SPI Fall 2022 Incubator Plans

Computational Methods

Zoom Meeting Link:
https://gc-cuny-edu.zoom.us/j/83446425174?pwd=eTJVRE5IamRuQ2F6OWhiUE1oSjJxQT09

Meeting 1 | Tuesday, September 13

9:00 AM | Check-in & Goals of the Fall Meetings

- Conversational, to hear your stories from the field
- Your observations, thoughts, and insights about your students, instruction, and classroom settings
- Engaging you in longitudinal thinking; research, and collaborative projects that might emerge from the SPI

One thing about your course/students that surprised you/brought you joy!

9:30 AM | Syllabus Remixing

Anchoring experience for fellows to share their syllabi, ideas, information, and experiences

- If any, what changes have you made in your syllabus?
- Considering what you have participated in so far (the Summer Institute and SPI Teaching Resources), what kinds of things have you done at the beginning of the semester that you perceive as inclusive teaching strategies for career readiness?
- Can you provide specific examples of ways you were able (or not able) to enact those strategies?
- What factors made it easier to teach those strategies? What factors made it more difficult?
- Did you find the SPI Teaching Resources helpful? How? If not, what are your recommendations for growth?

10:00 AM | Discuss and Develop

- Aspects of celebrating (What did I like most about a syllabus? How would I adopt it in my context?)
- Opportunities for growth (What could the instructor improve? What suggestions do I have for the instructor's future teaching?)

10:20 AM | Q&A

- What questions do you have?

William - How do we design validated scales to assess impact on career interests/ career readiness in bioinformatics or data science?

For those using github for student submission, do the students have to use command line? Or github desktop, or just drag and drop on the web page?

- Next Week
  - Brown, N. C., & Wilson, G. (2018). Ten quick tips for teaching programming. *PLoS computational biology*, *14*(4), e1006023. https://doi.org/10.1371/journal.pcbi.1006023
  - Pon-Barry, H., Packard, B. W. L., & St. John, A. (2017). Expanding capacity and promoting inclusion in introductory computer science: a focus on near-peer mentor preparation and code review. *Computer Science Education*, *27*(1), 54-77. https://doi.org/10.1080/08993408.2017.1333270
- Exit Ticket

Resources shared

Classroom discussion tool https://www.slido.com/

Welcome video example https://youtu.be/jLE1d76lcYg

Meeting 2 | Tuesday, September 20

Check-in & First Meeting Recap

STEM career interest survey

Kier, M. W., Blanchard, M. R., Osborne, J. W., & Albert, J. L. (2014). The development of the STEM career interest survey (STEM-CIS). *Research in Science Education*, *44*(3), 461-481. https://doi.org/10.1007/s11165-013-9389-3

Hava, K., & Koyunlu Ünlü, Z. (2021). Investigation of the relationship between middle school students' computational thinking skills and their STEM career interest and attitudes toward inquiry. *Journal of Science Education and Technology*, *30*(4), 484-495.

Wiebe, E., Unfried, A., & Faber, M. (2018). The relationship of STEM attitudes and career interest. *EURASIA Journal of Mathematics, Science and Technology Education*, *14*(10).

Kitchen, J. A., Sonnert, G., & Sadler, P. M. (2018). The impact of college-and university-run high school summer programs on students' end of high school STEM career aspirations. *Science Education*, *102*(3), 529-547. https://doi.org/10.1002/sce.21332

Reading Discussion

Ten quick tips by Brown and Wilson (2018)	**Peer code review as a mechanism for feedback by Pon-Barry et al. (2017)**
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Guiding Questions for Reflection

How do you enact these ideas and principles? What are spaces that show up in your teaching? How does their work come into your pedagogy?
How can you transfer these ideas to your classroom? To CUNY context?
What are some pros and cons of these practices?

Q&A

- Next Meeting - October 11th
    - Drawing in expertise and sharing your work. Any volunteers?
- Exit Ticket

Resources

Growth Mindset Scale

Paper Stephen Shared:

Demetriadis, S., Egerter, T., Hanisch, F., & Fischer, F. (2011). Peer review-based scripted collaboration to support domain-specific and domain-general knowledge acquisition in computer science. *Computer Science Education*, *21*(1), 29-56.

Culturally Authentic Practices in Student-Centered Computing

Culturally Authentic Practices	**Examples**
Promoting asset-based thinking and sense of belonging	· Problems are narrated as stories that emphasize context, characters, and audience. This emphasis on storytelling enables students to incorporate their own culture into their products. · Students engage in a progressive resume-building activity, adding new skills as they acquire them, and reflecting on the strengths they bring to the project. · Students explore different types of roles involved in CS-based careers and reflect upon their own interests and talents.
Building equity through collaborative work	· Students continually work in groups, with roles defined within the curriculum and rotated among the students. · Teachers are provided with guidance on how to use jigsaw strategies to ensure that all students feel their contributions are essential to the work of the group, how to manage group dynamics, cultural considerations that may emerge, and how to maximize students' voice and choice.

Building agency	· Students choose their own focal problem, thereby ensuring that they pursue personally relevant project work that is grounded in their own experiences. · Students use CS skills to address real-world problems which help them see themselves as agents of change in the pursuit of a more just world, and envision their "future self" in CS.
Addressing social identity/stereotype threat	· Students' CS role-switching and the progressive resume building help them build competence and see their CS knowledge acquisition as incremental. · Reflective discussions (i.e."Who is a Coder?") enable students to critically examine society's views on coding while also envisioning themselves in that role. · Reflection activities based on role model videos are also incorporated into the SCC curriculum. Students watch video interviews with Black, Latinx, and women undergraduate and graduate students who are successful CS majors and who discuss the challenges they have faced and how they have persisted within the field despite these challenges.

Meeting 3 | Tuesday, October 11

Check-in

- What's been going on in the classrooms?
- Accessible Lab Workshop
    - Elena and Brian attended
- Racial Health Equity Seminar at QCC - Wednesday, October 12th at 12 PM
- Announcements

Explore

- Computational Methods specific pedagogical techniques/tools
    - *For those using GitHub for student submission, do the students have to use the command line? Or GitHub desktop, or just drag and drop on the web page?*
    - *Is it possible to actually use GitHub properly for intro-level students? In general, they seem to just want to drag and drop into repos and not really use it as a version control system. or, when loading a dataset into python, do people use pandas? or more lower-level, non-package-based methods?*
    - *Some of the intro concepts might be helpful - like students frequently get confused about what an "argument" to a function is and have trouble abstracting my example commands.*
    - *Version control and literate programming may be cross-disciplinary and career-related (at a conceptual level; these are in addition to core ideas like loops, logic, etc, that I actually don't use in stats coding much)*
    - *Can we identify a core set of computational methods topics/concepts that seem to be relevant across disciplines? Should we include statistics (including implementation computationally) and data science as part of computational methods? What about ethics and communication?*
    - *Data Viz - Identifying approaches for data visualization would be helpful and how to teach that to students who do not have a background in computer science..*
    - *Freely/publicly available datasets for use as input in computational methods/data analytics.*

Resources

Lyon, J. A., & J. Magana, A. (2020). Computational thinking in higher education: A review of the literature. *Computer Applications in Engineering Education*, *28*(5), 1174-1189. PDF

Hug, S. (2021, March). How Do Faculty Convey Growth Mindset in Computer Science Teaching? A Preliminary Qualitative Study. In *Proceedings of the 52nd ACM Technical Symposium on Computer Science Education* (pp. 1285-1285). PDF

Sarrasin, J. B., Nenciovici, L., Foisy, L. M. B., Allaire-Duquette, G., Riopel, M., & Masson, S. (2018). Effects of teaching the concept of neuroplasticity to induce a growth mindset on motivation, achievement, and brain activity: A meta-analysis. *Trends in neuroscience and education*, *12*, 22-31. PDF

Morales-Navarro, L., Fields, D. A., & Kafai, Y. B. (2021, January). Growing Mindsets: Debugging by Design to Promote Students' Growth Mindset Practices in Computer Science Class. In *Proceedings of the 15th International Conference of the Learning Sciences-ICLS 2021*. PDF

Q&A

- Next Meeting - October 25th
- Exit Ticket

Meeting 4 | Tuesday, October 25

CANCELED

Growth Mindset

- Fostering growth mindset in the classroom https://soeonline.american.edu/blog/growth-mindset-in-the-classroom
- Summary of growth and fixed mindsets
- Video on Teaching a Growth Mindset
- Developing a growth mindset by Carol Dweck
- Growth Mindset Scale
- Learning module at Purdue Uni
- Developing a growth mindset module by Microsoft
- Growth mindset toolkit at Transforming Education
- Growth mindset activity for STEM
- Limeri, L. B., Carter, N. T., Choe, J., Harper, H. G., Martin, H. R., Benton, A., & Dolan, E. L. (2020). Growing a growth mindset: Characterizing how and why undergraduate students' mindsets change. *International Journal of STEM Education*, *7*(1), 1-19. https://doi.org/10.1186/s40594-020-00227-2

Guiding Questions for Reflection

- How do you enact these ideas and principles? What are spaces that show up in your teaching? How does their work come into your pedagogy?
- How can you transfer these ideas to your classroom? To CUNY context?
- What are some pros and cons of these practices?

Meeting 5 | Tuesday, November 8

Check-Ins

- What's been happening in the classrooms?
- Data Feminism Talk
- Transforming STEM Higher Education Conference
- Events at ASRC
    - https://asrc.formstack.com/forms/cagregistration
    - https://asrc.gc.cuny.edu/event/an-afternoon-with-malcolm-gladwell/
- Announcements

Ethics in STEM Classrooms

Baumer, B. S., Garcia, R. L., Kim, A. Y., Kinnaird, K. M., & Ott, M. Q. (2022). Integrating data science ethics into an undergraduate major: A case study. *Journal of Statistics and Data Science Education*, *30*(1), 15-28. https://doi.org/10.1080/26939169.2022.2038041 PDF

Teaching Data Science Ethics Supplementary Materials
https://smithcollege-sds.github.io/sds-www/ethics.html

Reflection Questions

- How do you enact these ideas and principles? What are spaces that show up in your teaching? How does their work come into your pedagogy?
- How can you transfer these ideas to your classroom? To CUNY context?
- What are some pros and cons of these practices?

Additional Reources

- Elliott, A. C., Stokes, S. L., & Cao, J. (2018). Teaching ethics in a statistics curriculum with a cross-cultural emphasis. *The American Statistician*, *72*(4), 359-367. https://doi.org/10.1080/00031305.2017.1307140
- Data science education lacks a much needed focus on ethics
- Why ethics are important n data science
- From Dr. Carr

Q&A

- Next Meeting - December 6th
- Exit Ticket

Meeting 6 | Tuesday, December 6

Check-Ins

- What's been happening in the classrooms?
- SPI Mid-winter symposium
    - Wednesday, Jan 11th at 10:00 - 2:00 pm at the GC
    - Share ideas and think about the next steps

Reflection

1. Aspects of celebrating (What did you like most about this semester? What would you do the same? Which aspects of the incubator meetings were effective?)

2. Opportunities for growth (What could you improve in your teaching? What would you do differently? What suggestions do you have for future SPI planning?)

3. Moving forward (What would you want to explore more/try in the future?)

   I wonder if we can make time to brainstorm collaborative opportunities among participants, such as new course ideas or grant proposals. Even if nothing comes from it, it would be interesting to task ourselves with answering what should be done next, in principle.

Q&A

- Next Meeting - January 11th Winter Meeting
- Additional meeting on December 13th or 20th - growth mindset
- Exit Ticket

Bonus Meeting | Tuesday, December 20th

Welcome & Check-in

- What's been going on in the classroom?

Explore

- Fostering a growth mindset in the classroom
    - https://soeonline.american.edu/blog/growth-mindset-in-the-classroom
    - https://www.mindsetworks.com/science/Default

Guiding questions for reflection

- How do you enact these ideas and principles? What are spaces that show up in your teaching? How does their work come into your pedagogy?
- How can you transfer these ideas to your classroom? To CUNY context?
- What are some pros and cons of these practices?

More to Explore Later

Genomics Education Partnership - Course-based Undergraduate Research Experience

Lopatto, D., Rosenwald, A. G., DiAngelo, J. R., Hark, A. T., Skerritt, M., Wawersik, M., ... & Elgin, S. C. (2020). **Facilitating growth through frustration: using genomics research in a course-based undergraduate research experience**. *Journal of microbiology & biology education*, *21*(1), 40. https://doi.org/10.1128/jmbe.v21i1.2005 PDF

Burnette, J. L., Billingsley, J., Banks, G. C., Knouse, L. E., Hoyt, C. L., Pollack, J. M., & Simon, S. (2022). A systematic review and meta-analysis of growth mindset interventions: For whom, how, and why might such interventions work? *Psychological Bulletin.* Advance online publication. https://doi.org/10.1037/bul0000368

Macnamara, B. N., & Burgoyne, A. P. (2022). Do growth mindset interventions impact students' academic achievement? A systematic review and meta-analysis with recommendations for best practices. *Psychological Bulletin.* Advance online publication. https://doi.org/10.1037/bul0000352

Yeager, D. S., & Dweck, C. S. (2020). What can be learned from growth mindset controversies?. *American psychologist*, *75*(9), 1269. https://doi.org/10.1037%2Famp0000794

Limeri, L. B., Carter, N. T., Choe, J., Harper, H. G., Martin, H. R., Benton, A., & Dolan, E. L. (2020). Growing a growth mindset: Characterizing how and why undergraduate students' mindsets change. *International Journal of STEM Education*, *7*(1), 1-19.

- https://evidenceintopractice.wordpress.com/2015/02/19/growth-mindset-what-interventions-might-work-and-what-probably-wont/
- https://www.structural-learning.com/post/growth-mindset
- https://soeonline.american.edu/blog/growth-mindset-in-the-classroom
- Summary of growth and fixed mindsets
- Video on Teaching a Growth Mindset

- Developing a growth mindset by Carol Dweck
- Growth Mindset Scale
- Learning module at Purdue Uni
- Developing a growth mindset module by Microsoft
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- Growth mindset activity for STEM
- Limeri, L. B., Carter, N. T., Choe, J., Harper, H. G., Martin, H. R., Benton, A., & Dolan, E. L. (2020). Growing a growth mindset: Characterizing how and why undergraduate students' mindsets change. *International Journal of STEM Education*, 7(1), 1-19. https://doi.org/10.1186/s40594-020-00227-2
- Motivating Students https://derekbruff.org/?p=2704
- Social Pedagogies for Motivation https://derekbruff.org/?p=808
- How to encourage students to pursue STEM degrees

Q&A

- Next Meeting - January 11th