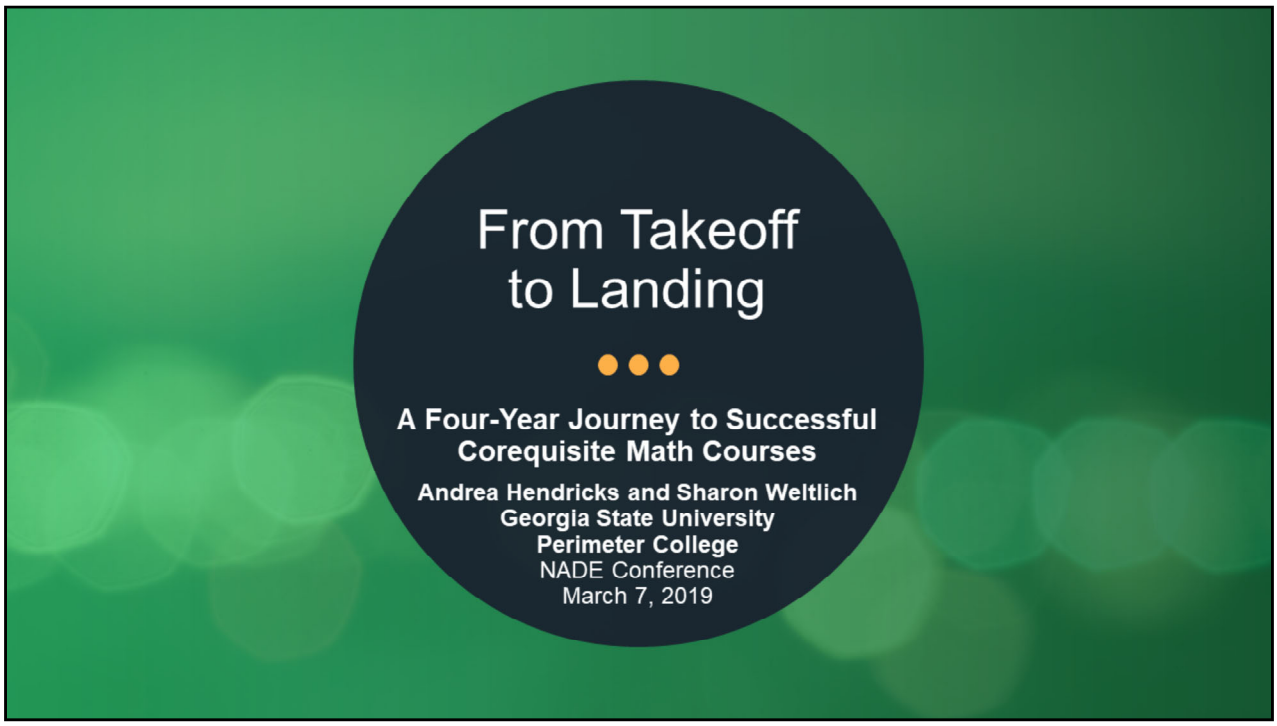


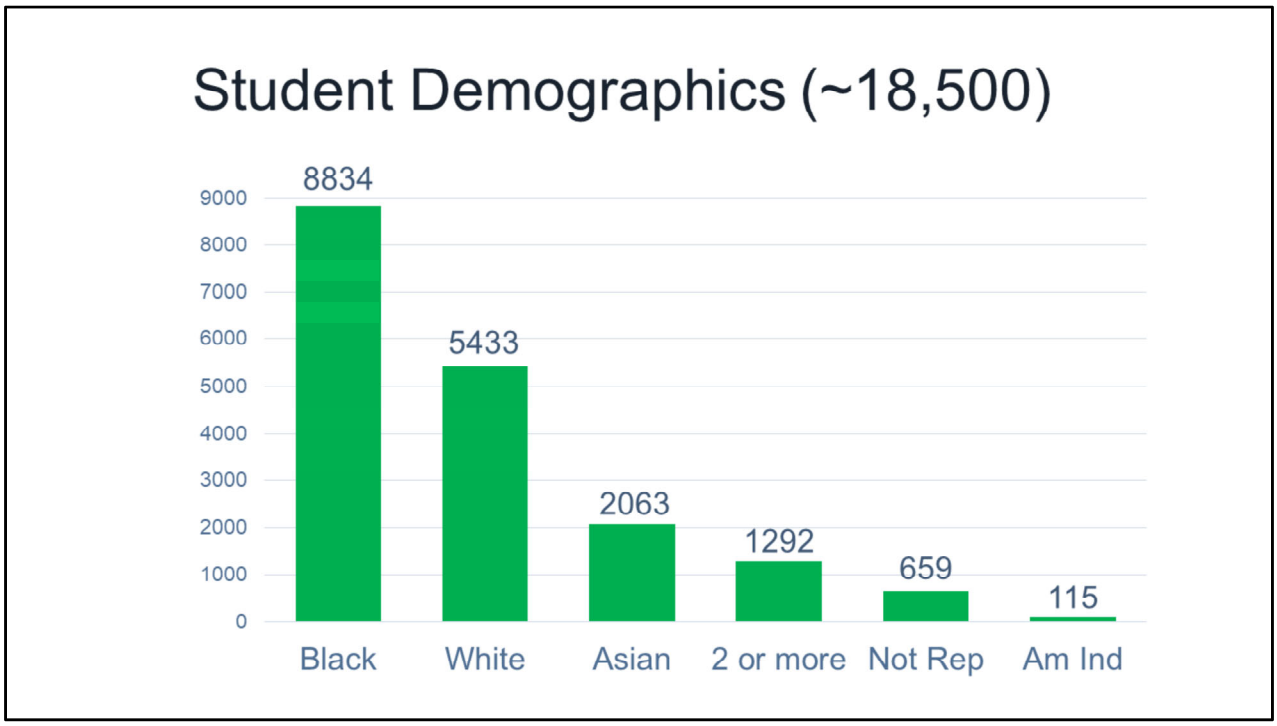
Hello, we are glad to be here this afternoon. How many of you have already implemented Corequisite courses? How many of you are in the planning stages of creating your courses? It looks like all of us are on this same journey with some being further along than others. Sharon and I will share what that journey has looked like for us the past four or so years. At times, we felt we were moving backwards or walking in circles. However, each iteration of our course moved us closer to where we are today which is a successful Corequisite math course.

Let us briefly introduce who we are and where we teach.

I am Andrea Hendricks. I serve as the Associate Dept Chair for the online math/csc dept and am an associate professor of mathematics at Perimeter College. I am finishing up 27 years of teaching at Perimeter this semester, with 17 of those years being fully online. I was a member of the College Algebra curriculum committee and then liaison to the committee in my role of administrator during the time we created our coreq course.

Sharon – I have taught at Perimeter College for 10 years and served on the College Algebra curriculum committee for the last 8 years. I was chair of the committee when going through the process of creating corequisite courses.

Perimeter College since 2016 is the access college within Georgia State University. We have five physical campuses located around metro Atlanta and an online campus. The course materials we use at one campus is used at all campuses with the exceptions of any pilots.

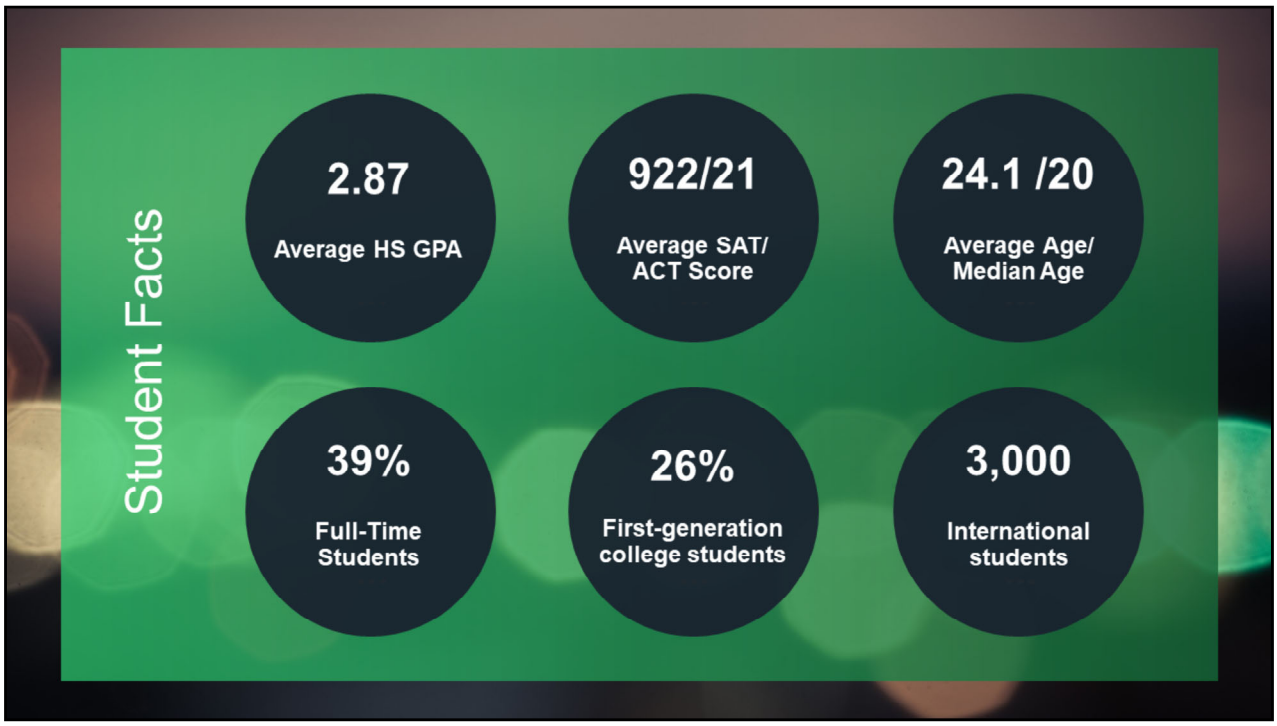


We have about 18,500 students with the majority of our students being black.

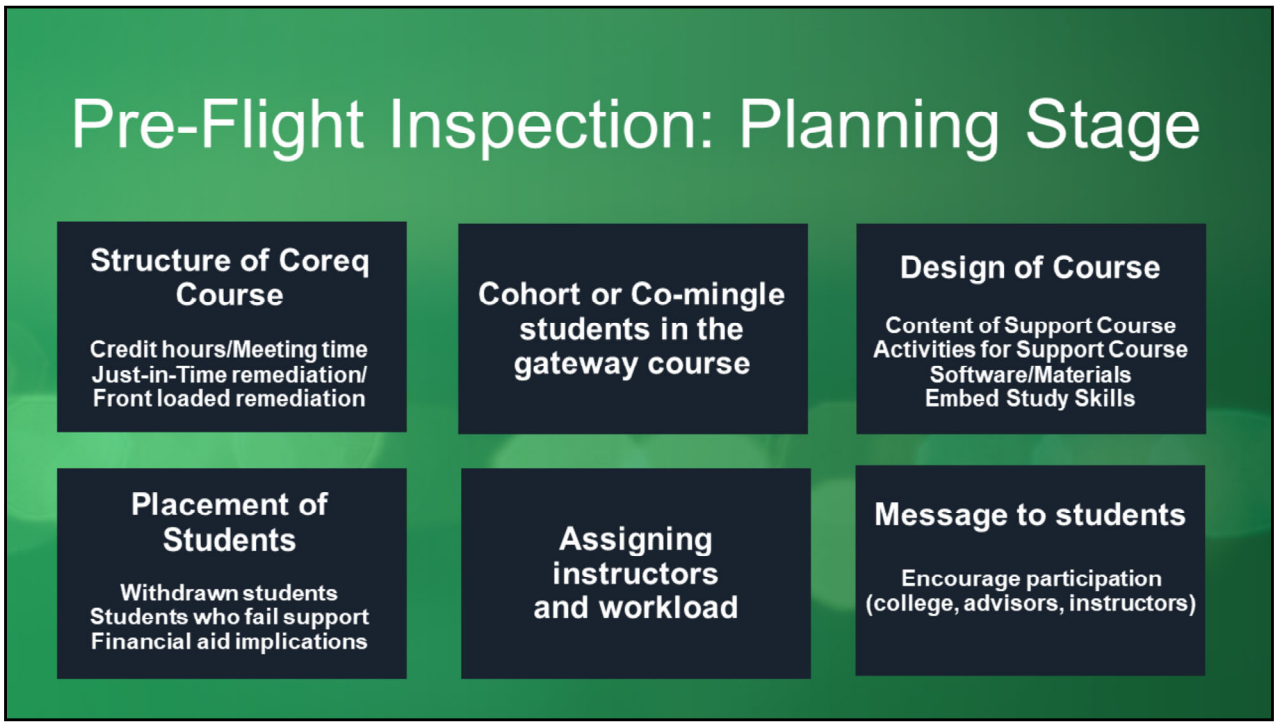
57% Female

43% Male

Size and make-up of our student body



Here is a snapshot of our student population to show you that our students are likely similar to your student populations.



Distribute Quick Guide

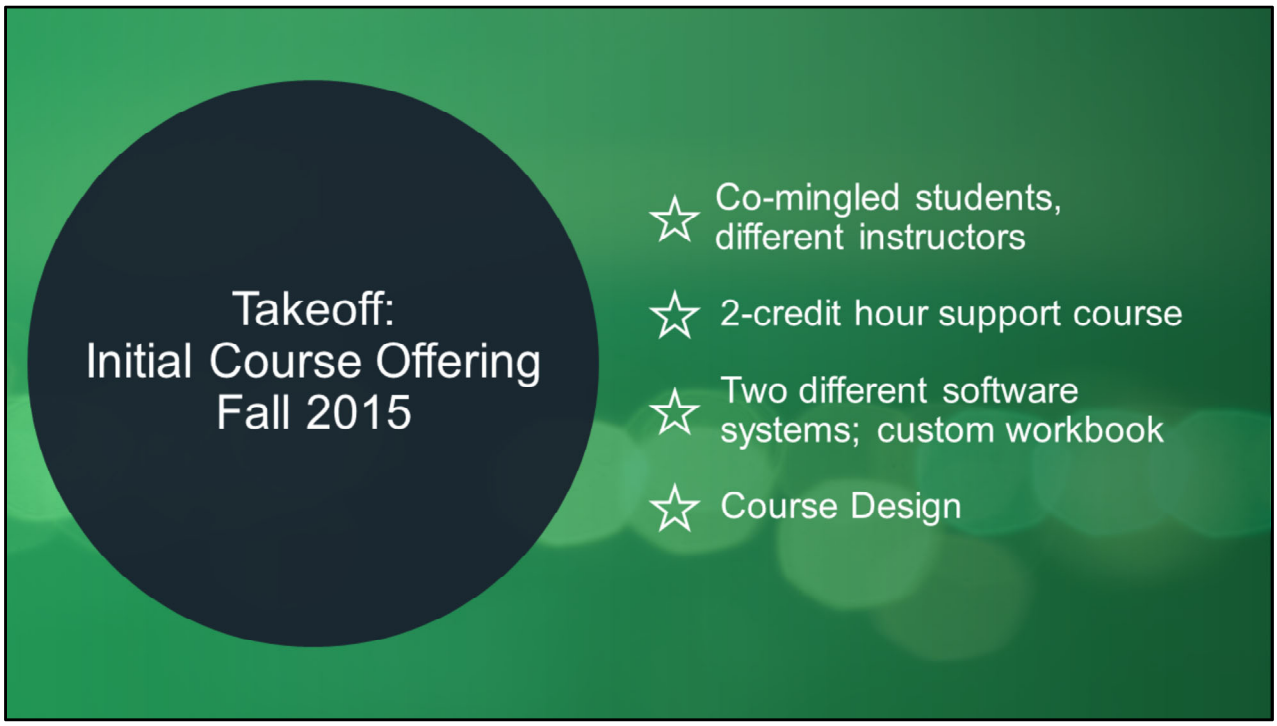
Historical context: In Fall 2014, the University System of Georgia announced that each institution would create and offer co-requisite math courses by Fall 2015. The goal was to place approximately 2/3 of our developmental math students into the gateway course along with the coreq course. Prior to this time, dev math students took a 4-credit hour dev math course and from this course could go into either College Algebra or Quantitative Reasoning. When the Corequisite courses launched, the dev math course split into two 3-credit hour courses – one for students following a STEM/Business pathway and one for those following a non-STEM pathway. Only the very weak students would take the 3 credit hour dev math course. When the students left the dev math course, they would be required to take the support course along with the College Algebra course.

The USG provided some guidelines but we had a lot of flexibility in how we wanted to deliver the course. These were several things we had to figure out in our planning stages. When we were at this stage, there were very few schools offering co-requisite courses and very few resources from publishers on how to do this.

What is your support course going to be? What are you going to do during class time? We couldn't make it a "study hall"; it had to be a real course with real objectives. We knew that

students coming in would not necessarily have the math skills to complete the College Algebra requirements. (real grades)

The Quick Guide is a checklist for things that you need to determine and figure out as you plan and offer your own coreq course. It is in no way an exhaustive list but hopefully you will find it helpful as you move forward.



We landed on a 2 credit hour support course (could range from 1 – 3 credit hours).

We were initially told that we could not link our gateway and support courses together due to BANNER coding and multi-campus issues. Therefore, students enrolled in a support course and a College Algebra course that were not necessarily taught by the same instructor and were not necessarily on the same campus. Students in the support course represented multiple College Algebra sections with multiple instructors. Sections of College Algebra had “clean” and “support” students in one section. This required us to create a common calendar for College Algebra so that all sections would be at the same place enabling the appropriate support at the appropriate time.

Because it was a “course”, we had to create a list of objectives to cover and decide how grades were going to be assigned. It could not just be a study hall course. The committee created a list of prerequisite topics for College Algebra. Then we worked with a publisher to create a workbook with these topics for our support course. The workbook pages came from an existing Beginning and Intermediate Algebra text. We basically cut and pasted these pages together to form a workbook that instructors and students could use in the support classroom.

Outside of class, the support students would also work on an adaptive software for the first 8 weeks of the course. Our goal was to help students get through the support topics as soon as possible. The College Algebra course required a traditional online homework system with a traditional College Algebra text.

Sharon – couldn't find two softwares but couldn't find one to serve both courses

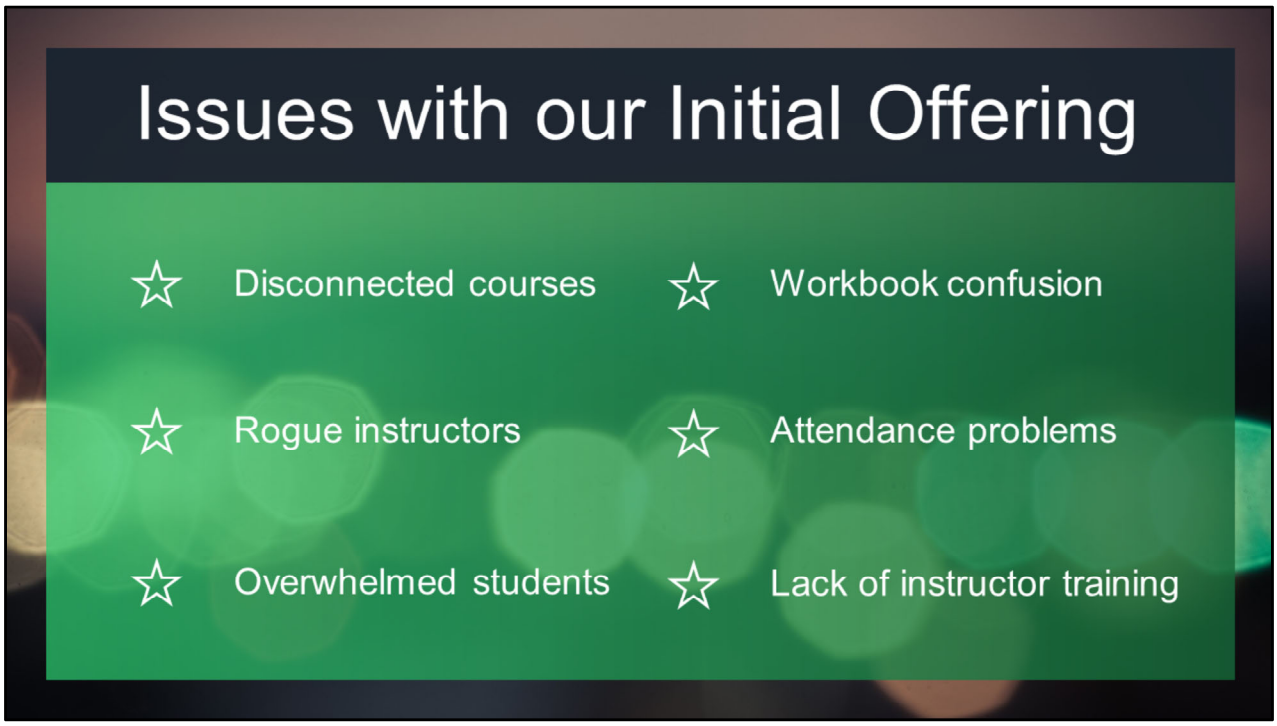
Initial class design: 1 day a week for 2 hours (wanted practice time; force interaction)

30 MINUTES OF LECTURE – Instructors will lecture on the EERs included in the pacing guide. They should emphasize the topics on the graded worksheet for the day.

* 60 MINUTES OF PRACTICE – This hour will be spent with students working on provided worksheets (pacing guide included). The instructor can choose which problems are assigned. Not all problems need to be completed. We included extra worksheets to provide ample practice and to allow the instructor several choices. The instructor can have students working in groups, working problems as a class on the board, etc. Hands on time is essential during this part of the class.

* 20 MINUTES TO COMPLETE WORKSHEET OF THE DAY – The last 20 minutes can be devoted to students completing the worksheet to hand in to the instructor for a grade.

* MATH 1111 TOPICS – At any time during the class, the instructor can choose to address problematic issues that students are having in Math 1111. Demonstrating the CONNECT and ALEKS software at the beginning of the semester will be beneficial for the students

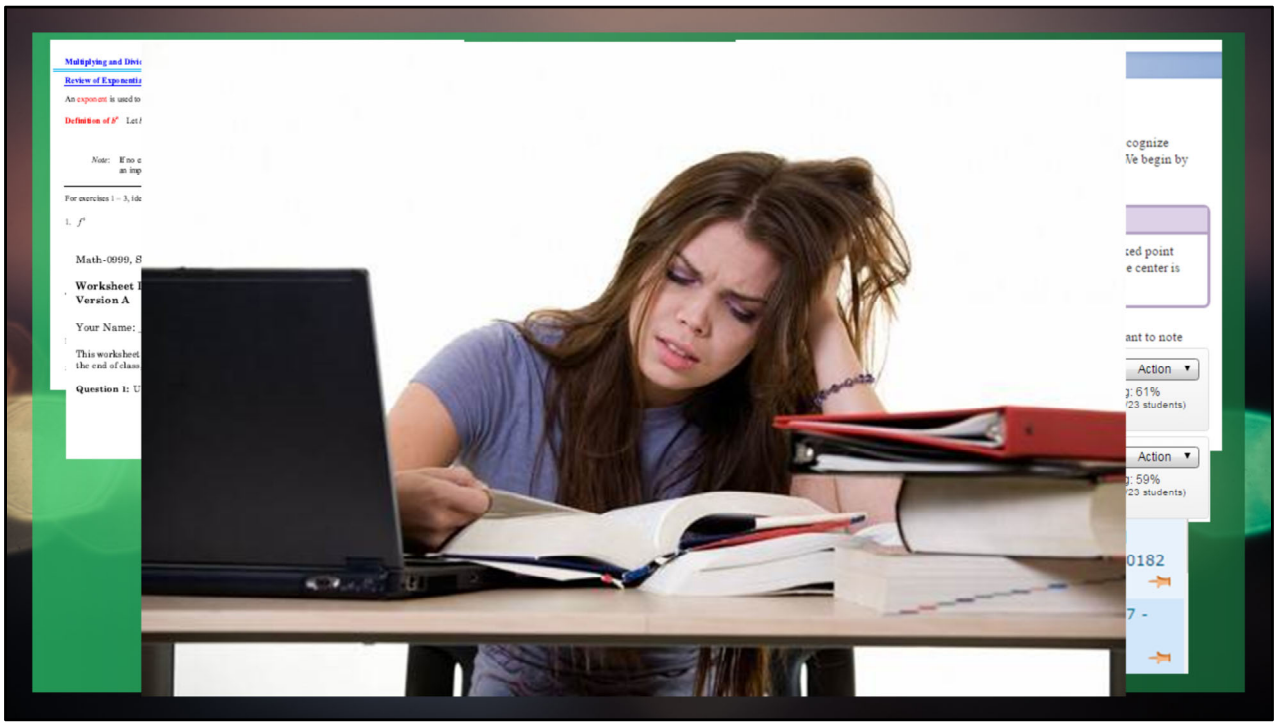


We found that there was a disconnect between the support course and the gateway course. Students were often working on topics in the adaptive learning software that had nothing to do with the College Algebra topics. In addition, there were some college algebra instructors who chose not to follow the common calendar which meant that students in the support course were not being supported with the appropriate CA topics.

Ultimately, students perceived the support course as extra work they had to do that didn't necessarily help them succeed in College Algebra. They felt overwhelmed with four things to do: attend their CA course, the support course, homework for CA, and homework in another system for the support.

Sharon: Because we had little time to select course materials and launch the course, the workbook pages from the publisher did not have page numbers. This caused a lot of confusion for instructors and students. It turned out that the problems in the book while covering the prerequisite topics did not necessarily give students the reason behind doing the work. (Overdid it – tried to give instructors a lot of choices); Less is more; overwhelming for instructors as well: Sharon: Trying to give instructors options to choose from workbook – but less is more; overwhelming for instructor

Attendance problems: After students learned that the grade in the support course would not keep them from moving forward as long as they passed College Algebra, they didn't take the course very seriously. Later they realized that poor grades in the support course impacted their SAP.



Barely manage to keep up with required assignments…no time for make connections, retain material

We readily discovered the workbook solution was not working nor were the in-class graded worksheets.

Did away with the workbook and wrote worksheets of our own aligned to the prereqs for each corresponding section of College Algebra. (Refer to back of Quick Guide.)

Worksheets served as a better guideline for instructors to know what to cover in the support course. We also added a Connect to College Algebra problem on each worksheet so that students could see the reason for reviewing those skills.

Discovered that we needed to hold students more accountable for the support topics, so we changed what components are used in grading.

Grading: Attendance (25%), Module Completion (25%), Quizzes (25%), Post-test (25%)

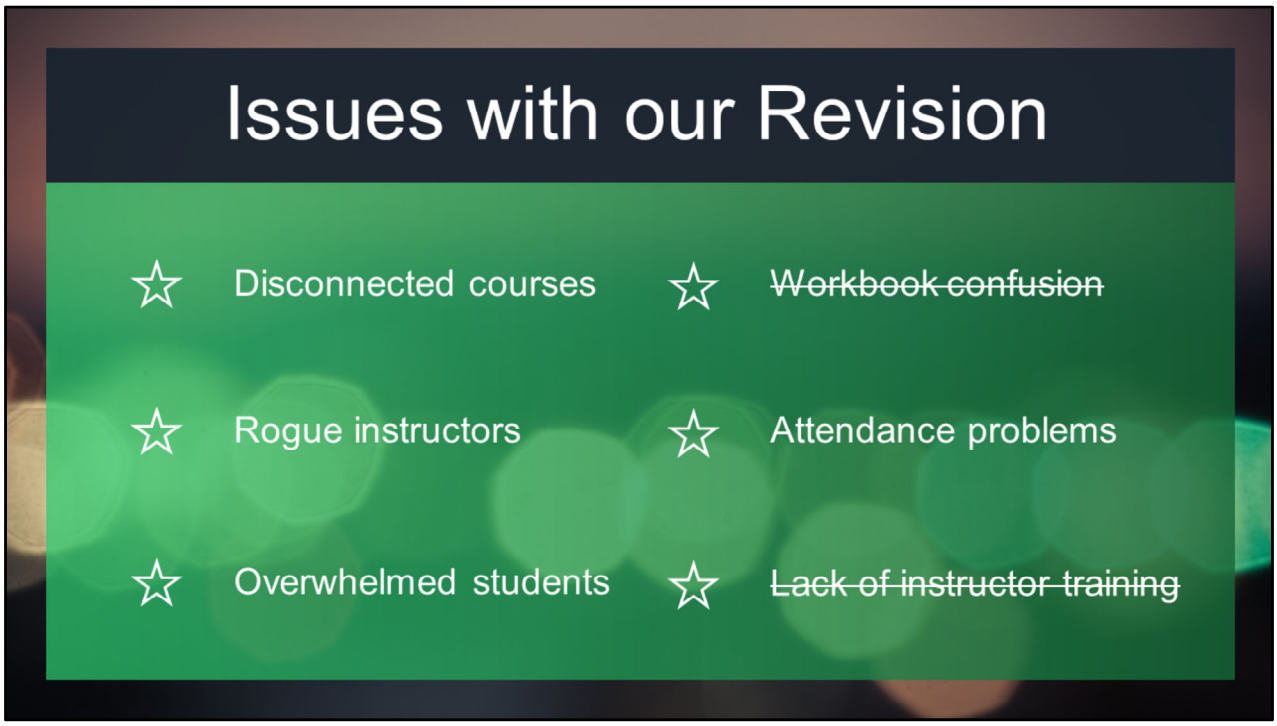
We changed the structure of their work in the adaptive software by creating modules that better aligned with the College Algebra content and by spreading this work out over most of the semester.

Revised course structure:

Mini-Lecture: Instructors should provide mini-lectures based on the support material in iCollege.

* Practice: The instructor can have students working in groups, working problems as a class on the board, etc. Hands on time is essential in this class. Support worksheets are located in iCollege. Instructors may choose to create additional problem sets.

* MATH 1111 TOPICS – At any time during the class, the instructor can choose to address problematic issues that students are having in Math 1111. Demonstrating the CONNECT and ALEKS software at the beginning of the semester will be beneficial for the students.



Students could still be working on topics in the adaptive learning software that had nothing to do with the College Algebra topics. There were some college algebra instructors who chose not to follow the common calendar which meant that students in the support course were not being support with those topics.

The new worksheets did help solve some issues related to the connection to college algebra as long as their college algebra course was following common calendar. The worksheets also helped the instructors by giving them more direction and focus of what to do in class.

Even still, students felt overwhelmed with the abundance of the work. Taking 5 credit hours of math is difficult to manage.

The big question: What is the appropriate amount of time/appropriate amount of work on remediating students?

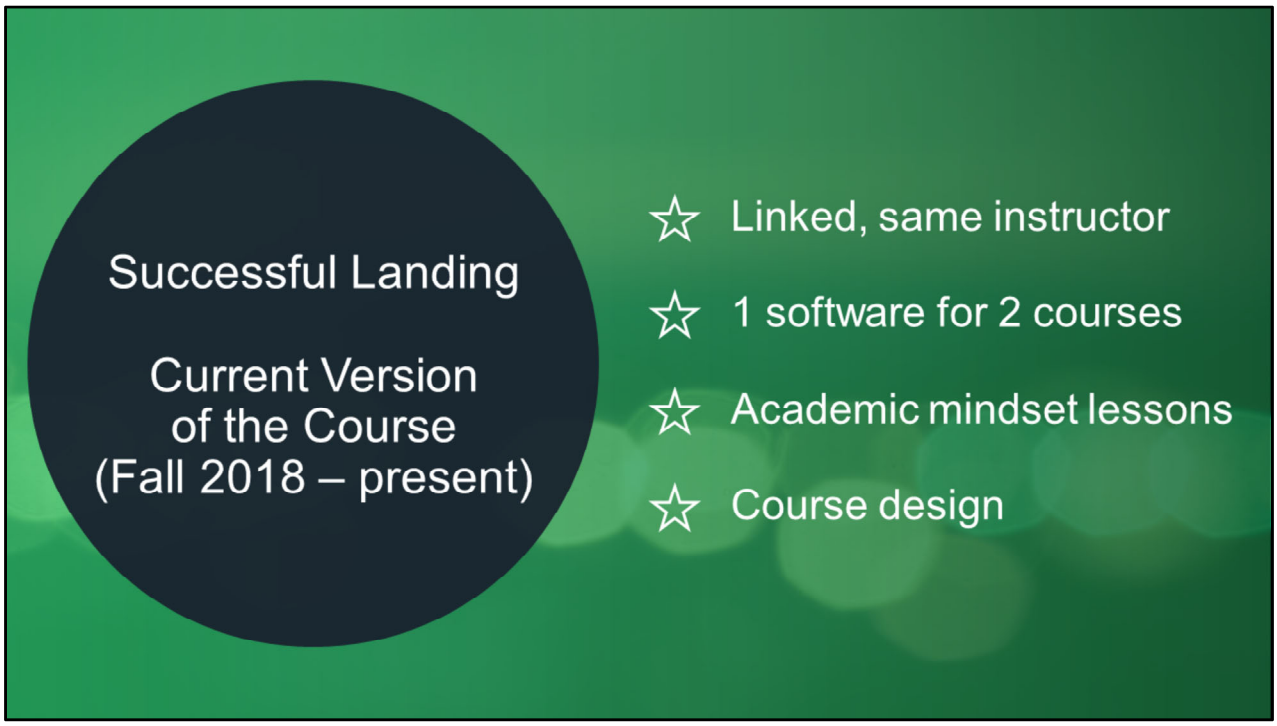
In Fall 2017, the USG announced that by Fall 2018, all coreq courses needed to be created so that only one software package is used for both courses and that the support course should cover only those topics that are needed for College Algebra with just-in-time remediation. So, we had to select different materials for our courses.

The USG also announced that colleges would no longer offer foundations courses (dev math). Beginning Fall 2018, all students would be placed in a coreq course or test out of it.

Concerning the one software package, I piloted teaching both the support course and the college algebra course with the software we were using in College Algebra. There were issues finding sufficient online problems for the prereq problems. It was also difficult finding where those resources were to begin with. I had also planned to teach both the support course and the college algebra course with the adaptive software. There were limitations to this as well as far as scheduling and coverage of the college algebra topics.

Because I was piloting the one software in my online course, I ended up writing my own materials for the support course to fill in the gaps. At the same time, I was approached by a company about writing an online textbook in their platform, essentially an OER (lower cost,

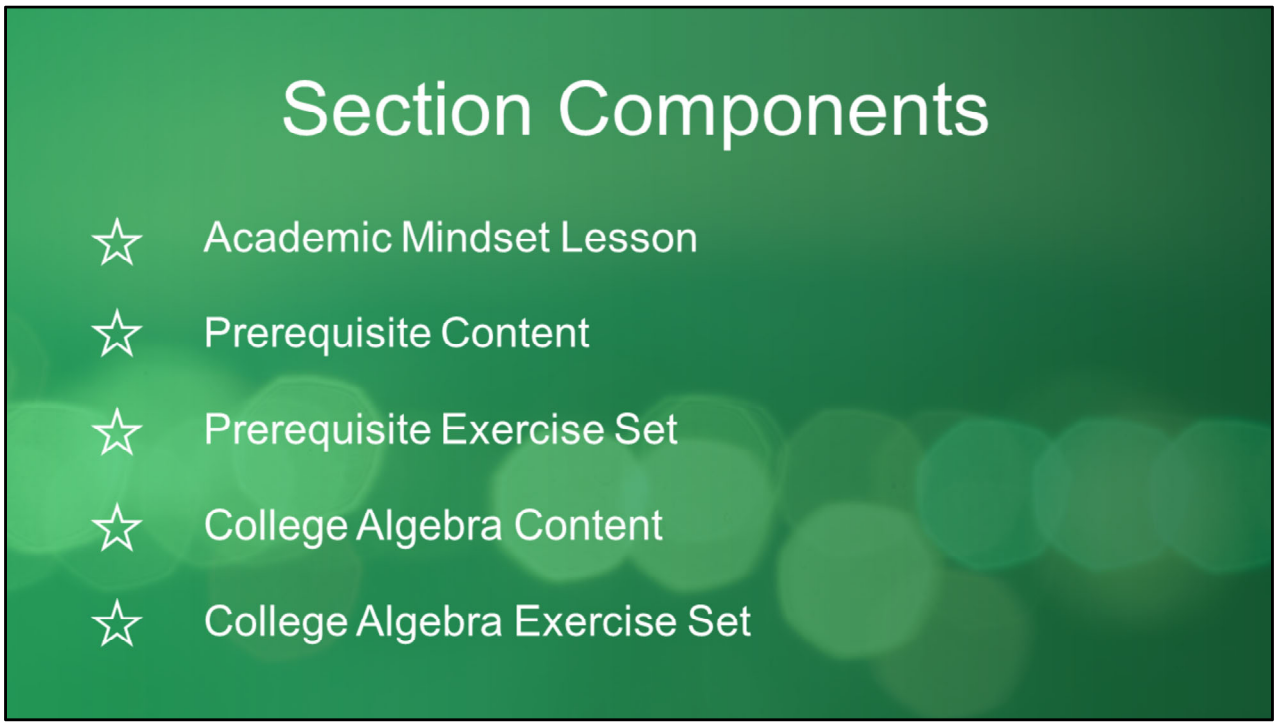
open to edit, not free). Because of my experience with the support course and realizing that there were not specific materials that clearly aligned the support content with the college algebra content, I decided to write a College Algebra with Support text. Because we had gone through the book search process just a couple of years ago, I realized that there wasn't anything on the market that provided exactly what we wanted or needed. I along with three other instructors piloted this in Fall 2017/Spring 2018.



The committee went through the search process, choosing between these materials I created and the adaptive software. The materials I created were selected for all courses beginning this past fall. So, we had the one software for the two courses.

We were also able to link the support course and the gateway course with the same instructor teaching both courses with the same set of students. Another big push from the system was to embed academic mindset lessons into the support course. These are included in the course materials.

The course platform that we use provides classroom engagement tools which has made the support course much more interactive. The course materials include more than a worksheet. In fact, the worksheets are not used as much. The text has lessons on those prereq skills along with exercises (just enough prereq that are perfectly aligned to the college algebra content).



Because the course materials dictate how we deliver our course, I want to share briefly what those materials consist of. Each section of the text consists of five components: an academic mindset lesson (motivational, study skills, evidence-based strategies grounded in learning science), prerequisite content (backmapped each college algebra lesson with what students need to know to complete that lesson), prereq exercises, and then the college algebra text and exercises. Each of these "pages" is assignable. The content includes embedded questions, videos, pause and reflect questions, and such to direct students through process

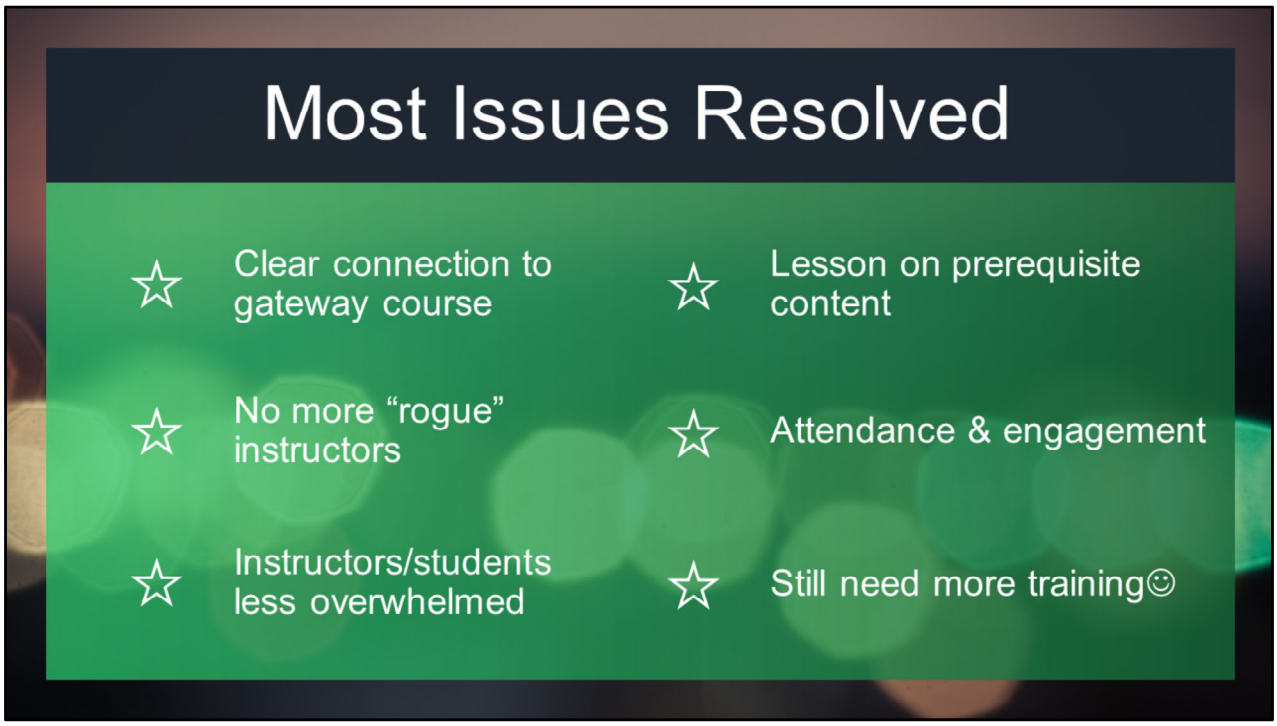
These components provide direct students to the appropriate learning path. They are guided through what does it mean to be successful, how do I read a textbook, take time to reflect…and the best part is that it is all in one place.

To help you visualize what our solution looks like and to put a framework behind what I just explained.

There are also instructor PPT's with interactive questions that can be presented directly from the text.

Interactive classroom

Alignment of content

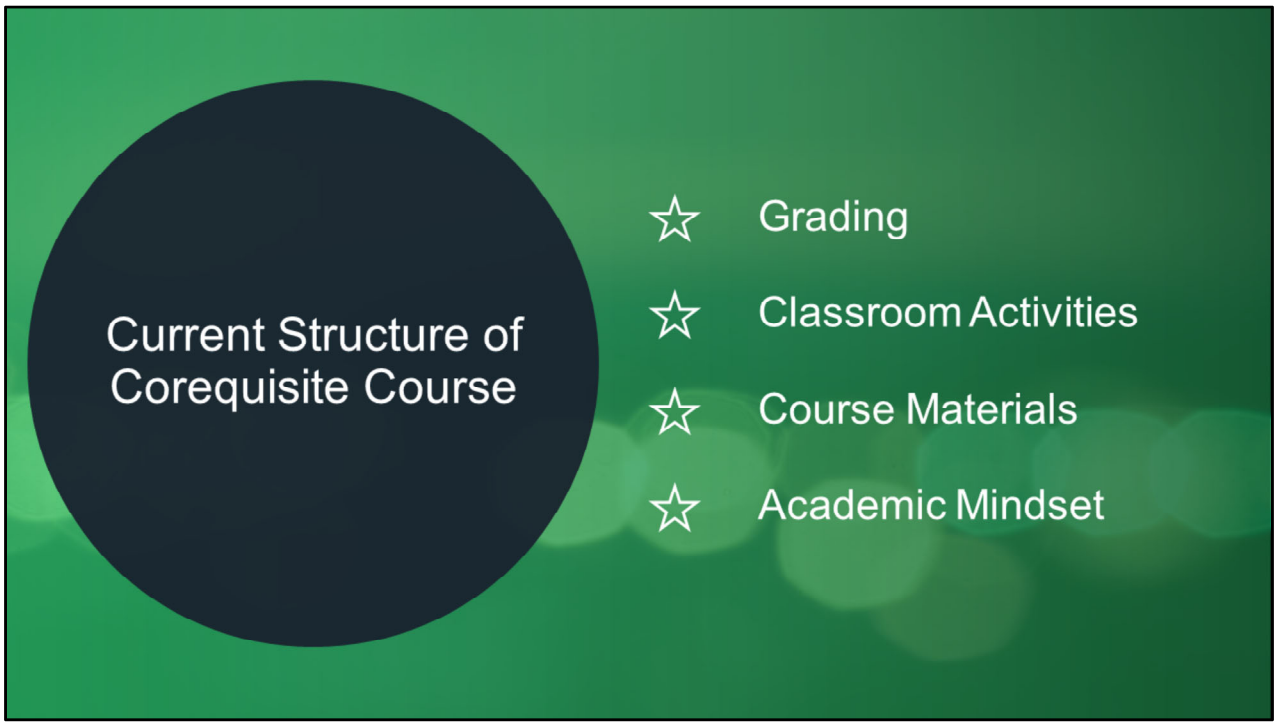


Clear connection between the two courses

Content all in one place; more clearly outlined – with some software packages, the material may be in one place but students have to go to different areas of the platform to read the book, complete homework, watch videos, and such.

PPT with interactive class questions which has provided more engagement because of the PPTs and embedded questions; students read before coming to class

Training – new software, completely digital, some instructors hesitant/resistant to change



Grading: 75% from textbook (reading, study with purpose, in-class questions, and homework)

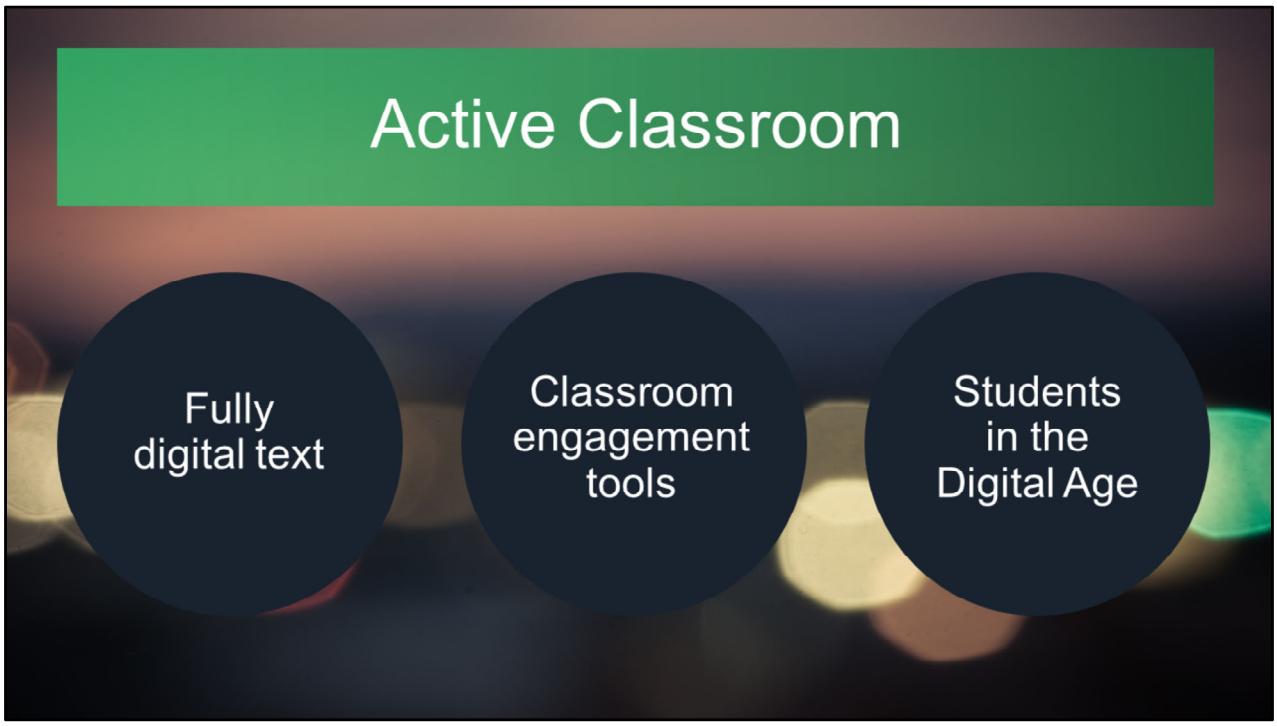
25% post-test; not bombarded with more quizzes and worksheets

Each support lesson exactly corresponds to the College Algebra lesson. Problems that are part of the college algebra content show up in less intimidating language and address trouble spots.

Instructors can flip the class since students come to class having read the lesson. Students engage with the instructor through interactive questions.

Course materials include interactive, online textbook with prereq skills, embedded videos and embedded questions that can be assigned. Each section also contains about 10 homework problems. Worksheets can also be used for in-class or additional practice if the instructor choose.

Academic mindset lessons, as mentioned before, are also provided for most every section…lessons to teach students how to be successful.



Sharon

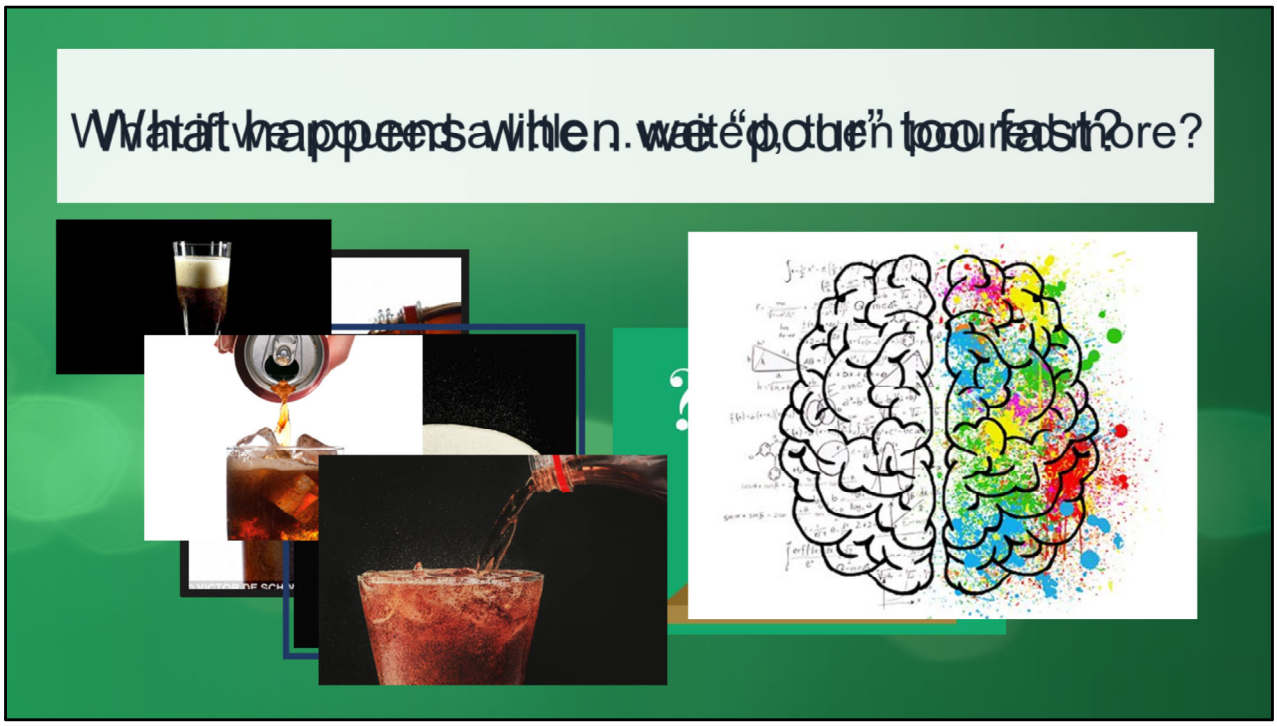
Reaches the current Gen Z and millennials student in digital age

Teaching with lecture is harder

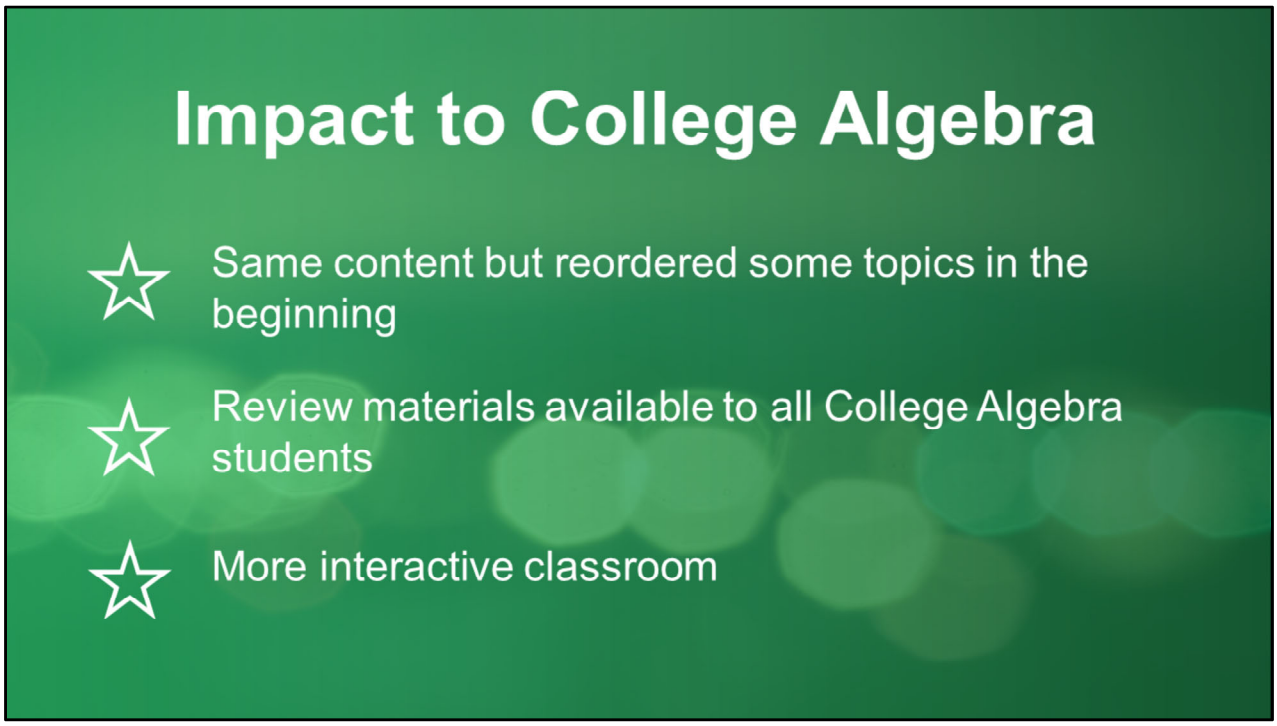
Traditional lecturer but is it what our students need? Students who grew up with technology…classrooms have not changed in many years.

College Algebra with support is a digital text – what students are used to

Platform helped me get my classroom more engaged



Soda – settle knowledge



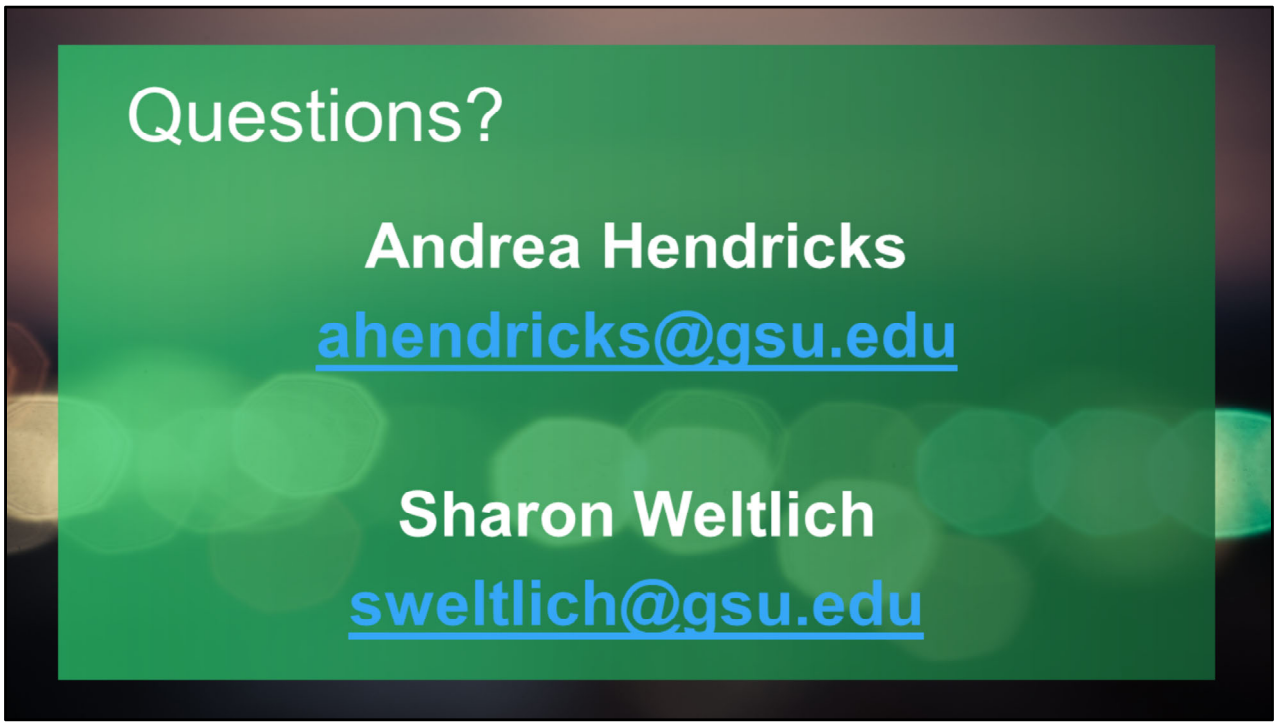
Sharon: More interactive classroom that has spilled over into College Algebra (Digital age, lecture less); require reading before class

Our College Algebra course is still college algebra; we didn't remove any topics but we did reorder some topics to give students more time to learn/review the necessary prereq skills. For instance, the book we were using grouped linear equations and rational equations leading to a linear equation in the first section. The 2nd section we covered was quadratic equations. We reordered sections in our 2nd iteration of the course but the current materials also present the topics in a similar order.

The great thing now with all the materials for both courses being in one platform is that we can set all the prereq materials to review mode in case there are College Algebra students who need to brush up on some skills.

Grading – heavy on tests

15% devoted to reading/homework grade vs 75% of grade in coreq


Questions?
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Sharon Weltlich
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A Quick Guide to Co-requisite Design

1. Define your co-requisite course.
   - Is it a just-in-time course running concurrently with the gateway course?
   - Is it a compressed co-requisite course prior to the start of the gateway course?
   - Is it a boot camp prior to enrolling in the gateway course?

2. State the purpose of your co-requisite course.
   - Is it to teach the prerequisite skills for the gateway course?
   - Is it a study skills course?
   - Is it enrichment for the gateway course?

3. Determine the structure of your course.
   - Is it a separate course? If so, how many credit hours/contact hours? How do these hours count in the faculty load?
   - Will you teach it as a traditional course, a lab, an emporium, etc.?
   - Will you increase the credit hours for the gateway course? If so, by how many?
   - Will the support students be mingled or separate from the non-support students?
   - Will you link the support and gateway courses? If so, will the same instructor teach both courses?
   - How will the pacing of the gateway course and the support course align especially if taught by different instructors? Will you have a common course pacing?
   - How will you schedule the support course and gateway course?
   - Will you offer the support course online?

4. Determine how to place students in the support course.
   - What criteria will place students in the support course/gateway only?
   - How will you deal with students who fail the gateway course but pass the support course?
   - How will you deal with students who withdraw from the support course? Gateway course?
   - How will you handle students who are at the institution prior to support course offerings?
   - Will there be a limit on the number of attempts in the support course?

5. Determine what content the support course will cover.
   - Will you cover prerequisite math skills?
   - Will you embed study skills and academic mindset lessons?
   - Will the course help with the gateway course content?
   - What activities will the students engage in during class?
   - Will you use technology?

6. How will you evaluate the course?
   - What grades can instructors assign?
   - Do any of the activities in the gateway course affect the grade in the support course and vice versa?
   - Will you assign two separate grades?

Andrea Hendricks, ahendricks@gsu.edu Sharon Weltlich, sweltlich@gsu.edu

Backmap objectives to appropriate prerequisite skills for the coreq course

Learning Objectives of Gateway Course	Prerequisite Skills for Objectives	Activities to Enforce Skills

What study skills are important for your students? What activities will reinforce these concepts?

1.

2.

3.

4.

5.

Information on Georgia's design of corequisite math courses:
http://www.completegeorgia.org/sites/default/files/resources/Features%20of%20Corequisite%20Remediation%20-%20Math.pdf

Information on Open Educational Resource, *College Algebra with Support*:
https://tophat.com/marketplace/science-&-math/math/textbooks/college-algebra-with-support-2nd-edition-andrea-hendricks/3569

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Test Your Knowledge: Pre-Check for Linear Equations

Skill 1: Perform operations with real numbers.

Classify each number as a natural number, whole number, integer, rational number, or irrational number. Check all that apply for each number.

	Natural	Whole	Integer	Rational	Irrational
1. $-\frac{1}{5}$					
2. $\sqrt{81}$					
3. $\frac{\pi}{2}$					
4. -6					
5. 0					

Perform the indicated operation.

6. $4-8$

7. $-4+8$

8. $4-(-8)$

9. $-4-(-8)$

10. $4(-8)$

11. $-4(-8)$

12. $\frac{-4}{-8}$

13. $\frac{8}{-4}$

Skill 2: Apply the order of operations.

Use the order of operations to simplify each expression.

14. $8+2\cdot 6$

15. $8/2\cdot 6$

16. $8/(2\cdot 6)$

17. $2(-3)^2-5(-3)+4$

18. $-(-5)^2+4(-5)-1$

19. $\frac{-4-(-2)}{1-3}$

20. $\frac{3-6}{-7-2}$

Skill 3: Simplify algebraic expressions.

Simplify each expression.

21. $-3(2x-4)+10$

22. $-4m+2(m-3)+2m$

23. $5(y-4)+3-6(y-7)$

24. $8(3-x)-(x+4)$

Skill 4: Apply the addition and multiplication properties of equality.

Solve each equation using the appropriate property of equality.

25. $x-9=1$

26. $-9x=1$

27. $\frac{3}{4}p=15$

28. $\frac{3}{4}+p=15$

29. $\frac{r}{3}=-12$

30. $3r-5=-14$

Skill 5: Find the least common denominator of a set of fractions.

Find the LCD of the given set of denominators.

31. 9 and 8

32. 27 and 18

33. 16 and 24

34. 4 and 20

35. 12 and 28

36. 6 and 15

Test Your Knowledge: Pre-Check for Quadratic Equations

Skill 1: Define polynomials.

Complete the table by writing each polynomial in standard form, identifying the degree and leading coefficient of the polynomial, and classifying it as a monomial, binomial, or trinomial.

	Standard Form	Degree	Leading Coeff.	Classification
1. $-4x+5x^2+3$				
2. $-0.05x^2-3x$				
3. x^5				
4. $4x^2-\frac{x^3}{2}-5+7x$				

Skill 2: Perform operations with polynomials.

Perform each operation.

5. $(x^2-7x+8)+(9x^2-8x+3)$

6. $(x^2-7x+8)-(9x^2-8x+3)$

7. $(x-8)+(x-9)$

8. $(x-8)(x-9)$

9. $(6x-7)(2x+3)$

10. $(4x-5)(x-10)$

11. $(x-8)\left(x+8\right)$

12. $(6x-7)\left(6x+7\right)$

13. $(x-8)^2$

14. $(3x-2)^2$

15. $(x-8)(x^2+8x+64)$

16. $(2x+5)(4x^2-10x+25)$

Skill 3: Factor polynomials.

Factor each polynomial completely.

17. $4p+12$

18. $8a^2-4ab+6ac-3bc$

19. $4x^2-25$

20. $81w^2-1$

21. $x^2+10x+16$

22. $20p^2+19p+3$

23. $x^2+10x+25$

24. $y^2-20y+100$

25. $6x^2-5x-6$

26. x^3-27

27. $2x^4+128x$

28. $12x^2-23x+10$

Skill 4: Simplify Radicals and Express Radicals as Imaginary Numbers

Simplify each radical expression.

29. $\sqrt{80}$

30. $\sqrt{48}$

31. $\sqrt{-16}$

32. $\sqrt{-50}$

33. $3\sqrt{8}$

34. $-4\sqrt{20}$

Test Your Knowledge: Pre-Check for Applications of Linear Functions

Skill 1: Write an equation in slope-intercept form.

Write each equation in slope-intercept form.

1. $y-5=3(x-1)$

3. $y-6=\frac{1}{3}(x-2)$

5. $y-4=\frac{2}{3}(x-(-3))$

2. $y-(-1)=-4(x-(-2))$

4. $y-(-2)=-\frac{3}{4}(x-6)$

6. $y-(-8)=\frac{5}{2}(x-0)$

Skill 2: Understand opposites, reciprocals, and equivalent values of numbers.

Complete the chart by filling in each column.

	Opposite	Reciprocal	Negative Reciprocal	Equivalent Value
7. 4				
8. 20				
9. -5				
10. -100				
11. $\frac{1}{9}$				
12. $-\frac{1}{8}$				
13. $\frac{3}{2}$				
14. $-\frac{5}{3}$				

15. Multiply each number in exercises 7 – 14 by its reciprocal. What is the result when you multiply a number by its reciprocal?

Find the slope of each line and state if they are the same or equivalent values, opposites, reciprocals of each other, negative reciprocals of each other, or none of these.

16. $5x+4y=-4$
$y=\frac{5}{4}x+1$

17. $x+3y=9$
$2x=-6y+1$

18. $3x-7y=21$
$14x+6y=6$

19. $y=\frac{1}{2}x-5$
$2x+y=-6$

20. $2x+y=4$
$x+2y=-6$

21. $x=7$
$y=3$

Test Your Knowledge: Prereq Check for Logarithmic Functions

Skill 1: Simplify powers of 10.

Simplify each expression.

1. 10^2
2. 10^3
3. 10^{-1}
4. 10^{-2}
5. $10^{1.2}$
6. $10^{\frac{1}{2}}$

Write each number as 10^x, for some real number x, if possible.

7. 100
8. $\sqrt[3]{10}$
9. 0.0001
10. 0
11. 1
12. -10

Skill 2: Write numbers in an equivalent exponential form.

Identify the exponent to which the base must be raised to obtain the given value.

Value	**Base**	**Exponent**	**Check: Base$^{\text{Exponent}}$ = Value**
13. 5	5		
14. 1	4		
15. 216	6		
16. $\frac{1}{9}$	3		
17. $\frac{1}{16}$	2		

18. 3	9		
19. 2	16		
20. 16	$\frac{1}{2}$		
21. 9	$\frac{1}{3}$		

Skill 3: Write numbers in scientific notation.

22. 1,043,000

23. 45,000,000,000

24. 0.00000023

25. 0.000056

Skill 4: Solve a linear inequality.

Solve each inequality. Write the solution set in interval notation.

26. $3x + 7 > 0$

27. $4x - 12 > 0$

28. $6 - 2x > 0$

29. $-8 - x > 0$