

# **Technical College Reports**

**AUGUST 2015**

**REPORT ON THE ASSESSMENT OF STUDENT LEARNING**

**INSTITUTION:** *Flint Hills Technical College*

**AREA ASSESSED:** Mathematics and Analytical Reasoning

Assessment Instrument(s): FHTC's Core Abilities Assessment Rubric (Math Logic section); Course Pre-/Post-Tests for MA 110 College Algebra.
Assessment Results: Core Abilities Assessment: In FY '15, FHTC's aggregate score for Math Logic was 3.00 for the fall semester and the spring aggregate score was 3.04 on a 4 point scale. Instructors rated each student in their program of study according to this scale (Exceeds Expectations - 4, Meets Expectations - 3, Needs Improvement - 2, Unsatisfactory - 1 or Not Assessed) in the math logic area, using the same scale for FHTC's other 8 core abilities areas as well. They rated the students in both the fall and spring semesters, allowing faculty and students to see the growth in improvement in these areas. College Algebra Pre-/Post-Tests: In the spring semester of 2105, students taking the FHTC-generated College Algebra pre-test scored an average of 3 (11.5% correct). Students (from these same sections taught at FHTC) scored an average of 24.5 (54% correct) on the post-test. This was an average increase of 42.5% in student learning gain over the course of the College Algebra class.
Explain how your institution makes use of the assessment results: Core Abilities Assessment: The results are primarily used with the individual student. Upon completion of the individual ratings, faculty and students conferenced together to discuss the results, talk about the strengths of the students and ways to improve in the areas of weakness. The students also have the opportunity to use the information in their personal portfolios (they receive a hard copy report that summarizes each of the 9 Core Abilities areas for them individually) as they are searching for employment. College Algebra Pre-/Post-Tests: Instructors respond to the results of the post-tests for their College Algebra sections with a Feedback Form at the end of each semester. For every individual question on the post-test where the total students' responses are below 70% correct, the instructor must indicate what the issue(s) were for students not meeting success benchmarks. The instructor must also report what they plan to do differently so that student results are improved during the next semester.
Comments:

**AUGUST 2015**

**REPORT ON THE ASSESSMENT OF STUDENT LEARNING**

**INSTITUTION:** *Manhattan Area Technical College*

**AREA ASSESSED:** Mathematics and Analytical Reasoning

<p>Assessment Instrument(s):</p> <p>In line with the Board's Strategic Plan, Foresight 2020, during the 2014-2015 Academic Year, Manhattan Area Technical College conducted student learning assessment in the area of mathematics/quantitative/analytical reasoning. The assessment was based on the student outcomes of all mathematics courses offered during Fall 2014 and Spring 2015. Tabled data can be seen in the attached tables.</p>
<p>Assessment Results:</p> <p>In Fall 2014, 10 math courses ranging from a remedial level course (Workplace Mathematics—MAT-099) through College Algebra (MAT-135) were offered. One of the College Algebra courses was a CEP offering. College Algebra (MAT-135) is listed on the KRSN Course Transfer Matrix. A total of 179 students were enrolled in math courses during the semester. The average score across all courses was 75.86% with an average course-level GPA of 2.48. If the CEP course is excluded from the analysis there are negligible decreases in both indices: the average score across the remaining courses drops to 75.26% and the average course-level GPA drops to 2.44.</p> <p>In Spring 2015, 12 math courses ranging from Technical Mathematics I (MAT-101) through College Algebra (MAT-135) were offered. Two of the College Algebra courses were CEP offerings. A total of 170 students were enrolled in math courses during the semester. The average score across all courses was 78.10% with an average course-level GPA of 2.68. If the CEP courses are excluded from the analysis there are negligible decreases in both indices: the average score across the remaining courses drops to 76.97% and the average course-level GPA drops to 2.58.</p> <p>From Fall 2014 to Spring 2015, the average score across courses increased by 2.24% and the average course-level GPA increased by 0.14. A course-by-course examination of the grade distributions reflects no indications of grade inflation, with the possible exception of one College Algebra course offered in spring (i.e., MAT-135; 12955), which was a CEP course.</p> <p>In the area of Indirect Measures of Student Learning, students' ratings of teaching effectiveness (i.e., measured using the IDEA Survey) were generally positive and no specific, consistent complaints were noted for any instructor. In addition, in-class observations of faculty teaching by the Vice President of Instructional Affairs revealed no notable issues.</p>
<p>Explain how your institution makes use of the assessment results:</p> <p>Overall, a semester-to-semester analysis of the math courses reflects generally positive outcomes for students. There was a slight increase in average scores from Fall to Spring. With the exception of one course, grade distributions show no indication of artificial grade inflation—that instructor will be tracked in this area. Indirect measures of student learning are generally positive and do not suggest specific areas of concern with any instructor.</p> <p>The plan for the future in this domain of the General Education Division is to maintain the status quo and continue to track data as noted above. At this juncture, no immediate changes appear to be warranted.</p>
<p>Comments:</p>

**AUGUST 2015**

**REPORT ON THE ASSESSMENT OF STUDENT LEARNING**

**INSTITUTION:** *North Central Kansas Technical College*

**AREA ASSESSED:** Mathematics and Analytical Reasoning

<p>Assessment Instrument(s):</p> <p>Math instrument: Common final from all sections of the course taught</p> <p>Composition instrument: Portfolio collection of papers from all sections of the course taught.</p> <p>Results are entered into a matrix outlining the competencies assessed, the assessment tool used, the benchmark, assessment results and analysis of stated results.</p>
<p>Assessment Results:</p> <p>For math, 96% of students assessed met the benchmark.</p> <p>For composition (analytical reasoning) 81% of students assessed met the benchmark.</p>
<p>Explain how your institution makes use of the assessment results:</p> <p>NCK Tech uses the results of assessment to improve teaching and learning. Results are analyzed to implement new or additional teaching strategies, textbook choices, incorporate technology and invest in needed learning resources.</p>
<p>Comments:</p> <p>NCK Tech assess at the program level for our majors and at the course level for general education. We have not developed institutional general education outcomes at this point. For purposes of this report, I've included assessment results from our math and composition courses.</p>

**AUGUST 2015**

**REPORT ON THE ASSESSMENT OF STUDENT LEARNING**

**INSTITUTION:** *Northwest Kansas Technical College*

**AREA ASSESSED:** Mathematics and Analytical Reasoning

**Assessment Instrument(s):**

Students are assessed within the Learning Management System (LMS), WebAssign. There are specific course embedded activities that are graded to assess each student's learning progress against learner outcomes that align with KBOR's learner outcome standards. Each of the KBOR standards are measured directly by at least one course activity.

Each student's progress is measured by the percentage of correct questions obtained by that individual student when completing a particular assessment activity. Then the individual student's percentage score is treated as a qualitative variable where a score of "70% or better" is considered to be performance that "met or exceeded" the standard set for a particular learner outcome, and a score of "69% or less" is considered to be performance that "needs improvement." Individual results are combined into a single class count for the activity. Then a second percentage calculation is made for the whole class, again, with an objective of "70% or better," in order to determine if the class, as a whole, achieved performance that "met or exceeded" the standard set by a particular learner outcome.

These evaluations of performance against KBOR standards are made independently of the final letter grade that are given to each students.

In 2014, Northwest Tech decided to move to textbooks that used the WebAssign LMS, primarily as a cost-saving measure for its students. The student cost for printed textbooks had moved to over \$250.00 per copy. By moving to electronic textbook delivery, the College determined that it could reduce student textbook costs to \$75.00. In addition, concurrent use of WebAssign with electronic texts might lead to more precise learner outcome assessments.

In the past, Northwest Tech had used COMPASS tests as a post-course assessment tool to ensure students were progressing against learner outcome standards at an appropriate level. While COMPASS tests provided a nationally recognized assessment tool, they did not report student results at a level that could be calibrated to assess particular learner outcomes. Within WebAssign, it became possible to create activities that could be aimed to measure student progress against particular outcomes and that would fit completely within regular classroom work. This move to WebAssign has become even more essential because of ACT's recent announcement that the COMPASS tests will be retired. Northwest Tech will consider future use of ACCUPLACER to evaluate student for placement as well as for post-class assessment, but there are advantages to using WebAssign as an assessment tool for learning outcomes.

**Assessment Results:**

As this is the first year of Northwest Tech's using WebAssign as an assessment tool, results are preliminary. Data cover classes conducted in Spring Semester 2015. KBOR groups learner outcome standards into broad areas within which there are more specific learner outcomes. Course level percentage results are reported in terms of the broad groupings. All students registered for the courses on the census date are included in the assessment results. The results would have been higher if the report was restricted to students with passing grades and all standards would have a score exceeding the 70% threshold.

### Beginning Algebra

Learner Outcome	Class Percentage Meeting Outcome
Arithmetic and Algebraic Manipulation	63%
Equations and Inequalities	38%
Graphs on a Coordinate Plane	75%
Analysis of Equations and Graphs	63%

### Intermediate Algebra

Learner Outcome	Class Percentage Meeting Particular Outcomes
Arithmetic and Algebraic Manipulation	73%
Equations and Inequalities	73%
Graphs on a Coordinate Plane	100%
Analysis of Equations and Graphs	91%

### College Algebra

Learner Outcome	Class Percentage Meeting Particular Outcomes
Analysis and Graphing of Functions and Equations	80%
Solutions of Equations and Inequalities	73%

Explain how your institution makes use of the assessment results:

Northwest Tech uses the results of its assessment results to refine its course offerings. The results help faculty to identify topic emphasis in future semesters by course. Each course is revised to raise the class percentage of students who meet standards and also to address any differences in the performance against the standards by topic.

Comments and Recommendations:

This is the first time that Northwest Tech has used WebAssign activities as an assessment tool for KBOR learner outcomes in mathematics and analytical reasoning. As a result, these data cannot be regarded as conclusive, but they suggest several improvements can be made by course in Northwest Tech's course offerings. Here are some of the most important conclusions and recommendations by course:

#### Beginning Algebra

1. The results for this course have the greatest room for improvement. Beginning Algebra is the foundation for future mathematical coursework and is a required course for all students who take the course. While it can be expected results would be lower in Beginning Algebra, primarily because of the diversity of interests and backgrounds of the students who take the course, nevertheless, one would hope for better student performance matter what the mathematical interests and backgrounds of the students might be.

2. Students in Beginning Algebra demonstrate very specific weaknesses in equations and inequalities with respect to problem solving and applications using one variable. In particular, many students demonstrate poor translation skills with respect to word problems and the applications of algebraic principles to problem solving. Students appear to navigate symbolic manipulations successfully once an equation is developed, but developing an appropriate equation for a solution is a problem for many.
3. In order for Beginning Algebra students to demonstrate the requisite skills for equations and inequalities, pedagogical emphasis should be given to reading and critical thinking. In particular, students must be taught “extraction” and “focus” skills—that is, providing students with reading and thinking tools to assist them with separating what they “know” from what they “don’t know,” and then relating what they do “know” to what they “don’t know,” by using a variable to define the unknown.
4. There are several promising leads for addressing this issue:
  - a. Aiming students to focus on the “question” they want to answer—the answer to the question becomes the variable for which one solves
  - b. Relating the “known” to the “unknown” by using a consistent input-output matrix format. Students begin to see that many problems have similar patterns for solutions. (This is particularly helpful with investment, mixture, and time-motion problems.)
  - c. Walking students through the matrix to obtain an equation. “Input across and connect to get outputs going down, right into an equation,” might be an easy way to describe this process.
  - d. Teaching patience. Many students get frustrated with having to focus on the process of getting to an answer.
5. Faculty face a difficult choice in trying to cover these problem solving skills while maintaining adequate coverage of other required topics. This year’s Beginning Algebra results indicate that it is difficult to lead a class through the problem solving and critical thinking skills that are required to solve application problems. The low percentage scores on algebraic manipulation and analysis of graphs and equations indicate a lack of adequate time spent on rational expressions and manipulations of slope-intercept equations into other linear forms.
6. It is possible to cover basic evaluation of variables and principles of equality more quickly. This would provide students with additional time to master the higher order problem solving, linear equation, and rational expression skills.

### Intermediate Algebra

1. Overall, the results for this course are encouraging. Intermediate Algebra is considered the “terminal” required mathematics course for Northwest Tech AAS degree candidates. Students demonstrated acceptable or better performance on all curriculum topics covered in the course.
2. The majority of students in this course were Engineering Technology students. The 100% class performance on graphing, in part, reflects training that the Engineering Technology students received as part of their program.
3. Several areas for course improvement can be identified with a finer grained analysis of the data. Among these are:
  - a. Rational expressions
  - b. Simplification of complex fractions
  - c. Factoring techniques
  - d. Rationalizing denominators
4. There are promising leads for leading students to mastery of these topics:
  - a. With operations on rational expressions, it is helpful to lead students through the algebraic rules for operations on whole number fractions. Simply asking students to subtract whole number fractions with unequal denominators (such as  $\frac{1}{2} - \frac{1}{4}$ ) can help them to see the same principles to

use with rational expressions.

b. “Clean house quickly” by using least common denominators can be helpful in teaching how to simplify complex fractions.

c. Using the “ac method” to rewrite the middle term of a quadratic and then “factoring by grouping” is far more effective than “guess and check” methods for factoring.

d. Connecting the process of rationalizing denominators to an already memorized difference of squares factoring formula helps student performance.

### College Algebra

1. Results also are encouraging. College Algebra is an elective course in Northwest Tech’s programs. The majority of students taking this course this year had an objective of pursuing additional education beyond the AA degree. Students enrolled in this course are personally motivated to master the material. WebAssign measures “time spent” on activities and assignments. Students who met or exceeded standards for performance consistently spent the time needed to master material whereas the students who failed to meet expectation did not invest adequate time and effort.

2. Class performance met or exceeded performance in both broad groupings, but a finer grained analysis of these data suggested areas for class improvement:

a. Greater emphasis should be placed upon the “visual” understanding of functional forms.

For example, students should be encouraged to graph more functions to look for patterns in how functional forms behave.

b. Students need to compare and contrast functions so that rules of symmetry and composition are clearer

c. Students had difficulty in mastering conic sections. More emphasis should be placed on relating the various functional forms of the conics to each other (e.g. “here is the equation for an ellipse--how is it like the equation for the circle and the hyperbolas

d. Students had difficulty in mastering matrix algebra topics. Additional emphasis might be placed on using Gauss-Jordan techniques for achieving solutions.

### Comments:

This reports on the assessments that Northwest Kansas Technical College, (hereafter, Northwest Tech), has conducted for mathematics and analytical reasoning for the Academic Year 2014-2015.

It discusses Northwest Tech’s assessments made in three courses: Beginning Algebra, Intermediate Algebra, and College Algebra. These courses are part of the KBOR alignment project to ensure that course learner outcomes are consistent in courses for two-year and four-year colleges in Kansas.

Northwest Tech requires Beginning Algebra and Intermediate Algebra for its Associate of Applied Science (AAS) degrees offered in four programs: Business Technology, Crime Scene Investigation, Engineering Technology, and Mobile Applications and Entertainment Development. Students in these programs have the option to take College Algebra as a general education elective course in pursuit of an AAS degree.



**AUGUST 2015**

**REPORT ON THE ASSESSMENT OF STUDENT LEARNING**

**INSTITUTION:** *Salina Area Technical College*

**AREA ASSESSED:** Mathematics and Analytical Reasoning

Assessment Instrument(s): WorkKeys and Assessment of Student Learning Plans
Assessment Results: WorkKeys  WorkKeys test evaluates student performance in three areas: Reading for Information, Math, and Locating Information. Based on WorkKeys' scores, students receive a platinum, gold, silver, or bronze Kansas WORKReady certificate. ACT recommends a certificate level for each program. The student's certificate award is determined by lowest score in the three areas (if a student tests platinum in two areas and silver in the third, the student receives a silver certificate). This end of program test provides an excellent tool to evaluate a student's communication and math/critical thinking skills.  94% of graduates met the ACT recommended certificates; 11 of 14 programs had 100% achievement.  Assessment of Student Learning - math  1. Basic Math goal: 80% of class will achieve 80 or higher on the rubric. Results: 75% of class achieved 80 or higher. Plan in place to improve. 2. Intermediate Algebra goal: 80% of class will achieve 80 or higher on the rubric. Results: 100% of class achieved 91 or higher on the rubric. No changes in plan (note only 3 students in this class). 3. Technical Math goal: 80% of class will achieve 80 or higher on the rubric. Results: 42% of the students averaged a score of 80 or higher on the rubric. Plan to improve (only 2 students in this class).
Explain how your institution makes use of the assessment results: WorkKeys scores are analyzed and tracked historically. The Administration and Board reviews and discusses the data.  Assessment Plans are reviewed with advisory committees, faculty and by Administration and the Board. Within the Plan is a area for a "plan of action based on results."
Comments: WorkKeys data and plans available on request.

**AUGUST 2015**

**REPORT ON THE ASSESSMENT OF STUDENT LEARNING**

**INSTITUTION:** *Wichita Area Technical College*

**AREA ASSESSED:** Mathematics and Analytical Reasoning

Assessment Instrument(s): Standardized Final Exam in Intermediate Algebra & Standardized Final Exam in College Algebra
Assessment Results: Intermediate Algebra- 56.0% (47 out of 84) of students scored 70% or higher on the final Intermediate Algebra exam.  The mean score was 71% out of 100%.  College Algebra- 57% (38 out of 67) of students scored 70% or higher on the final College Algebra exam.  The mean score was 72% out of 100%.
Explain how your institution makes use of the assessment results: The assessment data is used to determine student proficiency in course outcomes related to quantitative problems and drawing conclusions within various contexts. Students scoring 70% or better on the final exam are considered to have met the expected level of proficiency.
Comments:

**AUGUST 2015**

**REPORT ON THE ASSESSMENT OF STUDENT LEARNING**

**INSTITUTION:** *Washburn Institute of Technology*

**AREA ASSESSED:** Mathematics and Analytical Reasoning

Assessment Instrument(s): WorkKeys			
Assessment Results:			
Score	Students	%	Level
3	24	1.59%	Bronze
4	372	24.64%	Silver
5	631	41.79%	Gold
6	399	26.42%	Platinum
7	84	5.56%	Platinum Plus.
Explain how your institution makes use of the assessment results: WorkKeys assessments are given to students as part of the admissions process to Washburn Tech and again upon graduation from a program. Washburn Tech uses the assessment results to assure a minimum level of proficiency before acceptance into a program as well as certifying WorkReady certificates as students enter the workforce.			
Comments: 1,114 students out of 1,510 students (73.77%) who took the WorkKeys Applied Mathematics assessment during the 2014-2015 academic year scored at the Gold level or higher.			