Discipline Outcome
Students will be able to factor a quadratic equation.

Assessment Author(s)
Danielle Staples

Measure 1 Type:
Direct

Embedded exam items

Measure 1 Description:
The learning outcome is assessed by measuring algebra students’ ability to factor a quadratic expression. Factoring quadratic expressions and solving quadratic equations is a basic algebraic skill integral to the application of mathematics to engineering, physical sciences, and economics.

Measure 1 Sample Size:
346

1) Describe the benchmark for this measure.
A cross-sequential longitudinal design was implemented with statistically significant improvement in student performance across two algebra courses (MAT 055 and MAT 121) predicted. Benchmarks were set for the college transfer-level course of MAT 121. A statistically significant improvement in correctly answering this question on the department final exam was predicted.
2) What is the rationale for choosing this benchmark?

Quadratic equations are a foundational competency necessary for success in future mathematics courses as well as other STEM disciplines. Achieving the benchmark would confirm students comprehension of basic mathematical skills related to algebra after receiving continuing instruction in this concept.

Measure 2 Type:

Direct

This discipline outcome was

Surpassed benchmark

Measure 1 Results:

Student responses for department finals were scored on scantrons. Item analysis was collected for all face-to-face sections in both courses (MAT 055 and MAT 121). Online sections were disregarded for analysis. An identical multiple choice factoring question was embedded in the final exam for each course. Image of question attached.

Scores for 346 students were collected. Percentage of correct responses for this question was 65.4% for MAT 055 students and 79.6% for MAT 121 students, as indicated in the graph attached.

We conducted a hypothesis test to determine if the difference between the two proportions is significant and indicates growth in factoring ability from course to course.

Using statistical software the p-value was calculated as .0016630966, showing extremely statistically significant improvement in student performance on the factoring assessment from MAT 055 to MAT 121. This result provides evidence that the math department contributes to student learning at the discipline level. MAT 055 or appropriate placement test score is the prerequisite for MAT 121. Therefore, it is not unexpected that MAT 121 students perform significantly better than MAT 055 since they have received more ongoing instruction.

1) How did unit/department performance compare to the benchmark?

Student performances in the MAT 121 exceeded the benchmark by showing an extremely significant improvement from MAT 055 to MAT 121.

2) How does the data compare to the previous year, if applicable?
In 2015, 46% of MAT 055 students were able to answer the question correctly; this is up to 65.4%.
In 2015, 70% of MAT 121 students were able to answer the question correctly; this is up to 79.6%.
Great improvement over a one-year period.

3) If multiple measures were used, how do they compare to each other?
n/a

1) Based on the findings, how does the unit/department rate performance in regards to this outcome (strong exceeds benchmark, neutral meets benchmark, or weak misses benchmark)?
Surpassed benchmark

2) How does this assessment affect plans for this coming year in terms of strategic planning, budget planning, administrative and educational support unit planning, and assessment planning?
The math department exceeded the benchmark established for the factoring discipline outcome. The anticipated outcomes indicated the implementation of the new developmental education courses are stable and the math department could focus their assessment needs in another direction.

3) How will your assessment results enable you to improve institutional processes or academic instruction in order to support, facilitate and/or stimulate student learning?
The math department offers a variety of courses meeting many student needs. Continuing to oversee all aspects these needs from many perspectives ensures that we are continually improving our efforts towards student learning.

Further Action:
Further Action Planned

Describe the action plan:
The math department will meet to determine the new area of assessment for next academic year.

Person/ Group responsible for action
Danielle Staples

Target Date for implementation of the action
Course competencies for MAT 121 are changing. A new final exam must be created to adjust to the new course competencies.

Discipline Outcome

Students enrolled in the corequisite MAT121/093 will have comparable scores to stand alone MAT 121 students.

Assessment Author(s)

Danielle Staples

Measure 1 Type:

Direct

Scores and pass rates on a standardized test

Measure 1 Description:

The mean average of the common final exam for MAT 121/093 students will be compared to MAT 121 stand alone students. The final exam will be administered in December 2016 face-to-face courses. Because the two samples are independent of each other and the population standard deviation is unknown we will use the Welch's t hypothesis test to compare the means.

1) Describe the benchmark for this measure.

This is the pilot year for this assessment. Benchmarks will be established after the initial year data is collected.
They hypothesis is that there will be no significant difference in test mean average between MAT 121/093 students and MAT 121 stand alone students.

2) What is the rationale for choosing this benchmark?

The math department would like to assess the effectiveness of the corequisite model at the college level. The goal is to minimize the number of developmental courses students are required to take to successfully complete a transfer level math course.

This discipline outcome was

Met benchmark

Measure 1 Results:

There were 157 students that took the MAT 121 College Algebra final exam in a “stand alone” course, meaning they did not take the corequisite MAT 093 class. Their exam average was 23.36 points out of 33 possible points or 70.8%. There was a standard deviation of 5.49 points or 16.6%.

There were 59 students that took the MAT 121 College Algebra exam that were also enrolled in MAT 093. Their exam average was 22.64 points out of 33 possible points or 68.62%. There was a standard deviation of 5.59 points or 16.95%.

While the data sets are very similar to each other with the averages differing by less than one question on the exam, because the data are not normally distributed a test of statistical significance cannot be conducted. More data points are necessary to normalize the distributions. Please see the two attachments for a visual comparison of the results and the spread of the data.

1) How did unit/department performance compare to the benchmark?

The department hypothesized that there would be no significant difference in final exam test averages between students enrolled in MAT 121/093 and students enrolled in MAT 121 stand alone classes. While the outliers in the data did not provide us an opportunity to complete a statistically approved analysis approach, when comparing the averages (23.36 compared to 22.64) less than a one question difference on a 33 question exam, the math department feels it met the intended bench mark.

2) How does the data compare to the previous year, if applicable?

n/a
3) If multiple measures were used, how do they compare to each other?

n/a

1) Based on the findings, how does the unit/department rate performance in regards to this outcome (strong exceeds benchmark, neutral meets benchmark, or weak misses benchmark)?

Met benchmark

2) How does this assessment affect plans for this coming year in terms of strategic planning, budget planning, administrative and educational support unit planning, and assessment planning?

More corequisite courses will be added to the MATH course schedule as of Fall 2017. This requires a need for additional training for faculty and adjuncts and may necessitate additional classroom time and technology inclusion.

3) How will your assessment results enable you to improve institutional processes or academic instruction in order to support, facilitate and/or stimulate student learning?

Corequisite courses provide access to college-level courses to developmental students. By providing this access, we are saving student semesters and cost of developmental coursework. As shown by the data, developmental students are scoring at a comparable rate to college-level peers thereby stimulating and encouraging student learning.

Further Action:

Further Action Planned

Describe the action plan:

The math department will design and develop MAT 092 a corequisite course to support both MAT 120 Math for Liberal Arts and MAT 135 Introduction to Statistics.

Person/ Group responsible for action

Danielle Staples

Target Date for implementation of the action

08/21/2017
Learning Outcome

Personal Development - Students in MAT 121/093 will successfully complete at a higher rate than MAT 121 stand alone students.

Assessment Author(s)

Danielle Staples

Measure 1 Type:

Direct

Performance comparison

Measure 1 Description:

Success rates of MAT 121/093 students will be compared to MAT 121 standalone students. The additional corequisite instruction will increase student aptitude and abilities in pursuit of their goal to complete the transfer level course.

Measure 1 Sample Size:

247

1) Describe the benchmark for this measure.

This is the pilot year for this assessment. Benchmarks will be established after the initial year data is collected.

It is the hypothesis of the math department that proportionally more students will successfully complete MAT 121/093 than the number of students in the MAT 121 standalone course.

2) What is the rationale for choosing this benchmark?
The math department is developing corequisite courses to support students in transfer level courses. Part of the curriculum for these courses involves advising, planning and preparing for the future.

This learning outcome was

Surpassed benchmark

Measure 1 Results:

Student completion rates for all MAT 121 standalone courses and MAT 121 with MAT 093 courses. Grades for 247 students were collected. The percentage of MAT 121 students that successfully completed College Algebra in the standalone format was 72% or 135 of 188 students. The percentage of MAT 121 students that took the supplemental academic instruction course MAT 093 that successfully complete College Algebra was 90% or 53 or 59 students.

We conducted a hypothesis test to determine if the difference between the two proportions is significant and indicates improved retention, completion and personal growth. Using statistical software the p-value was calculated as \( p = 0.0023102133 \), showing extremely statistically significant improvement in student retention and completion. This result provides evidence that the supplemental academic instruction provided in MAT 093 encourages students to continue with their education increasing student responsibility and accountability.

1) How did unit/department performance compare to the benchmark?

Student performances in the MAT 121/093 exceeded the benchmark by showing an extremely significantly higher success rate than the stand alone MAT 121.

2) How does the data compare to the previous year, if applicable?

Historically the College Algebra success rate at ACC is 64%. Both the standalone course improved to 72% and the linked MAT 121/093 improved to 90%.

3) If multiple measures were used, how do they compare to each other?

n/a

1) Based on the findings, how does the unit/department rate performance in regards to this outcome (strong exceeds benchmark, neutral meets benchmark, or weak misses benchmark)?
2) How does this assessment affect plans for this coming year in terms of strategic planning, budget planning, administrative and educational support unit planning, and assessment planning?

More corequisite courses will be added to the MATH course schedule as of Fall 2017. This requires a need for additional training for faculty and adjuncts and may necessitate additional classroom time and technology inclusion.

3) How will your assessment results enable you to improve institutional processes or academic instruction in order to support, facilitate and/or stimulate student learning?

Corequisite courses provide access to college-level courses to developmental students. By providing this access, we are saving student semesters and cost of developmental coursework. As shown by the data, developmental students are completing college level math courses at a higher rate than their upper level peers when the use of a corequisite course is included.

Further Action:

Further Action Planned

Describe the action plan:

The math department will design and develop MAT 092 a corequisite course to support both MAT 120 Math for Liberal Arts and MAT 135 Introduction to Statistics.

Person/ Group responsible for action

Danielle Staples

Target Date for implementation of the action

08/21/2017

Priority

Medium

Learning Outcome
Quantitative Reasoning - Students will be able to interpret and predict a numerical concept.

Assessment Author(s)
Danielle Staples

Measure 1 Type:
Direct

Embedded exam items

Measure 1 Description:
The percentage of MAT 121 students that are able to correctly interpret the quadratic equation to predict the maximum height of the projectile. There will be a common question on the final exam for this course.

Measure 1 Sample Size:
216

1) Describe the benchmark for this measure.
This is the pilot year for this assessment. Benchmarks will be established after the initial year data is collected.

2) What is the rationale for choosing this benchmark?
This application shows a student's ability to interpret models of real life applications. Quadratic functions as well as interpreting and predicting outcomes from models, are foundational mathematical skills found in many disciplines.

This learning outcome was Met benchmark

Measure 1 Results:
148 out of 216 students or 68.5% of students correctly interpreted the mathematical concept of “vertex” and accurately made a prediction for the maximum height of a projectile.
1) How did unit/department performance compare to the benchmark?

The department did not set a benchmark for this learning outcome as this was the first year for this data. The initial reaction is that 68.5% success on the question seems low and efforts to improve quantitative reasoning should be considered.

2) How does the data compare to the previous year, if applicable?

n/a

3) If multiple measures were used, how do they compare to each other?

n/a

1) Based on the findings, how does the unit/department rate performance in regards to this outcome (strong exceeds benchmark, neutral meets benchmark, or weak misses benchmark)?

Met benchmark

2) How does this assessment affect plans for this coming year in terms of strategic planning, budget planning, administrative and educational support unit planning, and assessment planning?

The math department will make a more conscience effort to select and produce materials that focus on applications and quantitative reasoning. They may include selecting different text books and preparing supplemental exercises for students.

3) How will your assessment results enable you to improve institutional processes or academic instruction in order to support, facilitate and/or stimulate student learning?

By exposing students to more real world applications that require quantitative reasoning, more students will be workforce ready upon graduation. Knowing that there is a need for supplementation is the first step to improved instruction.

Further Action:

Further Action Planned
Describe the action plan:
Textbook review committees will evaluate their course materials and supplement as needed.

Person/ Group responsible for action
Danielle Staples

Target Date for implementation of the action
08/21/2017

Priority
Low

Describe any additional resources needed (Leave blank if no additional resources are needed.)
Time and compensation for curriculum development.