629.1 Increasing Community College STEM Student Success & Persistence through Engaged Communities of Support: *Relationships in Science Education*

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Relationships in Science Education

Too few STEM-interested students persist to degree attainment and underrepresented and under-resourced community college students often fail to persist to a STEM degree. The **Relationships in Science Education (RiSE) project** (2011-2018) is a student-centered, faculty-driven program at Edmonds Community College (EdCC). RiSE is focused on increasing STEM student success by creating and reinforcing STEM student resources, building an intentional STEM student community & a STEM study room and providing wrap-around support, including tutoring, advising, transfer assistance. STEM faculty communities have been critical to RiSE success: a Core Leadership Team, STEM education research Journal Club, and Faculty Colloquium series to discuss research and share best practices in pedagogy and student support. Through student events, undergraduate research, engaged evidence-based instruction, and a STEM Study Room, faculty have become increasingly engaged with students and have built a community that supports all students.

RiSE Questions

(1) What impact has RiSE had on STEM student persistence (completion of transfer degrees), success (GPA) and STEM identity?
(2) What impact has RiSE had on STEM faculty engagement and practice?

Mixed Methods: Including analysis of quantitative data on student and faculty participation in RiSE activities, student and faculty surveys, coding and analysis of student focus groups and faculty written reflections and semi-structured interviews. Data from student records were used to measure the impact on student performance.

RiSE Student Activities

- **RiSE Community – STEM Study Room:** Creation of voluntary student RiSE group with a STEM study room as the center of the community, coordinated by a **STEM support specialist**.
- **Wraparound Support:** Student support services include faculty mentors / advisors, peer tutors and faculty office hours, service learning opportunities, undergraduate research opportunities, workshops and speakers, support staff, and transfer assistance for students transferring to regional colleges and universities. Made possible by RiSE-funded, STEM Support Specialist.
- **RiSE Events:** STEM student awards & outreach (STEM Kick-Offs, Haunted STEM lab & STEM magic show) increase student STEM identity, RiSE visibility, administrative buy-in & faculty validation.

RiSE Faculty Activities

- **STEM Room Community (2012-2018):** Faculty office hours.
- **Faculty Summer Retreats (2013 & 2017):** multi-day, off-campus faculty opportunities to plan & reflect on RiSE.
- **Faculty STEM Journal Club (2013-2018):** Monthly opportunity to discuss STEM education research and related cognitive science papers to support evidence-based, student-centered STEM teaching.
- **Faculty STEM Colloquium (2016-2018):** Monthly gathering to share and reflect on student-centered teaching & student support.
- **FT STEM Support Specialist**: Planned, coordinated & facilitated RiSE student activities. NSF funding led to EdCC-supported position, 2018.

RiSE Student Outcomes

Observation #1. Student participation in RiSE has steadily increased throughout this project: 2012-2016 (Fig.1 below).

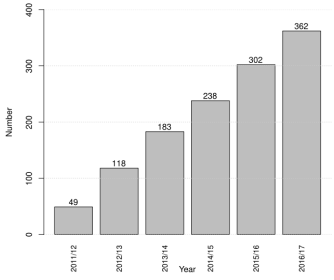

Figure 1: RiSE enrollment, from 49 in 2011-12 to 362 in 2016-2017

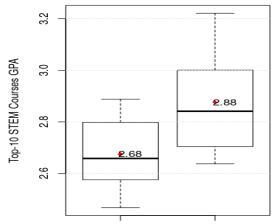

Figure 2: Median GPA of RiSE students (N=314) is 2.88 versus non-RiSE (N=10,613) of 2.68 when comparing grades in "Top-10" STEM Courses between Fall 2011 – Winter 2017. Difference significant at p=0.026.

Observation #2. STEM students who participate in RiSE activities have higher GPAs than non-RiSE STEM students (Fig.2 above).

Observation #3. RiSE increases STEM student persistence (Fig.3).

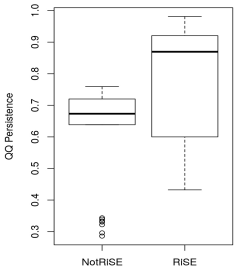

Figure 3: Persistence: Over 29 consecutive quarters, median persistence rates for RiSE students, higher by ~20% (87% vs 67%)

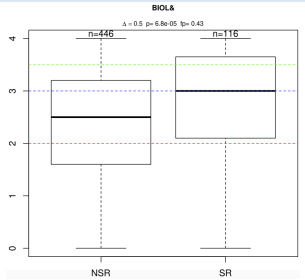

Figure 4: Median GPA of students in Biology courses who used (SR) vs. did not use (NSR) STEM student room (Win. 2016– Fall 2017).

Observation #4. Students using STEM study room have higher GPAs and pass with 2.0 (Fig.4 above for Biology students).

Observation #5. RiSE increases student's sense of STEM community.

RISE students are 59% more likely to report being part of the EdCC STEM community than are Non-RISE students. (survey question, Fall 2017 (n=27, RiSE & n=105 notRiSE, $p < 0.0000$).

STEM Study Room, Student Feedback: *"…everyone is accepting, helpful & non-judgemental. I can get help & support without worrying."*

"Personally, the STEM study room is more than just a place where people go to study math and science courses. Instead, it is a community of people who are passionate about education and the scientific world. It provides a space to meet and interact with other people who are on a similar academic journey. This community that EdCC has to offer is incredibly valuable."

Acknowledgments

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Faculty Engagement & Change

RiSE activities increased STEM faculty communication & collaboration with other STEM faculty, students and staff that focused on developing improved student-centered, evidence-based teaching and learning.

Observation #6. Broad faculty participation in RiSE activities (Fig. 5).

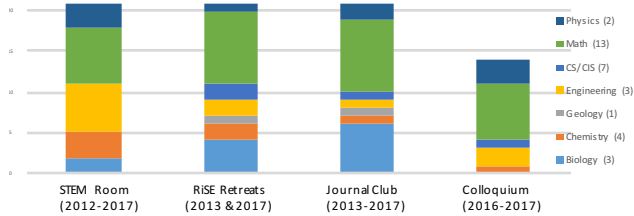
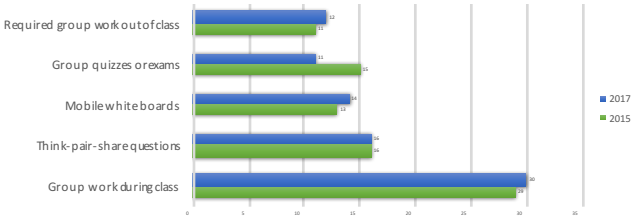


Figure 5: Faculty involvement in RiSE activities by department. Numbers of faculty participants in each department are noted in parentheses. There are 37 full-time STEM faculty at EdCC (2017-18) and approximately 68 adjunct faculty.

Observation #7. EdCC STEM faculty increasingly incorporate evidence-based methods in teaching (Fig. 6).

Figure 6: Faculty Self-Report of Increased use of Teaching Methods Compared to Teaching in 2011



"I also adapted my teaching as I would hear how other faculty were incorporating new techniques in their classrooms. Sharing the research and sharing how we all attempted new applications was the best thing for me." RiSE Core Team – from reflective essay (2017)

Past instructional approach: *"I used to feel I had to cover all chapters and materials. … I focused on learning content …"* Current instructional approach: *"I focus more on higher level materials, and less on Power Points. I also utilize more demanding labs, sometimes including assignments for which there are no predetermined results. Classrooms are more inquiry based and interactive."* from STEM faculty (non-core team) interview (2017)

"Because we are not just assessing what students remember or know, but also look at what is challenging for them to conceptualize or articulate, students are learning more and gaining confidence in their ability to extrapolate and transfer information." from STEM faculty (non-core team) interview (2017)

Conclusions

Necessary Resources require funding and space.

- **STEM study room & tutors**: white board tables are great too!
- **FT staff position:** STEM support specialist to coordinate RiSE
- **Faculty participation**: PIs, core team & other engaged faculty

RiSE Outcomes: RiSE activities and structures

- **Increase STEM student** success, persistence & sense of community.
- **Increase faculty engagement** and evidence-based practices.

Multiple Activities & Structures are **critical levers** for building communities; each are necessary but none alone would be sufficient.