horizontal and vertical lines
- D. Intercepts
- E. Exponential equations
- F. Interpreting graphs

**Topic 8:** Logarithms
- A. Converting from logarithmic to exponential form
- B. Converting from exponential to logarithmic form
- C. Evaluating logarithms
- D. Simplifying logarithmic and exponential expressions

**Topic 9:** Exponential and Logarithmic Equations
- A. Solving exponential equations
- B. Solving exponential equations (Advanced)
- C. Solving logarithmic equations
- D. Solving logarithmic equations (Advanced)

**Topic 10:** Linear Equations in Two Variables
- A. Linear equations in two variables
- B. Finding the equation of a line
- C. Horizontal and vertical lines
- D. Determining characteristics of a line

**Topic 11:** Factoring
- A. Greatest common factor
- B. Factoring trinomials (Part 1)
- C. Factoring trinomials (Part 2)
- D. The difference of two squares
- E. Factoring completely

**Topic 12:** Quadratic Equations in One Variable
- A. Solving quadratic equations
- B. Solving quadratic equations by factoring
- C. Solving equations by factoring (Advanced)
Initial Phase

- Every Gen-ed student took the exam
- Tracked students success (A,B,C)
- Split students into 4 ranks based upon ACT_M
  - 0, 1-17, 18-21, 22+
Preliminary Results: All students
Preliminary Results: MAT110 students
Preliminary Results: MAT112 students
Preliminary Results: MAT116 students
Resource Website

• Notes over each topic
• Video lecture over each Topic and sub-Topic
• Worksheets
• 30 electronic problems from each topic
Email feedback!

Placement Exam
To: ['gwaters@missouriwestern.edu', 'andersk@missouriwestern.edu', 'pfuhr@missouriwestern.edu']
Math Placement Exam Results for student1

Override,

You recently (Tue Aug 25 15:07:02 2015) completed a Mathematics Placement Exam at Missouri Western State University. This is an automatically generated email describing the results.

Your score of 57% is high enough to grant you placement into MAT110E Contemporary Problem Solving (3 credit hours) and MAT099 Supplemental Instruction for Success (2 credit hours). Earning credit in MAT110E will satisfy general studies at MWSU, however, may not meet your major requirements. Please consult with your advisor.

Your student record will be updated by 8:00pm this evening at which time you will be eligible to enroll in the above courses.

You may also choose to retake the Mathematics Placement Exam next week in an attempt to achieve at least 70% and gain access to MAT110 Contemporary Problem Solving (3 credit hours), MAT112 Finite Mathematics (3 credit hours), or MAT116 College Algebra (3 credit hours).

Your score on the Mathematics Placement Exam indicates that the following mathematics concepts caused you difficulty:

- Integer and Rational Numbers
- Irrational Numbers
- Linear Equations in One Variable
- Linear Inequalities in One Variable
- Graphing in the Coordinate Plane
- Logarithms
- Exponential and Logarithmic Equations
- Linear Equations in Two Variables
- Factoring
- Quadratic Equations

It is recommended that you review the mathematics concepts that caused you difficulty prior to retaking the Mathematics Placement Exam. Both the Center for Success in Mathematics and the Mathematics Placement Exam online resources are available to assist you in this review process.

If you have any questions, please contact Dr. Kevin Anderson, Computer Science, Mathematics, and Physics Chairperson, in Agenstein Hall 140.

Mathematics Placement Team
Course Distributions
Course Distributions: Placed correctly
Questions?
Comments?