Long-term efforts toward VIGRE goals: The University of Arizona Perspective

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My remarks reflect the thinking of a group of investigators writing a second VIGRE proposal and grappling with the "post-VIGRE plan" requirement. I'll focus on graduate aspects.

VIGRE goals in a nutshell

- Increase the quality of training of mathematical scientists, in communication and mentoring skills as well as in research

- Increase the number of well-prepared mathematical scientists

Mechanisms for Achieving VIGRE Goals

- Opportunities---things to do
- Structures---how the program fits together
- Support---time to engage the opportunities

VIGRE at Arizona

- Opportunities
  - "Authentic practice" early and often: RTGs, term papers, vertically integrated research seminars, Integration Workshop, cutting-edge conferences such as AWS
  - Peer tutoring (e.g., for quals), undergrad research and teaching programs, high school outreach
  - "Horizontal" research, teaching, and internships (business, econ, physics, life sciences, ..., industry and labs)

VIGRE at Arizona

- Structures
  - Activities are naturally integrated into students' *intellectual* life: creating, communicating, and applying mathematics.
  - Evaluation takes into account all activities (e.g., not just qual scores, but RTG and term paper performance).
  - Active mentoring is essential to insure participation and balance. All the more so for female and minority students.

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VIGRE at Arizona

- Support
  - Fellowships are awarded strategically, based on a proposal-based, competitive application process.
  - Students must explain the goals to be achieved during the support period. These should include a research goal (furthering the degree) and a professional development goal or activity.

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Achieving VIGRE Goals

- Appropriate opportunities, better mentoring, and support to profit from them will lead to better-prepared graduates.
- They will also lead to better retention.
- Similar efforts at the undergraduate level will feed the pipeline.
- VIGRE efforts at grad and post-doc level will increase employability and satisfaction, making mathematics a more attractive option.
- Measuring these claims is a priority in our second proposal.

Long-term prospects

- Providing opportunities and establishing structures requires *faculty commitment*. Structures and opportunities of well-designed projects with faculty commitment will naturally persist after VIGRE funding ends.
- But *financial support* (stipends and tuition) is crucial for long-term viability. The sums involved are significant.

Post-VIGRE at Arizona

- Opportunities, structures, and faculty commitment are in place. What about continuing financial support?
- Grad fellowships: If renewal is funded, UA admin has committed to 12 permanent new grad fellowships after 5 years, 2 of them in third year devoted to minorities.
- Undergrad research will be funded by (i) an endowed fund in development; (ii) REU supplements generated and managed by research groups. VIGRE funds will be phased out over 5 years.
- Undergrad teaching program will be funded by an endowed fund established by a generous undergraduate alumnus. VIGRE funds will be phased out over 5 years.

Conclusion

A well-designed VIGRE program will put in place (or organize existing) opportunities and structures for broadening and deepening students' mathematical preparation as well as their communication and mentoring skills. Faculty commitment is the key ingredient.

Given opportunities and structures, giving students time (resources) is the main ingredient for building VIGRE-ish infrastructure with good long-term prospects.

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