Strategies for Orchestrating a Comprehensive Math Learning Center

IES 2020

Jonathan Watkins, Ph.D.
Kelly Coultas, M.Ed.
Tyler Price

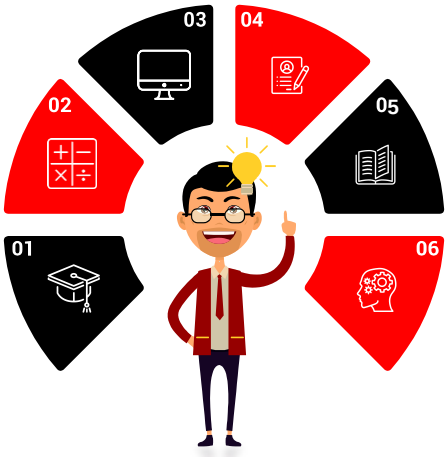
UNIVERSITY OF LOUISVILLE.

Presentation Overview

Emporium Math Lab
Intervention courses in mathematics

Math Resource Center
Tutoring and summer bridge programs

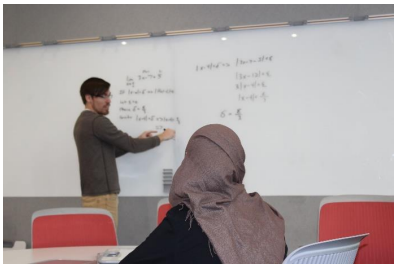
Context
University of Louisville and REACH (Academic support)



Learning Resource Center
Face-to-face and online tutoring

Peer-Assisted Learning
Large-group tutoring and classroom assistance

Workshops
Exam prep and student success workshops



Context

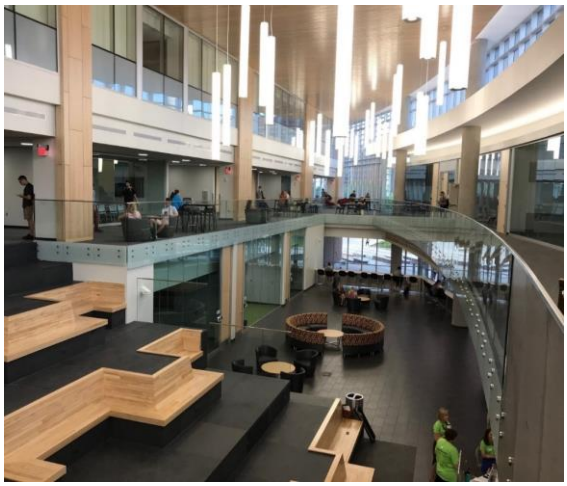
University of Louisville

- State-supported research university in Louisville, Kentucky
- Population of Louisville: ≈ 600,000
- UofL enrollment: > 22,000
  - ≈ 70% White
  - ≈ 30% Minority (≈11% AA)
- UofL's Belknap campus

REACH

- **RE**sources for Academic **ACH**ievement
- Academic support unit for undergraduate students at the University of Louisville
- Programs: Tutoring services, student success workshops, and intervention courses
- All REACH tutoring services are free to students.

REACH



REACH

During the 2018-19 academic year, REACH…

- Served more than **5,000** unique students for a total of about **76,000** contact hours!
- Tutored **70.4%** of the entire 2018 cohort in at least one course.
- Offered more than **14,000** hours of mathematics tutoring through the Math Resource Center.
- Helped students achieve an **88%** ABC pass rate and a **94%** overall (i.e., ABCD) pass rate.

REACH

REACH professional and paraprofessional staff

- REACH has **12** full-time professional staff members and **11** graduate student assistants.
- REACH also employs approximately **150** tutors each semester.
- Tutors earn between **$10 – $11.50** per hour, depending on their experience and certification level.
- REACH's tutor training program is certified by the College Reading & Learning Association (CRLA).

REACH

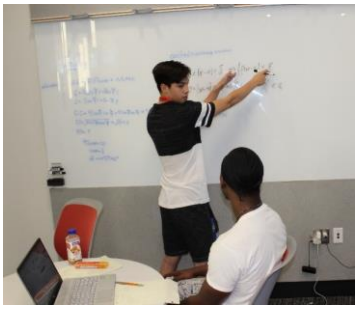
Types of training provided by REACH

- Face-to-face training (beginning of semester and midterm)
- Online training
- Make-up training

Topics addressed in training

- Policies and procedures
- Tutoring/CRLA topics
- Content (mathematics)

Math Resource Center

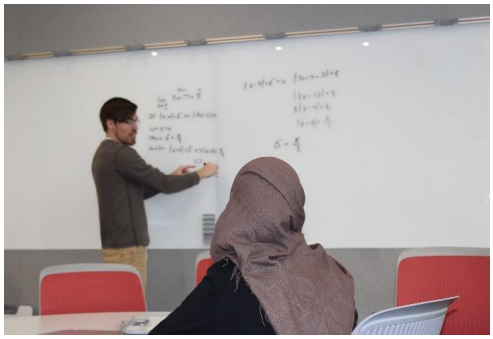


Math Resource Center

- Drop-in tutoring for math courses up to Calculus II
- Limited scheduled tutoring for math ed courses
- Seating for ≈ 50 students
- Hours of operation:
  - 9-7 Monday-Thursday
  - 9-2 Friday

Math Resource Center

- Summer Bridge Programs
  - MATH XCELERATOR
  - Brown-Forman Engineering Academic (BFEA)
  - Calculus Preview Program (Fully online)



Emporium Math Lab

GEN 103/104

Emporium Math Lab

- Computer lab used to teach the University's intervention courses in algebra (GEN 103/104)
- Three credit-hour courses (elective) and graded Pass/Fail

Emporium Math Lab

- GEN 103: Special Topics in College Mathematics for **Non-STEM** Majors
  - Includes topics from pre-algebra and basic algebra (such as solving linear equations)
  - Designed for students who only need a basic mathematics/quantitative reasoning course

Emporium Math Lab

- GEN 104: Special Topics in College Mathematics for **STEM** Majors
  - Includes topics from basic and intermediate algebra (such as solving quadratic equations)
  - Designed for students who need College Algebra or beyond

Emporium Math Lab

- Courses taught using the Emporium model
  - Computer-based with fully-integrated instructional courseware
  - Personalized curriculum
  - Self-accelerated (pacing guides)
  - No lecturing (Lectures replaced with courseware learning aids, on-demand assistance, and other resources)

Source: The National Center for Academic Transformation, 2013

Emporium Math Lab

- Courses taught using the Emporium model
  - Ongoing assessment/feedback
  - Active learning
  - Mastery learning
  - Time on task (attendance policy)
  - Monitoring student progress (*Plan of Action* meetings)

Source: The National Center for Academic Transformation, 2013

Emporium Math Lab

- Other features of our intervention courses
  - Taught by GSAs and professional staff
  - Peer tutors embedded in all classes
  - Opportunity to finish the class early
  - Opportunity to complete both courses (GEN 103/104) in one semester
  - "Returning" students don't start over!

Emporium Math Lab

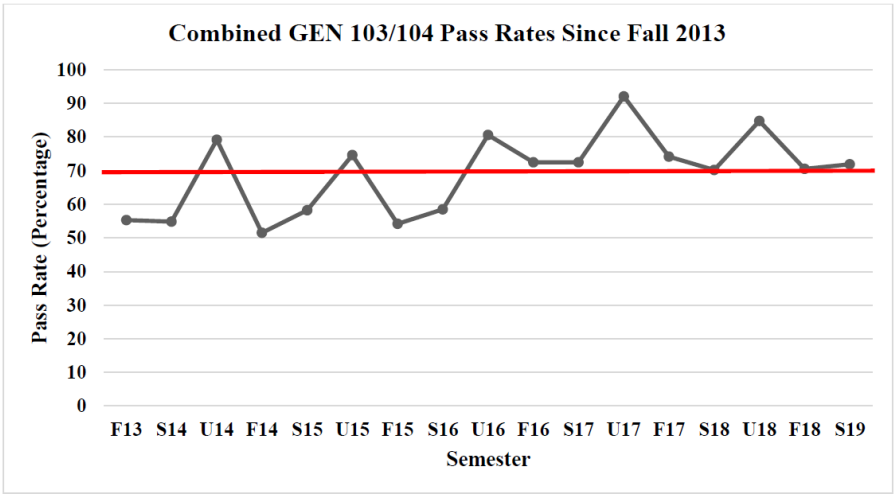


Figure 1. Combined GEN 103/104 pass rates from Fall 2013 to Spring 2019

Learning Resource Center

Learning Resource Center

- The Learning Resource Center (LRC) offers tutoring for many freshman- and sophomore-level undergraduate courses, as well as several junior-level courses.

Learning Resource Center

Mathematics/Statistics

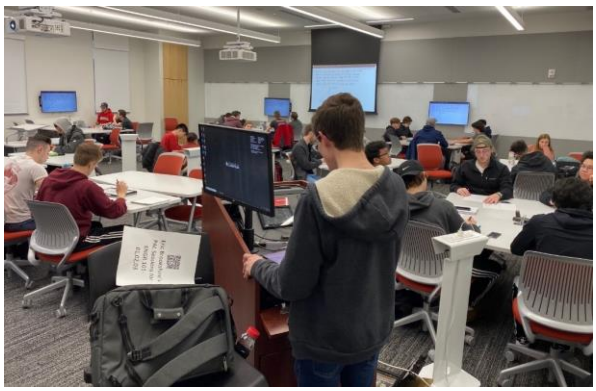
- Scheduled tutoring for a variety of statistics courses (such as social stats and biostatistics)
- Scheduled tutoring for select engineering mathematics courses, as needed
- Limited drop-in tutoring for statistics

Learning Resource Center

Scheduled Tutoring	Drop-In Tutoring
Students have a standing tutoring appointment.	Students do not make an appointment.
Students meet with their assigned tutor for one hour per week.	Students can meet with any available tutor when center is open (no time limit).
Small-group tutoring (1–5 students)	Combination of small-group and one-on-one tutoring
Students cannot miss two tutoring sessions in a row.	There is no attendance requirement.

Learning Resource Center

- Online tutoring
  - Online tutoring is available to distance-education students, as well as students who need evening or weekend tutoring.
  - Tutors work with students using an online platform that includes video conferencing and an interactive whiteboard space.
  - Online tutoring appointments take place weekly for one hour/week (similar to face-to-face scheduled tutoring).



Peer-Assisted Learning

Peer-Assisted Learning

- Peer-Assisted Learning (PAL) is a peer-tutoring program designed specifically for **large-enrollment courses** (≥ 100) that have been **historically difficult** for students to pass.
- For example, PAL sessions are offered for a number of engineering mathematics courses (e.g., calculus).

Peer-Assisted Learning

- How does PAL work? A PAL leader…
  - Attends class sessions and assists the instructor (if requested).
  - Prepares for weekly **large-group** review and discussion sessions.
  - Holds 2 – 3 sessions/week.
  - Holds test review sessions before major exams.
  - Works ≈ 10 hours per week.

Peer-Assisted Learning

- On average, about **40%** of the students in classes with a PAL leader attend at least one PAL session.
- However, participation is generally much higher in mathematics courses.
- Students who attend PAL sessions earn **at least a half of a letter grade** higher than students who do not attend.

Workshops

Workshops

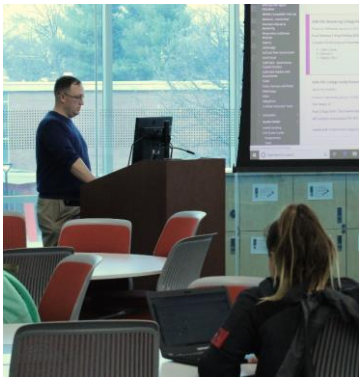
- Workshops for Praxis® Core Mathematics test
  - Partnership with the College of Education & Human Development
  - 2 – 4 sessions per semester
  - Focus on the **math content** covered on the test
  - Also includes general and specific **test-taking strategies**

Workshops

- Test prep workshops for the GRE and other exams required for entrance into graduate/professional school
- Partnership with The Princeton Review®
- Students receive a free full-length practice test!

Workshops

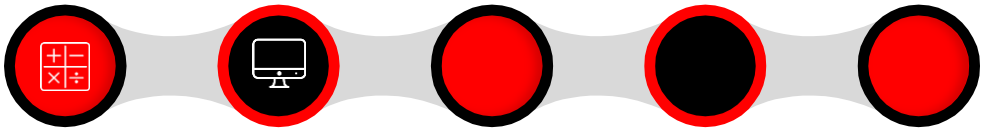
- *Hackademic* workshop series
  - REACH workshops designed to help students succeed academically
  - Topics include…
    - Studying Smarter
    - Acing the Test
    - Taking Effective Notes
  - Offered onsite (fall only) and online



Connections

Math Resource Center	Emporium Math Lab	Learning Resource Center	Peer-Assisted Learning	*Hackademic* Workshops
Tutoring and summer bridge programs	Intervention courses in mathematics	Face-to-face and online tutoring	Large-group tutoring and class assistance	Graduate exam and student success

Connections



Math Resource Center

Tutoring and summer bridge programs

Emporium Math Lab

Intervention courses in mathematics

Learning Resource Center

Face-to-face and online tutoring

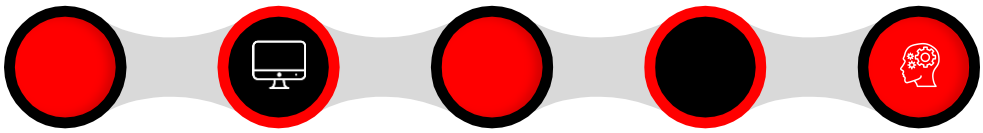
Peer-Assisted Learning

Large-group tutoring and class assistance

Hackademic Workshops

Graduate exam and student success

Connections



Math Resource Center

Tutoring and summer bridge programs

Emporium Math Lab

Intervention courses in mathematics

Learning Resource Center

Face-to-face and online tutoring

Peer-Assisted Learning

Large-group tutoring and class assistance

***Hackademic* Workshops**

Graduate exam and student success

Connections

Math Resource Center
Tutoring and summer bridge programs

Emporium Math Lab
Intervention courses in mathematics

Learning Resource Center
Face-to-face and online tutoring

Peer-Assisted Learning
Large-group tutoring and class assistance

Hackademic Workshops
Graduate exam and student success

Connections

Math Resource Center
Tutoring and summer bridge programs

Emporium Math Lab
Intervention courses in mathematics

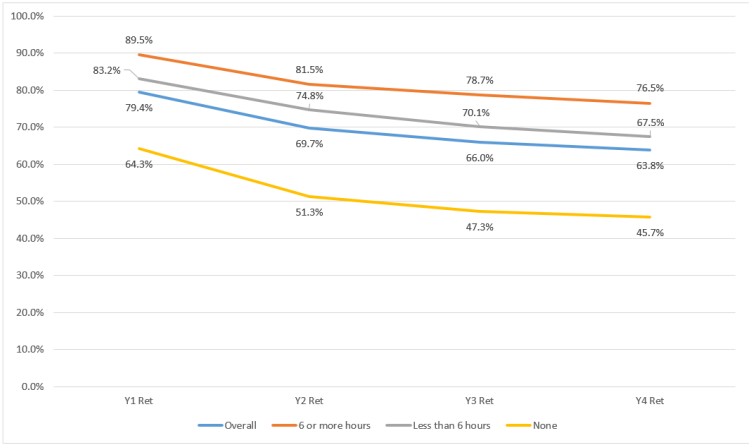
Learning Resource Center
Face-to-face and online tutoring

Peer-Assisted Learning
Large-group tutoring and class assistance

Hackademic Workshops
Graduate exam and student success

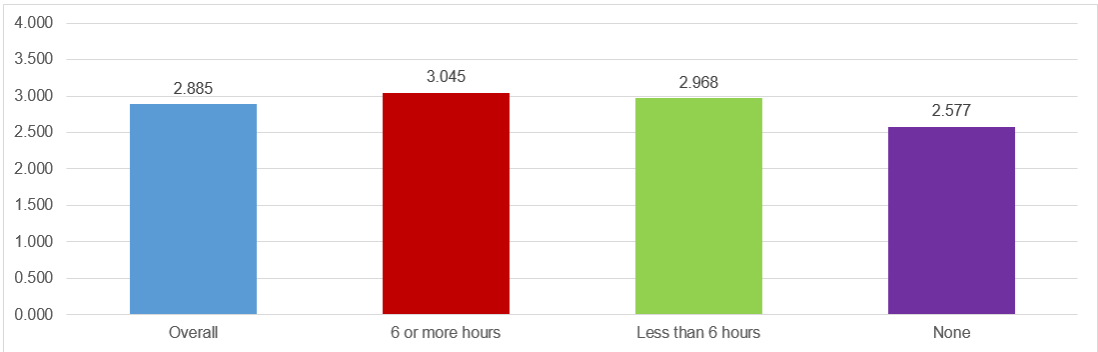
Results

2014 Cohort Retention Rates by REACH Utilization



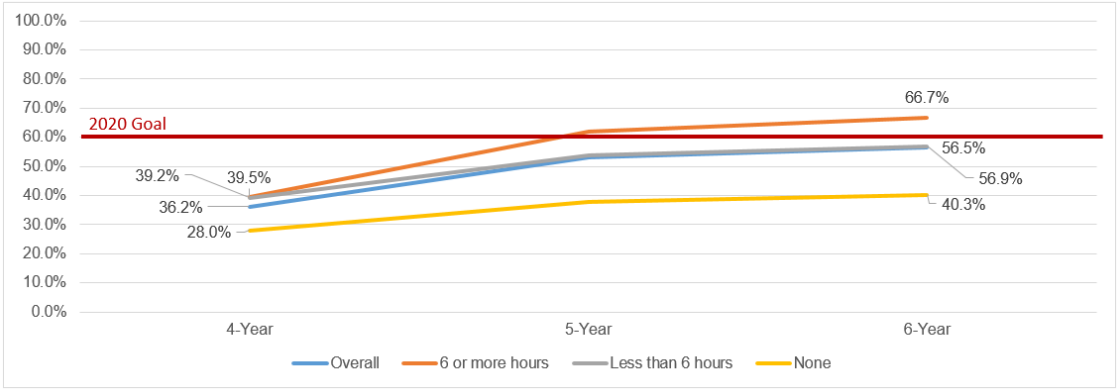
Results

2018 Cohort First-Year GPA by REACH Utilization

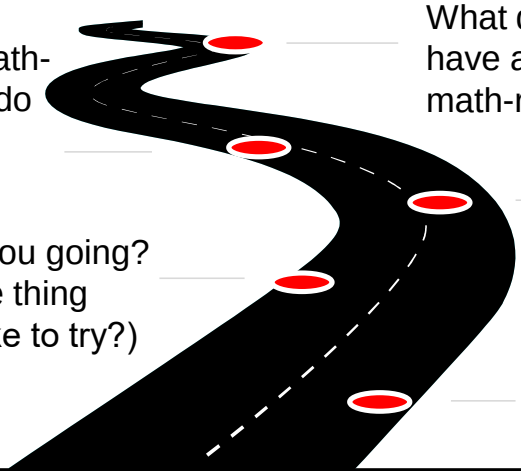


Results

2013 Cohort Graduation Rates by REACH Utilization



Discussion



What types of math-related services do you offer at your institution?

What questions do you have about REACH and our math-related services?

How are your services connected?

Where are you going? (What is one thing that you'd like to try?)

Other questions or comments?

Thank You for Attending!

Jonathan Watkins, Ph.D.
jonathan.watkins@louisville.edu

Keith McKnight
keith.mcknight@louisville.edu

UNIVERSITY OF LOUISVILLE

Ethnicity & Pass Rate

Table 5: GEN 103/104 Pass Rates by Ethnicity for AY 2018-19

	% (#) Pass White	% (#) Pass African-American	% (#) Pass Hispanic	% (#) Pass Other Minority	% (#) Pass All Minority
AY 2018-19					
GEN 103*	82.0 (168/205)	71.6 (53/74)	87.5 (28/32)	77.3 (17/22)	76.6 (98/128)
GEN 104	68.8 (265/385)	74.3 (84/113)	57.4 (27/47)	57.8 (52/90)	65.2 (163/250)
Combined	**73.4 (433/590)**	**73.3 (137/187)**	**69.6 (55/79)**	**61.6 (69/112)**	**69.0 (261/378)**

**This category includes students in both regular and supplemented sections of GEN 103.*

Ethnicity & Pass Rate

- Pearson's chi-square test of association (see Cohen, 2008) was performed to determine whether there was a statistically-significant relationship between pass rate and ethnicity (white vs. all minority) in GEN 103/104.
- All basic assumptions of the chi-square test were met. These assumptions included
  - The use of mutually exclusive and exhaustive categories
  - Independence of observations
  - Meeting the minimum expected cell frequencies (Cohen, 2008).

Ethnicity & Pass Rate

GEN 103

Fall 2018		
	P	F / W
White	89	19
Minority	49	16

$\chi^2(1) = 1.24$, $p = .27$

No association

Spring 2019		
	P	F / W
White	72	17
Minority	41	10

$\chi^2(1) = 2.07$, $p = .15$

No association

Ethnicity & Pass Rate

GEN 104

Fall 2018		
	P	F / W
White	180	80
Minority	96	58

$\chi^2(1) = 0.01$, $p = .94$

No association

Spring 2019		
	P	F / W
White	74	38
Minority	54	29

$\chi^2(1) = 0.02$, $p = .88$

No association