

Evaluation of Global Relay of Observatories Watching Transients Happen (GROWTH):

Activity summary for September to December 2016

A California Institute of Technology (Caltech) Partnerships for International Research and Education (PIRE) Project Funded by the National Science Foundation (NSF)

GROWTH is an international scientific collaborative project in astronomy, studying the physics of fast-changing events in the cosmos like supernovae, neutron stars or black hole mergers, and near-earth asteroids. The intention of this project is to continuously observe and gather data of cosmic transient events in the first 24-hours after detection, before many of them fade away in intensity below the sensitivity of telescopes. Project activities are conducted among undergraduate students, graduate students, postdocs, partner institution faculty, and researchers. This newsletter showcases findings from undergraduate GROWTH internships, GROWTH courses, and a Social Network Analysis conducted between September and December 2016.

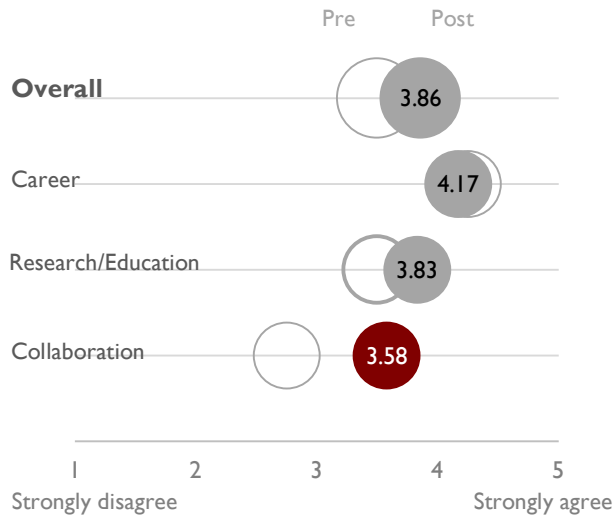
The internships and courses both contribute to Goal 2: education and workforce development. The undergraduate GROWTH internships enhanced students’ research, career, and collaboration readiness. Most of the respondents from the GROWTH courses mentioned that the hands-on experience, data mining, and data collection activities were useful to their learning. These activities contribute to this **goal area as detailed in the diagram below.**



Activity evaluation findings

Undergraduate GROWTH internships:

Participants (n=5) reported the most growth, yet the lowest post-internship rating, in their **collaboration readiness** compared to their career and research readiness.



GROWTH courses: Most respondents (79%) reported that their interest in pursuing future studies or a career in astronomy or astrophysics **increased after taking the course.**

AY122a: Astronomical Measurements and Instrumentation (Caltech)



ASTR 310: Observational Astronomy (University of Maryland)



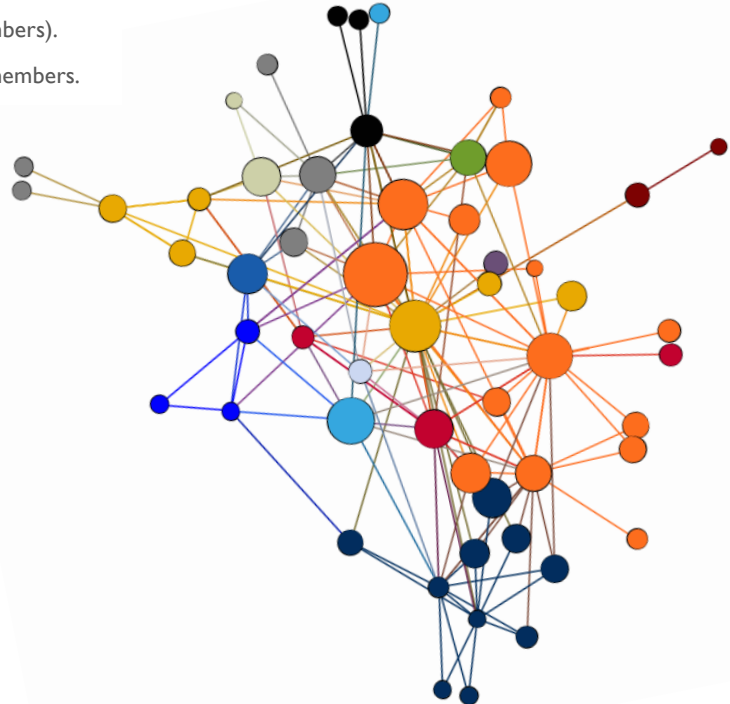
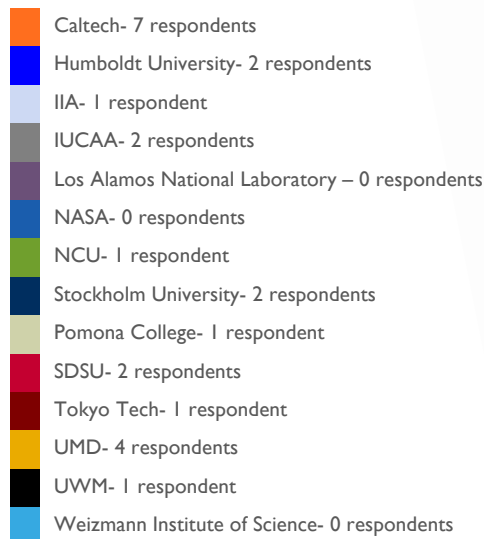
ASTR 680: Astronomical Techniques (San Diego State University)



Social Network Analysis findings

Project members (indicated by circles) tended to collaborate with members of their own institution, rather than cross-institutionally. Project members that are most influential (indicated by larger circles) on the network are from Caltech, Stockholm University, and University of Maryland, College Park (UMD).

- Circles represent participants (GROWTH members).
- Lines represent the connections between the members.



Consider these adjustments:

- Internship participants reported low agreement with statements about networking and sense of community, indicating more assistance is needed to foster these areas.



Help students make **meaning out of their internships** by assisting them in identifying ways to continue collaborative work, such as publication and presentation opportunities, and research projects at their home institution.

- Most course participants reported high levels of agreement that “the opportunity to collect their own data was useful to their learning.”



Future iterations of the courses should continue to have students **utilize GROWTH data** and allow students to explore data on their own.

- Members tend to collaborate more with members of their own institutions. Undergraduate students and postdocs were not highly connected to other members.



The results of the SNA should be utilized to **conceptualize the ideal GROWTH network** and to **understand how collaborations** in the network **can be modified**, and how to start planning new project components. Project leads should focus on fostering cross-institutional and international collaborations.

Evaluation in the upcoming year:

- GROWTH participant publications (Spring 2017)
- GROWTH courses (Spring 2017)
- GROWTH Social Network Analysis (Summer 2017)
- GROWTH graduate and undergraduate internships (Summer 2017)

A full detailed report is available upon request.



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