



WHOLE STUDENT MENTORING OF UNDERGRADUATE STUDENTS IN SCHOOL AND CAREERS

21 September 2019
GSA Annual Meeting, Phoenix, AZ

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Agenda

- Session one

- *Welcome, introductions, overview*
- *Workshop goals*
- *Mentoring experiences*
- *Intentional mentoring*
- *Mentoring STEM students from underrepresented groups*

- Session two

- *Mentor mapping*
- *STEM resources*
- *Working session*



Workshop Goals

Participants will:



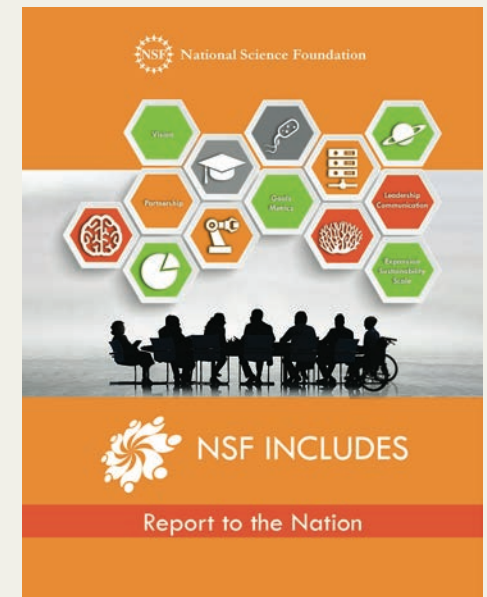
- explore the concept of intentionally mentoring students in STEM
- increase knowledge of and/or resources for mentoring students from groups underrepresented in STEM



National Science Foundation (NSF)

- Commitment to broadening participation – embedded in Strategic Plan
 - Guided by the Strategic Plan, NSF established a performance area focused on broadening participation: **to expand efforts to increase participation from underrepresented groups and diverse institutions throughout the United States in all NSF activities and programs.**
- Broadening participation portfolio
 - https://www.nsf.gov/od/broadeningparticipation/bp_portfolio_dynamic.jsp
 - *Foundation-wide opportunities*
 - e.g. NSF INCLUDES – comprehensive national initiative to enhance U.S. leadership in STEM by focusing on diversity, inclusion, and broadening participation in these fields at scale
 - *Specific program examples*
 - REU Sites and supplements
 - IUSE GEOPATHS – *under revision, new solicitation this fall!*

<https://www.nsf.gov/od/broadeningparticipation/bp.jsp>



GAGE Facility and UNAVCO

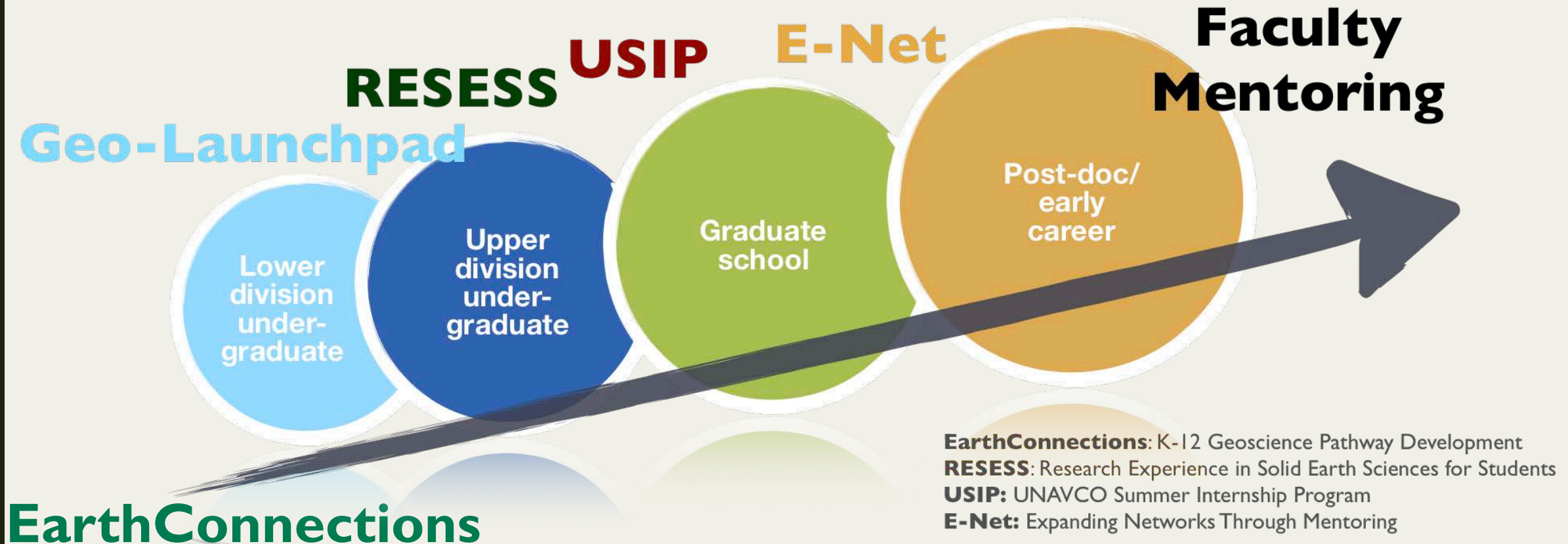
- Geodetic Facility for the Advancement of Geosciences, funded by NSF
- Support geoscience / geophysics community in research and education using geodesy, including workforce
- About UNAVCO and the GAGE Facility
 - <https://youtu.be/yxLMk120vMU>
- This workshop is an extension of NSF IUSE GEOPATHS award (#1540524)
 - *Geo-Launchpad: Preparing Colorado Community College Students for Geoscience-Focused Careers*



GAGE National Science Foundation's
Geodetic Facility for the Advancement of Geoscience



UNAVCO Workforce Development



Intentional preparation and talent development of populations historically underrepresented in the geoscience workforce will present an infusion of necessary new perspectives and people into the workforce

Activity: Faculty-Student Interactions

1. On post-it notes, write one way in which you interact with students
One action per note! Write 3 to 5 interactions.
2. Identify if the activity is an example of mentoring, advising or instruction
3. Place the post-it note on the appropriate large sticky



Past Mentoring Experiences



Form new groups of 3 (think-pair-share activity) (*15 minutes*)

In your group:

- What was an exceptionally successful experience mentoring students?
 - *What strategies did you use that you think made that successful?*
 - *What areas do you think could have been improved to make it more successful?*
- What is an example of a challenging experience mentoring students?
 - *What were the points of struggle?*
 - *What did you do to overcome those challenges?*
 - *In retrospect, what would you have done differently?*


Intentional Mentoring

The role of mentoring cannot be underestimated. [Huntoon and Lane, 2007]

Students with a close mentoring relationship have:

- *academic achievement such as higher GPAs and completing more credit hours*
- *higher likelihood of graduation*
- *enhanced professional skill development*
- *better networking*
- *more likely to secure initial employment*
- *higher income levels and promotion rates*
[Johnson, 2007]

Dictionary

mentor 

noun | *men·tor* | *\ˈmen-tôr, -tər*

[Cite!](#) [Share](#) [g+](#) [Tweet](#)

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: someone who teaches or gives help and advice to a less experienced and often younger person

Full Definition of MENTOR

1 *capitalized* : a friend of Odysseus entrusted with the education of Odysseus' son Telemachus

2 **a** : a trusted counselor or guide

b : TUTOR, COACH

— *men-tor-ship*  | *\-,ship* | *noun*

Scholarship on Mentoring

Intentional Mentoring

- Typically traced to a seminal study by *Levinson et al. [1978]*
- Levinson observed mentoring in higher education is “...limited and poor in quality”.
- Widely defined
- Mentoring is provided by more than one single relationship
- Formal & informal
- Duration varies greatly

TABLE 2
Mentoring functions

Functions

Acceptance/support/encouragement
Advice/guidance
Bypass bureaucracy/access to resources
Challenge/opportunity/“plum assignments”
Clarify values/clarify goals
Coaching
Information
Protection
Role model
Social status/reflected credit
Socialization/“host and guide”
Sponsorship/advocacy
Stimulate acquisition of knowledge
Training/instruction
Visibility/exposure

From Jacobi, 1991

Structuring the Mentorship

Role Expectations



Goal Clarification



Frequency of Contact and Duration of Relationships



Matching Concerns



Relationship Boundaries

See worksheet: Structuring the Mentoring Relationship

Periodic Evaluation



Mentoring Students from Groups Underrepresented in Science

- Hear and listen
- Be aware of implicit biases
- Advocate
- Champion
- Be open to learning and then implementing learning
- Be aware of resources or willing to find them
- Informal transfer of knowledge - share your social capital and insider knowledge [Zambrana, 2018]



Emphasize Societal Relevance

- Societal relevance increases interest [e.g. *Huntoon and Lane, 2007*]
- Important to highlight the societal (human and planetary) importance of geoscientists' work [e.g. *PCAST report, Engage to Excel, 2012*]



- Emphasize/stress the importance of students' work in the “Big Picture”
- If desired by students, encourage them to identify research projects that involve communities of interest

Prepare Students for Non-Academic Career Pathways

- < 30% of high school graduates have taken a formal geoscience course; college and university faculty are often students' first exposure to the geosciences
- Faculty may have taken a more “traditional” academic pathway, and may not be comfortable speaking to career pathways beyond their immediate expertise



- Intentionally highlight pathways in intro classes and during REU/internship experiences
- Provide training relevant to non-academic pathways for graduate students (e.g. leadership, networking and entrepreneurship) [Turk-Bicakci et al., 2014]

Lessons Learned from UNAVCO's Experiences

- Where possible, provide students with a cohort with which to experience the summer or other research experience - facilitate cohort activities
- Provide interns with professional development (PD) opportunities to supplement their research or work activities
- Focus on aspects of PD that help students “sell” themselves academically and professionally
- Expose students to multiple career pathway examples to inform them of the multitude of career opportunities in the geosciences



Break

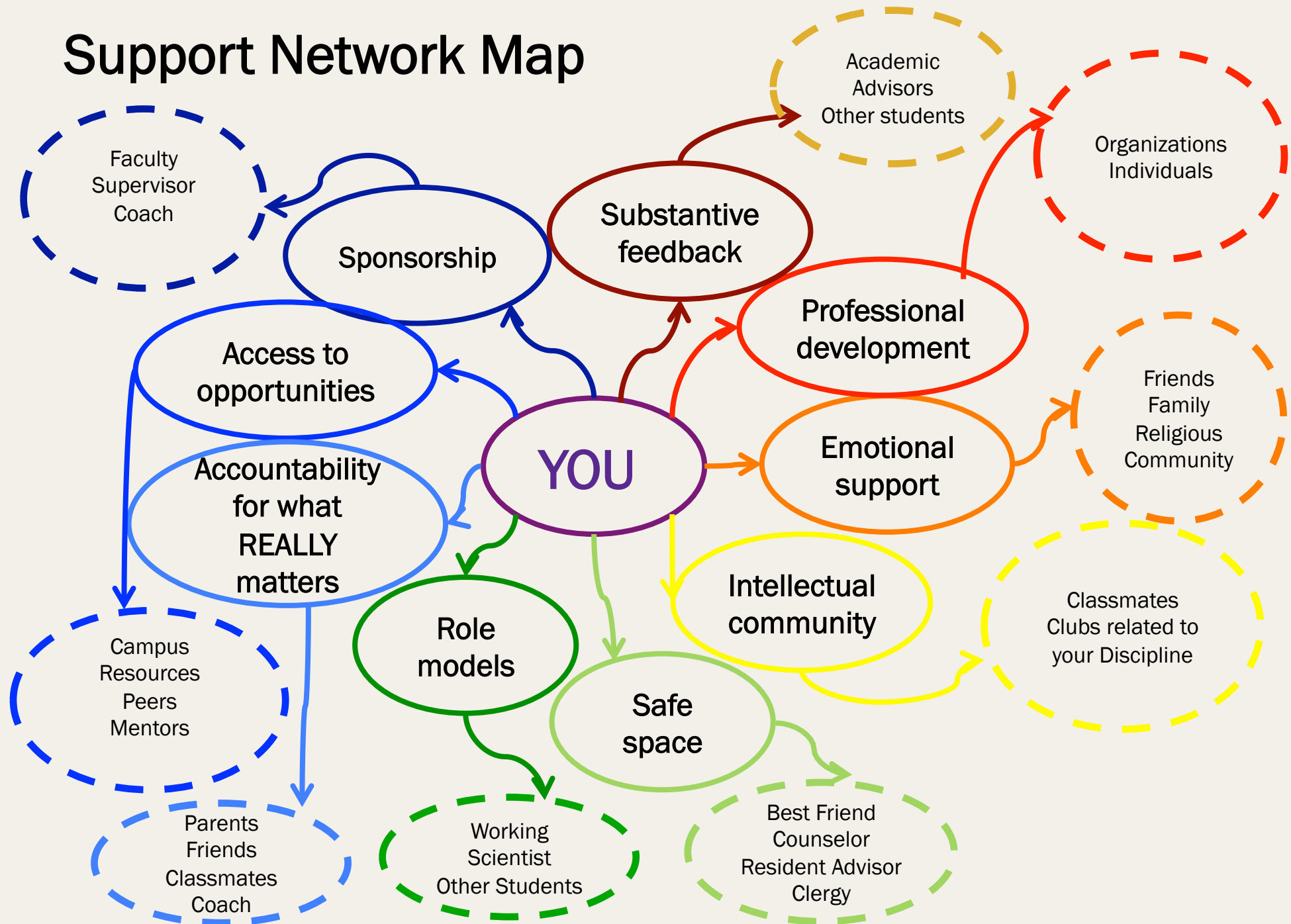
- 2:45
- Time to refresh
- 3:00 - Reconvene

Mentor Support Map

- What is support?
- Who supports you?
- Write each person's name on a separate post-it note



Support Network Map



How do each of these groups help me succeed?

Sponsorship

- write you letters of recommendation
- mention your name for promotions/opportunities
- potentially mediate for you issues with a professor or classmate

Access to opportunities

- making sure your network (people and organizations) lets you know about upcoming opportunities
- workshops
- summer schools
- research opportunities
- scholarships
- internships, jobs
- awards

Accountability

Someone that will check in to make sure you are making progress with a given task

Role models

- behavior we want to emulate in different aspects of our lives:
- School-life balance
 - Work ethics
 - Productivity
 - Career Choices
 - Skill Set

Safe space

- people you trust who will let you vent without judgment or criticism
- blow off steam, express your frustration, and find your way to deal with the issue in a calm, composed, and unemotional way

Intellectual community

- can ask about homework
- study for tests together
- work with on group projects
- buddy for attending academic related activities on campus (seminars, extracurricular clubs related to your discipline)

Substantive feedback

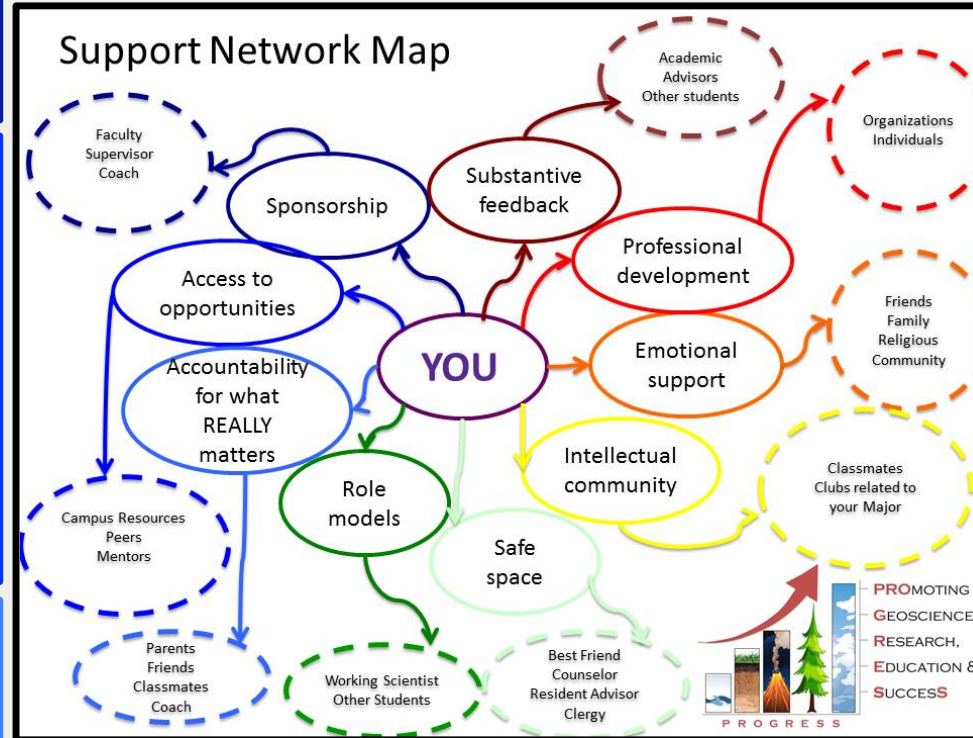
- advice on classes to take
- advice on which internship or REU to accept
- read and comment on drafts of papers
- look over essays for applications

Professional development

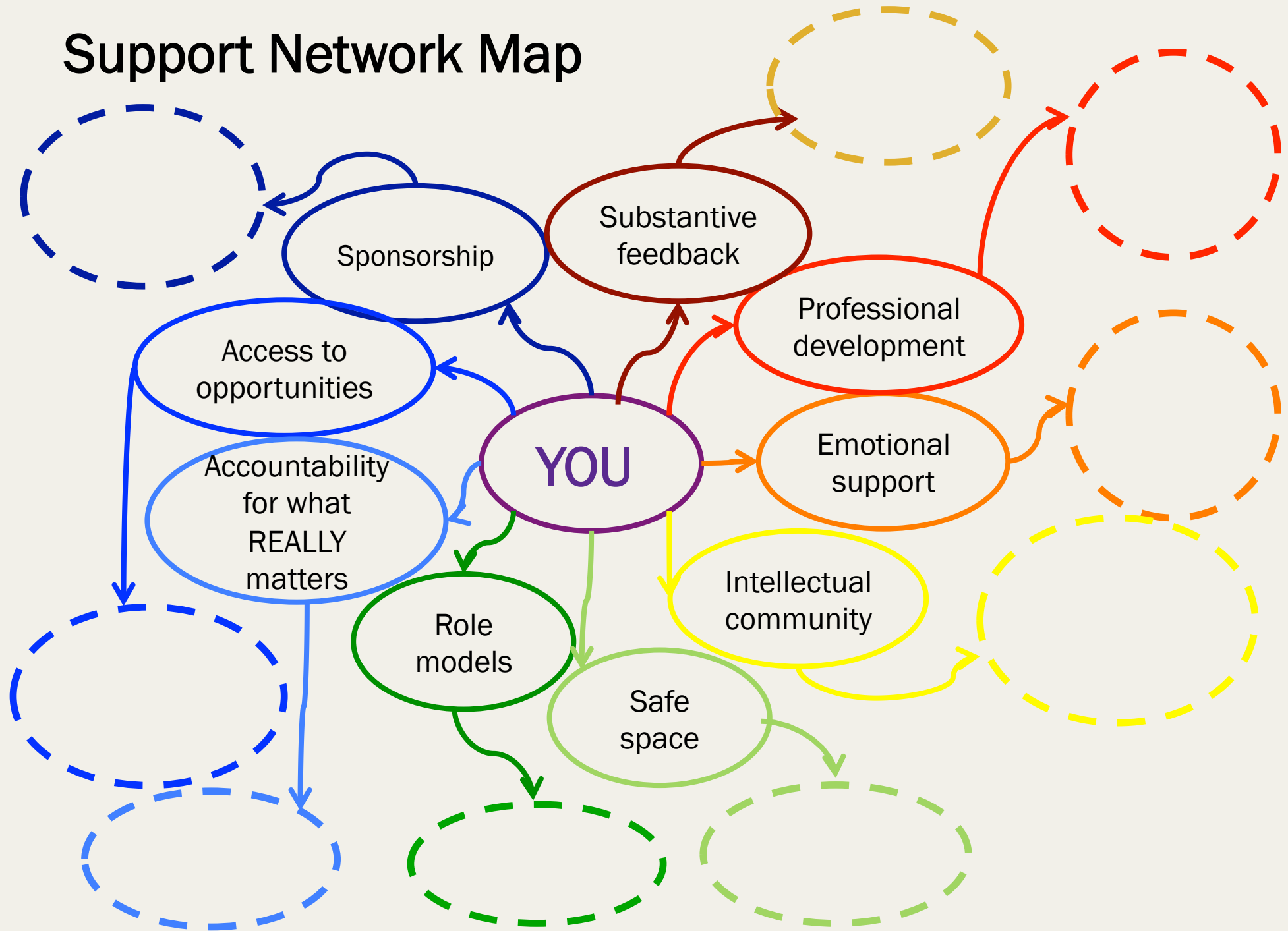
- Inspiration to improve yourself by gaining skills outside the classroom
- time-management
 - conflict resolution
 - public speaking training
 - scientific skills
 - confidence building

Emotional support

- someone that you feel comfortable sharing your emotions with
- helps you deal with stress
- believes in you

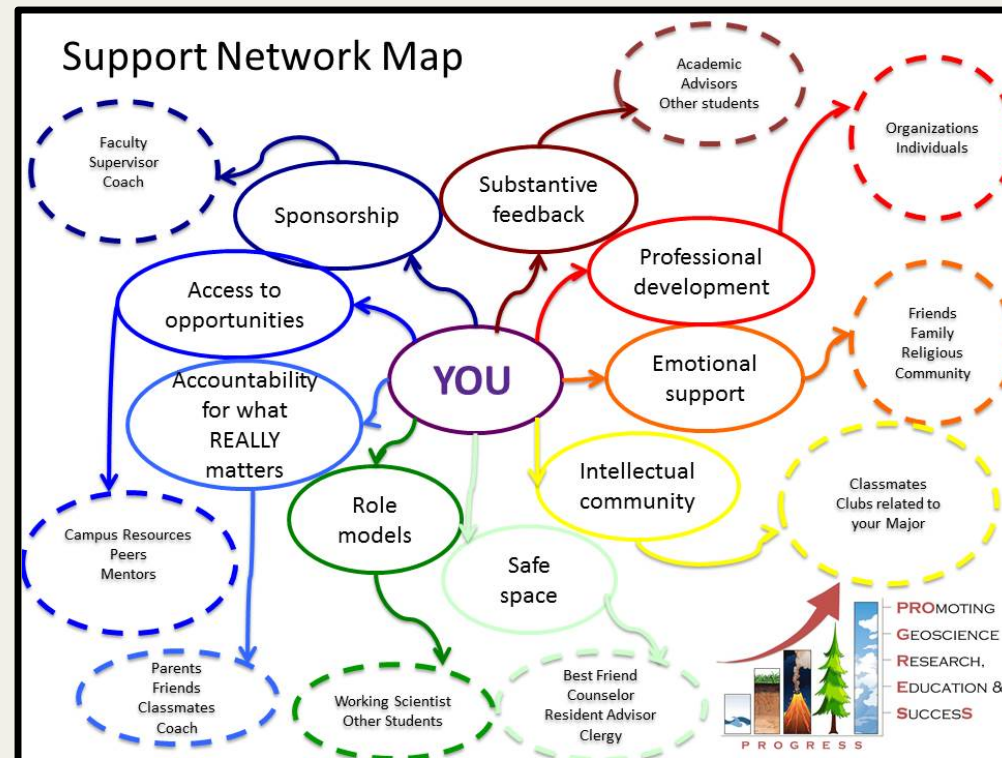


Support Network Map



Support Map

- With a neighbor, discuss – what is one category you are ‘sure of’?
- What is one category you are ‘unsure of’?



How do I find people for all of these areas?

Sponsorship

- Who has seen you at your best?
- Who has seen you overcome a challenge?
- Who depends on you?

Access to opportunities

- email announcements
- campus career center
- befriend people who always seem to be “in the know”
- forward information, be a “hub”
- mentor

Accountability

- study group
- workout buddy
- friend who sets deadlines and follows up

Role models

- professors/working scientists
- grad students
- recent graduates
- classmates a year or two ahead of you
- people outside of school

Safe space

- be careful to trust too early
- consider people removed from the situation you need to vent about
- Who can you always count on to be outraged on your behalf?
- who will keep things private?

Intellectual community

- Classmates
- Residence hall neighbors
- Friends at other universities
- Offer to be this type of support for someone else and they will often reciprocate!

Substantive feedback

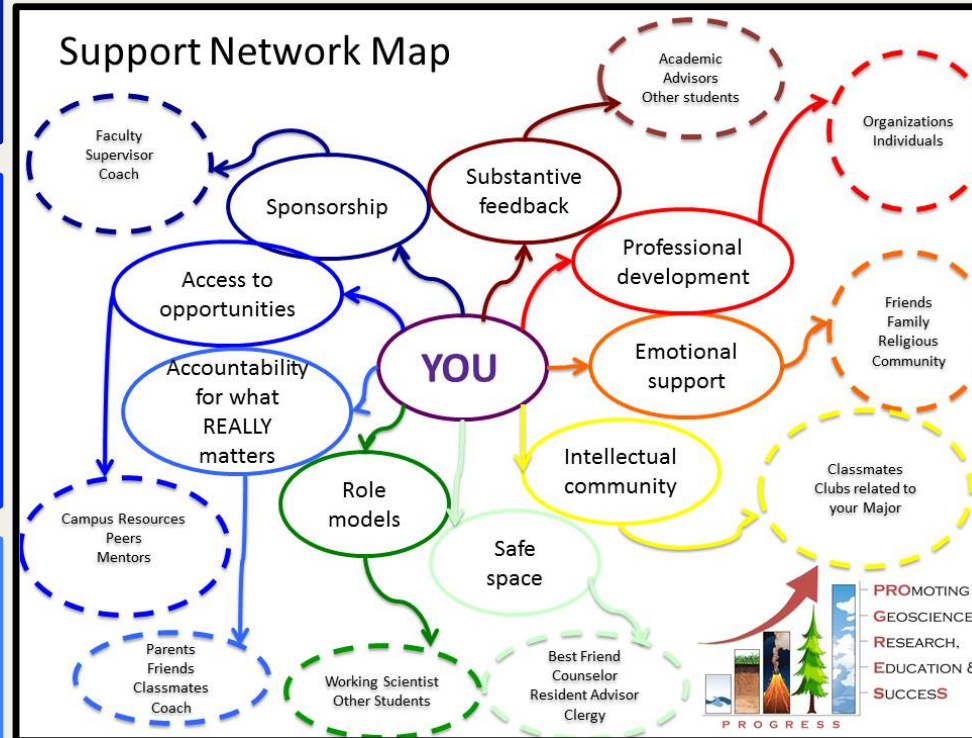
- academic advisor
- professor you relate well to
- student a year or two ahead of you
- teaching assistant

Professional development

- workshops
- professional organizations
- online resources
- university emails

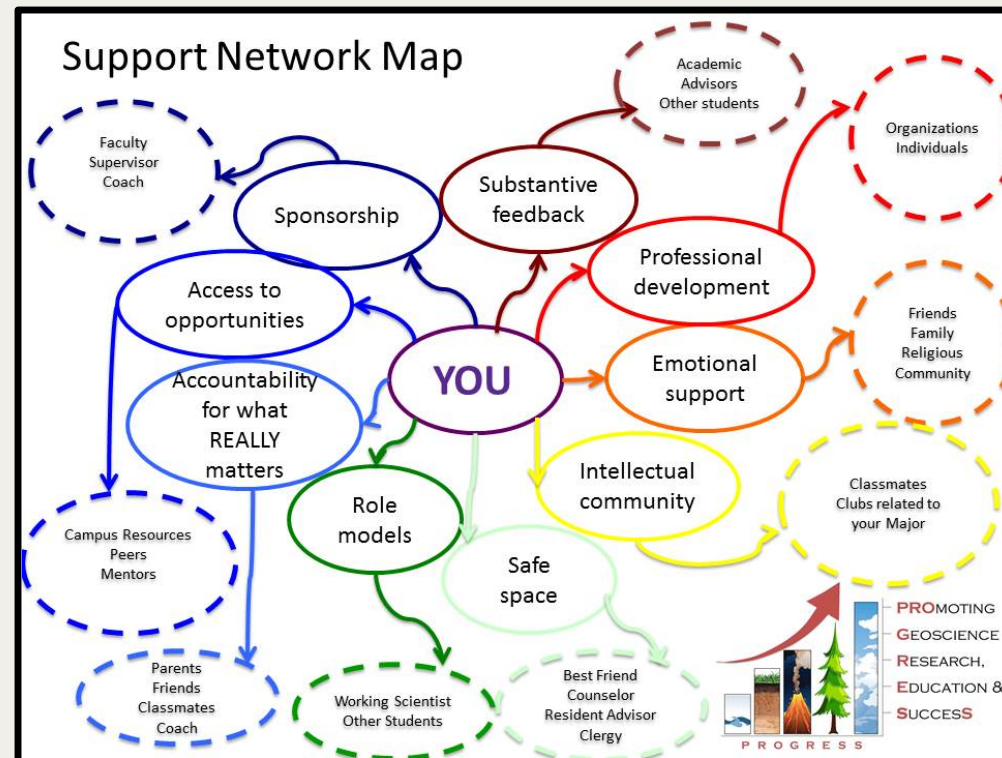
Emotional support

- as important as career support
- family & friends
- trained professionals



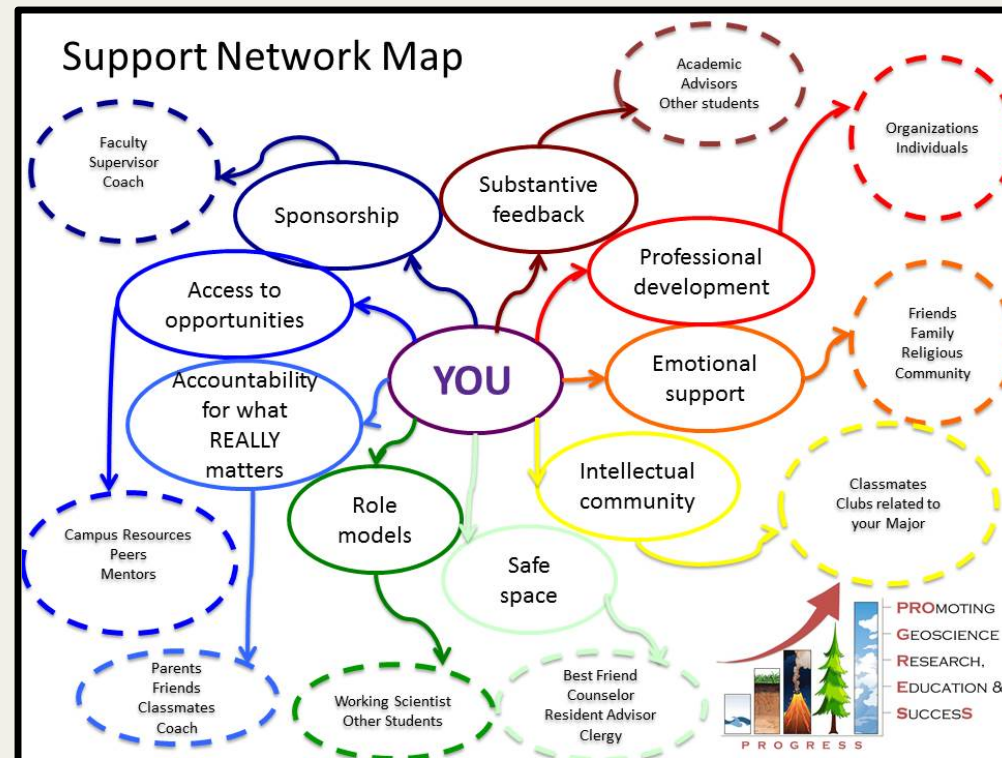
Support Map

- What are things that you can do to meet and connect with the right people moving forward?



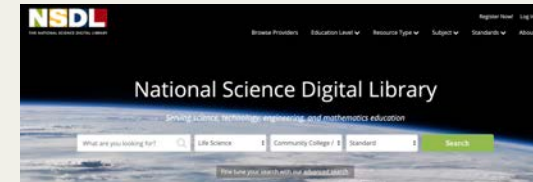
Support Map

- How can you help your students identify people to help support them in their academic careers and beyond?



Geoscience related resources

- National Science Digital Library
 - <https://nsdl.oercommons.org/>
- National Association of Geoscience Teachers (NAGT)
 - <http://nagt.org/index.html>
- Science Education Resource Center (SERC)
 - <http://serc.carleton.edu/index.html>
- Supporting and Advancing Geoscience Education in Two Year Colleges (SAGE 2YC)
 - <http://serc.carleton.edu/sage2yc/index.html>
- InTeGrate – *Interdisciplinary Teaching about Earth for a Sustainable Future*
 - <https://serc.carleton.edu/integrate/index.html>
- GETSI – *Geodesy Tools for Societal Issues*
 - Google: “GETSI SERC”



Wrap up

- **Share a Take Away:** One thing you intend to implement or do differently in mentoring your student(s) or with colleagues
- Workshop resources

The screenshot shows the UNAVCO website with a red navigation bar. The main content area features a breadcrumb trail: home > education > professional development > short courses > 2019 > whole student mentoring. The page title is "Whole Student Mentoring and STEM Resource Workshop". A sidebar on the left lists categories: Education, Professional Development, and Short Courses, with sub-items like Previous Courses, Geodetic Imaging, GPS/GNSS, Inaar, Strainmeter, Science Communication, Faculty Development, and Teachers (Grades 6-12). The main text includes a "Course Overview" section with dates (April 20, 2019), times (9:30 a.m. - 3:00 p.m.), location (Sitter Family Hall Room 710, Fort Lewis College), and contact information (Dr. Kim Hannula). A paragraph describes the workshop's focus on evidence-based mentoring and geoscience resources. An "Agenda" section lists "Workshop opens" and "Workshop goals and participant introductions". A small image of a presentation screen is visible at the bottom right.

UNAVCO

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Community Projects Instrumentation Data Software Science Education

home > education > professional development > short courses > 2019 > whole student mentoring

Whole Student Mentoring and STEM Resource Workshop

Education
Help with Education
Professional Development
Short Courses

- Previous Courses
- Geodetic Imaging
- GPS/GNSS
- Inaar
- Strainmeter
- Science Communication
- Faculty Development
- Teachers (Grades 6-12)

Course Overview
Dates: April 20, 2019
Times: 9:30 a.m. - 3:00 p.m.
Location: Sitter Family Hall Room 710, Fort Lewis College
Fort Lewis College Contact: Dr. Kim Hannula [email: hannula_k@fortlewis.edu]

The Whole Student Mentoring and STEM Resource Workshop is open to all interested STEM faculty and instructors from Fort Lewis College and surrounding areas. This six-hour workshop will introduce the evidence-based concept of intentionally mentoring students in STEM [e.g. Pope, 2002; Huntoon and Lane, 2007; Crisp, 2010], and will include components specifically provided for faculty mentoring of STEM students from underrepresented groups. This workshop will also focus on identifying and providing resources regarding geoscience pathways. These resources include video and animation series, career resources, curricular materials including lesson plans and instructor guides, digital libraries, self-directed learning opportunities, and other available geoscience-focused materials. This workshop builds upon the structure and content developed for intentional mentoring workshops supporting 2YC faculty mentors involved in the UNAVCO – Front Range Community College Geo-Launchpad internship program [Morris and Charlevoix, 2016]. The agenda for the workshop is included below. *Stipends (\$150) will be provided for participants.*

Agenda:

- Workshop opens
- Workshop goals and participant introductions

Work Session [if enough remaining time]

- Think about how you might incorporate what you learned today in your mentoring relationships or classroom
 - *Look at document "2018 RESESS Mentor Application" for ideas on creating a mentoring plan*
 - *Explore instructional resources*

References

- Crisp, G. (2010), *The Impact of Mentoring on the Success of Community College Students*, *Review of Higher Education*, 34(1), 39-60.
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