Faculty-Driven, Student-Centered Change for Increased Success of All STEM Students

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Critical Role of Community Colleges

To ensure continued U.S. competitiveness and prosperity, our Nation must foster a strong, STEM-capable workforce[1]. Half of the people who enter STEM fields start at community colleges (CCs)[2] but only a fraction of the federal funding has been awarded to CCs, thus more research is needed on our population of STEM students. Furthermore, CCs typically serve diverse student populations and are an underutilized source of women, first generation and underrepresented students in STEM fields.

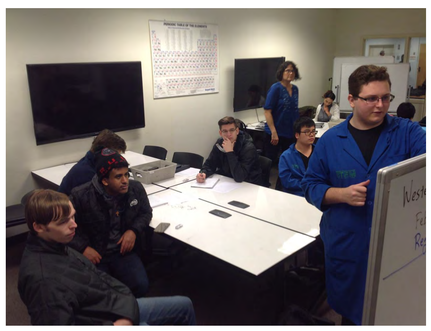
RiSE & MESA Project Goals

The Relationships in Science Education (RISE) and Mathematics Engineering Science Achievement (MESA) projects share two critical objectives:

1. Increase the STEM student **retention**, **graduation** (associate degrees) rates and **transfer** rates to 4-year institutions, and
2. Increase the **diversity** (women, underrepresented minorities and first generation) of STEM majors, graduates and transfer students.

MESA & RiSE Student Impact Activities

1. **Community:** Creation of MESA & RiSE groups, each with a study room as the center of the community.
2. **Wraparound Support:** Student support services include faculty mentors / advisors, peer tutors and faculty assistance, service learning opportunities, undergraduate research opportunities, workshops and speakers, support staff, and transfer assistance for students transferring to local colleges and universities.
3. **Recognition:** STEM & MESA awards and graduation celebrations are important for student affirmation, administrative buy-in and visibility, and faculty community validation.



RiSE Results: Impact on Students

Student participation in RiSE has steadily increased throughout the duration of this project (Fig 1). RiSE increases student success. STEM students who participate in RiSE activities have significantly higher GPA (Fig 2) and persistence (Fig 3) than STEM students who are not part of this community.

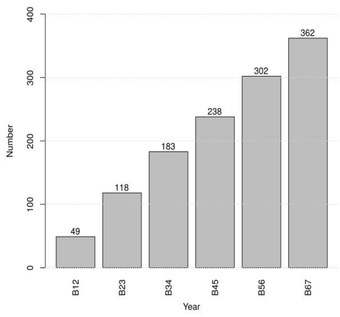


Figure 1: RiSE enrollment

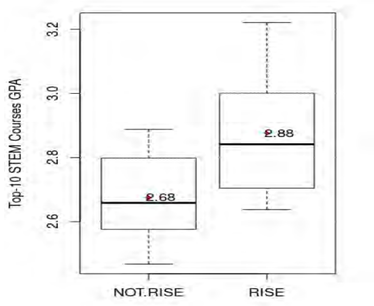


Figure 2: Median GPA of RiSE students (N=314) is 2.88 versus non-RiSE (N=10,613) of 2.68 when comparing grades in "Top-10" STEM Courses between Fall 2011 – Winter 2017. Difference significant at p=0.026.

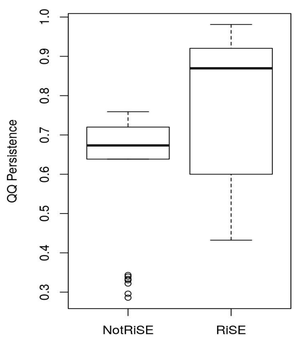


Figure 3: Persistence: Over 29 consecutive quarters, median persistence rates for RiSE students are higher by about 20% (87% vs 67%)

MESA Results: Impact on Students

The MESA program also increases students persistence, and students often comment on the role of belonging in MESA in motivating them to stay in STEM.

Current number of MESA students: 73

Since the program began in Fall 2010, approximately 350 total students have been enrolled.

73% of the Fall to Fall Enrolled Cohort Persisted (n=52)

"It comes down to the community aspect…I wouldn't, couldn't do this alone…through the MESA program I've learned I need other people if I want to help other people…MESA has taught me to not give up, to not quit." (Ashley/Engineering Major)

Results: Impact on Faculty

Faculty have been involved in RiSE/MESA activities that build relationships with STEM students and other STEM faculty. Faculty have participated in four important RiSE efforts (Fig 4): the RiSE & MESA study rooms (data from 2012-2017) two multi-day off-campus retreats (in 2013 & 2017), RiSE/STEM faculty journal club (2013-2017), and the RiSE/STEM faculty colloquium (2016-2017). One of the focuses of RiSE has been to increase faculty communication and collaboration to move toward more student-centered, evidence based teaching and learning. There are 37 full-time STEM faculty at EdCC and approximately 68 adjunct faculty. Survey responses (Figure 5) reveal several ways in which STEM faculty are incorporating evidence-based methods in their courses.

Figure 4: Faculty Involvement by Department

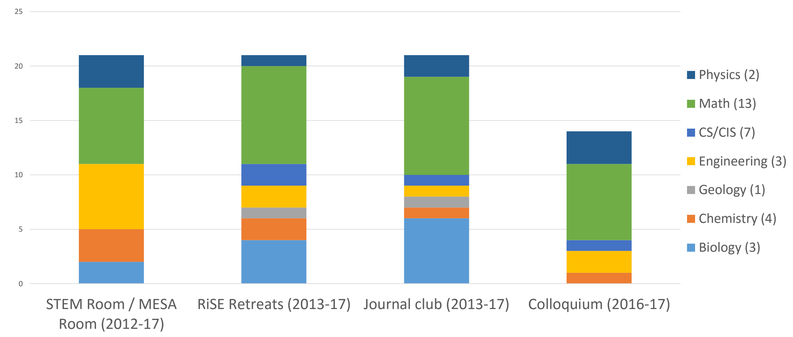
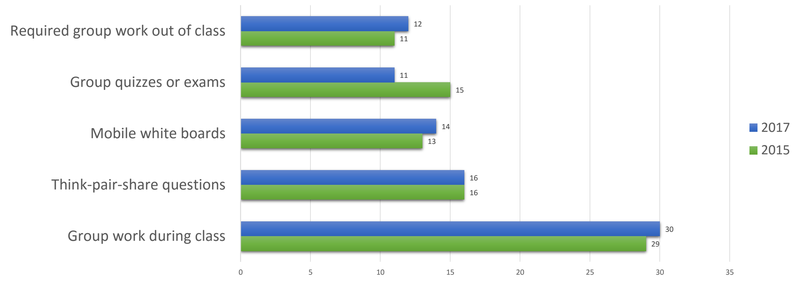


Figure 5: Faculty Self-Report of Increased use of Teaching Methods Compared to Teaching in 2011



Critical Impact of RiSE & MESA

- **Student community** impacts success, retention & transfer!
- RiSE & MESA activities and structures involve faculty and increase **faculty community** and engagement, including faculty learning communities: RiSE core team, faculty STEM journal club, faculty colloquium and STEM study room.
- For both faculty and students, multiple activities have been **critical levers** for building communities; each necessary but none alone would be sufficient.

References

1. 2014 NSF Report, *Revising the STEM Workforce; http://www.nsf.gov/pubs/2015/nsb201510/nsb201510.pdf*
2. http://www.usnews.com/news/stem-solutions/articles/2015/07/01/outreach-from-community-colleges-helps-to-build-stem-pipeline