1. Providing regularly available robust curriculum when the student body in the field at an individual institution is small

What is the problem? No faculty member; no institutional support for offering credit; ease of spinning up instruction?

   a. External resources –
      - Independent - e.g. COMET, https://www.comet.ucar.edu/what-we-do/portfolio-services
      - Faculty ready AMS https://www.ametsoc.org/index.cfm/ams/education-careers/education-program/undergraduate-course-packages/
   b. Collaborative programming - eg. HBCU/Penn State https://www.jbhe.com/2021/09/three-hbcus-partner-with-penn-state-to-increase-research-opportunities-in-materials-science/ NOAA EPP/MSI https://www.noaa.gov/office-education/epp-msi/csc
   c. External to the curriculum – boot camp; credentialing
   d. Partnerships within the institution – e.g. relationship between ocean acoustics and physics acoustics.

2. Recruitment and retention of a diverse student body/workforce in a relatively small field

Is the problem diverse or is the problem students or both?

   a. Attract/support/prepare: https://serc.carleton.edu/teachearth/broad_partic/index.html
   b. Infusion in intro, across the discipline
   c. Rethinking the entry requirements/sequencing – what is really needed for what? How does that connect to the existing curriculum
   d. Connection to the workforce
   e. Going to where the students are with partnerships (e.g. physics, medical physics, HBCUs, coasts, biology programs)
   f. SAGE 2YC has done an excellent job with its resources for 2 year college faculty and could be useful to you both in its model and its information:
      - https://serc.carleton.edu/sage2yc/index.html
      - https://serc.carleton.edu/sage2yc/support_students.html
        - Facilitating Professional Pathways
        - Broadening Participation
        - Providing Integrative Experiences

3. Other highly interdisciplinary fields

4. How do you create an environment that makes people want to stay

- Sense of belonging/identity
- Vision of the future/ desire to pursue/
- Enabling the path –
    - academic support
    - supporting the whole student https://serc.carleton.edu/integrate/programs/diversity/whole_student.html
    - advising
- in a classroom
    - hearing, respecting and learning from your students/exploring difference/avoiding jumping to conclusions
    - linking individual experience/interest/learning
    - engaged pedagogy

Added after meeting:

InTeGrate- teaching about the Earth across the curriculum

- https://serc.carleton.edu/integrate/index.html
- Teaching materials: https://serc.carleton.edu/integrate/teaching_materials/index.html
- Program models – these were funded and produced department, institutional, and cross institutional implementations of InTeGrate principles. https://serc.carleton.edu/integrate/programs/index.html
- Workshops and webinars are documented here: https://serc.carleton.edu/integrate/workshops/index.html Those in the first 3 years (2012-2014) were aimed at identifying materials authors and team topics as well as teams/institutions for program models. Starting in 2014 many were aimed at building diverse participation particularly engaging HBCUs. Following that time they were primarily aimed at building use of materials and models.
- These describes the project design:
    - https://serc.carleton.edu/integrate/about/index.html- be sure to look at project products as there are more details there
    - Kastens, Kim and Manduca, Cathryn, (2018) Leveraging the Power of a Community of Practice to Improve Teaching and Learning about the Earth, Change Vol. 49 no. 6.
    - Kastens, Kim A., and Manduca, C.A., 2017. Using systems thinking in the Design, Implementation and Evaluation of Complex Educational Innovations, With Examples From the InTeGrate Project, *Journal of Geoscience Education,* Vol. 65, no. 3, August 2017, pp. 219-230.
    - InTeGrate Book: Interdisciplinary Teaching About Earth and the Environment for a Sustainable Future.Gosselin, D. C., Egger, A. E., & Taber, J. J. (Eds.). (2019). Interdisciplinary Teaching About Earth and the Environment for a Sustainable Future. Springer. Table of contents here: https://serc.carleton.edu/integrate/about/pubs.html
- This is the materials for materials development team members describing the development process. https://serc.carleton.edu/integrate/info_team_members/currdev/index.html
- These are projects making use of related program designs

- GETSI https://serc.carleton.edu/getsi/index.html - this is run out of UNAVCO and also focuses on strengthening preparation for a subfield of geosciences, in this case geodesy.
- BASICS https://serc.carleton.edu/basics/index.html - Business and Science integration
- EDDIE https://serc.carleton.edu/eddie/index.html - envirnomental data driven inquiry that crosses both ecology and geoscience
- There may be newer examples that have come into play since I stepped down as director. If this is of interest contact Ellen Iverson the current director at SERC, eiverson@carleton.edu

Earth Connections https://serc.carleton.edu/earthconnections/index.html

- This is a pilot project that tried to local educational systems to workforce capitalizing on existing national efforts to improve Earth education https://serc.carleton.edu/earthconnections/index.html
- The pieces that worked well were the overall ecosystem vision/pathway model and trying to connect local implementaitons to info on multiple national scale programs
- I don't think you want to go in this direction, but you might think about the pathway model, even just at the higher ed level and how to connect to ocean acoustic workforce.
  - These are the examples we developed of pathway models – the mapping piece of this was particularly valuable as was the notion of signposting pathways for students. https://serc.carleton.edu/earthconnections/regional_alliances/index.html
  - The brochure describes the pathway idea most clearly: https://d32ogoqmya1dw8.cloudfront.net/files/earth_rendezvous/2018/program/earthconnections_brochure.v2.pdf

AGI
They have done a good job with a different take on the pathway concept. You might want to get ocean acoustics added to this collection:
https://www.americangeosciences.org/education/k5geosource/careers
In general, I think that AGI has the strongest career info for US geo and AGU points there – so looking through this with an eye to making ocean acoustics visible would be useful.