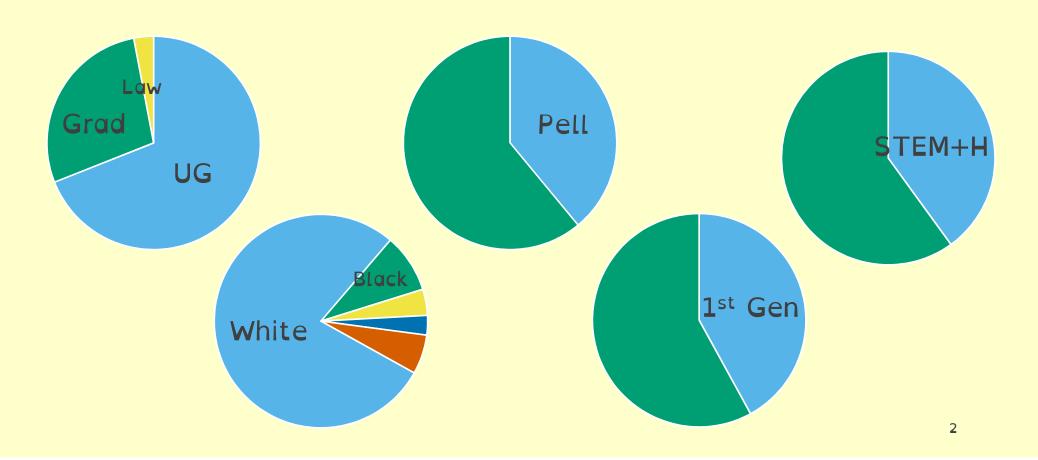
A Summer Bridge Program for STEM Student Success

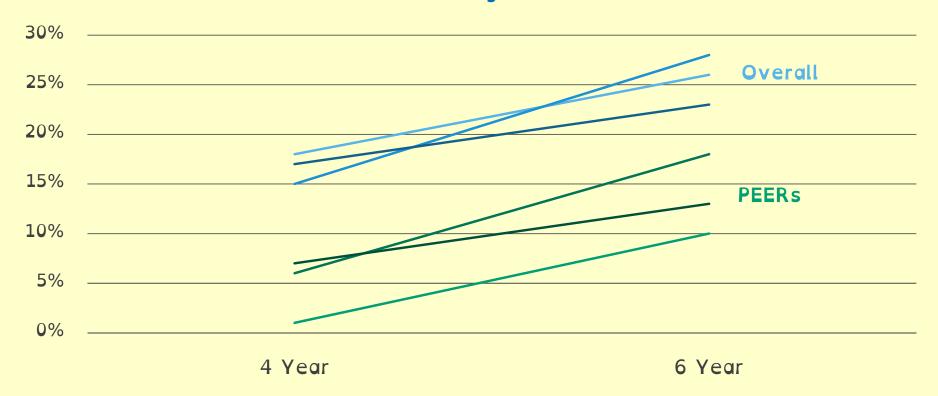
Axel Brandt (he/him)
John Carroll University

Ohio MAA Section Meeting, Fall 2022

Northern Kentucky University Student Profile

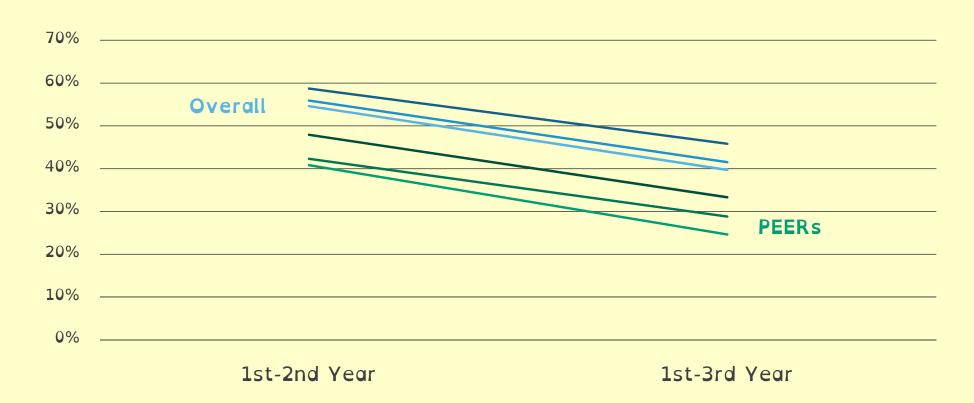


Northern Kentucky University STEM Graduation Rates for students starting 2009-11



Northern Kentucky University

STEM Retention 2013-15



Q: Why might students choose to stop pursuing their STEM major?

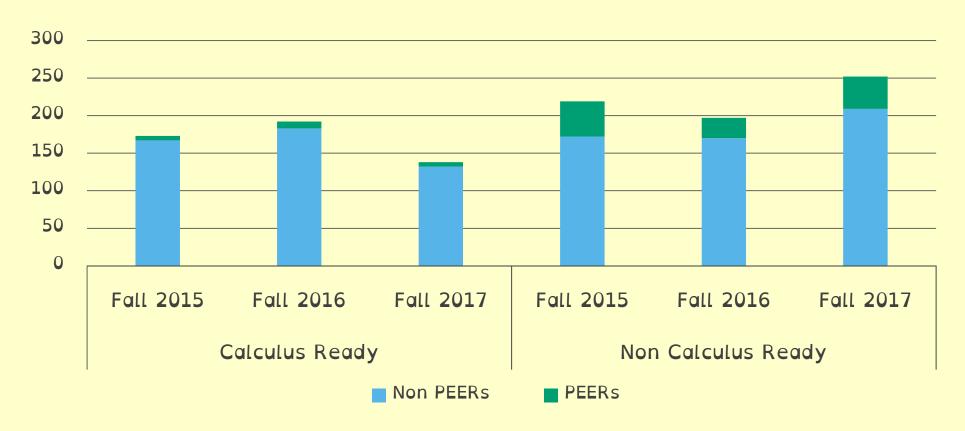
Our Focus: minimize effects of not starting in calculus

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



9

STEM Ready Team





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



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

Recruit **Students**

- Online and residential formats
- Coordinate with Admissions
- Applications

Select and Assign **Students**

- Prioritized selection of PEERs, First-Gen. Low-Income
- •Random assignment to online vs residential

Two-Week Summer **Bridge Program**

- ALEKS
- •STEM research projects
- Study skills
- Campus Tours of STEM spaces

Reassess Math Continued **Placement**

- ALEKS
- Fill reserved seats in calculussequence courses

Support

- •First-Year Seminar Sequence
- Mathematics Support via continued **ALEKS** access

Program Iterations

Summer 2020

Only Online – 15 Participants

Summer 2021

Only Residential – 14 Participants

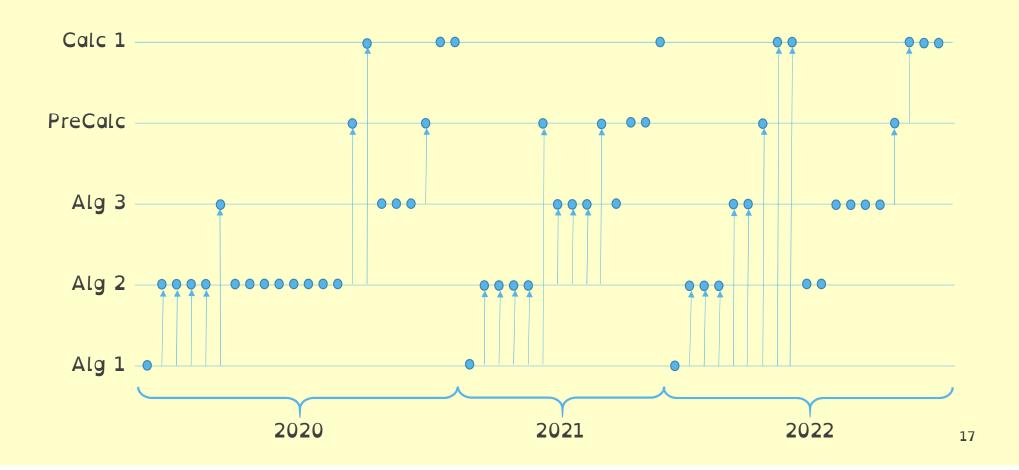
Summer 2022

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
9:00		Welcome, Intros & Logins	ALEKS	Research Exploration	ALEKS	Research Exploration			ALEKS Skills	ALEKS	Research Exploration	ALEKS	Breakfast
10:00		ALEKS Skills	Break / Travel	Break / Travel	Break / Travel	Break / Travel			Assesment 2	Break / Travel	Break / Travel	Break / Travel	ALEKS Skills Assessment 3
11:00		Assessment 1	Research Exploration	ALEKS	Research Exploration	ALEKS			Break?	Research Exploration	ALEKS	Research Exploration	ASSESSMENCS
		Break / Travel	Emploration		- Aprototion				0.000	Enpiroration.		Emploration	
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	ALEKS	Tips for STEM Talks & Group	ALEKS	Research
2:00		Break		Exploration		Exploration			Chats		Formation		Presentation
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 Research	Preparation Break
4:00	Move-In	ALEKS	Research Exploration	ALEKS	Research Exploration	ALEKS			Research Exploration	Research Exploration	ALEKS	Presentation Preparation	Research Presentations
						Break			•			Break	
5:00		Break	Break	Break	Break	2. 541			Break	Break	Break	2. 2011	
6:00	Welcome	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	
7:00	Picnic	Social	Social	Social	Social	Social			Social	Social	Social	Social	
8:00													

Outcomes Improved Course Placement

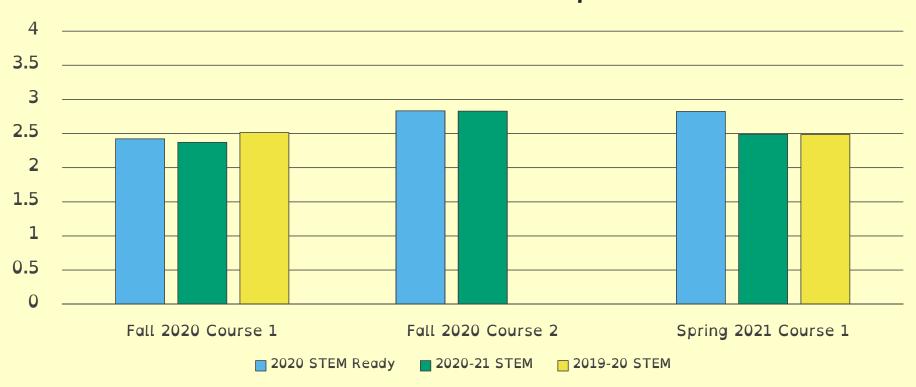


Summer Program Study Skills

	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
9:00		Welcome, Intros & Logins	ALEKS	Research Exploration	ALEKS	Research Exploration			ALEKS Skills	ALEKS	Research Exploration	ALEKS	Breakfast
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11:00		Assessment 1	Research Exploration	ALEKS	Research Exploration	ALEKS			Break?	Research Exploration	ALEKS	Research Exploration	Ascisinents
		Break / Travel	Exploration		Exploration				Di eak:	Exploration		Exploration	
12:00		Lunch	Lunch	Lunch	Lunch	Lunch			Lunch	Lunch	Lunch	Lunch	Working Lunch & Practice Talks
1:00		Campus Connections	ALEKS	Research	ALEKS	Research			ALEKS & 1-1 Progress	ALEKS	Tips for STEM Talks & Group	ALEKS	Research
2:00		Break	Exploration	140 2 301	Exploration			Chats		Formation		Presentation	
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 Research	Preparation Break
4:00	Move-In	ALEKS	Research Exploration	ALEKS	Research Exploration	ALEKS			Research Exploration	Research Exploration	ALEKS	Presentation Preparation	Research Presentations
	WIOVE-III		Exploration		Exploration	Break			Exploration	Exploration		Break	Fresentations
5:00		Break	Break	Break	Break	break			Break	Break	Break	bicak	
6:00	Welcome	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	
7:00	Picnic	Social	Social	Social	Social	Social			Social	Social	Social	Social	
8:00													

Outcomes Academic Success in STEM Majors

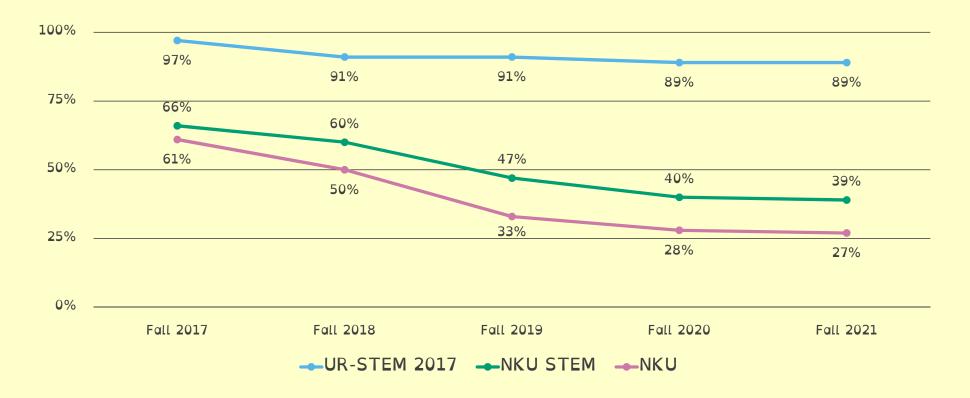
2020 First Year Math Success Comparison (Mean Grade as GPA)



Summer Program Belonging

	Su	M	Т	W	R	F	Sa	Su	M	Т	W	R	F
7:00													
8:00		Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Move-Out & Celebration
9:00		Welcome, Intros & Logins	ALEKS	Research Exploration	ALEKS	Research Exploration			ALEKS Skills	ALEKS	Research Exploration	ALEKS	Breakfast
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11:00		Assessment 1	Research Exploration	ALEKS	Research Exploration	ALEKS			Break?	Research Exploration	ALEKS	Research Exploration	
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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	ALEKS	Tips for STEM Talks & Group	ALEKS	Research
2:00		Break							Chats		Formation		Presentation
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 Research	Preparation Break
4:00	Move-In	ALEKS	Research Exploration	ALEKS	Research Exploration	ALEKS			Research Exploration	Research Exploration	ALEKS	Presentation Preparation	Research Presentations
\Box			Emploration		Emploration	Break			Emploration	Emploration		Break	. resentations
5:00		Break	Break	Break	Break	51 661			Break	Break	Break	Di con	
6:00	Welcome	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	
7:00	Picnic	Social	Social	Social	Social	Social			Social	Social	Social	Social	
8:00													

STEM Retention in Department



UR-STEM





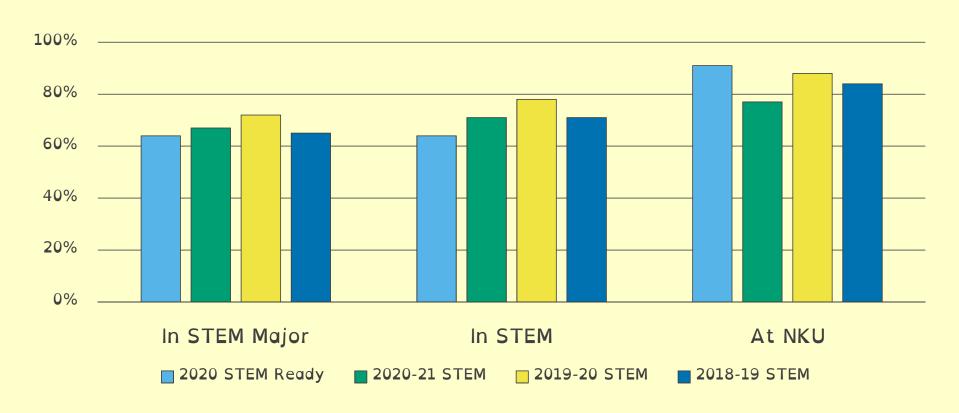
- Paid summer research with open application
- Prioritized selection model to include students atrisk of leaving a STEM major
 - No STEM experience (e.g. research, STEM job)
 - Struggle in STEM course
 - First-Year
 - PEERs
 - First-Generation
 - Low-SES
 - Female (in comp sci, physics, engineering)

Team: Vaughn, Henderson, Bowling, Kulkarni, Hokkanen

Summer Program STEM Research

	Su	М	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
9:00		Welcome, Intros & Logins	ALEKS	Research Exploration	ALEKS	Research Exploration			ALEKS Skills	ALEKS	Research Exploration	ALEKS	Breakfast
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1:00		Assessment 1	Research Exploration	ALEKS	Research Exploration	ALEKS			Break?	Research Exploration	ALEKS	Research Exploration	Assessment 5
2		Break / Travel	Exploration		Exploration				DI Edk:	Exploration		Exploration	
2:00		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
2:00		Break	Highlight: Campus	Highlight: Science	Metacognition /	Break / Travel			Highlight: Game	Highlight:	Highlight:	Break / Travel	Preparation
3:00		Growth Mindset	Rec	Center	Study Cycle	break / Havei			Room	Learning PLUS	CINSAM/ISRCA	Research	Break
4:00	Move-In	ALEKS	Research Exploration	ALEKS	Research Exploration	ALEKS			Research Exploration	Research Exploration	ALEKS	Presentation Preparation	Research Presentations
	WIOVE-III		Exploration	DIOTATION	Exploration	Break			Exploration	Exploration		Break	Presentations
5:00		Break	Break	Break	Break	bieak			Break	Break	Break	break	
6:00	Welcome	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	
7:00	Picnic	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