

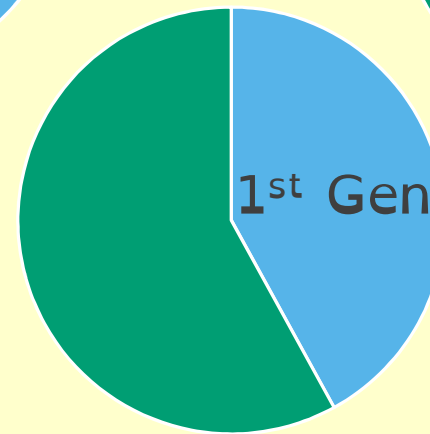
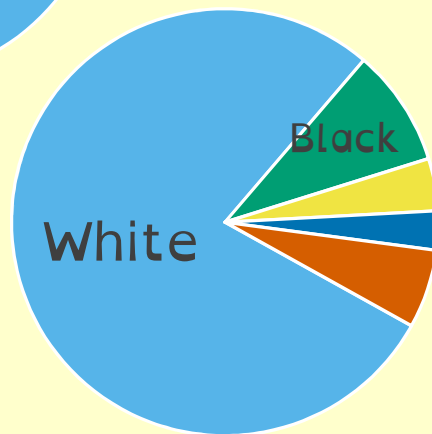
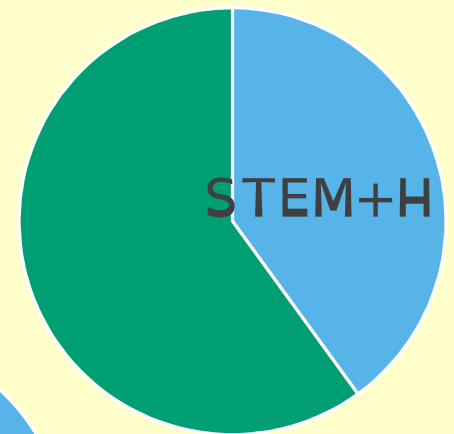
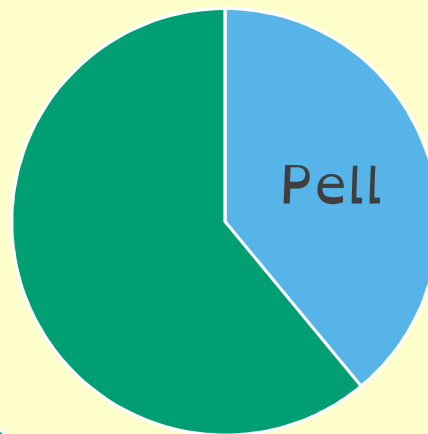
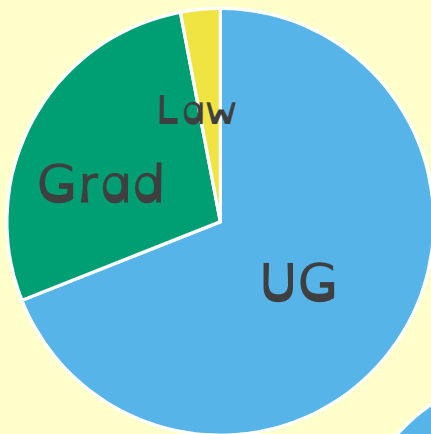
A Summer Bridge Program for STEM Student Success

Axel Brandt [\(he/him\)](#)
John Carroll University

Ohio MAA Section Meeting, Fall 2022

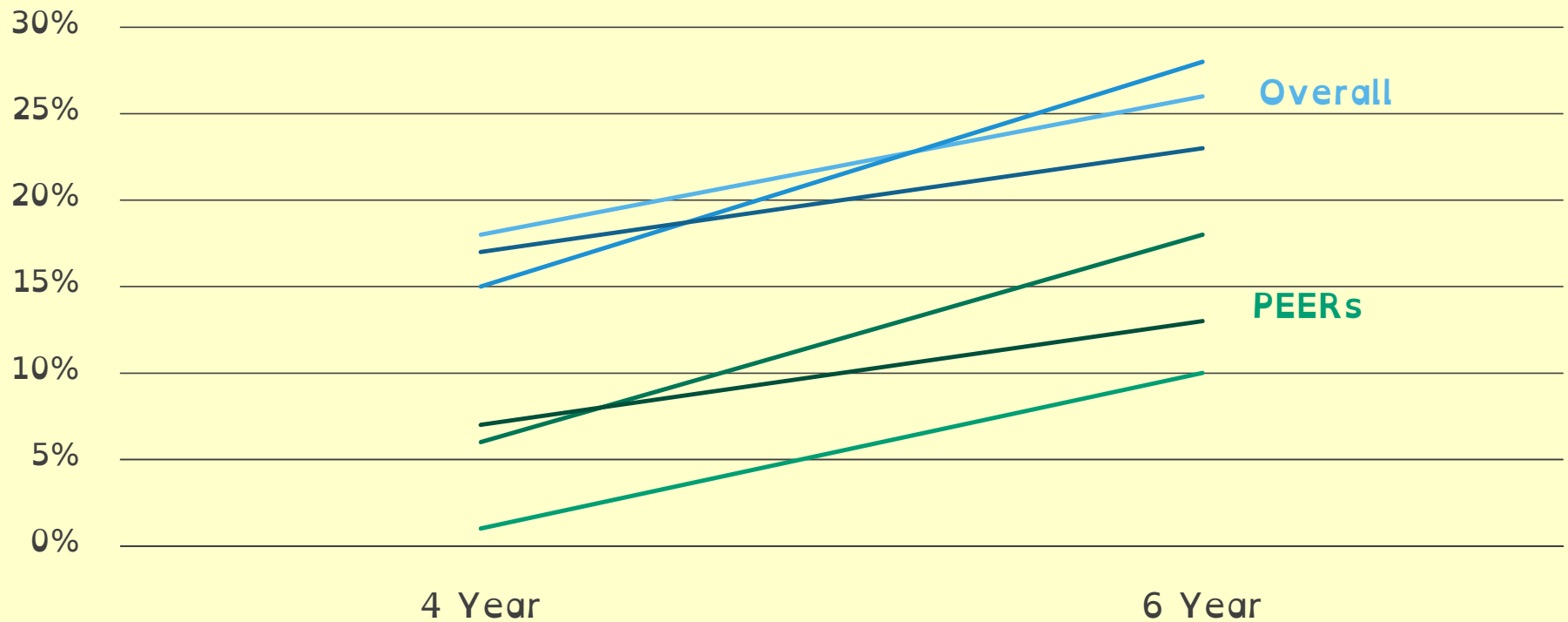
Northern Kentucky University

Student Profile



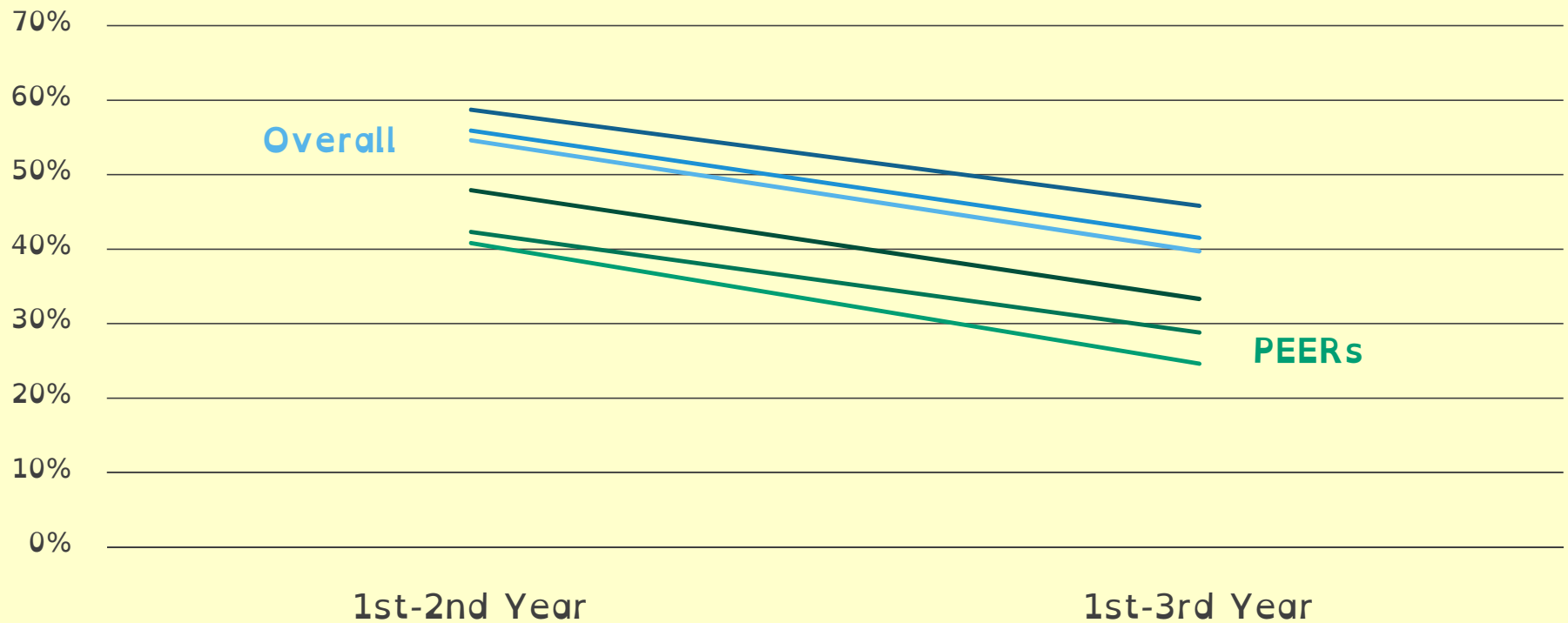
Northern Kentucky University

STEM Graduation Rates for students starting 2009-11



Northern Kentucky University

STEM Retention 2013-15



PEERs: Persons Excluded based on Ethnicity or Race

Q:

Why might students choose to stop pursuing their STEM major?

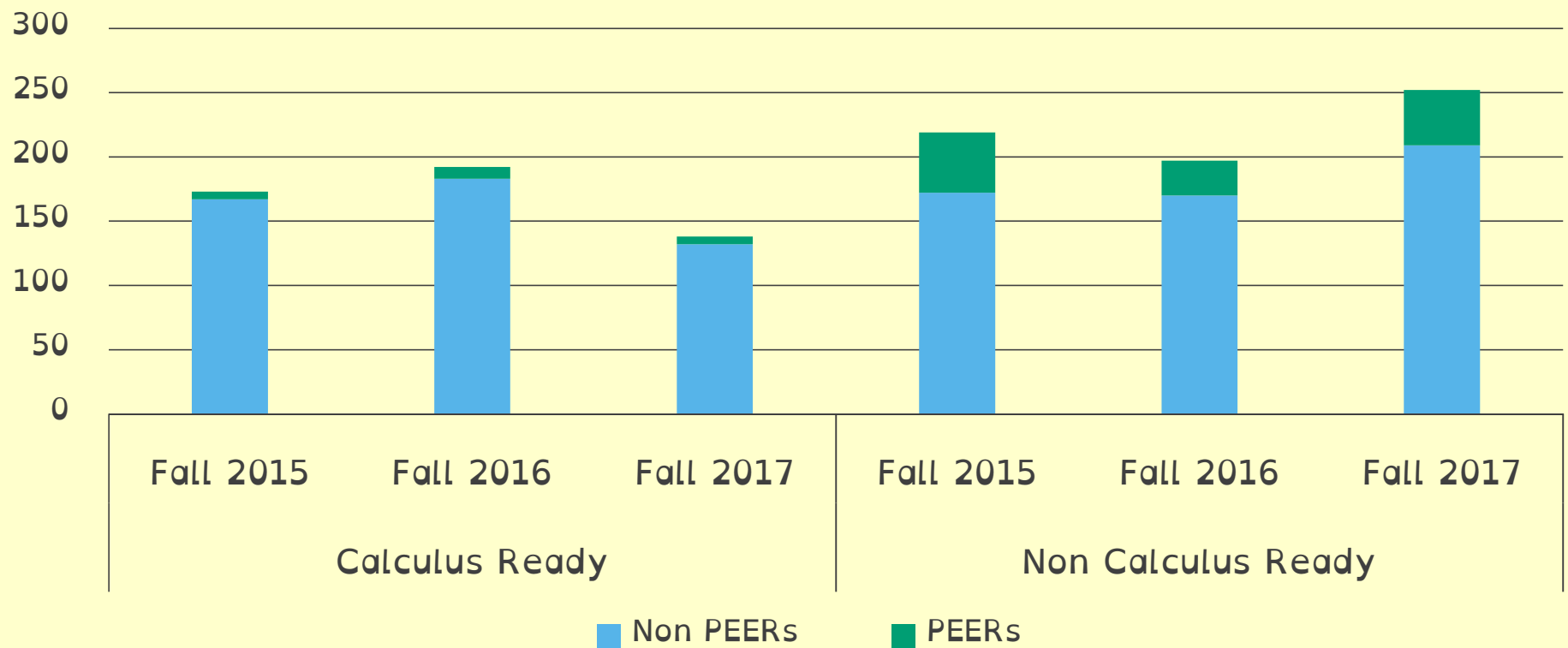
Our Focus: minimize effects of not starting in calculus

Motivation

the ultimate goal of the K–12 mathematics curriculum should not be to get students into and through a course in calculus by twelfth grade but to have established the mathematical foundation that will enable students to pursue whatever course of study interests them when they get to college

MAA/NCTM Joint Position Statement on Teaching Calculus

Motivation



STEM Ready Team



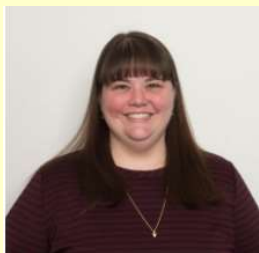
DUE IOUSE
1900036



Bethany Bowling (PI)
Assoc. Dean, College
of Arts & Sciences



Seth Adjei (Co-PI)
Computer Science



Brooke Buckley (Co-PI)
Math/Stat Dept Chair



Patrick Hare
Chemistry



Axel Brandt (Co-PI)
Mathematics



Josh Cooper
Biology

STEM Ready



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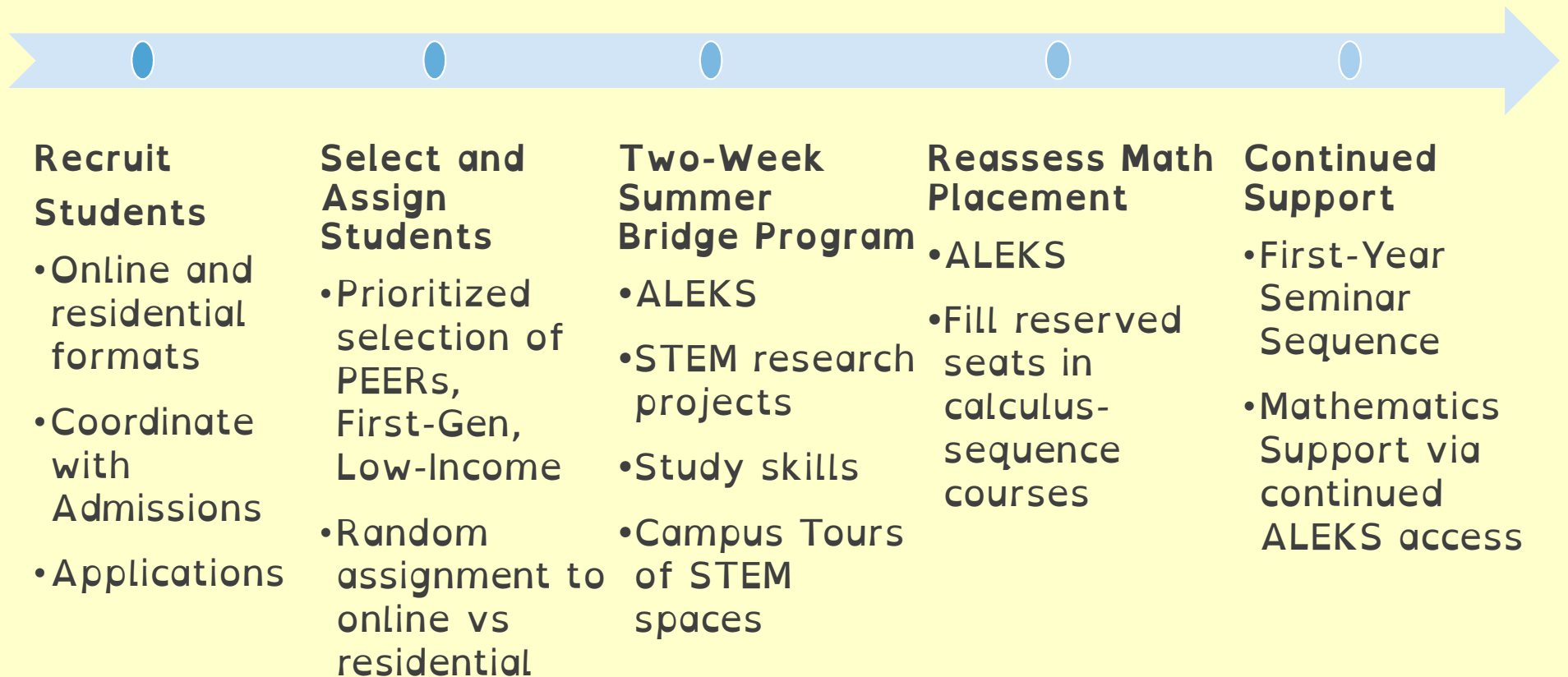
Primary Objective

- Test mechanisms to address mathematics preparation in a reduced amount of time to increase STEM retention and graduation rates

Primary Mechanism

- Develop two-week bridge programs to improve math readiness for students interested in STEM

Annual Timeline



Program Iterations

Summer 2020

Only Online – 15 Participants

Summer 2021

Only Residential – 14 Participants

Summer 2022

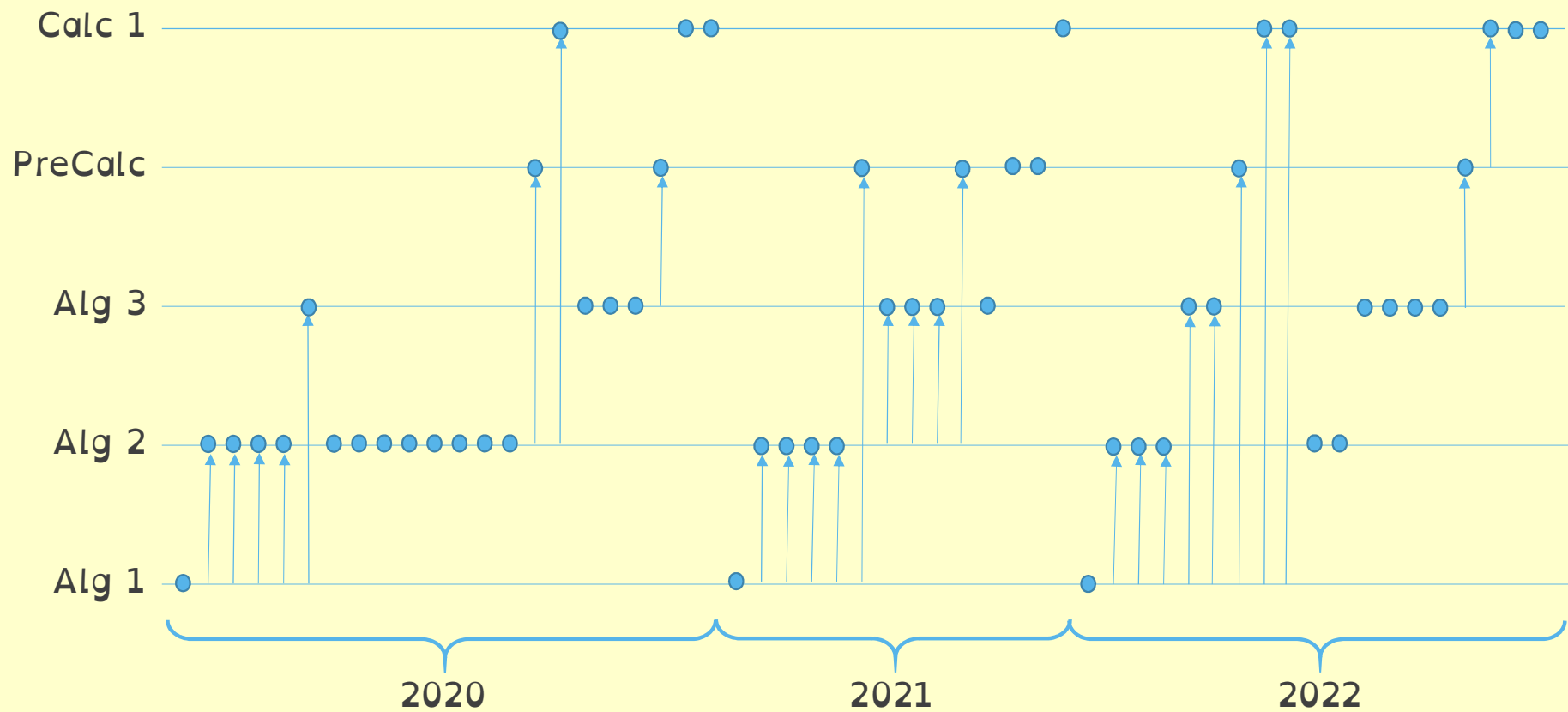
Only Residential – 19 Participants

Summer Program Math Skills

	Su	M	T	W	R	F	Sa	Su	M	T	W	R	F
7:00													
8:00		Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Move-Out & Celebration Breakfast
9:00		Welcome, Intros & Logins	ALEKS	Research Exploration	ALEKS	Research Exploration			ALEKS Skills Assessment 2	ALEKS	Research Exploration	ALEKS	
10:00		ALEKS Skills Assessment 1	Break / Travel	Break / Travel	Break / Travel	Break / Travel				Break / Travel	Break / Travel	Break / Travel	ALEKS Skills Assessment 3
11:00		Break / Travel	Research Exploration	ALEKS	Research Exploration	ALEKS			Break?	Research Exploration	ALEKS	Research Exploration	
12:00		Lunch	Lunch	Lunch	Lunch	Lunch			Lunch	Lunch	Lunch	Lunch	Working Lunch & Practice Talks
1:00		Campus Connections	ALEKS	Research Exploration	ALEKS	Research Exploration			ALEKS & 1-1 Progress Chats	ALEKS	Tips for STEM Talks & Group Formation	ALEKS	Research Presentation Preparation
2:00		Break				Break / Travel			Highlight: Game Room	Highlight: Learning PLUS	Highlight: CINSAM/ISRC	Break / Travel	Break
3:00		Growth Mindset	Highlight: Campus Rec	Highlight: Science Center	Metacognition / Study Cycle	ALEKS			Research Exploration	Research Exploration	ALEKS	Research Presentation Preparation	Research Presentations
4:00	Move-In	ALEKS	Research Exploration	ALEKS	Research Exploration	Break			Break	Break	Break	Break	
5:00		Break	Break	Break	Break	Break			Break	Break	Break	Break	
6:00	Welcome Picnic	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	
7:00		Social	Social	Social	Social	Social			Social	Social	Social	Social	
8:00													

Outcomes

Improved Course Placement

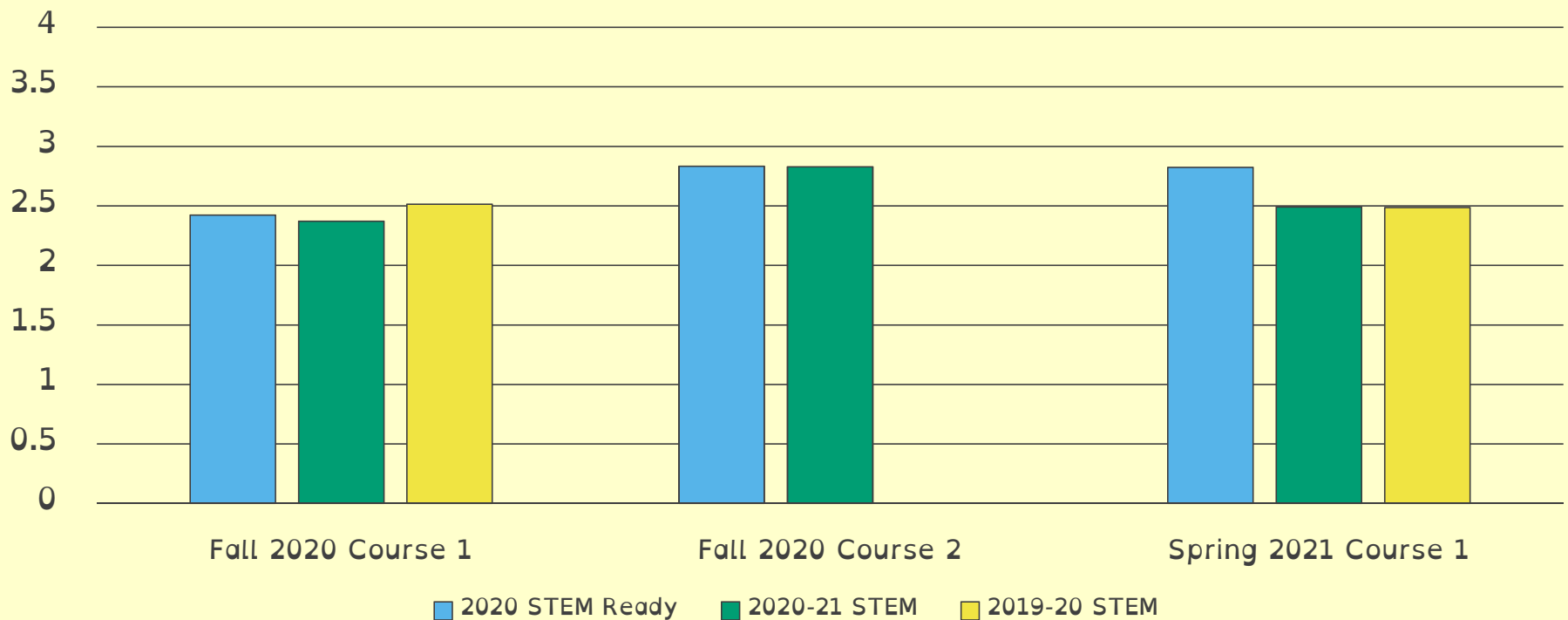


Summer Program Study Skills

	Su	M	T	W	R	F	Sa	Su	M	T	W	R	F
7:00													
8:00		Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Move-Out & Celebration Breakfast
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3:00		Growth Mindset	Highlight: Campus Rec	Highlight: Science Center	Metacognition / Study Cycle	Break / Travel			Highlight: Game Room	Highlight: Learning PLUS	Highlight: CINSAM/ISRCA	Break / Travel	Break
4:00	Move-In	ALEKS	Research Exploration	ALEKS	Research Exploration	ALEKS			Research Exploration	Research Exploration	ALEKS	Research Presentation Preparation	Research Presentations
5:00		Break	Break	Break	Break	Break			Break	Break	Break	Break	
6:00	Welcome Picnic	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	
7:00		Social	Social	Social	Social	Social			Social	Social	Social	Social	
8:00													

Outcomes Academic Success in STEM Majors

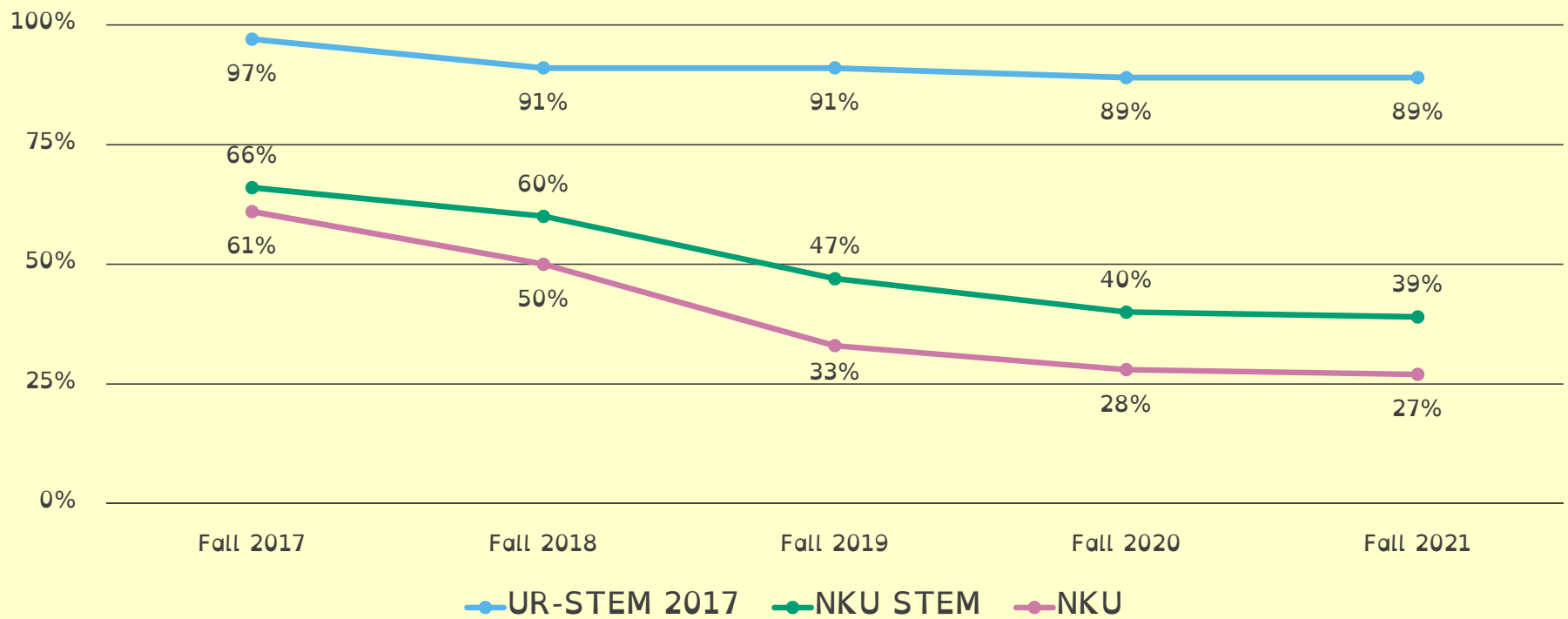
2020 First Year Math Success Comparison (Mean Grade as GPA)



Summer Program Belonging

	Su	M	T	W	R	F	Sa	Su	M	T	W	R	F
7:00													
8:00		Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Move-Out & Celebration Breakfast
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11:00		Break / Travel	Research Exploration	ALEKS	Research Exploration	ALEKS				Research Exploration	ALEKS	Research Exploration	Working Lunch & Practice Talks
12:00		Lunch	Lunch	Lunch	Lunch	Lunch			Lunch	Lunch	Lunch	Lunch	
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3:00		Growth Mindset				ALEKS			Research Exploration	Research Exploration	ALEKS	Research Presentation Preparation	Research Presentations
4:00	Move-In	ALEKS	Research Exploration	ALEKS	Research Exploration	Break			Break	Break	Break	Break	
5:00	Welcome Picnic	Break	Break	Break	Break		Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	
6:00		Dinner	Dinner	Dinner	Dinner				Social	Social	Social	Social	
7:00		Social	Social	Social	Social								
8:00													

STEM Retention in Department



UR-STEM



DUE STEP
0969280



NKU STEM
Center

- Paid summer research with open application
- Prioritized selection model to include students at-risk of leaving a STEM major
 - No STEM experience (e.g. research, STEM job)
 - Struggle in STEM course
 - First-Year
 - PEERs
 - First-Generation
 - Low-SES
 - Female (in comp sci, physics, engineering)

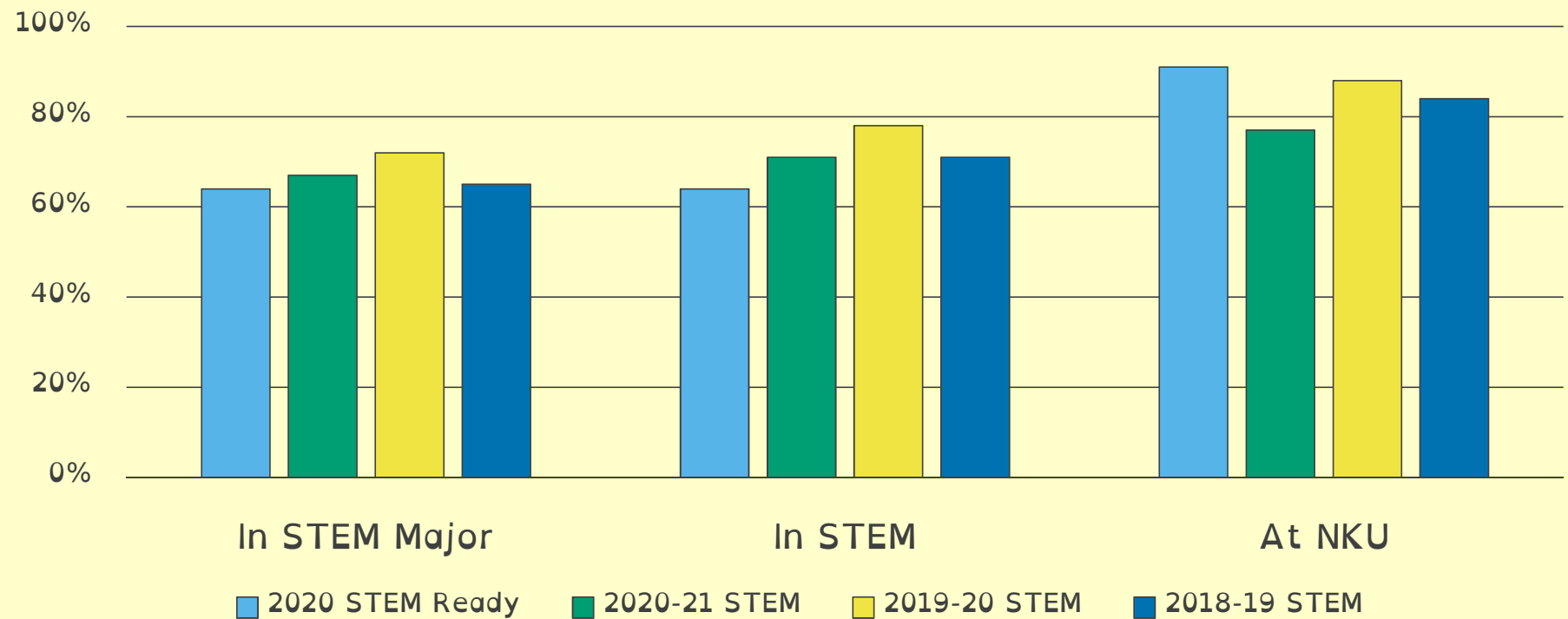
Team: Vaughn, Henderson, Bowling, Kulkarni, Hokkanen

Summer Program STEM Research

	Su	M	T	W	R	F	Sa	Su	M	T	W	R	F
7:00													
8:00		Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Move-Out & Celebration Breakfast
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7:00		Social	Social	Social	Social	Social			Social	Social	Social	Social	
8:00													

Outcomes

First-Year Fall-Spring Retention (2020)



Research Project Priorities

1. Draw connections b/w math & other STEM fields
2. Accessible to students with diverse mathematics preparation and scientific interests/backgrounds
3. Open-ended
4. Fit in 6-hour timeframe
5. Well-suited for in-person and online facilitation
6. Scalable to larger cohorts
7. Investigate real-world problems

Value of UG Research

- Recruit, and then retain, the best students ...
primarily a teaching effort on the part of faculty

2013 AMS Culture Statement on UG Research

- Educational benefits for student participants –
including and especially those from demographic
groups historically underserved by higher education

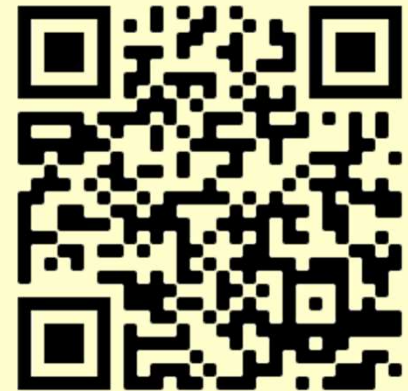
AAC&U (Kuh, 2008)

Thank You



Dyslexia-Friendly Font Info
(and other accessibility tips)

Slides



Axel Brandt
abrandt@jcu.edu