

Fayetteville Technical Community College

Detailed Assessment Report 2008-2009 Math-Curriculum

Mission/Purpose

The purpose of curriculum mathematics is to create a positive learning environment in which students are equipped with the content-area knowledge, reasoning skills, critical thinking skills, and problem-solving techniques needed in everyday life and to successfully pursue their individual academic and career-related goals.

Student Learning Outcomes, with Any Associations and Related Measures, Achievement Targets, Findings, and Action Plans

O 1: Construct a mathematical model

The student will use information to analyze problems and make logical decisions to construct an appropriate mathematical model for a given circumstance or set of data.

Associations:

General Education or Core Curriculum:

- 2 Use critical thinking to analyze problems and make logical decisions.
- 4 Demonstrate quantitative competencies.

Institutional Priorities:

- 2 EDUCATIONAL PROGRAMS-To provide a comprehensive educational program committed to quality...

Strategic Plans:

Curriculum Programs- Gen Ed Competencies

- 2.1.1 Promote active learning to serve students from diverse populations. (Ongoing) NOTE: Click the link, Strategic Plan, for additional objectives and activities for Curriculum Programs 2.1.1.
- 2.5.1 Annual Program Reviews (APR) (Departmental Plans) and NCCCS Critical Success Factors. (Ongoing) NOTE: Click the link, Strategic Plan, for additional objectives and activities for Curriculum Programs 2.5.1.

Related Measures:

M 1: Project in MAT 151/171

What and When: The Math Assessment Team will assign projects for MAT 151 (Statistics) and MAT 171 (Precalculus Algebra) students which require them to utilize various concepts and techniques learned in their courses. Students in selected sections of the two courses will be expected to complete one project over a specified period of time during the semester without class discussion or instructor assistance.

Who and How: A copy of each student's (ungraded) completed project will be submitted to the Assessment Team for evaluation. The Assessment Team will use a rubric to measure student

progress toward defining the problem, identifying relevant data, and designing an appropriate model. According to the rubric, projects will be classified into three major categories: Proficient, Acceptable, or Needs Improvement. Projects will be referenced by student name and course. Project results will be compiled alphabetically by student name for each course. This will facilitate semester-end analysis by the Assessment Team, who will distinguish between results of students achieving a grade of D or higher in the course and those who fail.

Source of Evidence: Project, either individual or group

Documents:

[MAT 151 Student Project Solution](#)

[MAT 151 Student Project](#)

[MAT 151 Project rubric](#)

Achievement Target:

At least 90% of students who successfully complete MAT 151, 171, or 172 will attain a rubric score classified as "Acceptable"; At least 70% of students who successfully complete these courses will attain a score classified as "Proficient".

Findings (2008-2009) - Achievement Target: Not Met

In the implementation of this assessment plan, the math assessment team decided to focus on only one of the two courses – MAT 151 (Statistics) – during this assessment cycle. Six sections of MAT 151 reported findings for this assessment. The sample included online and face-to-face classes from both the fall and spring semesters. The assessment tool was a project developed by a member of the math assessment team who routinely teaches MAT 151 both online and in the traditional classroom setting. The project was completed by each student individually and was scored according to a 20-point rubric which was disseminated to students along with the project data and instructions. Each instructor scored the project for her own class.

Of the six sections that reported findings, 81 results were obtained from students who passed the course with a D or higher. Student scores were grouped into three categories: Proficient (18 - 20 points); Acceptable (15 - 17 points); and Needs Improvement (0 - 14 points). Note that papers marked Proficient earned 90% or more of the available points on the project. Papers marked Acceptable earned 75 - 85% of the available points. The results are summarized below:

[MAT 151 Assessment Results 2008-2009]

	Proficient (18 - 20 pts)	Acceptable (15 - 17 pts)	Needs Improvement (0 - 14 pts)
Total (out of 81)	24	21	36
Percent	29.6%	25.9%	44.4%

Related Action Plans:

Action Plan for Learning Outcome #1

The purpose of the MAT 151 assessment was to measure students' ability to apply statistical concepts and problem-solving strategies to a new situation. The goal of the project was to present students with a problem that required them to identify relevant data and analyze it using the concepts and techniques learned in the course. Students were intentionally given extraneous data in the project. Also, the instructions described the objective of their task but did not provide guidance on how to accomplish it.

The findings from this assessment seem to demonstrate that students were not successful in applying what they had learned to a new situation. Nearly 45% of scores fell into the "Needs Improvement" category, instead of the target 90% of scores falling into the "Acceptable" or "Proficient" range. Feedback from individual instructors, however, indicates flaws in the design and scoring of the assessment. For example, the instructions for the project admonish students to "be sure to look at all aspects of the data before coming to your conclusion", but of the six columns of data given to the student, only the sales price column was relevant to their task. Also, the wide variation in scores reported by the two assessment team members who evaluated the projects (each for their own classes) suggests that they did not collaborate in the scoring process and may have interpreted the rubric differently. More than 75% of the scores reported by one instructor were classified as "Proficient" or "Acceptable". The other instructor reported fewer than 20% of scores in those categories.

Due to the flaws in the assessment for Learning Outcome #1, the math assessment team does not consider its findings to be valid for this outcome. For this reason, the team will include Learning Outcome #1 in its assessment plan for 2009-2010 and will apply what it has learned from this first assessment cycle to improve its assessment process. A new measurement tool will be designed for this outcome and efforts made to ensure that evaluators collaborate and agree on their interpretation of the scoring rubric used.

For more information, see the *Action Plan Details* section of this report.

O 2: Interpret data

The student will be able to draw qualitative conclusions about a given situation based on the quantitative results obtained from analyzing and interpreting data presented in a table, chart or graph.

Associations:

General Education or Core Curriculum:

- 2 Use critical thinking to analyze problems and make logical decisions.
- 4 Demonstrate quantitative competencies.

Institutional Priorities:

- 2 EDUCATIONAL PROGRAMS-To provide a comprehensive educational program committed to quality...

Strategic Plans:

Curriculum Programs- Gen Ed Competencies

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Related Measures:

M 2: Embedded unit test questions in MAT 115

What and When: The Math Assessment Team will distribute test questions to be embedded throughout the course in appropriate unit tests in MAT 115.

Who and How: To ensure uniform evaluation, student responses to the embedded test questions will be collected from the various instructors and will be scored by the Math Assessment Team according to a predetermined rubric. The results will be analyzed at the end of the course by the Math Assessment Team, who will distinguish between scores of students

achieving a grade of D or higher in the course and those who fail.

Source of Evidence: Standardized test of subject matter knowledge

Documents:

[MAT 115 Embedded Questions](#)

[MAT 115 Assessment Rubric](#)

Achievement Target:

At least 90% of students who successfully complete MAT 115 will attain an average score of 75% on the embedded test questions.

Findings (2008-2009) - Achievement Target: Not Met

Seven sections of MAT 115 participated in the assessment in the fall semester. The sample included 8-week and 16-week classes; day and evening classes; and both online and face-to-face classes. Instructors were given two sets of questions to embed either in the unit test on functions (Chapter 3) or, in the case of the online class, on a face-to-face midterm exam. One set of three questions required students to analyze and draw conclusions about a nonlinear function represented by a graph. The other set of three questions required an analysis of a linear function represented by a table of data. From the seven sections of MAT 115 that were sampled, 110 papers were obtained from students who were present on the day the assessment was given and who passed the course with a D or higher. These papers were collected from the various instructors and scored by a member of the math assessment team according to a 24-point rubric. Once the papers were scored, they were classified into three categories: 18 - 24 points (75% or more of the total points possible); 12 - 17 points (50 - 74%); and 0 - 11 points (less than 50%). The results are summarized below:

[MAT 115 Assessment Results 2008-2009]

	18 - 24 pts (≥ 75%)	12 - 17 pts (50% - 74%)	0 - 11 pts (< 50%)
Total (out of 110)	74	22	14
Percent	67.3%	20%	12.7%

Related Action Plans:

Action Plan for Learning Outcome #2

The purpose of the MAT 115 assessment was to gauge students' ability to read, interpret, and analyze data presented in tabular or graphic form. The forms used and the types of questions asked were ones that should be familiar to MAT 115 students after completing work in Chapter 3 of their text. The scoring rubric assigned a total of 4 points to each question and allowed for a reasonable amount of partial credit. One possible flaw in the rubric, however, was that it required students to use proper formatting of their answers to receive full credit for some questions.

Since the achievement target was not met for this learning outcome, the math assessment team intends to include the same learning outcome on its assessment plan for the 2009-2010 cycle. All MAT 115 instructors will be made aware of the results of the 2008-2009 assessment and will be asked to increase their efforts to teach the skills addressed in this learning outcome. In designing the assessment plan for the 2009-2010 cycle, the target for this outcome will be to improve by at least five percent the number of students scoring 75% or better on a similar set of embedded test questions.

For more information, see the *Action Plan Details* section of this report.

O 3: Evaluate formulas

The student will be able to evaluate formulas from a variety of disciplines, using calculators when appropriate.

Associations:

General Education or Core Curriculum:

- 2 Use critical thinking to analyze problems and make logical decisions.
- 4 Demonstrate quantitative competencies.

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Related Measures:

M 3: Embedded final exam questions in MAT 161

What and When: The Math Assessment Team will embed specific questions on the final exam for MAT 161 which require students to evaluate a formula.

Who and How: MAT 161 instructors will be asked to score these exam questions uniformly, according to predetermined criteria for full, partial, or no credit. Instructors will complete an item analysis for these questions and will turn in their results to the Math Assessment Team at the end of the semester when course grades are submitted. As part of their analysis, instructors will divide their results into two categories: an item analysis for students passing the course with a D or higher and an analysis for students who do not pass the course.

Source of Evidence: Comprehensive/end-of-program subject matter exam

Document:

[MAT 161 Scoring Guidelines](#)

Achievement Target:

At least 90% of students who successfully complete MAT 161 will attain an average score of 75% on the pre-selected final exam questions.

Findings (2008-2009) - Achievement Target: Not Met

All sections of MAT 161 taught in the spring semester were invited to participate in this assessment. The sample consisted of 123 students from 11 sections of the course who took the two-part common final exam and passed the class with a D or higher. Of the 11 sections that participated, two were Huskins classes, three were online classes, and one was an 8-week class. Instructors who participated in the assessment were asked to score four pre-selected questions on the common final exam according to a given set of guidelines and to report the results. Each question was scored on a 2-point scale, allowing for very limited partial credit. Total scores for each student were grouped into three categories: 6 - 8 points (75% or more of the total possible points); 4 - 5 points (50% - 62.5%); and 0 - 3 points (less than 38%). The results are summarized below:

[MAT 161 Assessment Results 2008-2009]

	6 - 8 pts (≥ 75%)	4 - 5 pts (50% - 62.5%)	0 - 3 pts (< 38%)
Total (out of 123)	66	26	31

Percent	53.7%	21.1%	25.2%
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Related Action Plans:

Action Plan for Learning Outcome #3

The purpose of the MAT 161 assessment was to measure students' ability to manipulate and evaluate formulas. Four questions from the common final exam for the course were selected for the assessment. In scoring students' answers, a two-point scale was used, allowing for very little partial credit. Also, with a total of only 8 points possible, a student missing more than one question scored less than the requisite 75%. Since the target for this learning outcome was not met, the math assessment team will carry over this learning outcome to its plan for the 2009-2010 assessment cycle. The team will carefully review the content and quantity of items used in the assessment tool to ensure that students are given an adequate opportunity to demonstrate mastery of this learning outcome. Also, the team will amend its target for this outcome, with the goal of raising the number of students scoring 75% or better to at least 80% of those passing the course with a D or higher. For more information, see the *Action Plan Details* section of this report.

Details for Action Plans Established This Cycle

Action Plan for Learning Outcome #1

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Priority: High

Target Date: 09/2009
implementation of 2009-2010 assessment cycle

Action Plan for Learning Outcome #2

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analyze data presented in tabular or graphic form. The forms used and the types of questions asked were ones that should be familiar to MAT 115 students after completing work in Chapter 3 of their text. The scoring rubric assigned a total of 4 points to each question and allowed for a reasonable amount of partial credit. One possible flaw in the rubric, however, was that it required students to use proper formatting of their answers to receive full credit for some questions.

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implementation of 2009-2010 assessment cycle

Action Plan for Learning Outcome #3

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Priority: High

Target Date: 09/2009
implementation of the 2009-2010 assessment cycle

Analysis Answers

What were the strengths of your assessment process?

Strengths:

- Learning outcomes were focused and measurable, not vague or too broad
- Most, if not all, math faculty were involved in administering the assessment tool for at least one learning outcome
- The courses with highest total enrollments were involved in the assessments
- Both transfer courses and a non-transfer course required by several two-year programs were involved in the assessment process

What were the weaknesses of your assessment process?

Weaknesses:

- MAT 151 assessment tool contained design flaws
- MAT 151 assessment scoring process was not consistent
- MAT 161 assessment may not have included enough questions to accurately measure students' performance on the desired scale
- The rubric for the MAT 115 assessment may have focused too heavily on the format of

student responses

What was learned as a result of your assessment process?

From this first cycle of assessment, the math assessment team has (hopefully) learned how to avoid some of the pitfalls of assessment in the next cycle:

- assessment tools must be well-designed to yield reliable, usable findings
- rubrics must focus on the intended learning outcome only, not on a particular format for student responses
- assessments must be designed to elicit a sufficient number of student responses to provide for accurate measurement

How will what was learned impact the direction and emphasis of your academic or support unit?

The assessment process will be refined and improved for the next cycle, so that findings can be viewed with more confidence and used to pinpoint areas of weakness within the math curriculum. Results and analysis from this assessment cycle will be shared with all math faculty to elicit suggestions for improvement in both the assessment process and in the curriculum. Findings from this cycle will be used to spark and encourage the type of interaction among faculty that leads to an improvement in teaching and evaluation techniques.

Annual Reports

Program Review (Academic Units)

All academic units must do an annual program review. If applicable, the associated document for the Program Review is attached at this level.

Document:

[Program Review for Mathematics 2008-09](#)

Advisory Comm. Minutes (Academic Units)

Academic units have associated Advisory Committees that provide community input on program direction and outcomes. If applicable, the minutes from these meetings are attached at this level.

Document:

[College Transfer Advisory Committee Minutes 11/21/2008](#)