



Course-Level Assessment Project Final Report

To complete the Final Report, type your responses to the prompts below. Share a copy of the document with your supervisor and the Associate Provost of Assessment and Institutional Research.

Faculty Name(s): Mary Virostek

Division/Department: Mathematics and Engineering

Course Assessed: MAT 099 Foundations for College Mathematics, Part 2

Step 1. Define

Explain the purpose or rationale for assessing the selected course.

Identify which course objective(s) were assessed. Briefly explain why you selected these course objectives for assessment.

Identify to which program goal(s) selected course objective(s) align.

The purpose for assessing MAT 099 was to identify mistakes and issues with five key objectives students need regardless of the course they will complete after taking MAT 099. Though this course is intended to prepare students for MATH 130 Precalculus, many students take this course as a prerequisite for other courses including Chemistry, Physics, Finance, and MATH 122 Math Concepts and Structures if pursuing a degree in Education. Though this course does not count towards graduation credit or towards most students' GPA, passing the course is a requirement for many majors. There were five objectives that were assessed out of the 12 objectives listed for this course.

- Being able to use symbols to display mathematical meaning was assessed through using proper interval notation when solving inequalities.
- Evaluation a function occurred frequently throughout the course and was presented in similar but ever evolving ways as students first substituted numerals for variables then eventually progressing to substituting polynomials and even other functions in for variables.
- By assessing an application of solving systems of equations, not only were we able to see misconceptions in understanding the solution is where two linear equations intersect, we were also able to assess translating English sentences to mathematical equations.
- Mixture problems synthesize understanding the concept of systems of equations with a tangible example of the application of this type of mathematics. Students must understand the underlining problem along with the mathematics to solve this type of problem successfully.
- What does the quadratic formula tell us about a particular quadratic equation? Quite a bit actually. As gravity acts on an object, the object changes trajectory. How long will it take an object to reach its maximum height before gravity brings the object plummeting to the earth once

more? What was the maximum height the object reached? When will the object be so many feet above the ground? When will the object fall to the ground? All slightly different questions that can be answered in a variety of ways. Which way is the best approach? Does the answer make sense? Students learn to think as well as compute solving application problems in quadratic form.

Since MAT 099 is not a General Education course, it does not have any program goals.

Step 2. Design

Describe the instrument (project/assignment) used to assess identified course objective(s).

What benchmarks and/or controls were established?

Explain how the assessment instrument was externally reviewed and validated.

Five common questions were distributed to all MAT 099 sections during the semester and these same five questions were on everyone's final exam though the questions were not identical to the previously administered tests. Four of the common questions were on the Unit 1 Test and one question worth 15% of the test score was on the Unit 3 test. For the final exam, all five questions were worth the same amount of the overall grade for a total of 12.5% of the final exam.

For consistency purposes, a detailed grading rubric was included with each of the five types of questions. For Fall 2021 and Spring 2022, professors were asked to document how many points were earned for each of the five questions during the semester and on the final exam. For Fall 2021 only, professors were asked to document the types of mistakes students made on these five problems on the unit tests only, not on the final exam. This information was collected and dispersed to all Fall 2021 MAT 099 professors to promote improved instruction and to direct professors to typical mistakes.

Professors were given the common questions for the unit tests before the semester started and feedback was encouraged.

Step 3. Implement

Explain how the assessment was implemented.

Did any unexpected challenges arise in implementing the assessment?

Implementation. The common questions and feedback table were stored in Teams for everyone to access when needed instead of finding them in their emails. Reminders were sent out to use the questions on the Unit 1 and Unit 3 test as well as to collect the data. Since I made up the final for everyone, I did not have to share the common questions for the final in Teams. A detailed rubric was attached to the questions as well.

An unexpected challenge came from preparing for the Spring semester too early. Without thinking, I prepared for Spring 2022 in the online computer program we use in all transitional classes too early. I archived the courses and then deleted them from the system at the beginning of January, before I had obtained the "time in lesson" data I was trying to collect to see if the time spent in the three parts of the Hawkes Learning System program had a direct correlation to students' success rate. Upon realizing I could not longer obtain the required piece of data, I contacted our Hawkes representative. I

was not specific enough in my request, but I did receive the “time in lesson” for each student in the MAT 099-75 Asynchronous class though it was not the time for the class. After calculating the data, I was able to come up with the average time in each part for that class.

Step 4. Analyze

Explain the data that was collected and how the data was analyzed.

To what degree did students meet the established benchmarks?

Consider intention of learning activity and assessment as compared to results.

Fall 2021

Unit 1, Bracket explanation	Unit 1, Evaluation a function	Unit 1, Systems of Equations Application	Unit 1, Mixture Problem	Unit 3, Quadratic Application	Final Exam, Inequalities	Final Exam, Functions	Final Exam, System of Equations Application	Final Exam, Mixture Problem	Final Exam, Quadratic Application		HLS Overall Score	Final Exam Points out of 200	Student Final Percent Grade for Course
5	10	10	10	15	5	5	5	5	5				
score	score	score	score	score	score	score	score	score	score				
3.89	8.29	9.2	8.17	8.9	4.08	4.26	3.93	3.23	2.33		81	135	77

Spring 2022

	Unit 1, Bracket explanation (Inequality?) #3	Unit 1, Evaluation a function #9	Unit 1, Systems of Equations Application (Tickets) #15	Unit 1, Mixture Problem (Milk) #14	Unit 3, Quadratic Application	Final Exam, Inequalities	Final Exam, Functions	Final Exam, System of Equations Application	Final Exam, Mixture Problem	Final Exam, Quadratic Application		HLS Overall Score	Final Exam Points out of 200	Student Final Percent Grade for Course
Possible points	5	10	10	10	15	5	5	5	5	5		100	200	100
Mean	4.1230769	6.83076923	9.369231	8.0769231	8.8490566	3.9387755	4.4693878	3.3877551	3.1020408	2.36734694		73.896441	120.18636	70.10068
Percent	82.46%	68.31%	93.69%	80.77%	58.99%	78.78%	89.39%	67.76%	62.04%	47.35%		73.90%	60.09%	70.10%
St Dev	1.2184479	2.64763592	1.420489	2.9649394	4.1004044	1.3905659	0.7932539	1.680976	1.6039651	2.36241294		27.935142	53.54332	21.78857
Median	4	8	10	10	9	5	5	3	3	2		85	137	77

Summarize the results of implementing changes, re-administering the assessment, and collecting and analyzing new data.

By looking at this data, one might not see any improvement or very little difference between fall semester and spring semester. However, the students enrolled in MAT 099 tend to have higher placement scores in the fall semester than in the spring semester. To have the data and outcomes more or less even for the students taking the course in the fall and in the spring, all professors teaching MAT 099 in both semesters applied what the common mistake data showed us all in the fall and used this information in our classes in the spring. The success rate improved for MAT 099-75 online section and the pass rate remained overall the same across the different sections.

On the next five pages, you will see the time on task data through Hawkes Learning System for each class taught in Spring 2021 and Spring 2022 and the MAT 099-75 taught in the fall. I was not able to attach the tables as well as I was hoping. Part of the reason the pass rate increased for MAT 099-75 had to do with “nudging” students to do the Learn portion of the Hawkes Learning System. Since the students are not in class to see examples, it is imperative that they watch the videos I made as well as the example videos provided by Hawkes Learning System. Students spent minimal time watching the examples in Fall 2021 but spent two to three times longer in the Learn for Spring 2022. The pass rate increased, though it was still below the average for the class. Fewer students stopped attending as well for spring 2022 verses Fall 2021 in the MAT 099-75 course.

Those students taking the course in person did not need to work through the Learn portion of Hawkes Learning System. If a student was absent, they were encouraged to watch the videos to replicate part of the classroom environment. Practice was also done in class for every section but the 75 section. Those that chose to practice improved their overall grade in the course.

Hawkes data from Spring 2021 (two face to face classes) Use "Time Per Lesson" in Reports

	Done on time	Completed late	Did not Certify but attempted	Average Time spent on Learn	Average Time Spent on Practice	Average Time Spent on Certify	Average Time on all three	Standard Deviation of time spent on all three	Number of people that took more than one attempt to certify
7.8 Inequalities	7	0	1	11s	8m11s	28m56s	37m19s	15m4s	0
	3	2	0	10m54s	89m44s	28m17s	128m56s	119m57s	0
8.5 Functions	7	0	0	4m16s	31m50s	25m29s	61m35s	53m22s	1
	3	1	2	21m4s	58m7s	21m7s	100m18s	123m28s	1
9.4 System Application Problems	7	0	1	0m	14m38s	24m18s	38m57s	25m34s	1
	3	1	2	10m34s	43m50s	31m58s	86m22s	84m25s	1
9.5 Interest and Mixture systems	7	0	1	0	14m38s	24m18s	38m57s	25m34s	1
	3	1	1	32m44s	65m56s	52m19s	150m59s	129m58s	0
14.4 Applications of Quadratic Equations	4	2	2	0	2m14s	21m32s	23m46s	19m48s	2
	3	1	1	29m56s	49m46s	31m37s	111m20s	90m10s	1

Hawkes data from Spring 2021 (two remote synchronous classes) Use "Time Per Lesson" in Reports

	Done on time	Completed late	Did not Certify but attempted	Average Time spent on Learn	Average Time Spent on Practice	Average Time Spent on Certify	Average Time on all three	Standard Deviation of time spent on all three	Number of people that took more than one attempt to certify
7.8 Inequalities	13 17	3 1	1 0	1 min 8 sec 6m31s	25m55 sec 31m31s	28m52 sec 34m34s	55m 55 sec 72m35s	30m 41 sec 40m12s	4 2
8.5 Functions	13 14	3 3	0 0	2m23s 7m 29s	18m47s 31m43s	36m38s 30m3s	57m48s 69m16s	27m5s 32m51s	6 7
9.4 System Application Problems	12 13	3 4	1 0	10s 5m29s	10m56s 20m1s	30m2s 32m14s	41m10s 57m44s	18m26s 20m25s	2 2
9.5 Interest and Mixture systems	12 13	2 3	1 1	28s 4m4s	21m55s 22m19s	45m8s 40m28s	67m31s 77m29s	31m43s 24m54s	3 5
14.4 Applications of Quadratic Equations	9 9	5 5	2 2	1m 4m1s	18m8s 11m29s	22m4s 21m7s	22m4s 36m38s	33m1s 35m28s	6 5

Fall 2021 Asynchronous

	Done on time	Completed late	Did not Certify but attempted	Average Time spent on Learn	Average Time Spent on Practice	Average Time Spent on Certify	Average Time on all three	Standard Deviation of time spent on all three	Number of people that took more than one attempt to certify
7.8 Inequalities	15	0	0	13 min 30 sec	32 min	20 min 32 sec	66 min		1
8.5 Functions	13	0	1	21 min 36 sec	32 min	39 min 30 sec	100 min		5
9.4 System Application Problems	11	0	2	7 min	32 min 34 sec	32 min	72 min		4
9.5 Interest and Mixture systems	8	0	4	7 min 18 sec	21 min	43 min	71 min		5
14.4 Applications of Quadratic Equations	7	0	5	8 min 48 sec	33 min	23 min	64 min 48 sec		4

Spring 2022

	Done on time	Did not Certify but attempted	Average Time spent on Learn	Average Time Spent on Practice	Average Time Spent on Certify	Average Time on all three	Standard Deviation of time spent on all three	Number of people that took more than one attempt to certify
7.8 Inequalities	11 18 16		4m 24s 2m 36s 6m 56s	28m 45s 35m 15s 31m 22s	20m 25s 23m 44s 24m 30s	53m 34s 61m 37s 62m 49s	48m 53s 30m 40s 40m 25s	1 3 4
8.5 Functions	11 18 15	1	6m 26s 2m 36s 10m 13s	32m 29s 35m 15s 30m 00s	24m 17s 23m 44s 28m 35s	63m 14s 61m 37s 68m 50s	64m 13s 30m 40s 64m 13s	3 3 4
9.4 System Application Problems	12 15 16	1	0m 1s 3m 26s 5m 19s	20m 18s 26m 01s 55m 35s	33m 23s 29m 53s 33m 08s	53m 42s 59m 20s 59m 26s	25m 52s 30m 58s 43m 40s	3 6 4
9.5 Interest and Mixture systems	12 15 14	1 2	3m 13s 1m 14s 3m 05s	20m 39s 24m 52s 24m 27s	45m 54s 45m 08s 40m 57s	69m 46s 71m 16s 68m 30s	40m 44s 48m 57s 49m 00s	2 6 4
14.4 Applications of Quadratic Equations	12 7 8	6 4	3m 13s 0m 41s 6m 59s	20m 39s 7m 43s 9m 50s	45m 54s 14m 41s 16m 22s	69m 46s 23m 06s 33m 11s	40m 44s 16m 35s 38m 28s	2 4 3

Hawkes data from Spring 2022 (three face to face classes) Use "Time Per Lesson" in Reports

Key: first Bussiere's class of 12 then Carnaggio's class of 18 then Virostek's class of 16

	Done on time	Did not Certify but attempted	Average Time spent on Learn	Average Time Spent on Practice	Average Time Spent on Certify	Average Time on all three	Standard Deviation of time spent on all three	Number of people that took more than one attempt to certify
7.8 Inequalities	15	1	35m 05s	35m 37s	25m 30s	96m 13s	48m 46s	3
8.5 Functions	15		39m 50s	34m 30s	36m 18s	110m 39s	54m 12s	2
9.4 System Application Problems	12	1	20m 24s	25m 49s	35m 01s	81m 15s	40m 24s	2
9.5 Interest and Mixture systems	13		32m 46s	33m 53s	59m 07s	125m 47s	73m 19s	3
14.4 Applications of Quadratic Equations	6	2	24m 23s	3m 39s	23m 26s	51m 28s	44m 55s	1

Spring 2022
Asynchronous
class Use "Time
Per Lesson" in
Reports

Step 5. Modify/Maintain

Based on analysis of data, describe changes made to the course and/or course materials.

Changes made during the school year were towards instruction. Knowing the type of mistakes and the misconceptions students had coming into our classroom help us deliver material in a more meaningful way during the spring semester. More practice problems were embedded into the guided notes to give students a chance to try and ask more meaningful questions.

For the Spring MAT 099-75 course, instead of the Book Activities due the class before a test, each activity was dispersed throughout the semester. Not only did this keep students on schedule, this shorter yet more frequent activity allowed me as the professor to give them feedback earlier in a unit and gave students a better idea as to the need to get help from me or from the Academic Center.

For all transitional courses, Kristin Hadden and I implemented using the Final Exam grade to replace a lower scoring unit test grade if this substitution helped, not hindered the students' overall score. By using this in MAT 099, two students out of 64 went from not scoring high enough to pass to enough to take the MAT 001 self-paced completer course and two went from below a 75% to above a 75%. In order to pass this course, a student must have a score of 75% (unrounded) or better. From collecting and studying the data, we noticed that some students had one low test grade but showed they knew the material on the final exam. This gave students motivation to continue taking the course even with one below passing unit grade. This "reason to continue" helped many students that were going through a rough time somewhere in the semester. For example, even though the overall grade only went up by one to three percentages, 28 out of 64 or almost 44% of the students that did not withdraw from MAT 099 benefitted from using the final exam to replace a low scoring unit test. Two students even went from a B+ to an A.

Final Results and Recommendations

To the best of my ability, I will rework some sections of the MAT 099-75 course to promote completing activities before taking the unit tests. For example, in the remote synchronous and the face-to-face MAT 099 courses we have a review day planned at the end of each unit. During the review day, professors can finish up the unit, go over specific objectives, and allow students to ask questions or complete review materials. This opportunity was not in the schedule for the asynchronous class resulting in students not obtaining necessary feedback before taking the unit test. Though the test was available for three days in the testing center, many students did the review for the test after taking the unit test since the review was due in the middle of those three days. This placement of when a review was due might account for students in the asynchronous course not scoring as well as students taking the course in the other two platforms.

I will make videos this summer addressing specific objectives and placing these videos in all MAT 099 courses regardless of format. Though the videos will include examples, I plan on including a question in part of the video that students need to answer before finishing the video for more interaction and participation. I will use Kaltura to assist me in this.

Supervisor Signature _Brianna L. McGinnis_____ Date __06/17/22_____

Please forward a copy of the signed report to the Associate Provost of Assessment and Institutional Research.