

everylearner
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everywhere

How to use Data in the Classroom

A presentation on data informed teaching

ADAPT Summit
12/1/2021

TODAY'S PRESENTERS



Kati Dobeck
Professor of Mathematics
*Lorain County Community
College*



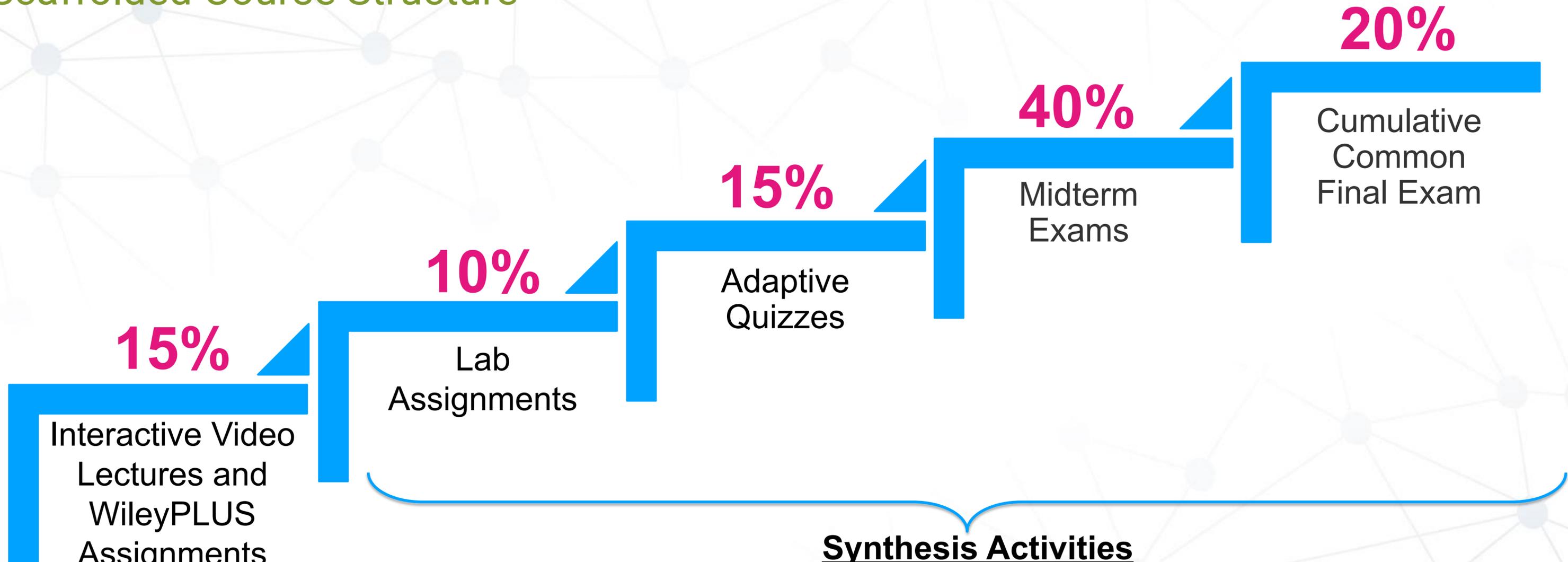
Greg LaPlaca
Associate College
Lecturer and Precalculus
Coordinator
Cleveland State University



Julia Chadwick
Program Manager
*Association of Public and
Land-grant Universities*

MTHM 168: Statistics

Scaffolded Course Structure



Section-level assignments

2–3 per week

Synthesis Activities

Lab Assignments: 3 per term

Adaptive Quizzes: 9 per term

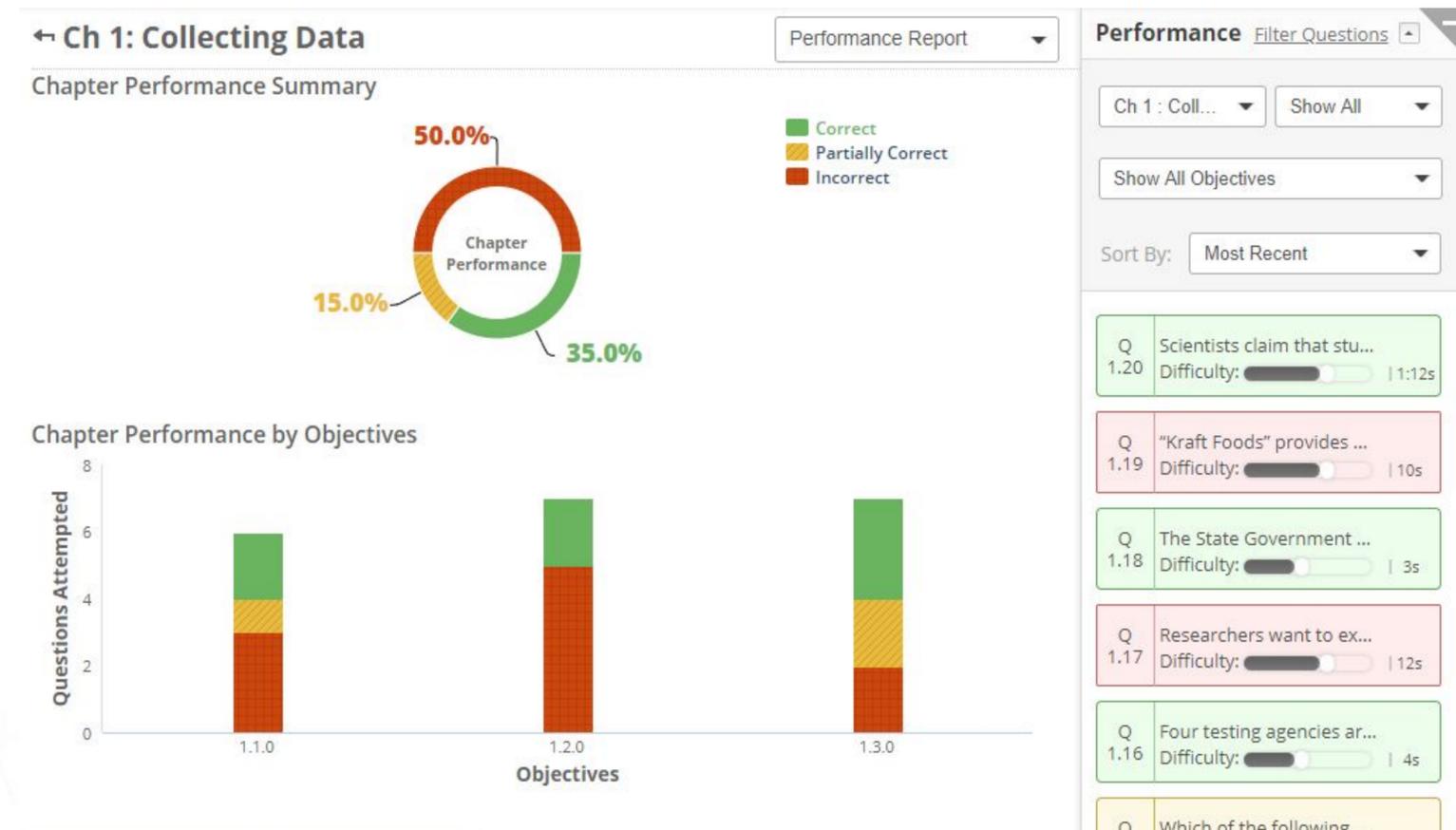
Midterm Exams: 4 per term

Common Final Exam: Item-analysis used for course assessment

WileyPLUS Adaptive Practice: Fall 2018-Spring 2021

Overview of Student Experience

- Step 1: Rate your confidence level for the chapter you are completing
- Step 2: Complete the 20-question diagnostic, giving a confidence level for each answer
- Step 3: Review your reports to determine what to study and practice
- Step 4: Complete a minimum of 20 additional questions, targeting the areas in which you are weakest
- Step 5: If you are unhappy with your grade, continue to answer more questions until you achieve your desired proficiency level



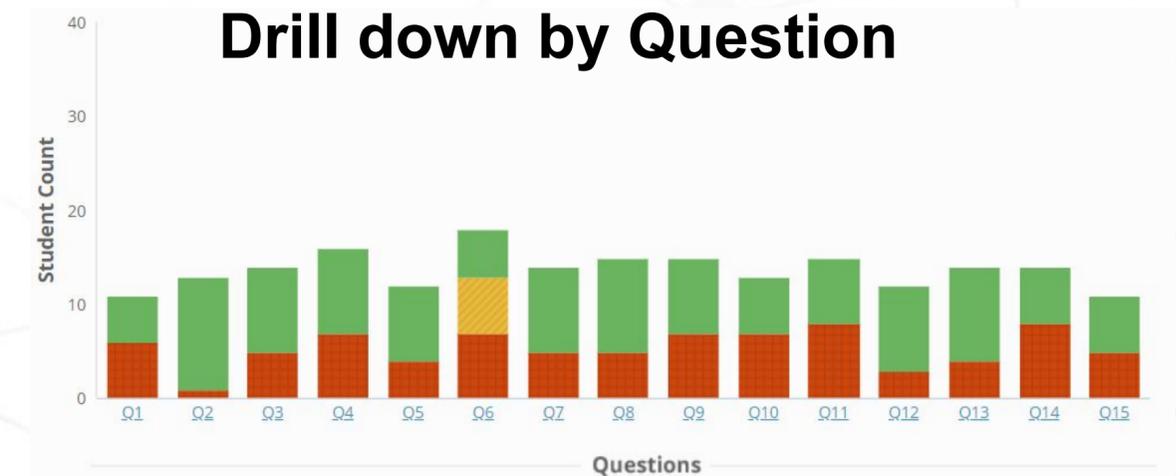
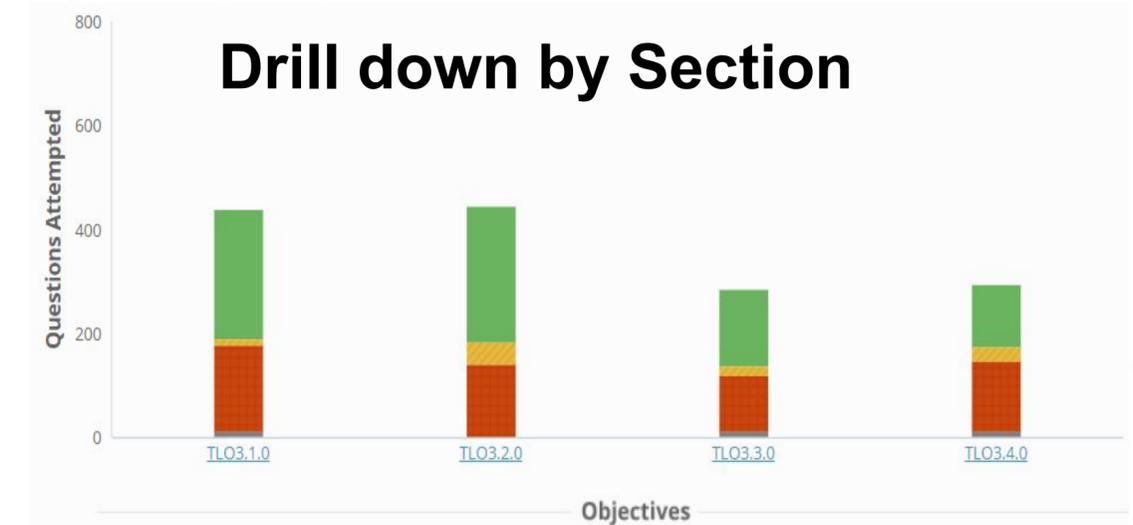
WileyPLUS Adaptive Practice: Fall 2018-Spring 2021



Instructor Reports

Class Performance ([Weakest 7](#) | [All](#)) [Learn More](#) about how Proficiency and Performance are used in ORION

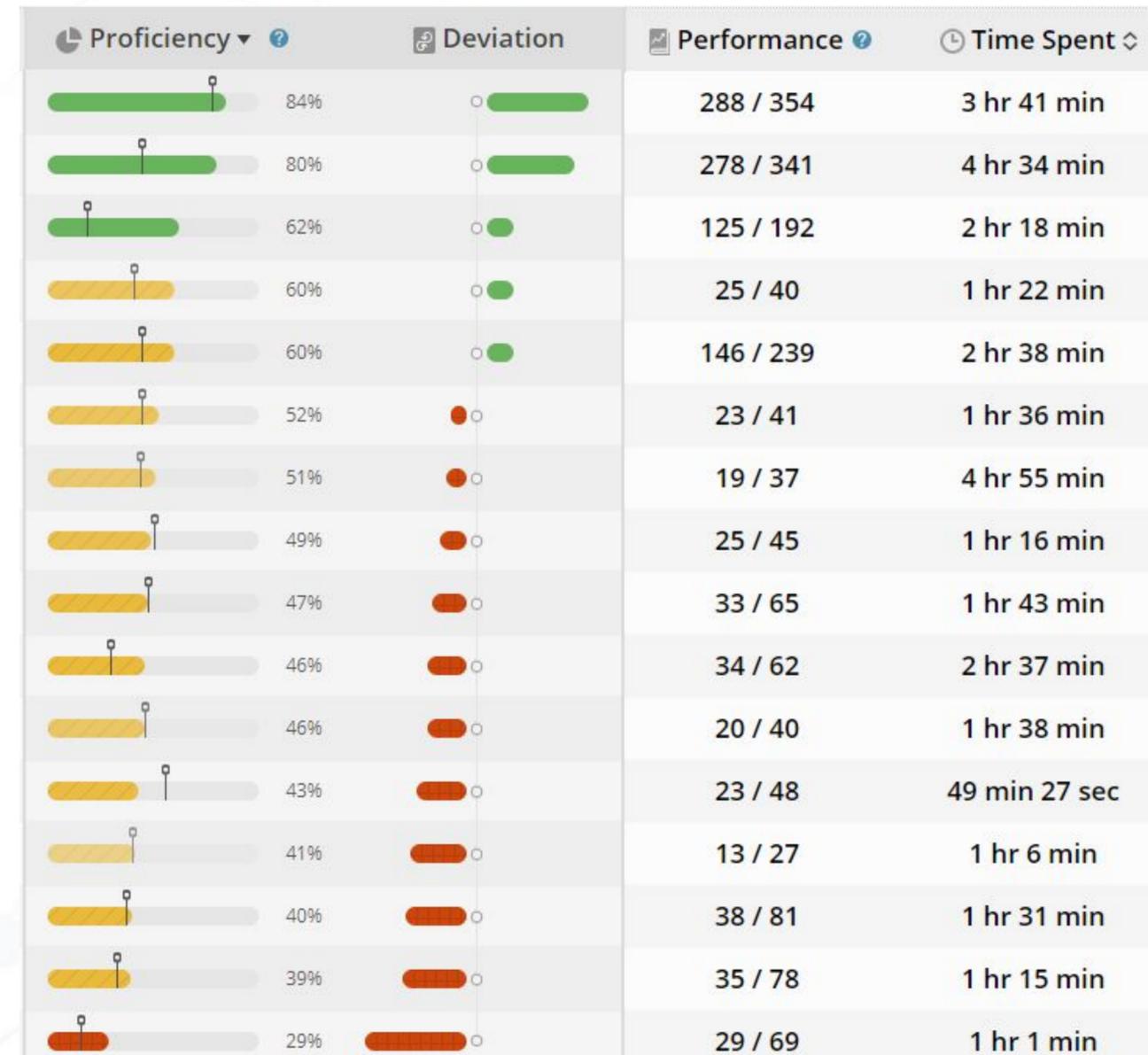
Chapters	Proficiency	Performance	Total Class Performance
Ch 3: Confidence Intervals	51%	70/122	<p> ■ Correct ■ Incorrect ■ Skipped ■ Partial Correct </p>
Ch 4: Hypothesis Tests	52%	112/168	
Ch 6: Inference for Means and Proportions	55%	114/179	
Ch 1: Collecting Data	57%	90/134	
Ch 5: Approximating with a Distribution	59%	36/56	
Ch 2: Describing Data	62%	194/241	



WileyPLUS Adaptive Practice: Fall 2018-Spring 2021

My Findings

1. The learning curve for students was high, due to the complicated nature of these assignments.
2. Students frequently became frustrated by these assignments
3. I was able to use the data in the reports for personalized interventions
4. Student adaptive scores were the strongest predictor of their performance on exams, with $r=0.650$



Proficiency	Deviation	Performance	Time Spent
84%	Green bar	288 / 354	3 hr 41 min
80%	Green bar	278 / 341	4 hr 34 min
62%	Green bar	125 / 192	2 hr 18 min
60%	Yellow bar	25 / 40	1 hr 22 min
60%	Yellow bar	146 / 239	2 hr 38 min
52%	Yellow bar	23 / 41	1 hr 36 min
51%	Yellow bar	19 / 37	4 hr 55 min
49%	Yellow bar	25 / 45	1 hr 16 min
47%	Yellow bar	33 / 65	1 hr 43 min
46%	Yellow bar	34 / 62	2 hr 37 min
46%	Yellow bar	20 / 40	1 hr 38 min
43%	Yellow bar	23 / 48	49 min 27 sec
41%	Yellow bar	13 / 27	1 hr 6 min
40%	Yellow bar	38 / 81	1 hr 31 min
39%	Yellow bar	35 / 78	1 hr 15 min
29%	Red bar	29 / 69	1 hr 1 min

Adaptive Assignments Powered by Knewton: Fall 2021

Simple and User Friendly

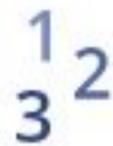
- Students can jump in and start answering questions
- Progress continues to increase or decrease, but the grade does not change once a new benchmark is met

How Progress and Points Work



Progress tracks your completion

It can increase and decrease based on how you're doing



Grades are based on points

Earn points for reaching benchmarks on the Progress bar. You'll keep your points even if your Progress decreases.



Fill your Progress bar

Work toward 100% Progress to complete your assignment and show that you know your stuff

CLOSE

Adaptive Assignments Powered by Knewton: Fall 2021

Student Reports

CHAPTER 5 ADAPTIVE QUIZ

You reached 100% progress!

Nicely done. You can keep going for more practice - it won't affect your score.

GOT IT

Progress and Points ↻ ASSIGNMENT HISTORY

Progress tracks your completion. Earn points by reaching the benchmarks on the Progress bar. [Learn more](#)

Progress and points

Current Progress: 100% | Highest Progress: 100%

Assignment Information

[Review Assignment](#)
Answer questions to identify areas that you need to focus on before an exam

Content Covered

Section	Time Spent	Activities Completed
5.1 Hypothesis Tests Using Normal Distributions	9m 59s	4
5.2 Confidence Intervals Using Normal Distributions	6m 46s	3

Adaptive Assignments Powered by Knewton: Fall 2021

Instructor Reports

Chapter 4 Adaptive Quiz Part 2 (Sections 4.4 and ...)

OPTIONS

Review

Estimated 6–10 questions

100 points possible

Due Tuesday, Nov 23 at 11:59 PM (EST)
Available to students

CONTENT STUDENTS POLICIES

Student Status

Struggling 1
In Progress —
Complete 21
Not Started 5

Class Progress



< 50% 5 50 - 79.99% 1 80 - 99.99% 0 100% 21

Powered by Knewton

Time Spent	Questions Completed	Current Progress	Grade
38m 24s	22	Complete	100%
8m 23s	10	Complete	100%
1h 29m	48	Complete	100%
16m 17s	89	Struggling	60%
2h 49m	41	Complete	100%
34m 42s	88	Complete	100%
20m 59s	13	Complete	100%
3h 4m	17	Complete	100%
42m 56s	26	In Progress	80%

Adaptive Assignments Powered by Knewton: Fall 2021

Student Intervention Emails

Initial deadline for the quiz has passed, but no grade in gradebook.

I've noticed that you do not have a grade for the Chapter 2 Adaptive Quiz Part 1. This is either because you did not complete the assignment or because you did not correctly complete questions on at least half of the learning objectives. I have decided to reopen the quiz until Wednesday October 27 at 11:59 p.m. so that you may complete it. This will be a firm deadline.

In order to successfully complete this quiz, please remember the following:

- Read each question carefully – writing down any important information or calculations on paper and/or using StatKey for calculations, where appropriate.
- Answer the question yourself before finding the option that best matches the answer you have identified.
- The typical student spent around 35 minutes on this quiz and answered around 18 questions; the more questions you answer correctly, the less questions you will need to complete!
- You do not need to complete the quiz all at once. You are able to log out and log back in as needed, up until the deadline.
- If you continue to struggle, consider visiting the LCCC Math Studio (<https://www.lorainccc.edu/tutoring/>) for additional help and clarification so you can learn from your mistakes and improve as you continue to work on the quiz. Free online and in-person tutoring is available at the Math Studio, PLUS if you ask your tutor to email me a "Proof of tutoring" message you will be awarded Bonus Participation Points!

I hope that this extension and advice helps you to get back on track. :)

Adaptive Assignments Powered by Knewton: Fall 2021

Student Intervention Emails

Earned a 100% but had to answer 2-3 times the number of questions compared to other students.

I just wanted to say that I noticed how hard you worked to successfully complete the Chapter 2 Adaptive Quiz Part 1. Nice job on earning a 100%!

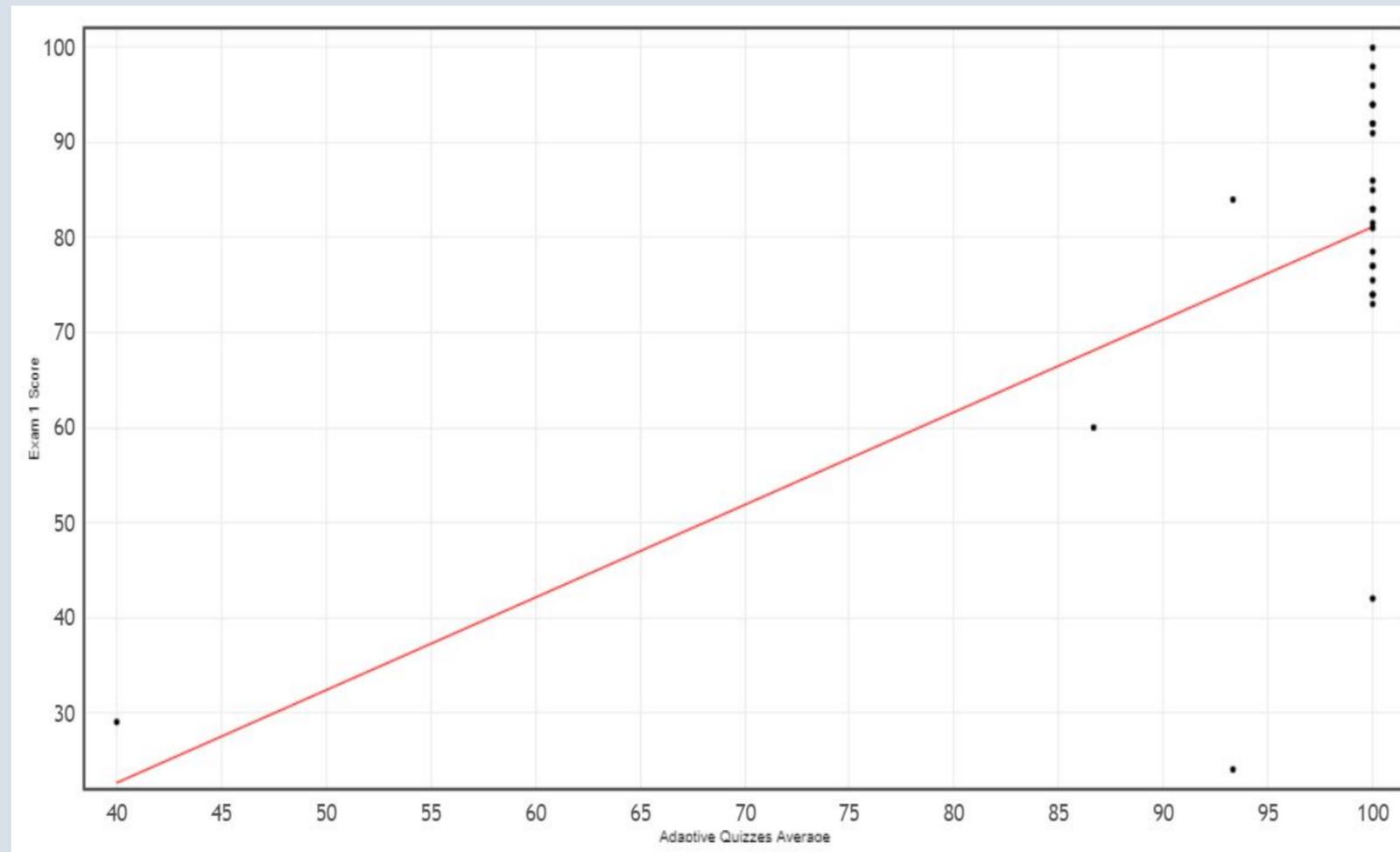
I am a little concerned at the number of questions you needed to answer to get there, though. The system indicates that you spent and answered on that one assignment. That really isn't what I had in mind, as I know you most likely have a lot of other responsibilities on your plate and would rather not be answering Statistics questions all day!

Here are some tips that may help for future quizzes:

- Read each question carefully – writing down any important information or calculations on paper and/or using StatKey for calculations, where appropriate.
- Answer the question yourself before finding the option that best matches the answer you have identified.
- The typical student spent around 35 minutes on this quiz and answered around 18 questions; the more questions you answer correctly, the less questions you will need to complete!
- You do not need to complete the quiz all at once. You are able to log out and log back in as needed, up until the deadline.
- If you struggle on future quizzes, consider visiting the LCCC Math Studio (<https://www.lorainccc.edu/tutoring/>) for additional help and clarification so you can learn from your mistakes and improve as you continue to work on the quiz. Free online and in-person tutoring is available at the Math Studio, PLUS if you ask your tutor to email me a "Proof of tutoring" message you will be awarded Bonus Participation Points!

My hope is that this will help you achieve an equally high score in a more efficient way. ;)

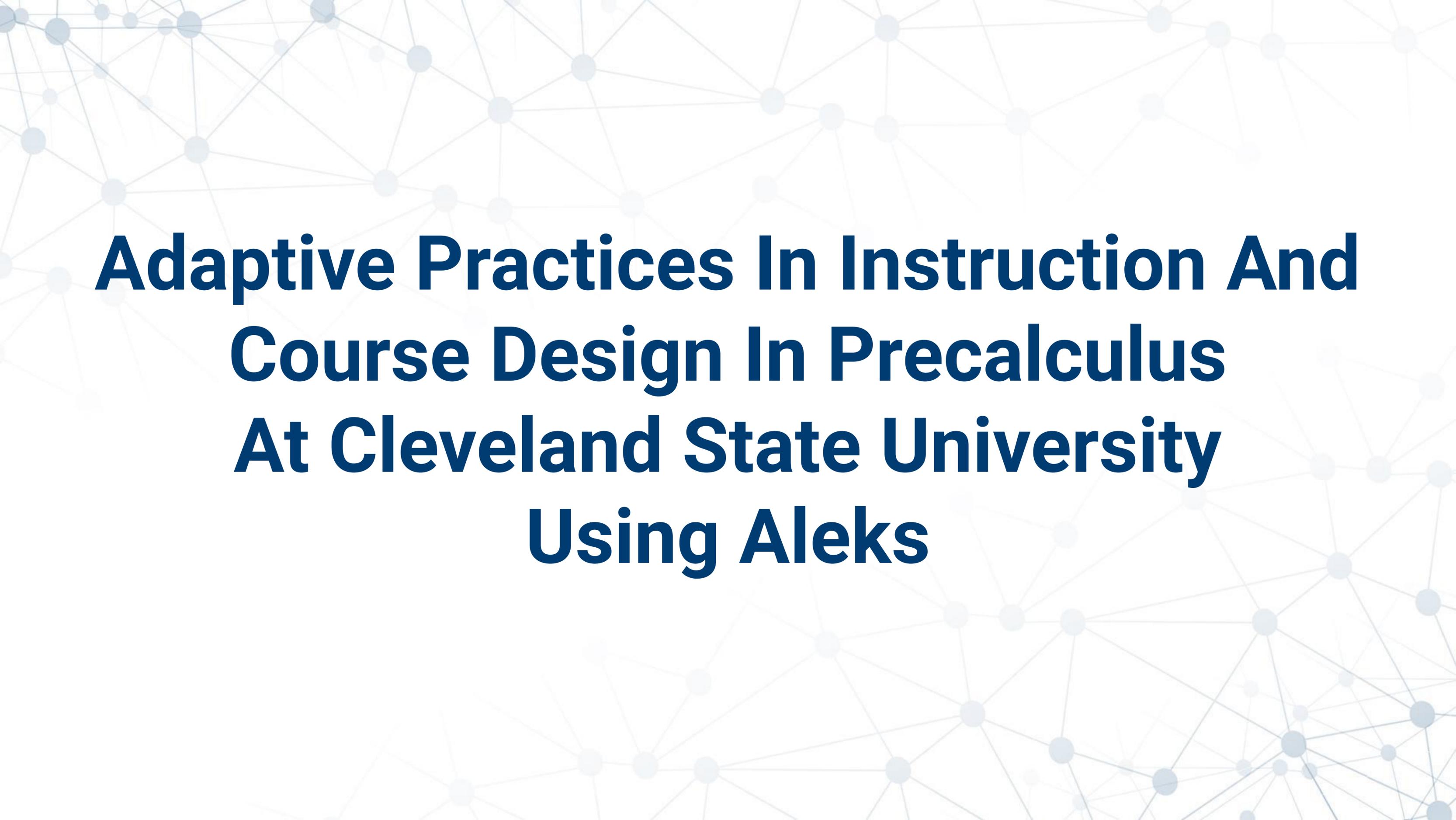
Keep up the fantastic work!



Adaptive Quiz Average vs. Exam 1 Performance

3 quizzes and 1 exam over 2 chapters

Exam 1 Average: 77.9%
Exam 1 Standard Deviation: 19.5%
Correlation: 0.598

A background of a network graph with light blue nodes and connecting lines, creating a web-like pattern across the entire slide.

**Adaptive Practices In Instruction And
Course Design In Precalculus
At Cleveland State University
Using Aleks**

BACKGROUND



Precalculus I (MTH 167, College Algebra) and Precalculus II (MTH 168, Trigonometry) at Cleveland State have used ALEKS for over 10 years. These are coordinated courses with multiple sections at Cleveland State, and I have been coordinator for 4 years. ALEKS provides a wealth of up-to-the-second information about student topic completion, and this is how my instructors and I have used this information over the last 4 years to try to maximize student success in these “gateway” courses.



▶ Objective 9

▶ Objective 10

Progress 89%

▼ Objective 11

Progress 85%

	Progress ⓘ	Remaining ⓘ	Ready to Learn ⓘ	Attempted, Not Yet Learned ⓘ
• Simplifying a sum or difference of multivariate polynomials	90%	10%	6%	0%
• Factoring out binomials from a polynomial: GCF factoring, advanced	87%	13%	6%	0%
• Simplifying a ratio of multivariate polynomials	90%	10%	3%	0%
• Identifying solutions to a system of linear equations	90%	10%	10%	0%
• Graphically solving a system of linear equations	90%	10%	6%	0%
• Solving a system of linear equations using substitution	94%	6%	6%	0%
• Solving a system of linear equations using elimination with multiplication and addition	87%	13%	6%	0%
• Finding the time to reach a limit in a word problem on exponential growth or decay	74%	26%	16%	6%
• Finding the final amount in a word problem on continuous exponential growth or decay	77%	23%	10%	0%
• Solving a 2x2 system of linear equations that is inconsistent or consistent dependent	84%	16%	3%	0%
• Solving a word problem using a system of linear equations of the form $Ax + By = C$	84%	16%	3%	3%
• Solving a value mixture problem using a system of linear equations	90%	10%	3%	0%
• Solving a distance, rate, time problem using a system of linear equations	71%	29%	23%	10%

► Objective 10

Progress 73%

▼ Objective 11

Progress 62%

	Progress ⓘ	Remaining ⓘ	Ready to Learn ⓘ	Attempted, Not Yet Learned ⓘ
• Simplifying a sum or difference of multivariate polynomials	76%	24%	24%	0%
• Factoring out binomials from a polynomial: GCF factoring, advanced	59%	41%	30%	5%
• Simplifying a ratio of multivariate polynomials	65%	35%	35%	3%
• Identifying solutions to a system of linear equations	70%	30%	30%	5%
• Graphically solving a system of linear equations	73%	27%	27%	3%
• Solving a system of linear equations using substitution	84%	16%	16%	0%
• Solving a system of linear equations using elimination with multiplication and addition	78%	22%	5%	0%
• Finding the time to reach a limit in a word problem on exponential growth or decay	51%	49%	22%	5%
• Finding the final amount in a word problem on continuous exponential growth or decay	46%	54%	19%	0%
• Solving a 2x2 system of linear equations that is inconsistent or consistent dependent	51%	49%	16%	0%
• Solving a word problem using a system of linear equations of the form $Ax + By = C$	57%	43%	22%	0%
• Solving a value mixture problem using a system of linear equations	57%	43%	27%	0%
• Solving a distance, rate, time problem using a system of linear equations	43%	57%	41%	0%

ADAPTIVE PRACTICES: INSTRUCTION



Instead of a predetermined day-to-day, topic-by-topic course schedule, Objectives are considered weekly goals, and instructors are expected to review Objective data in ALEKS every day before they go in to teach their section.

If a topic has high percentage completion among the section, it can be avoided or have only a small amount of time devoted to it during the day's lecture.

If a topic has low percentage completion, it should be drilled more during the lecture.

Two different sections of the same course might get different lectures on the same day!



Some students have already taken this assignment, so the content cannot be modified.

#	Question	Accessible	Points
1	Identifying solutions to a system of linear equations		1
2	Graphically solving a system of linear equations		1
3	Solving a system of linear equations using substitution		1
4	Solving a system of linear equations using elimination with multiplication and addition		1
5	Solving a 2x2 system of linear equations that is inconsistent or consistent dependent		1
6	Solving a value mixture problem using a system of linear equations		1
7	Solving a distance, rate, time problem using a system of linear equations		1

Assignment 11



Class Code: UCTRJ-LRJYD

CLASS TOOLS



CONTENT

SETTINGS

 Some students have already taken this assignment, so the content cannot be modified.

#	Question	Accessible	Points
1	Simplifying a sum or difference of multivariate polynomials		1
2	Factoring out binomials from a polynomial: GCF factoring, advanced		1
3	Finding the final amount in a word problem on continuous exponential growth or decay		1
4	Solving a system of linear equations using substitution		1
5	Solving a system of linear equations using elimination with multiplication and addition		1
6	Solving a value mixture problem using a system of linear equations		1
7	Solving a distance, rate, time problem using a system of linear equations		1

ADAPTIVE PRACTICES: COURSE DESIGN



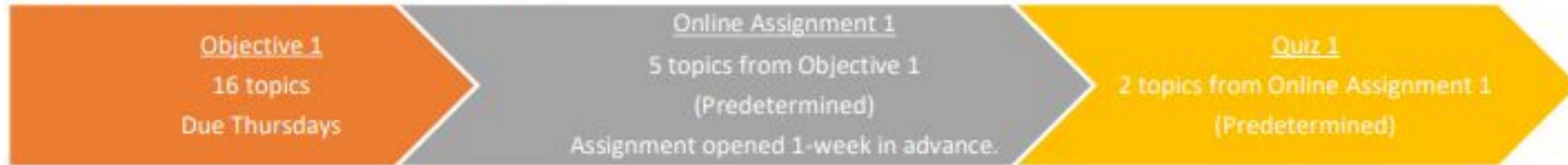
Objectives are the main homework of the course, representing all the topics to be learned. These are the same for all students.

Assignments are more homework, tailored to each individual section based on data from the Objectives. I (or my GA) review the data for each individual section on Friday nights, and construct a different 7 question Assignment for each section by Saturday afternoon, chosen from topics in the Objective.

Each Assignment is designed to contain topics that a particular section has not shown a high percentage of mastery yet. Thus immersing each individual section in what they need the most.

In MTH 167 and 168, weekly curriculum contained three components: completion of Pie Objective which covers topics taught the previous week (due Thursday nights), Written Homework Assignments which cover 5 topics from the Pie Objective (due the following Sunday night). The Sunday night assignment is then followed by a quiz the next class session.

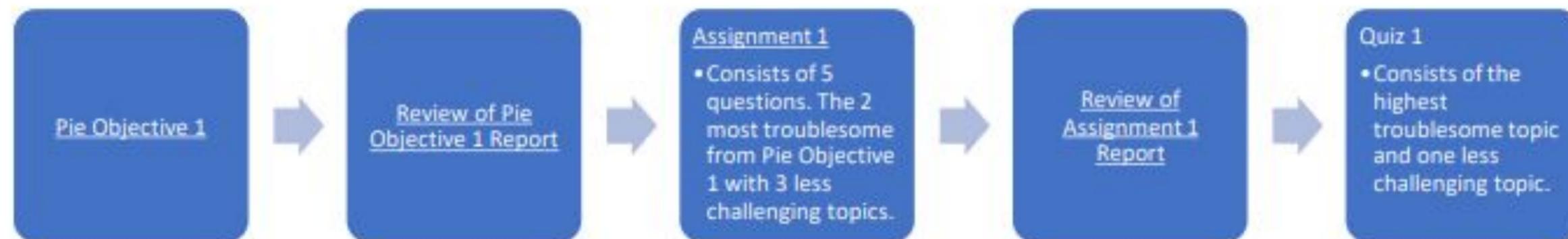
The model implemented before Exam 1 & 2.



Precalculus After Initiative

To take a more active role in week-to-week homework preparation during the semester, the course coordinator and course coordinator's assistant have recently begun reviewing each separate Precalculus section's results on the Objectives after Thursday night, and using that information to then construct the Assignments due Sunday night.

Questions for the Assignments are selected by choosing the two lowest-scoring Objective topics for that particular class section, as well as three other problems of our choosing. Because the performance between sections can vary from topic to topic, this process ensures that each specific section gets more assigned problems on the topics that seem to be the most difficult for students in that section, and thus get more practice on what they need the most as a class.



POST-EVENT SURVEY

Please take a few minutes to offer your feedback on the
ADAPT: Student-Centered Digital Learning Showcase
event at: <https://www.surveymonkey.com/r/PQF7XH5>

Note: the survey only needs to be completed once



THANK YOU!





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