

# Using Data to Design Effective Supplemental Instruction for Developmental Math Courses

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# Calumet College of St. Joseph

- Established in 1951
- Catholic
- Liberal Arts
- Approximately 420 traditional undergraduate students
- 16 undergraduate programs, 4 graduate programs
- Majority athletes
- International students from 13 countries
- Student to faculty ratio 10:1
- Location relative to Lake Michigan and Chicago
- Most diverse college in Indiana
- Designated Hispanic Serving Institution since 2000
- Fall 2022 – 69% of students enrolled in a math course were enrolled in a developmental math course



# Grant Funded Faculty Position

- 2021 – Five million dollar HSI grant to further fund our goal to increase enrollment in STEM-related majors, with a focus on Hispanic and low-income students
- STEM related majors require successful completion of general education and advanced math courses
- The SI program is resource-intensive and would not be feasible without support from a grant

# Developmental Mathematics Sequence

## Developmental:

- MATH 095 – Developmental Math
- MATH 097 – Beginning Algebra
- MATH 103 – Intermediate Algebra

## General Education:

- MATH 104 – Precalculus
- MATH 110 – Finite Mathematics
- MATH 171 – Principles of Statistics

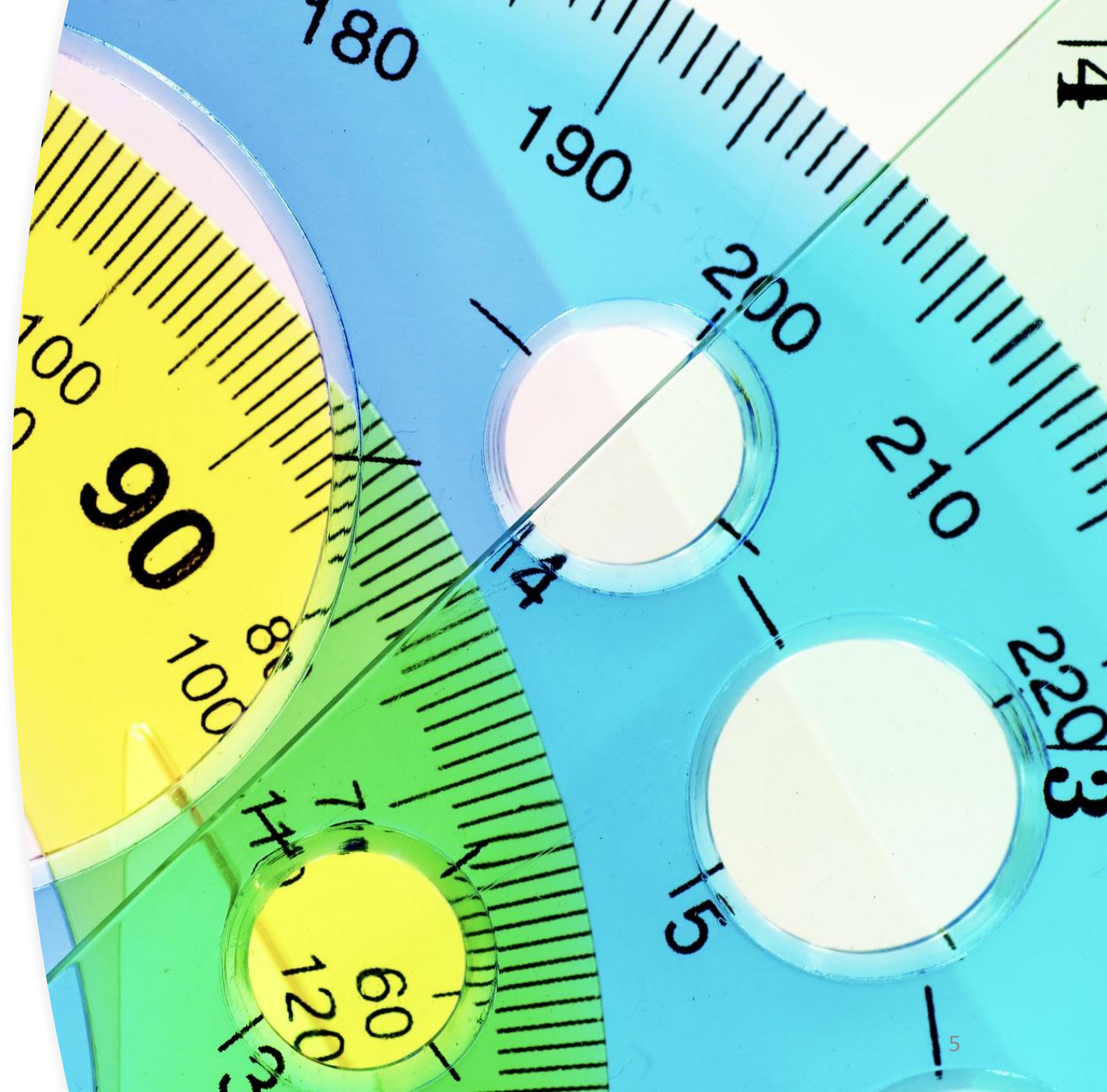
## Advanced – Required for STEM Majors

- MATH 230 – Calculus I
- MATH 231 – Calculus II
- MATH 310 – Calculus III



## MATH 103 – Bridge from Developmental to General Education

- MATH 103 has typically been a barrier to general education math courses for our students
- Student experiences and success in developmental courses have been shown to predict retention (supported by literature and observations on our campus)
- The course is designed to spiral so students have anywhere between three and six opportunities to demonstrate competency on course objectives via summative assessments
- During the term, students take eight chapter quizzes (50% of their course grade), one mid-term exam (10% of their course grade) and one final exam (10% of their course grade)
- The goal with the Supplemental Instruction in Math 103 was to get as many students as possible to earn a grade of C or better so they could move into their general education math course the following semester
- Bottom line - **failures limit access to and participation in higher education**



## MATH 103 Barriers to Success

**The SI program in Math 103 did not target high-risk students, but instead targeted a high-risk course**

- Homework Completion rates
- Quiz scores
- Mid-term and Final exam scores
- Attendance
- Participation in class



## Supplemental Instructor Responsibilities

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- Attend each class session
- Meet one-on-one with every student who scored below 75% on a quiz
- Reach out to students who did not submit homework assignments on time
- Reach out to students who did not attend class and arrange a time to meet with them



## Student Engagement with Supplemental Instructor – Carrots and Sticks

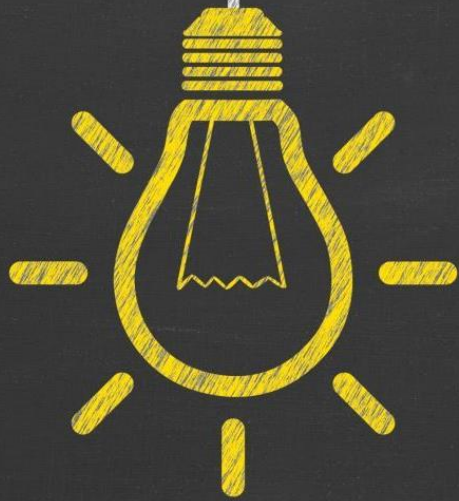
- Required student interactions with the SI outside of class were intentionally designed so that students who did not need extra academic support were not required to meet with the SI (although they could if they wanted to)
- Reach out to SI for extra help, as needed
- Meet with SI to review quiz (if score was below 75%)
- Meet with SI to catch up on class material if absent



# Fall 2022 Supplemental Instruction Data

	FINAL GRADES	103 B (SI)	103 C	103 D
Successful Completion	A	16.00%	6.00%	25.00%
Successful Completion	B	47.00%	22.00%	33.00%
Successful Completion	C	16.00%	22.00%	0.00%
Retake Course	C-	0.00%	22.00%	0.00%
Retake Course	D	11.00%	11.00%	17.00%
Retake Course	F	5.00%	11.00%	17.00%
Retake Course	FW	5.00%	6.00%	8.00%
Successful Completion Rate		79.00%	50.00%	58.00%
Avg. Number of Absences per Student		3.42	5.71	5.83
Avg. Attendance Rate		88%	81%	80%
Avg. Difference between pretest and posttest scores		15	16	10

# Ancillary Benefits of Supplemental Instruction



- Having a colleague observe every class session offered opportunities for collaboration and continuous feedback
- The SI (who taught a fourth section of math 103) was able use observed strategies in their section, allowing both instructors to place emphasis on the same content, thus ensuring that all students in math 103 had a very similar experience, regardless of who their instructor was
- A second faculty member (SI) allowed students to seek help from a faculty member who was familiar with the course, but not in 'authority'
- Student meetings with the SI, as required by academic performance in class, often led to the introduction of additional campus resources for students
- Students who did not successfully complete the SI section of math 103 in the fall showed growth during the term, which helped them complete math 103 next term
- Students became more confident in math class

## Using Data for Continuous Improvement – Revisions for Spring 2023

- All MATH 103 sections had an embedded, faculty SI
- Students were allowed to submit textbook assignments late (up to one week), for partial credit if they meet with the SI, completed the assignment with the SI, and submitted the assignment before they leave the SI's office
- All other SI and student responsibilities remained the same

# Spring Data

## Spring 2022

	FINAL GRADES	103 A	103 B	103 C
Successful Completion	A	0.00%	11.00%	0.00%
Successful Completion	B	21.00%	6.00%	10.00%
Successful Completion	C	0.00%	33.00%	40.00%
Retake Course	C-	14.00%	0.00%	0.00%
Retake Course	D	29.00%	33.00%	50.00%
Retake Course	F	29.00%	6.00%	0.00%
Retake Course	FW	7.00%	11.00%	0.00%
Successful Completion Rate		21.00%	50.00%	50.00%

## Spring 2023

	FINAL GRADES	103 A	103 B	103 C
Successful Completion	A	19.00%	14.00%	0.00%
Successful Completion	B	25.00%	29.00%	0.00%
Successful Completion	C	44.00%	36.00%	25.00%
Retake Course	C-	0.00%	7.00%	50.00%
Retake Course	D	6.00%	1.00%	25.00%
Retake Course	F	0.00%	0.00%	0.00%
Retake Course	FW	6.00%	7.00%	0.00%
Successful Completion Rate		88.00%	79.00%	25.00%

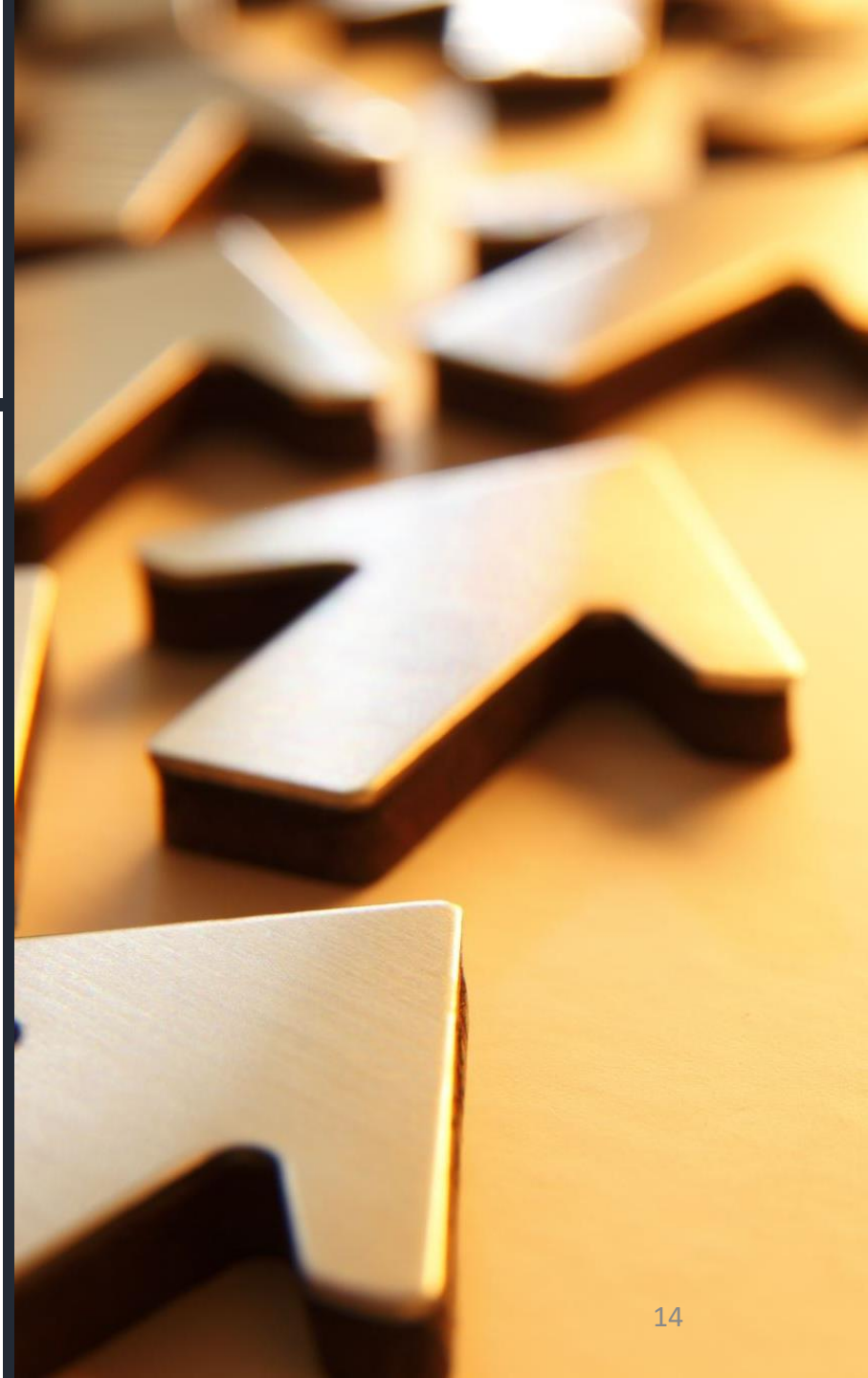
## Challenges with Scaling Up

- Process for contacting students and scheduling meetings was too complex for multiple sections
- Data collection for current and past students needed to be streamlined
- Time for student meetings and conferences
- Differentiating the level of support needed for more students in multiple sections
- Strategies to ensure students could transition from a developmental course with extra supports to a general education math course



# Moving Forward – Continuous Improvement

- Students who score between 50%-75% on quizzes can instead meet in a small group review. Students who score below 50% on a quiz will still need to attend a one-on-one conference
- Formalize weekly meeting times at the campus library for homework help and quiz review
- Create more agency for students with weekly class assignments by providing suggested study skills they can choose from
- Continue to adjust curriculum to meet the needs of students
- Required monthly check in's for students with a grade below 75%
- Monitor success of past SI students in their continued math sequence



Questions?

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