

Characteristics of Successful Programs in College Calculus: Masters Granting Institutions

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Selection of MA Case Studies

MA institutions are schools with masters in mathematics as the highest mathematics degree offered.



Selection of MA Case Studies

Selected Case Study Sites (exhibited at least two of three)

- Positive impact on students' confidence, enjoyment, and interest in mathematics
- Below median numbers of STEM-intending switchers
- Over-performance of expected calculus passing rate



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The Masters-Granting Institutions

College	UG / Grads	Setting	Popular Client
MA 1	9,000 / 1,000	Suburb: Large	Engineering
MA 2	5,000 / 500	Town: Distant	Teacher Ed
MA 3	7,000 / 5,000	City: Large	Economics
MA 4	13,000 / 1,000	City: Small	Engineering

Common Theme

Calculus teaching is a department priority

- Each department (chairs, instructors, etc) viewed the calculus classes as a key source of majors (who sustain their upper division courses)
- Faculty were usually selected for high skill
- Calculus was viewed as a positive teaching assignment

Who Teaches Calculus?

College	Calc 1 Instructors are...	Cap
MA 1	“best possible teachers”	40
MA 2	Full-time faculty only	35
MA 3	Picked carefully: “A-Team”	28
MA 4	Faculty want to teach calculus	35

**“Let's put our good people in calculus
and make sure we're doing a good job
there so we attract majors.”**

Chair, MA2



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Characteristics of Departments

	Calc Coord	Faculty Collaboration	Chair	Math & Math Education
MA 1	minimal, rotates	Strong informal culture	30 yrs, hired all	Math Ed faculty in Math
MA 2	minimal, rotates	Informal culture, mentoring	6 yrs	Close, 2/3 maj Math Ed
MA 3	guides new people	Dept pedagogy retreat	1 yr	Director of UG in Math Ed
MA 4	minimal, rotates	Very collegial, collaborative	12 yrs, hired 2/3 faculty	BS in Math Ed

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Characteristics of Four Masters Granting Institution

- **Low level of calculus coordination in the department**
- **Faculty collaborated but also had freedom (not coordinated independence)**

Every institution claimed faculty had freedom, but there was a culture of faculty collaborating through formal settings (retreats) and informal settings (hallway/coffee chats)

- **Math Ed faculty were curricular leaders (with indirect influence on calculus)**

Each site had faculty specializing in mathematics education. They often did not have direct oversight of calculus, but did have such control over developmental algebra and sometimes pre-calculus.

- **Most instructors' teaching was traditional, though reform techniques were accepted**

Observed lecture, lecture with questions, very little group work and a small amount of student presentations

Classroom Observation

	Reform Teaching?	Pure Lecture	Lecture with Questions	Student Presentations	Problem Solving
MA 1	A little	15%	65%	8%	10%
MA 2	Lecture w Compassion	28%	68%	5%	0%
MA 3	A little	11%	63%	1%	25%
MA 4	Lecture w Compassion	16%	73%	0%	2%

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(Un)Common Themes

	Placement Test?	Common Final?	Faculty Dev Center?	Student Tracking?	Reform Teaching?
MA 1	Accuplacer, SAT, interview	Some Qs	No	Yes, use data	A little
MA 2	No	No	Yes, fall conference	Yes, for accrediting	Lecture w Compassion
MA 3	Written test, now Dean's online	No	Yes	No	A little
MA 4	State ACT cut score or campus test	Common final, 30 yrs	No	No	Lecture w Compassion

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Student Supports

	Student Gathering Space	Majors formal work with Calc 1?	Student Research Support
MA 1	informal	Upper div UGs help in classroom	research, travel w faculty to conferences
MA 2	Windowed student room in center of faculty offices	Upper div UGs weekly sessions	No
MA 3	Math tutoring room, run by students, near faculty offices	No	No
MA 4	Pi Mu Epsilon math club room, near faculty offices	No	research, travel w faculty to conferences

What is the Take-Away?

- Characteristics were not consistent at all four institutions (but often appeared in at least two schools!)
- Low numbers of responses in Masters-granting institutions made it more challenging to select the case study sites
- Reform Teaching was minimal but Calculus I instructors were enthusiastic and students believed their instructors cared about their success.