Assessment Cycle 2022-2023

Mathematics – Core Competency #2. To apply mathematical and analytical reasoning skills.

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Northwestern Mission
Northwestern State University is a responsive, student-oriented institution committed to acquiring, creating, and disseminating knowledge through innovative teaching, research, and service. With its certificate, undergraduate, and graduate programs, Northwestern State University prepares its increasingly diverse student population to contribute to an inclusive global community with a steadfast dedication to improving our region, state, and nation.

Northwestern Core Curriculum
Northwestern has a broadly based core curriculum that is central to the University's mission and consistent with the Louisiana Board of Regents' requirements for general education survey courses applicable to all students regardless of their major. The core encompasses the knowledge and abilities that Northwestern believes are essential to college graduates. Its requirements are designed to improve students' writing and speaking, to expand students' aptitude in mathematics and its applications, to strengthen students' understanding of biological, physical, social, and behavioral sciences, and to develop an appreciation and knowledge of the arts and humanities.

The goal of the core curriculum is for undergraduate students, depending on their respective degree program, to obtain appropriate learning outcomes for this general education competency.

Methodology

(1) Students must complete one of the following Core sequences:

Course Name - Sequence	Methodology	Target	Term
Math 1020 & 1060	Quiz	70%	Fall & Spring
Math 1035 & 1060	Quiz	70%	Fall & Spring
Math 1020 & 1090	Quiz	70%	Fall & Spring
Math 1020 & 2010	Quiz	70%	Fall & Spring
Math 1810	Quiz	70%	Fall & Spring
Math 2100 & 2110	Quiz	70%	Fall & Spring

The first four sequences are offered online as well as face-to-face. The last two are only taught face-to-face at the Natchitoches campus.

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We will administer a quiz near the end of each core class according to the schedule below. If the course is taught online, we will administer this quiz through Moodle or My Math Lab whether the class is an online section or not. The following table shows the semester in which the quiz is administered.

Course Name	Administration Semester
Math 1020	Fall
Math 1035	Fall
Math 1060	Spring
Math 1090	Spring
Math 2010	Spring
Math 1810	Fall and Spring
Math 2100	Fall and Spring
Math 2110	Fall and Spring

(2) Data from the assessment tools (direct & indirect quantitative & qualitative) are collected and returned to the executive director at the end of each term indicated (see Student Learning Outcomes section, below, for details).

(3) The executive director analyzes data to determine whether applicable outcomes are met.

(4) Results from the assessment will be discussed with the appropriate staff members.

(5) The executive director, in consultation with the staff and senior leadership, will determine proposed changes to measurable outcomes and assessment tools for the next assessment period, and, if needed, service changes.

Student Learning Outcomes (SLO)

SLO 1: Students will apply mathematics/analytical reasoning skills by translating a word problem into an appropriate mathematical model and translating the solution of a model into an answer to a practical problem.

Measure 1.1 Methodology: Direct Measure – Quiz administered in each class. Target: 90% of students will attain a score of 2 (Acceptable) on the questions that ask the student to pick an appropriate mathematical model for a problem.

Course Name	Methodology	Target	Term
Math 1020	Quiz	70%	Fall
Math 1035	Quiz	70%	Fall
Math 1060	Quiz	70%	Spring
Math 1090	Quiz	70%	Spring
Math 2010	Quiz	70%	Spring
Math 1810	Quiz	70%	Fall and Spring
Math 2100	Quiz	70%	Fall and Spring

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Math 2110	Quiz	70%	Fall and Spring

Finding: Target met.

Analysis: In 2021-2022 the target of 70% was met. 1323 students (of whom 87 were Dual Enrollment) were assessed. 1155 met the goal (87.3%).

Course Name	Assessment Total	Total Students Meeting Target	% Meeting Target
Math 1020	615	591	96.1
Math 1035	73	63	86.3
Math 1060	466	359	77.0
Math 1090	110	89	80.9
Math 2010	40	35	87.5
Math 1810	9	8	88.9
Math 2100	4	4	100.0
Math 2110	6	6	100.0

To drive further improvement, the following changes were implemented for the 2022-2023 academic year:

- The assessment quiz was integrated into regular course work as opposed to a special assignment with no impact on grade.

- Assessment quiz questions were integrated into tests and homework assignments.

- The number of questions for each measure was increased.

- A new target goal was set for measure 1.1: 90% of students will attain a score of 2 (Acceptable) or better on questions that ask the student to pick an appropriate mathematical model for a problem.

The following data was found in the 2022-2023 academic year: Overall, 1236 students were assessed (of which 250 were Dual Enrollment); 1147 met the target score or better. 92.8% of students reached the assessment goal.

Course Name	Assessment Total	Total Students Meeting Target	% Meeting Target
Math 1020	669	660	98.7

Math 1035	45	40	88.9
Math 1060	363	318	87.6
Math 1090	78	61	78.2
Math 2010	45	40	88.9
Math 1810	21	15	71.4
Math 2100	9	7	77.8
Math 2110	6	6	100.0

We saw improvement in Math 1020, 1035, 1060, 2010. Math 2110 maintained a 100% success rate. Math 1090 saw a slight drop in percentage. Though both Math 1810 and 2100 saw significant changes, they met their individual goals of 70%. Overall, it appears the actions integrated in 2022-2023 were successful.

Decision or action to drive future improvement. Based on the analysis of the 2022-2023 results, the faculty will implement the following changes in 2023-2024 to drive the cycle of improvement:

- To build upon the above improvements, the Assessment Quiz will be structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.

- Since the quiz is administered either in Moodle or My Math Lab, students will turn in their written work to professors/instructors for evaluation.

- We will maintain the overall target of 90% success on measure 1.1 but set a new target for the individual courses: 80% of students in each course will attain a score of 2.

Measure 1.2 Methodology: Direct Measure – Quiz administered in each class. Target: 80% of students will attain a score of 2 (Acceptable) on questions that ask the student to interpret the solution to a mathematical model as an answer to a practical problem. Further, in each course, at least 70% of students will attain a score of 2.

Course Name	Methodology	Target	Term
Math 1020	Quiz	70%	Fall
Math 1035	Quiz	70%	Fall
Math 1060	Quiz	70%	Spring
Math 1090	Quiz	70%	Spring
Math 2010	Quiz	70%	Spring
Math 1810	Quiz	70%	Fall and Spring
Math 2100	Quiz	70%	Fall and Spring
Math 2110	Quiz	70%	Fall and Spring

Finding: Target met.

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Analysis: In 2021-2022 the target was not met. 1323 students (of whom 87 were Dual Enrollment) were assessed. 1095 met the goal (91.3%). Two of the eight courses did not meet the goal of 70%.

Course Name	Assessment Total	Total Students Meeting Target	% Meeting Target
Math 1020	615	578	94.0
Math 1035	73	47	64.4
Math 1060	466	427	91.6
Math 1090	110	107	97.3
Math 2010	40	34	85.0
Math 1810	9	5	55.6
Math 2100	4	4	100.0
Math 2110	6	6	100.0

To drive further improvement, the following changes were implemented for the 2022-2023 academic year:

- The assessment quiz was integrated into regular course work as opposed to a special assignment with no impact on grade.

- Assessment quiz questions were integrated into tests and homework assignments.

- The number of questions for each measure was increased.

The following data was found in the 2022-2023 academic year: Overall, 1238 students were assessed (of which 250 were Dual Enrollment); 1188 met the target score or better. 96.0% of students reached the assessment goal.

Course Name	Assessment Total	Total Students Meeting Target	% Meeting Target
Math 1020	669	649	97.0
Math 1035	45	45	100.0
Math 1060	365	356	97.5
Math 1090	78	72	92.3
Math 2010	45	37	82.2
Math 1810	21	15	71.4
Math 2100	9	8	88.9
Math 2110	6	6	100.0

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Most classes maintained their success rate. However, we saw dramatic improvement in Math 1035 and Math 1810. Math 1090 and Math 2010 had small percentage drops, but nothing to cause alarm. Math 2100 had a larger drop, most likely due to the success of the 4 students in 2021-2022. Every class hit the target of 70% success.

Decision or action to drive future improvement. Based on the analysis of the 2022-2023 results, the faculty will implement the following changes in 2023-2024 to drive the cycle of improvement:

- To build upon the above improvements, the Assessment Quiz will be structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.

- Since the quiz is administered either in Moodle or My Math Lab, students will turn in their written work to professors/instructors for evaluation.

- We will increase the overall target to a 90% success on measure 1.2 and set a new target for the individual courses: 80% of students in each course will attain a score of 2.

SLO 2: Students will demonstrate the ability to solve a mathematical problem through algebraic, graphical/geometrical, or numerical/statistical methods as appropriate.

Measure 2.1 Methodology: Direct measure – Quiz administered in each class. Target: 95% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a problem stated in mathematical symbology. Further in each course, at least 80% of students will attain a score of 2.

Course Name	Methodology	Target	Term
Math 1020	Quiz	80%	Fall
Math 1035	Quiz	80%	Fall
Math 1060	Quiz	80%	Spring
Math 1090	Quiz	80%	Spring
Math 2010	Quiz	80%	Spring
Math 1810	Quiz	80%	Fall and Spring
Math 2100	Quiz	80%	Fall and Spring
Math 2110	Quiz	80%	Fall and Spring

Finding: Target not met.

Analysis: In 2021-2022 the target of 75% was met. 1323 students (of whom 87 were Dual Enrollment) were assessed. 1237 met the goal (93.4%). All eight courses met the secondary goal of 70%.

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Course Name	Assessment Total	Total Students Meeting Target	% Meeting Target
Math 1020	615	608	98.9
Math 1035	73	60	82.2
Math 1060	466	421	90.3
Math 1090	110	95	86.4
Math 2010	40	36	90.0
Math 1810	9	8	88.9
Math 2100	4	3	75.0
Math 2110	6	6	100.0

To drive further improvement, the following changes were implemented for the 2022-2023 academic year:

- The assessment quiz was integrated into regular course work as opposed to a special assignment with no impact on grade.

- Assessment quiz questions were integrated into tests and homework assignments.

- The number of questions for each measure was increased.

- A new target goal was set for measure 2.1: 95% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a problem stated in mathematical symbology. Further, in each course, at least 80% of students will attain a score of 2.

The following data was found in the 2022-2023 academic year: Overall, 1239 students were assessed (of which 250 were Dual Enrollment); 1210 met the target score or better. 97.7% of students reached the assessment goal.

Course Name	Assessment Total	Total Students Meeting Target	% Meeting Target
Math 1020	669	667	99.7
Math 1035	45	44	97.8
Math 1060	366	358	97.8
Math 1090	78	69	88.5
Math 2010	45	42	93.3
Math 1810	21	17	81.0
Math 2100	9	7	77.8
Math 2110	6	6	100.0

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Math 2110 maintained its 100% success rate. Math 1020, 1035, 1060, 1090, 2010, and 2100 all saw improvement. Only one course did not meet the individual course goal of 80% success, but if 1 student more had scored 2 or better, the goal would have been achieved. It appears the previous actions we took were effective.

Decision or action to drive future improvement. Based on the analysis of the 2022-2023 results, the faculty will implement the following changes in 2023-2024 to drive the cycle of improvement:

- To build upon the above improvements, the Assessment Quiz will be structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.

- Since the quiz is administered either in Moodle or My Math Lab, students will turn in their written work to professors/instructors for evaluation.

Measure 2.2 Methodology: Direct measure – Quiz administered in each class. Target: 90% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a word problem.

Course Name	Methodology	Target	Term
Math 1020	Quiz	80%	Fall
Math 1035	Quiz	80%	Fall
Math 1060	Quiz	80%	Spring
Math 1090	Quiz	80%	Spring
Math 2010	Quiz	80%	Spring
Math 1810	Quiz	80%	Fall and Spring
Math 2100	Quiz	80%	Fall and Spring
Math 2110	Quiz	80%	Fall and Spring

Finding: Target not met.

Analysis: In 2021-2022 the target of 70% was met. 1323 students (of whom 87 were Dual Enrollment) were assessed. 1163 met the goal (87.9%).

Course Name	Assessment Total	Total Students Meeting Target	% Meeting Target
Math 1020	615	587	95.4
Math 1035	73	61	83.6
Math 1060	466	376	80.7
Math 1090	110	89	80.9
Math 2010	40	35	87.5

Math 1810	9	6	66.7
Math 2100	4	3	75.0
Math 2110	6	6	100.0

To drive further improvement, the following changes were implemented for the 2022-2023 academic year:

- The assessment quiz was integrated into regular course work as opposed to a special assignment with no impact on grade.

- Assessment quiz questions were integrated into tests and homework assignments.

- The number of questions for each measure was increased.

- A new target goal was set for measure 2.2: 90% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a word problem. Further, in each course, at least 80% of students will attain a score of 2.

The following data was found in the 2022-2023 academic year: Overall, 1238 students were assessed (of which 250 were Dual Enrollment); 1117 met the target score or better. 90.2% of students reached the assessment goal.

Course Name	Assessment Total	Total Students Meeting Target	% Meeting Target
Math 1020	669	644	96.3
Math 1035	45	42	93.3
Math 1060	365	315	86.3
Math 1090	78	55	70.5
Math 2010	45	38	84.4
Math 1810	21	13	61.9
Math 2100	9	4	44.4
Math 2110	6	6	100.0

While our overall target of 90% success was met, the individual courses varied significantly. Math 1035 and 1060 showed improvement; Math 1090, 1810, and 2100 all dropped. Once again, Math 2110 had a 100% success rate. The changes we implemented had mixed results. Clearly, students find measure 2.2 more challenging than the others.

Decision or action to drive future improvement. Based on the analysis of the 2022-2023 results, the faculty will implement the following changes in 2023-2024 to drive the cycle of improvement:

- To build upon the above improvements, the Assessment Quiz will be structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.

- Since the quiz is administered either in Moodle or My Math Lab, students will turn in their written work to professors/instructors for evaluation. This will help tremendously on word problems so that the professor or instructor can determine where students tend to "go wrong".

- We need to increase our focus on solving word problems in the classroom. This will include adding extra word problems into our assignments and giving special attention to word problems during lectures.

Comprehensive Summary of Key Evidence of Improvements Based on Analysis of Results. We are pleased to report that the mathematics department, overall, was able to meet the overall goal for each respective measure in which students were assessed over AC 2022-2023. However, in some instances, individual courses did not meet the intended target. In addition, the following courses showed a consistent student success rate across each measurement: Math 1020, 1035, 1060, 2010, and 2110. Math 1090, 1810, and 2100 had success rates that fluctuated across the measurements.

The following reflects all the changes implemented in AC 2022-2023 to drive the continuous process of seeking improvement. These changes are based on the knowledge gained through the analysis of the AC 2021-2022 results.

SLO1.

Measure 1.1.

- The assessment quiz was integrated into regular course work as opposed to a special assignment with no impact on grade.

- Assessment quiz questions were integrated into tests and homework assignments.

- The number of questions for each measure was increased.

- A new target goal was set for measure 1.1: 90% of students will attain a score of 2 (Acceptable) or better on questions that ask the student to pick an appropriate mathematical model for a problem.

Measure 1.2.

- The assessment quiz was integrated into regular course work as opposed to a special assignment with no impact on grade.

- Assessment quiz questions were integrated into tests and homework assignments.

- The number of questions for each measure was increased.

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SLO 2.

Measure 2.1.

- The assessment quiz was integrated into regular course work as opposed to a special assignment with no impact on grade.

- Assessment quiz questions were integrated into tests and homework assignments.

- The number of questions for each measure was increased.

- A new target goal was set for measure 2.1: 95% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a problem stated in mathematical symbology. Further, in each course, at least 80% of students will attain a score of 2.

Measure 2.2.

- The assessment quiz was integrated into regular course work as opposed to a special assignment with no impact on grade.

- Assessment quiz questions were integrated into tests and homework assignments.

- The number of questions for each measure was increased.

- A new target goal was set for measure 2.2: 90% of students will attain a score of 2 (Acceptable) on the questions that ask a student to solve a word problem. Further, in each course, at least 80% of students will attain a score of 2.

Plan of action moving forward. In the measurements where the target was met, the success goal will be increased (see measure 1.1 and 1.2 above). In the measurements where the target was not met, the target will remain the same (see measure 2.1 and 2.2 above). Overall, we will implement the following changes:

- The Assessment Quiz will be structured so that a series of 4 questions, 1 from each measure, is arranged under the same topic covered in class.

- Since the quiz is administered either in Moodle or My Math Lab, students will turn in their written work to professors/instructors for evaluation. This will help tremendously on word problems so that the professor or instructor can determine where students tend to "go wrong".

- We need to increase our focus on solving word problems in the classroom. This will include adding extra word problems into our assignments and giving special attention to word problems during lectures.

- Special attention will be given to the courses with varying success. Professors and instructors will be asked to review their assessment quiz to ensure it is consistent with the material taught in class.

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