



Transforming STEM Education at Two-Year Colleges

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Need / Motivation

To ensure continued U.S. competitiveness and prosperity, our nation must foster a strong, STEM-capable workforce¹. Half of the people who go into STEM fields start at community colleges². Community colleges need to be part of the solution in order to meet the expected demand for STEM workforce. Less than 10% of the funded STEP projects have been awarded to community colleges³, thus more research is needed on that population of STEM students. Furthermore, community colleges often have a more diverse student body, which can be targeted and supported to help increase the number of women and underrepresented minorities in STEM fields. Relationships in Science Education, **RiSE**, is a National Science Foundation funded project at Edmonds Community College to address this need and opportunity.

RiSE Project Goals

The RiSE project will have four main objectives:

1. Increase the **number of STEM students** graduating with associate degrees and transferring to baccalaureate institutions,
2. Increase the **diversity** (women and underrepresented minorities) of STEM majors, graduates and transfers,
3. Increase the percentage of STEM majors progressing through **gateway STEM courses**, and
4. Decrease the mean **time to associate degree** attainment.

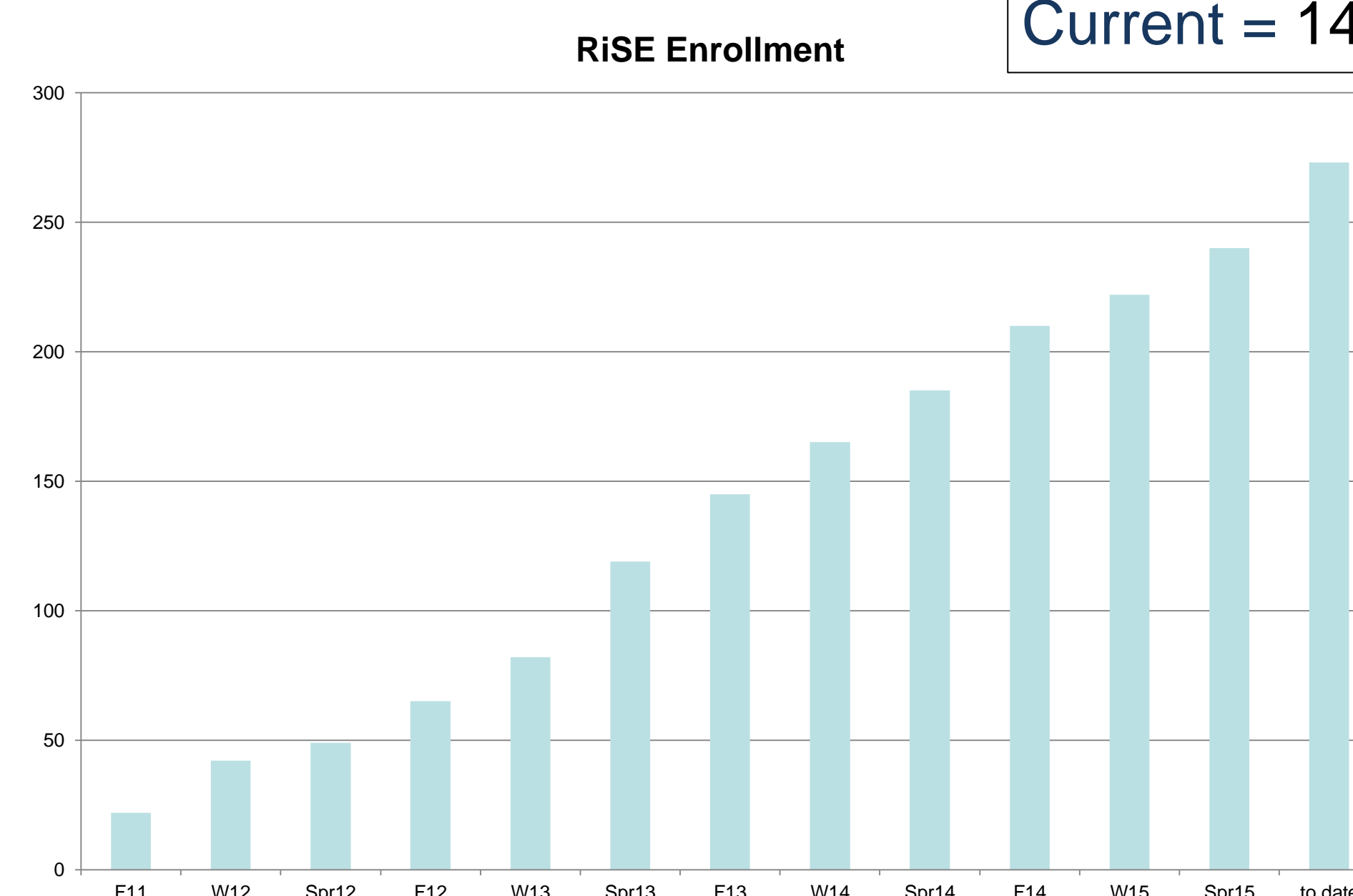
RiSE Project Activities

1. **Outreach** events including STEM Saturdays, Haunted STEM Lab, Summer STEM Exploration, and STEM Magical Mashups.
2. **Curricular redesign** based on evidence-based, active-learning techniques such as PBLs, POGIL, "flipped" teaching, clickers/personal response systems, group assessment, and student reflection, supported by monthly STEM faculty Journal Club focused on STEM education research.
3. **Student support services** that include faculty mentors / advisors, cohort STEMinars, study rooms with peer tutors, supplemental instruction, math support workshops and courses, early alert, STEM service learning opportunities, undergraduate research opportunities, and transfer assistance for students transferring to local colleges and universities.
4. **Evaluation and assessment** that measures the success of the project validating institutionalization and broad dissemination while helping faculty and students reflect and improve on their teaching and learning.

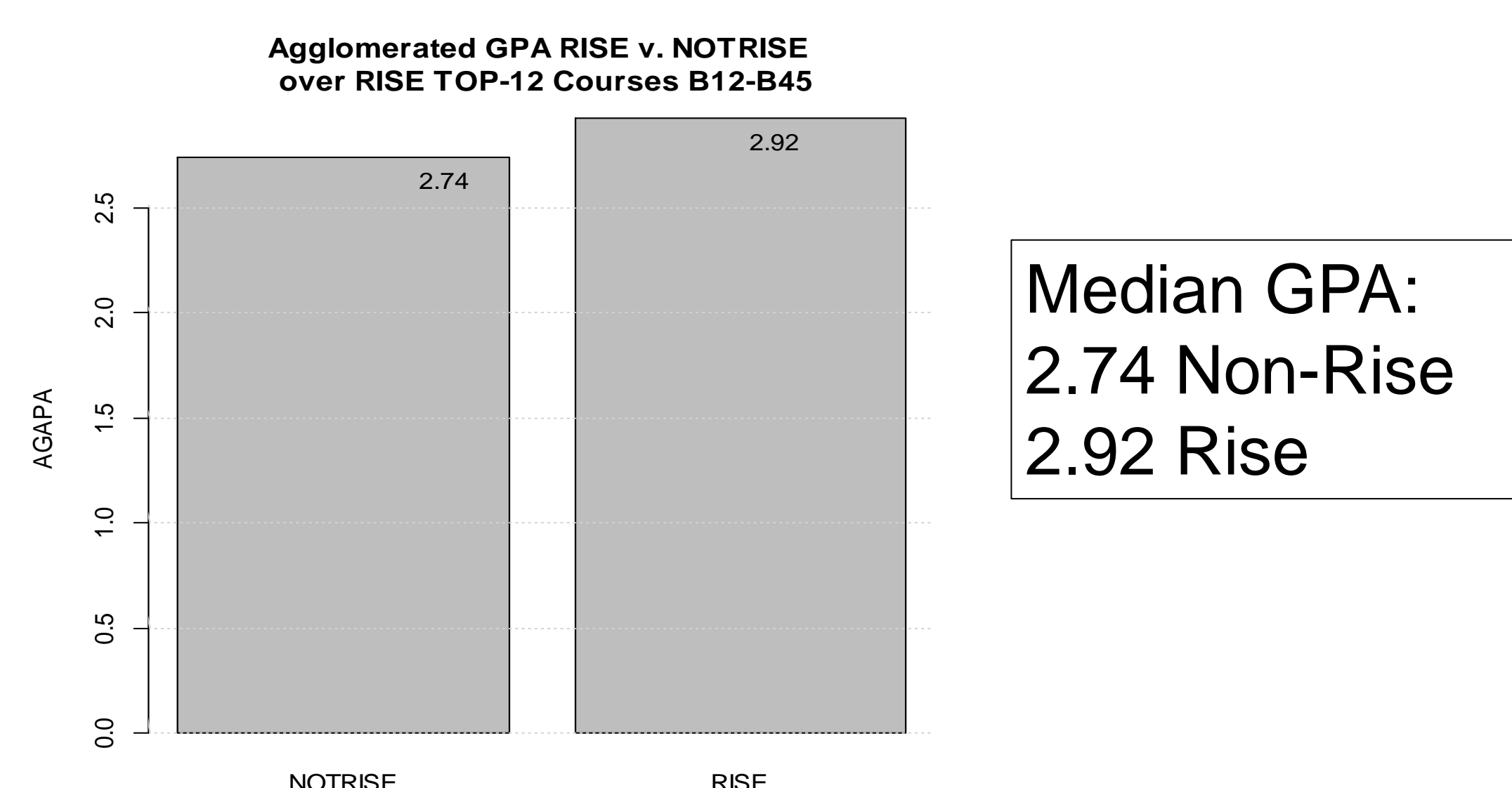
Results: Impact on Students

RiSE student program membership:.

Total = 273
Current = 144

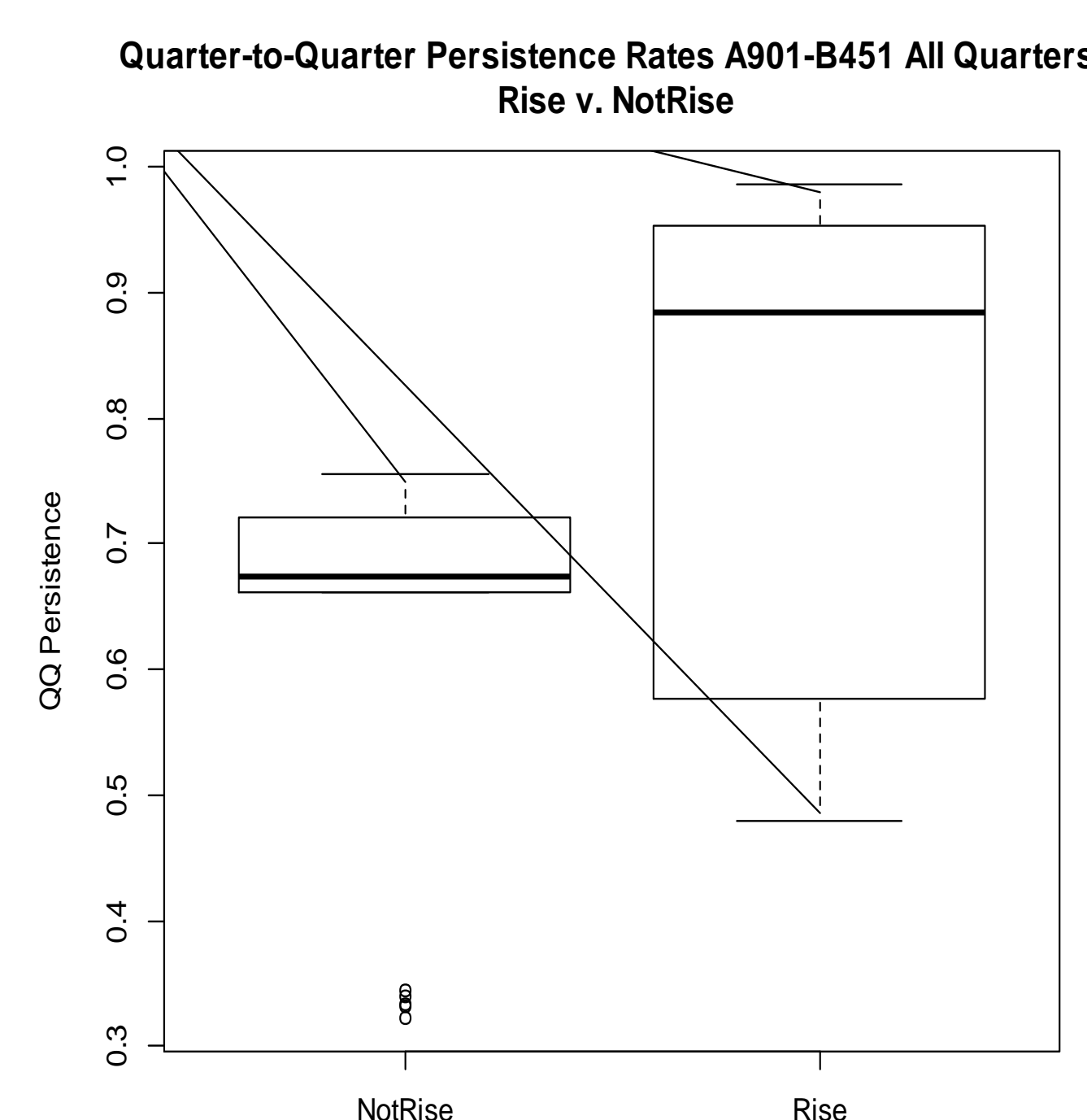


RiSE Student GPA vs "Agglomerated" STEM Student GPA:



We find that the mean GPA across the RISE-pattern courses for students in the RISE population are statistically significantly ($p < 10e-6$) higher than the mean GPA across RISE-pattern courses for students in the Non-RiSE population.

Student Persistence: RiSE versus non-RiSE STEM

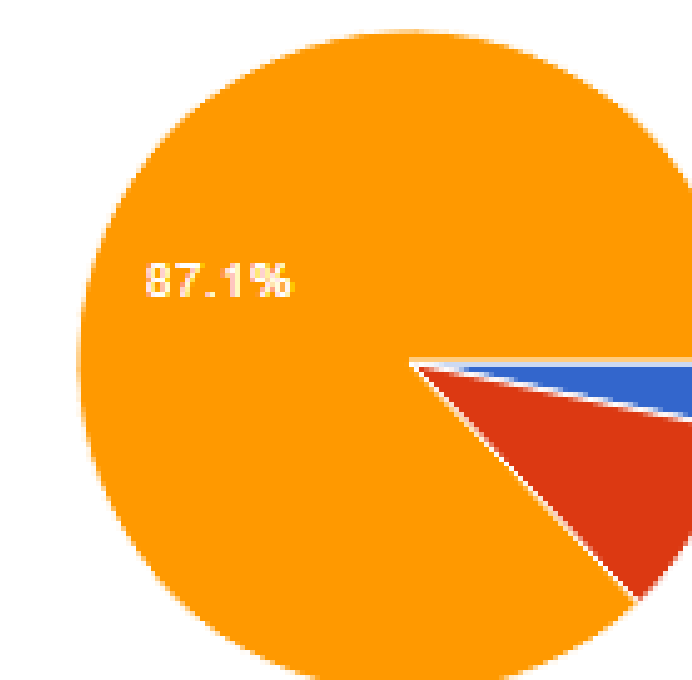


RiSE persistence higher by 21%
 p -value = 0.000906

Results: Impact on Faculty

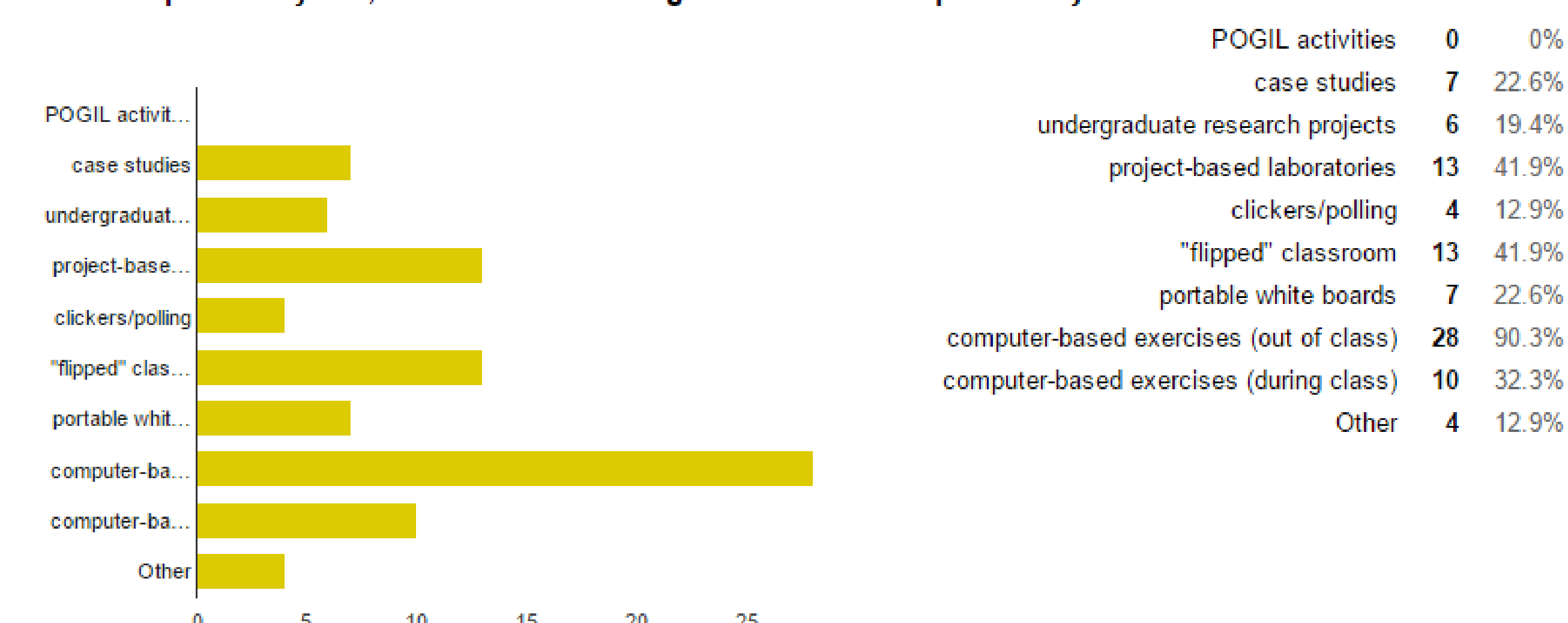
Faculty Survey Results

Compared with five years ago, my classes include



more lecture, fewer activities than before 1 3.2%
 about the same lecture and activities as before 3 9.7%
 less lecture, more activities than before 27 87.1%

Over the past four years, which of the following classroom techniques have you used REGULARLY



Next Steps / Challenges

- **Institutional sustainability:** Working to address the challenge of sustaining and institutionalizing the effective components of the RiSE Project.
- **Maintaining Awareness and Capacity:** Continually rebuilding and educating new staff and administration due to numerous retirements and departures.
- **Early Student Intervention:** Continuing to try to identify STEM students as early as possible in order to provide support to help them be successful and for assessment purposes.

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>
3. STEM Central (<https://stem-central.net/>)
4. <http://www.edcc.edu/rise/results.html>