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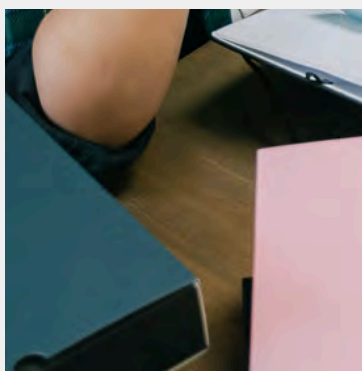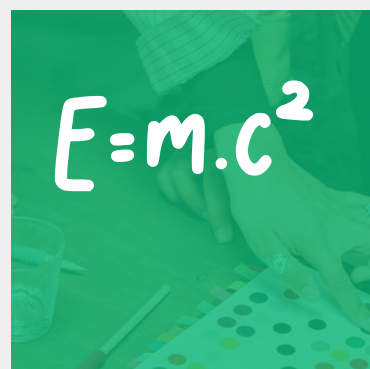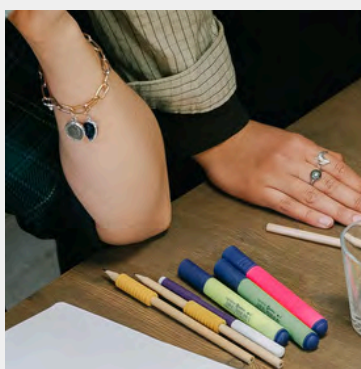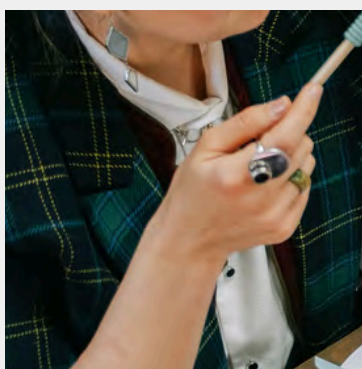
Mentoring in Research

a toolkit for researchers looking to start or improve their mentoring practices

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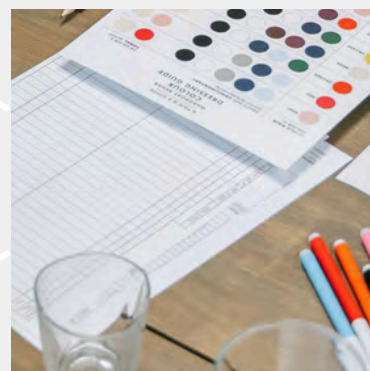
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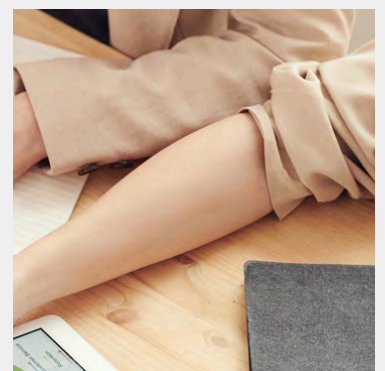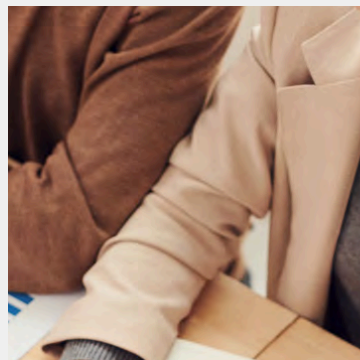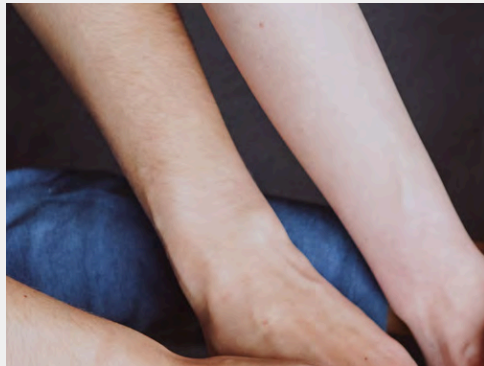
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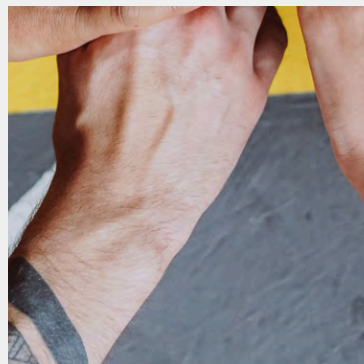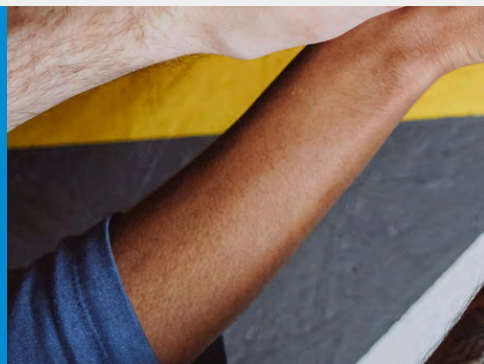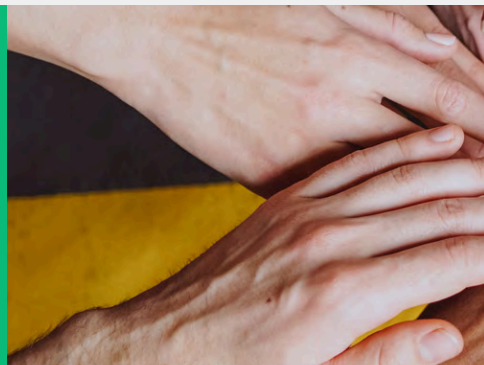
Acknowledgments

We would like to thank Dr. Amy Stone (UNLV) and Dr. Manognya Murukutla (Touro University Nevada) for their contributions to the editing of this toolkit

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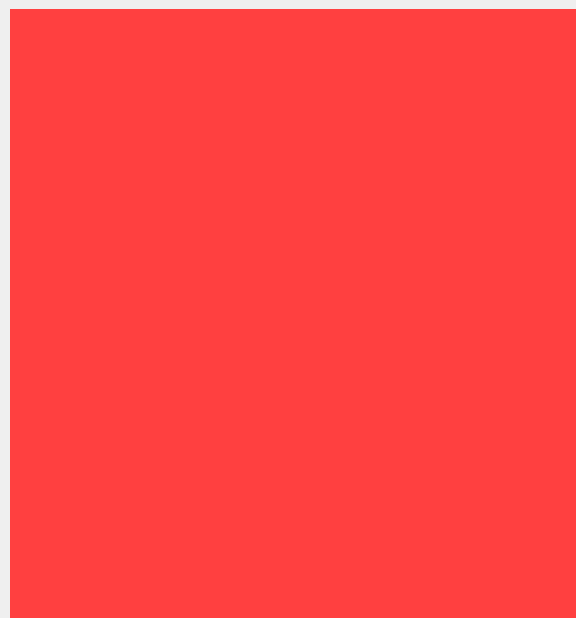
Introduction: Demystifying mentoring students in research experiences

Is the following true in your life?

- no time to plan and set up for mentoring!
- don't know where to start to plan or set up
- struggle with supporting student tasks and learning

Then this toolkit is for you!

This toolkit is the result of the CERES collective's experience in mentoring high-school, undergraduate and graduate students through both qualitative and quantitative research projects for the past five years. We wished to show how the mentoring experience, despite the many challenges, can be a rewarding and enriching experience for both the mentor and student if planned ahead. This is the toolkit we wished we had instead of learning through trial and error. It is an aid to reduce the time invested in mentoring and a guide to help you plan for this experience to be fruitful to you and your mentee.

Remember this is possible!

This toolkit is by no means an exhaustive list of all things related to mentoring in research. This toolkit is meant to help already busy researchers to efficiently mentor students in their own research work.

Why mentor students or why bring in students into large research projects?
○ Transferable Research Skills for both faculty and students
○ Students enhance existing ideas/projects
○ Helps with building community among the students and faculty.
○ Looks good on the tenure/promotion packets since most packets require mentorship experience.
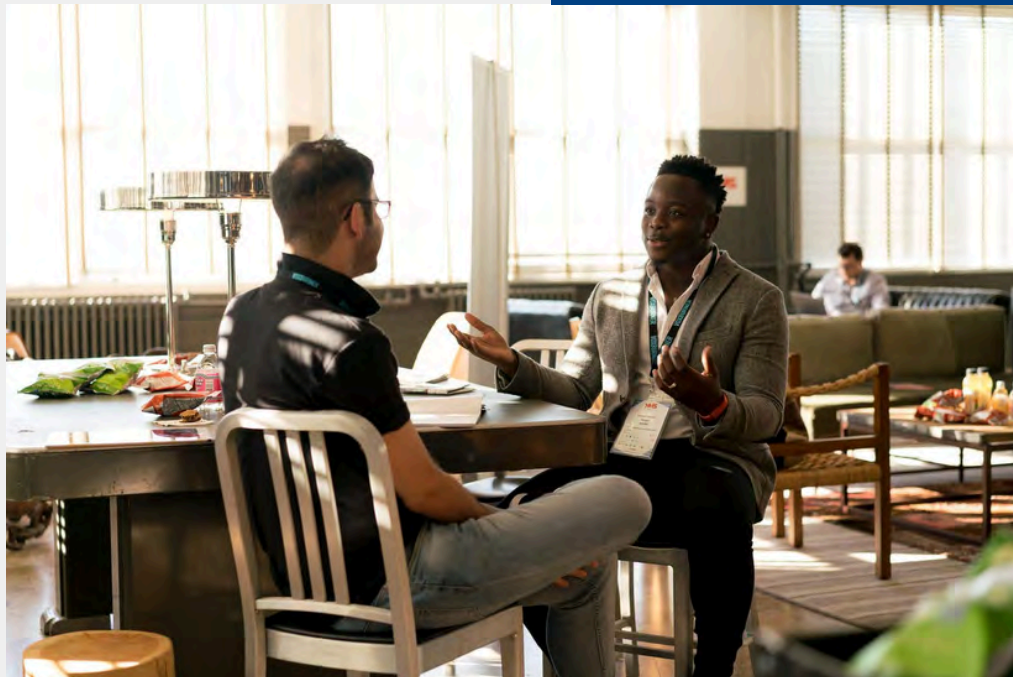
Step 1: Converting your project into tasks for students

Before you invite students to participate in your project, planning for them will save you time and set you and your project for success. This section is the first step in setting up this experience as a successful one. This section has 3 parts to help you get started:

1. Explaining how to divide your project and plan for tasks for your students
2. Providing a tool to help you plan
3. Demonstrate how to use the tool with an example from our research mentoring experiences

Dividing your project into tasks for students:

- Before you start dividing your project, ensure you have a relatively well-established idea (project proposal) or research question already in place
- Another important note as you plan, understand that sometimes students will not be able to do all the work that you planned for them due to several reasons, so plan for this too.
- We recommend that you plan for the first section of the project in greater detail, but the later section(s) should be more flexible to give both you and the student the space to accept the new directions the project could take.
- The first week of any project should be spent providing the foundational content - theoretical and practical framework- of the project.
- The information provided should be specific to the project and relayed in a manner that a non-expert would understand. This can take many different forms depending on the project, but completing sample tasks or performing thought-experiments on the foundational background data the project is based on. For example, if I wanted to perform a thought-experience with my student to understand a key finding from my previous work, I would talk through the experimental setup with the student and have the student help identify controls, expected outcomes, and then discuss the actual data/results. Alternatively, we could repeat the experiment in the lab for the student to experience the procedure, learning skills, and have data they generated to analyze.
- Break down your larger research question or hypothesis into smaller research questions or contributing tasks that you think can be answered within the time of the mentoring experience.
- It would also be good to have written summaries or step-by-step guides of the procedures involved in answering those hypotheses, and examples/tutorials of those procedures when they have been used in similar contexts.

Don't forget to provide examples of how the information should be documented during their time with you, and how information should be communicated at the end of their time on the project such as a written report or poster presentation. We discuss this more in Step 3.

Here are some more suggestions from other researcher-mentors we work with to help plan your mentoring experience:

"Something that I could do in about 2 normal weeks is about right for a student summer project and that has been a reasonable guideline for the breadth of a student project."
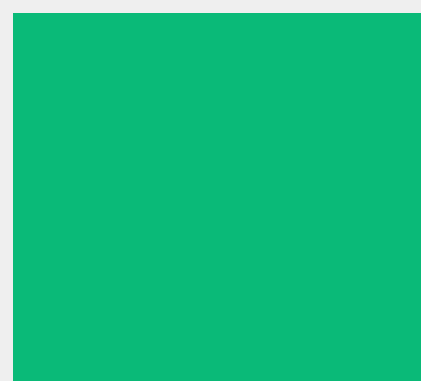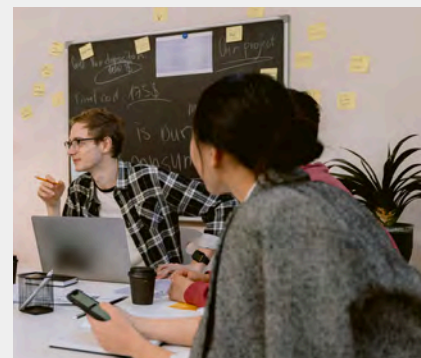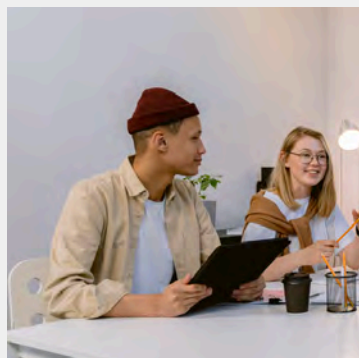
"Using a manuscript outline and dividing the expected/planned figures into panels and assigning students a panel to work on has been helpful. This meets my personal requirement that to be considered for manuscript authorship, the student needs to contribute one publishable figure panel."

"Similar to the panel approach, using a specific question to guide project division has been useful for me. I think about what small questions contribute to my big question. The small questions are the divided pieces to give to the students. For example: Big question - which COVID-19 rapid antigen test is the best for primary care settings? Small questions- Which test has the best sensitivity? Which test has the specificity? Which studies show a comparison between nasal and nasopharyngeal samples and how does that change the accuracy stats?"

Disability Access

The CERES Lab tries to center equity & justice in all our work and practices. We especially try to pay attention to students from marginalized backgrounds and support their growth in research. We have included a few suggestions throughout this toolkit with the label 'DISABILITY ACCESS FEATURE', like those below, as a way to help you START practicing including students often marginalized in research and support their success.

- DISABILITY ACCESS FEATURE: Ensure all the documents you share with students are accessible to screen readers. Having simple pdf documents is best for this.
- DISABILITY ACCESS FEATURE: When planning for tasks for students, account for different disabilities including physical, intellectual & learning disabilities. For example, don't assume all students will finish the same tasks within the same time. So allow for students to choose when they can work but provide structures like a deadline and means to communicate challenges with that deadline if need be.
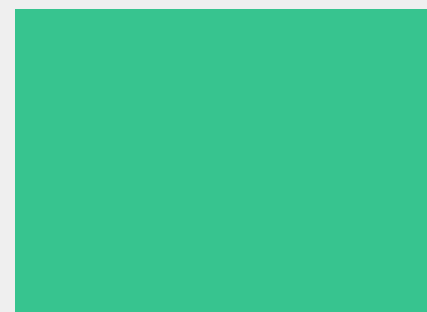
Tasks & timeline: Why have such a document?

It is important to have a tasks and timeline document, especially for short projects (a semester or 6-week ones), to keep both the mentor and mentee on track. It is a good way to visualize the different tasks of the project as well as keep all interested parties aware of the scope of the project. As a mentor who may be in charge of multiple projects, it will get overwhelming on what is going on in each project. This document is a helpful tool for the mentor to be aware of that as well as get a feeling of accomplishment on seeing different sections of the project being completed.
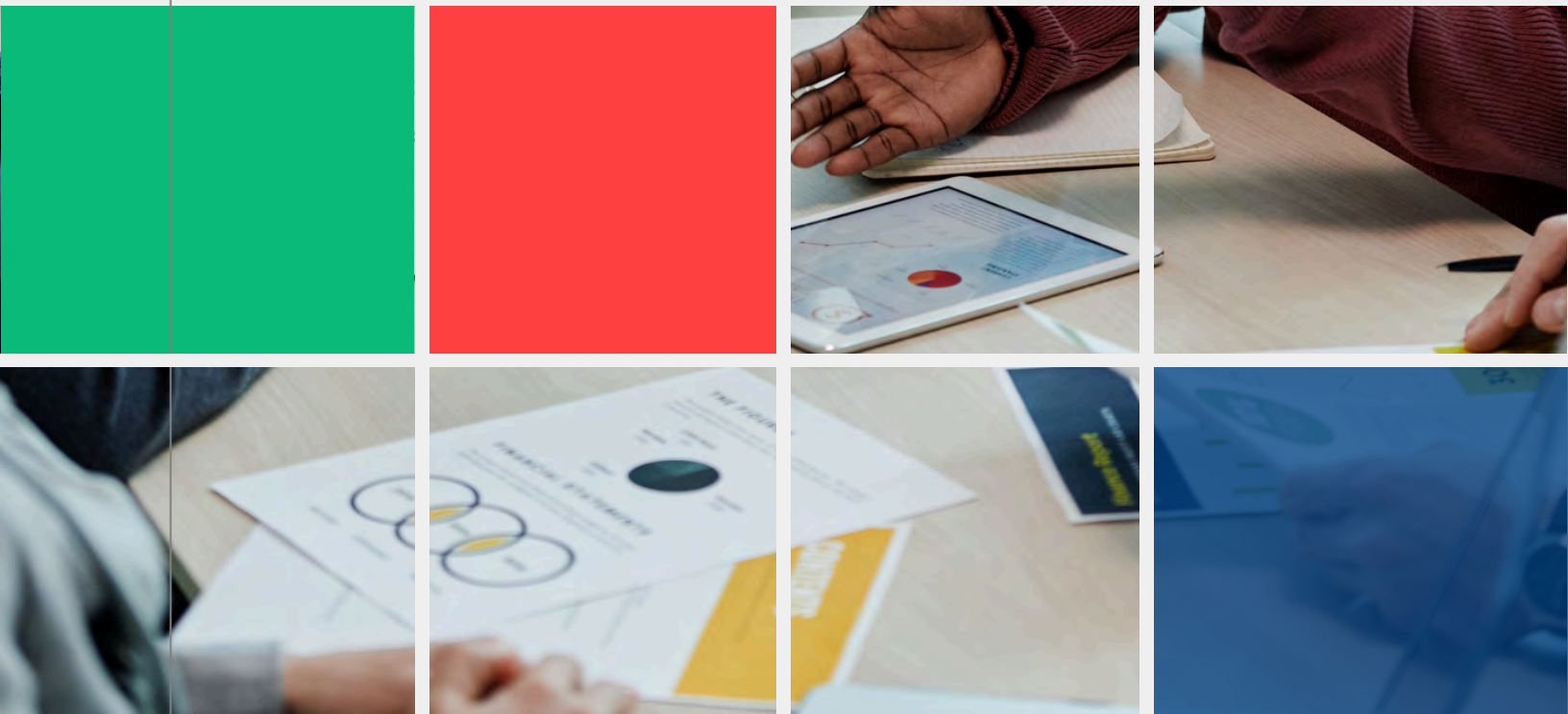
The below is an example Tasks and Timeline document which the CERES group used when virtually mentoring a high-school senior in the summer of 2020 virtually for six weeks. The project was a data analysis project so the example is geared to that kind of project. It can be modified for bench research. The author's notes are comments by the authors on different sections of the document and why the section is included.

This document is based on our own research mathematical longitudinal analysis project which was fully virtual during 2020-2021. The project was with high school students over a span of 6-weeks and two consecutive summers. It was an analysis of longitudinal educational data about the factors that may affect students with disabilities in the school system. The students met with the lab mentors daily and attended mini-virtual conferences. The students were tutored in the use of software with the help of example code, worksheets and code-debugging sessions. The work started by one student was carried forward in the next year with the help of research reports, tasks and timeline documents and extensive coding documentation. For the template, please see Appendices.
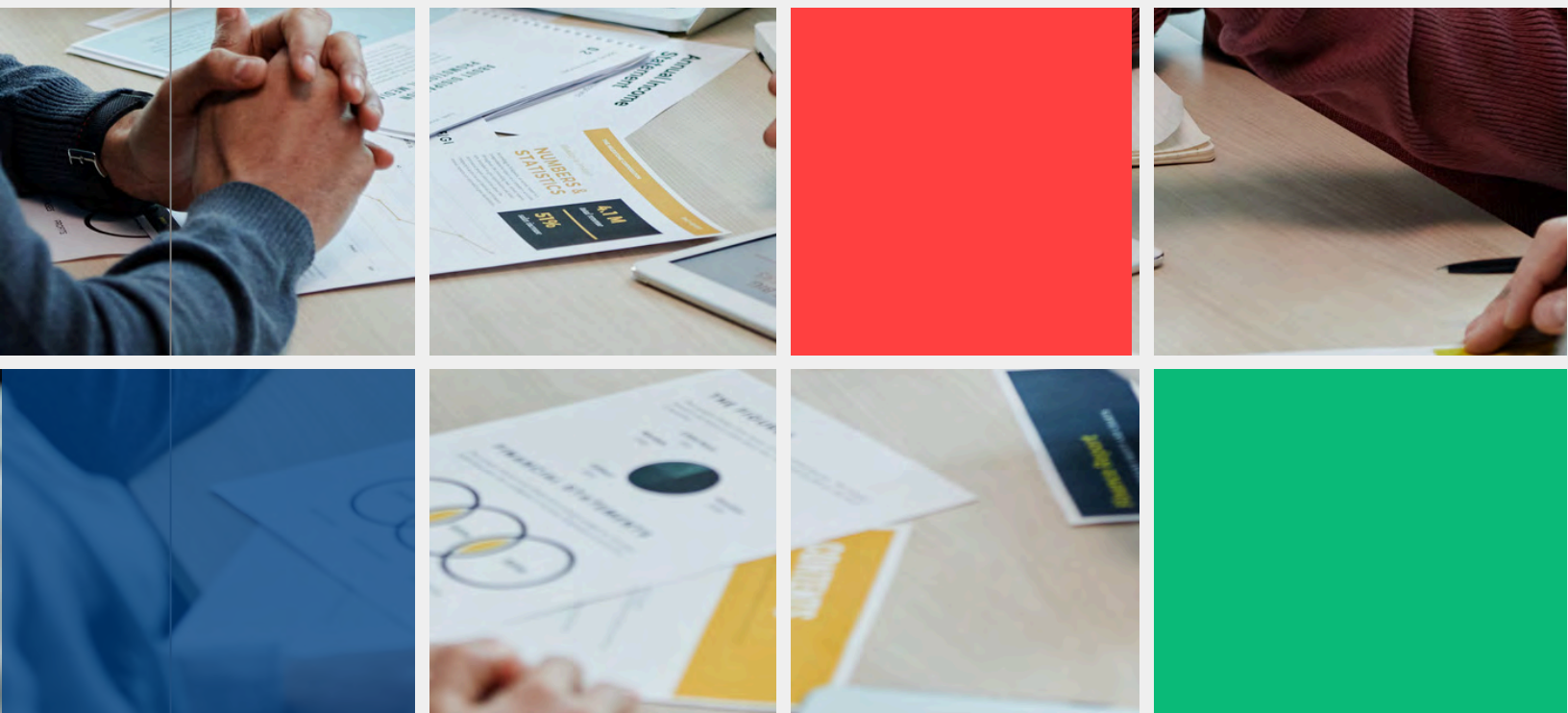
Tasks & Timeline

Author's note: In the screenshots of the table below, the author's notes are included in blue

Description of the project:
Analysis of longitudinal datasets to understand the trajectory of students with disabilities in STEM (science, technology, engineering, and mathematics):
Using the National Educational Longitudinal Study 1988-2000, the project will examine the influence of race and socioeconomic status on choice of STEM by students with disabilities. This data analysis project will focus on extracting the relevant data from the dataset, conducting descriptive analysis (like constructing graphs on the data), and regression analysis. All of the analysis will be done using R. Instruction and resources will be provided on the statistical techniques and the use of R.
Author's note: Description of the project can be as big or small as you wish it to be. This example description is one where the authors took a big dataset and broke the analysis into a 6-week project for high-school students.

Meeting times:
Mornings (Monday to Thursday) from 10am-11am via WebEx unless other meetings pop up.
Author's note: The meeting times are important when you have a short project and want to move things along. For longer projects, it's the mentor's prerogative on the frequency of the meetings.

Researchers:
ABC (high-school senior) (he/him), Dr. Koshy (she/her), Dr. D'Souza (she/her), Prof. Morales-Hernandez (she/her)
Author's note: This project had 3 mentors, one for the qualitative aspect of the project and two for the quantitative analysis.
A google doc will be shared with everyone in which ABC can write up questions that come up when he is working and will be answered during the morning meetings. If he has any urgent questions, shoot us an email and we will try to answer or schedule a quick check in. Also, feel free to always ask questions.
Having a running document of questions is a good way to keep track of the progress and also helps with the writing of the project report as well as the presentation.

Project Deliverables/Outputs:
Presentation as well as a project report

Tasks & Timeline

Week	Focus/ Goals	Meeting Tasks	Student Tasks & Products
Week 1 **June 22**	Introduction to project members & R *We believed one week of the 6-week project should be dedicated to getting to know the team and the theories/ foundational concepts or literature behind the project.*	1. Introduce team and introduce statistical analysis in ed. research 2. Introduce R and descriptive statistics and graphics Introduction to software need not be detailed. You can start with the code/commands that will be necessary to begin the project. 3. Discuss challenges & next steps 4. Introduce grant	1. Read Entry and persistence paper(Chapter 1, 2 and 3 up to the Logistic Regression section) & write notes *Author's note: If the paper is too long, it's good to point the students to the project-relevant sections.* 2. Play with R & write notes http://www.sthda.com/english/wiki/descriptive-statistics-and-graphics 3. Read grant 4. Start report/ maintain research notes
Week 2 **June 29**	DisCrit & Mixed-methods research in education *Theory/ foundational concepts behind any project lays a foundation for the student to understand the topic and helps them to ask relevant questions.*	1. Discuss journal paper-1 and notes 2. discuss annotated bibliography and re-write summary 3. Any questions on reflective paper and introduce social justice & science series a. Discuss social justice & science b. introduce critical race theory 4. Discuss comparisons and contrast 5. Introduce Latino pipeline & discuss pipeline and relate to present study 6. introduce Discrit theory	1. Reflective writing on justice + read links provided on social justice & race + create annotated bibliography 2. Read Quantcrit journal paper-2 & annotated bibliography + compare & contrast both papers 3. Read Discrit + annotated bibliography + final reflection: why use critical race theory in quantitative or statistical studies

Step 2: Planning and conducting research or lab meetings

Research or lab meetings are as essential to the scientific process as any theorem, data or lab instrument. It, explicitly, is meant for members in a research group to discuss and determine the action steps and interpretations in the research project. These meetings, implicitly, establish research or lab culture, which can have a strong influence on the production, and therefore nature of science produced in the lab.

Research or lab meetings are a great way to check in and serve as a space to mentor your student in the research work. These meetings are often the primary space where you interact with your mentees the most in order to get to know them, introduce them to the project, assign tasks, check in on their work and troubleshoot challenges.

Golden et al.(2021) recently defined productive lab meetings and have presented "10 simple rules" that are valuable. We would encourage you to read the paper but we have presented a few more pointers to get you started and running. These are not rules but guidelines to help think through as you plan and conduct your research meetings:

1. Have an agenda: In addition to clearly having this written in a shared resource and having discussed it with mentees, we would recommend you having clear objectives and meeting agenda that align with overall goal and objectives of the lab. Whether meeting a large group or one-on-one with your mentee, always have an agenda or purpose and share that ahead of time with your mentee(s).

DISABILITY ACCESS FEATURE: To be more inclusive and productive, provide space for mentees to add to the agenda and show them how.

DISABILITY ACCESS FEATURE: Offer virtual meeting options for all meetings (and this can help other mentees also who may have transportation issues, childcare or elder care challenges etc.) and ensure closed caption is available.
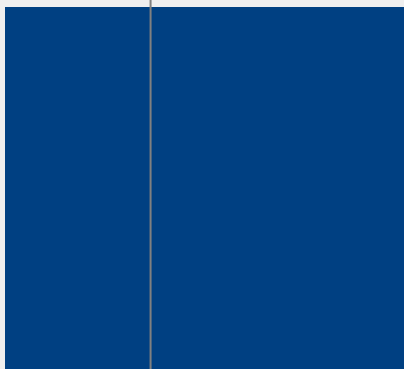
2. Set aside some time to discuss and set expectations for both yourself and your mentee. If you have certain expectations for work or conduct during meetings, please clearly communicate them to your mentee and provide justifications when you can. This is tied to the education term "hidden curriculum" where students are often help to unknown or dominant group expectations. We have provided a mentorship expectation guide in our appendix to help you with this conversation.

3. Set community guidelines for meetings to reduce conflict and miscommunication.

4. Have actionable next steps/smart goals for mentees before they leave the meeting so they know what to work on

5. Move away from the expectations that all your meetings have to last an hour or two. Some weeks they could be quick 15-30 min check-ins.

6. Follow up with a short written summary of the Action Items from the meeting via email and include any expected check-ins or timelines for these tasks.

Some resources & examples to explore for running meetings:

- https://ewallace.github.io/manual/meetings-overview
- https://civiclaboratory.nl/clear-lab-book/
- Golden, N., Devarajan, K., Balantic, C., Drake, J., Hallworth, M. T., & Morelli, T. L. (2021). Ten simple rules for productive lab meetings. PLoS computational biology, 17(5), e1008953. https://doi.org/10.1371/journal.pcbi.1008953

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8158921/

Step 3: Supporting your students doing research

Oftentimes due to limited experience or being a new research project, students may not be familiar with some research methods or even some science skills we might take for granted like searching for a paper or synthesizing literature. In addition, as mentioned earlier, hidden curriculum (citation) ..... As we discussed earlier, you could support students with some of these skills by setting aside some time before, during or after meetings to demonstrate and practice some of these methods. You could also share some supporting resources that could help them accomplish the research tasks you assign. We would encourage you to do both (share resources and organize practice sessions) if time permits. In this section, we discuss the following:

- Mentorship Expectation Guide
- Reading the literature
- Data Collection & Analysis
- Documenting & Disseminating Research
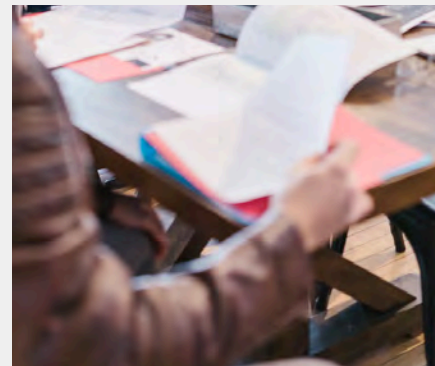
Mentorship Expectation Discussion Guide

Why have such a mentorship expectation discussion?

This document will help with transparency between you and the mentee. The agreement lists out mutually agreed upon goals of you, the mentee and the project. It will help you with setting clear expectations from the start. This can be a discussion or a written documentation that both you and the mentee can refer to through the project. The verbal or written agreement also specifies frequency and mode of communication. This is especially helpful for a mentor who is juggling multiple research projects and teaching. It establishes smooth and honest communication. This is a good tool to help stipulate some objectives which can be further explained in the Tasks and Timeline document.

The below is an example Mentorship Expectation Discussion Guide which the CERES group developed & used when virtually mentoring a high-school senior in the summer of 2020 virtually for six weeks. The project was a data analysis project so the example is geared to that kind of project. It can be modified for bench research.

Mentorship Expectation Discussion Guide

1   What are the proposed research project goals?

Using the National Educational Longitudinal Study 1988-2000, the project will examine the influence of race and socioeconomic status on choice of STEM by students with disabilities. This data analysis project will focus on extracting the relevant data from the dataset, conducting descriptive analysis (like constructing graphs on the data), and regression analysis. All of the analysis will be done using R. Instruction and resources will be provided on the statistical techniques and the use of R.

2. What are the mentee's goal during this research experience and how do they align with larger professional goals?

Create a presentable project on the trajectory of students with disabilities in STEM using longitudinal data, enhance computer programming skills (R) and understanding of statistical analysis.

3. What are the mentor's goals during this research experience?

Develop a longitudinal analysis project to investigate the trajectory of students with disabilities in STEM. Enhance existing mentoring skills.

4. What is the shared vision of success in this research project?

A conference talk/poster/paper.

5. Number of hours to work per week:

at least 2 hours per week on the project during the year.

6. What is the primary means of communication, and what are some shared expectations around communication?

Email. Expect response within 12-24 hours max. No expectations to email or respond duringL weekends or after 6pm EST.

7. When do we meet? And what are some goals and expectations for the meetings?

We will meet bi-weekly on Wednesdays to discuss our progress, the larger project goals, andLto evaluate the mentee's performance. We will reaffirm or revise our goals and/orLexpectations going forward 2 times for the project, we will check in about goals in Dec andLMay.

a) In preparation for these meetings, the mentee will: complete the tasks assigned to her. IfL she is having difficulty completing the task, he should let the mentor know prior to theL meeting.
b) In preparation for these meetings, the mentor will: look through the completed tasks andL have answers to the questions the student poses.

8. What are the mentee & mentor's preferred way to provide feedback on the mentee's performance and specific suggestion to improve the progress?

During meetings discuss feedback

9 What method, techniques and procedures does the mentee require suppot & training in?

Presentations, demonstrations with R, troubleshooting the R code with the trainee via Zoom orLL in-person.

10. How will the mentee document daily work and research results?
Using a running word document.

11. Expectations when the mentee gets stuck while working on the project (e.g has questions or needs help with a technique or data analysis)

to send an email to the mentor and they will try to answer or schedule a quick check in.

Data Collection & Analysis

Data collection & analysis are some of the major tasks the mentee-student will be involved in. It is also often the most underrated and unorganized piece in a group project because of the nature of the work.
The first step in supporting your students conduct data collection & analysis was something you would have completed earlier when you divided your project into weekly tasks for the student (see STEP 2). A valuable next step would be to look at the tasks and see if any require special skills like interviewing (data collection) or calculating t-tests (analysis) and provide students with resources they would need to complete these tasks. Getting to know your mentees will be helpful during this time because you can cater resources based on their prior experience with research, especially for students with disabilities who may need additional resources/time. Here are some resources ideas to get you started:

- University Library Guides: Contact your University librarian who will probably have lots of resources for you.
- Qualitative Research: https://guides.lib.vt.edu/researchmethods/interviews
- Getting started with R: http://rafalab.dfci.harvard.edu/dsbook/getting-started.html
- https://methods.sagepub.com/: This often requires Institutional access.
- Lab servers or repositories of protocols or guides
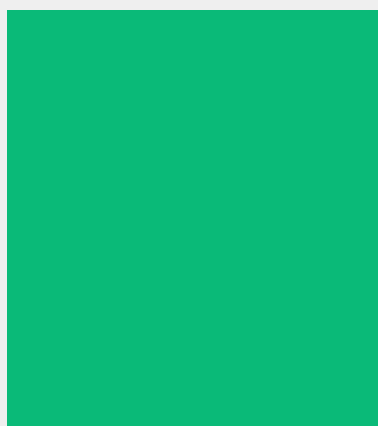
Encourage your mentees to review resources and assign a student lab partner (if possible) to help practice some of these techniques and strategies.
Another space where you can support your students' work is lab or research meetings you hold. These allow the student to see how others in the group collect and analyze data.

DISABILITY ACCESS FEATURE: Assistive technologies (AT) can assist in removing many physical barriers present in the laboratories, classrooms and in the field. Examples include Light Microscopy for Persons with Upper Limb Mobility Impairments like AccessScope, the Pentaview LCD Digital microscope equipped with a small screen that can be connected to a large monitor to allow for viewing by students with low vision. There are also accessible engineering laboratories like the Human Engineering Research Laboratories (HERL) at the University of Pittsburgh (https://www.herl.pitt.edu/)

Reading & Reviewing Research Literature

1. Often students have never read a research paper before or don't have strong reading and comprehension skills. It would be extremely valuable to provide resources to students to help them develop these essential skills of reading academic papers. If there is time, provide space either during research meetings or one-on-ones to discuss how to read the paper and what they have learned from reading.
2. Remind students that not every paper has to be read in depth! We researchers don't do this either. Share with them how you read and review papers, in addition to providing some resources. These articles are not novels and shouldn't be treated as such.
3. A note on annotated bibliography - Students are often asked to "read" literature or write annotated bibliography with no guidance. In addition to guidelines on how to read an academic paper, provide resources around or set aside some time during meeting to discuss what an annotated bibliography is, why is it important to write and what format to write it in. We have provided some suggestions below.
4. Introduce students to the Purdue University's Online Writing Lab (https://owl.purdue.edu/owl/index.html) which is an excllenet sources for most of these topics including academic writing.

Some Resources:
- https://www.science.org/content/article/how-seriously-read-scientific-paper
- https://www.elsevier.com/connect/infographic-how-to-read-a-scientific-paper
- https://owl.purdue.edu/owl/general_writing/common_writing_assignments/annotated_bibliographies/index.html
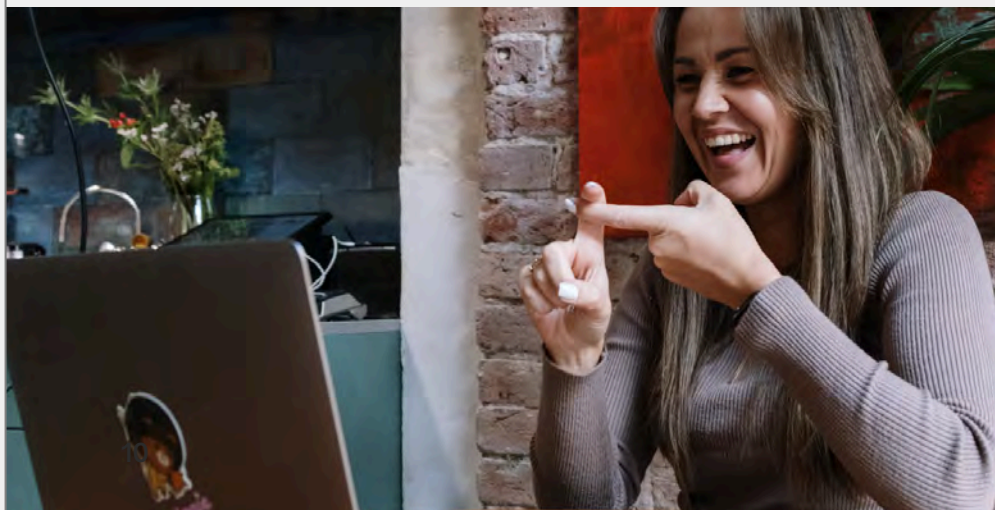
Below we provide a short description of the guidelines we share with our mentees when we assign reading.

1. *Title - Search for keywords in the title. This will give you an idea of what the paper presents.*
2. *Abstract - This is your WHY (why the study was conducted), HOW (methods), and CONCLUSIONS (results). Reading this first helps you determine if the paper is relevant to your project or question.*
3. *Introduction - FaL Method - Read the First and Last paragraphs of Introduction, as this will help you understand the background and hypothesis of the study. The first paragraph will give you the background whilst the last paragraph will give you a summary of what the paper covers.*
4. *Methods- Most of the time there is no need to go over all the methods in the paper, , unless you are planning to reproduce or slightly modify the study. The details in the methods section are not as important as we think they are to understand the tasks and experiments presented in the paper.*
5. *Results -Scroll through subsection headings of the Results. Identify the main figures and results or the important figures and results that you are interested in and try to identify the section in the text that explains the figure/result*
6. *Conclusion - quick summary of what this paper found and how it fits into our previous knowledge.*

Documenting & Disseminating Research

Project Reports
- A project report (template provided) has the following benefits:
    a. It is proof of research for both the mentor and mentee and a way to document the mentee's work and help with dissemination.
    b. Scaffolding tool to help with publication
    c. Helps with organizing other forms of dissemination (eg poster/talks/grant proposals) related to the subject in the future.
    d. Helps the students be organized with the project.
- We have shared a template in the appendices

Project Transition Documents:
- For projects that run further than the designated time with the student, it is good to have a transition document (or sections in the project report) to have a smooth turnover to the next person who will continue the work.
- Sections for this document could include a short background on the work before the student's arrival, a summary of the goals the student attempted to accomplish, actual progress on those goals, locations of data/code generated during the student's time, and protocols/procedures that were developed for the project.
- Many of these recommended items can be copied from the Project Report and edited to fit the needs of this document.

Publishing with Mentees

- We would encourage you, for equitable and ethical reasons, to always add your mentee's name to any publication produced if the mentee was involved in any part of the research discussed in the paper.
- This is also a great opportunity to provide your mentees with experience of writing research. They could work on a small section of the paper or even edit and find references.
- Find creative (blogs/twitter threads) or alternate avenues to disseminate research findings written by students.
- You could also encourage and support your mentees to submit to undergraduate student publications and student research forums like Math Horizons & The Stanford Undergraduate Research Journal.
- Another source of publishing with your mentees are local, branch, or regional meetings of relevant societies
- It is important to discuss with mentees that any submissions to public forums, whether as an abstract or a full manuscript, should be communicated to all members of the project (the authors) prior to submission
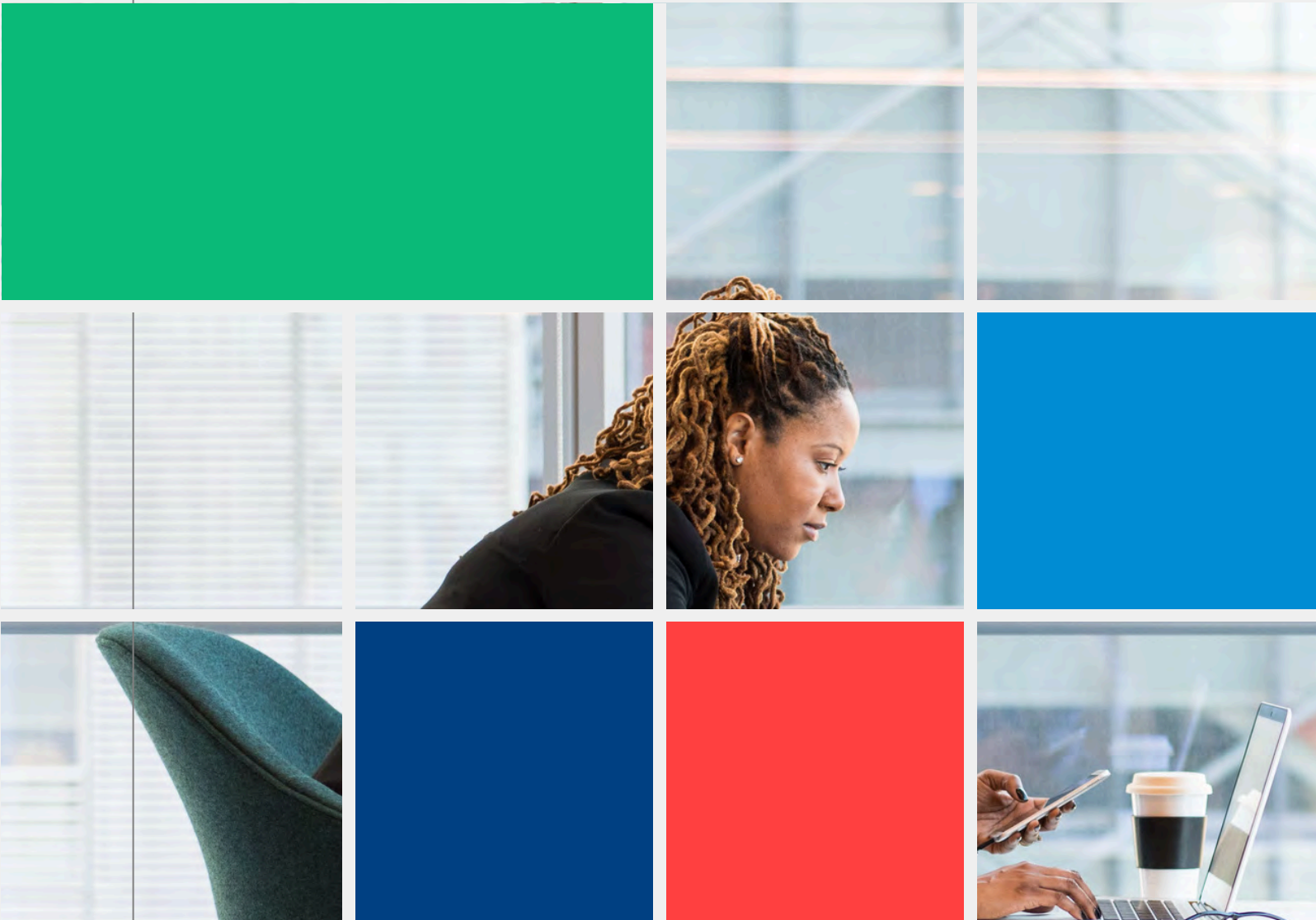
Choosing Authorship:
- Most journals now ask for the author contributions on the paper. This is a good impetus to have a frank discussion on how each team member will contribute to a publication.
- The discussion about first authors, corresponding authors and order of other authors should be held before the writing starts so that there are no disagreements on submission. It is also important to discuss the meaning of the various authorship positions on a publication or presentation as this can be part of the "hidden curriculum" and vary by field.
- According to the International Council of Medical Journal Editors (ICMJE), authorship is determined by:

"Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
Drafting the work or reviewing it critically for important intellectual content; AND
Final approval of the version to be published; AND
Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.
In addition to being accountable for the parts of the work done, an author should be able to identify which co-authors are responsible for specific other parts of the work. In addition, authors should have confidence in the integrity of the contributions of their co-authors."

- A caveat about the ICJME site, the information is written from an editor's point of view. The site also gives good information on timelines for submission, non-author contributors, and the peer-review process.
- Things may change, so another discussion may be warranted.
- See Authorship agreement template in appendix

Oral Presentations or Talks
- Presentations/talks have multiple advantages
- Helps with publicizing the project.
- Gives both the mentor and mentee name recognition.
- Allows the mentee to practice public speaking skills.
- Helpful suggestions from the audience could enhance the existing project.
- Allows for networking opportunities.
- The art of presenting is one which needs constant work. Practice the presentation with your mentee and provide them with constructive feedback on areas to improve.
- The usual layout of a presentation is similar to a paper- Introduction, Methods, Results, and Future Work.
- The presentation tells a story about your work and should be able to be logically followed.
- Assume the audience knows nothing about your project. You should provide background information on the theory behind your project. This can be restricted to a short summary and should be part of your introduction section. The introduction should contain the study's question, the rationale and the reason why this study is important.
- Content presented must be engaging, informative and concise.
- All sections should be such that non-subject matter experts can understand.
- Avoid full sentences and paragraphs in oral presentations. Full sentences can be appropriate on posters to make the work understandable when the presenter is not actively presenting the poster
- Images and diagrams are more visually pleasing than blocks of text. Use images to illustrate your models, methods, or background when possible but do not put in decorative images. The images need to serve the purpose of telling the research's story.
- Images, if possible, should be provided along with Alt text (Alternative (Alt) Text is meant to convey the "why" of the image as it relates to the content of a document or webpage. It is read aloud to users by screen reader software, and it is indexed by search engines. It also displays on the page if the image fails to load, as in this example of a missing image. Taken from:
- https://accessibility.huit.harvard.edu/describe-content-images)
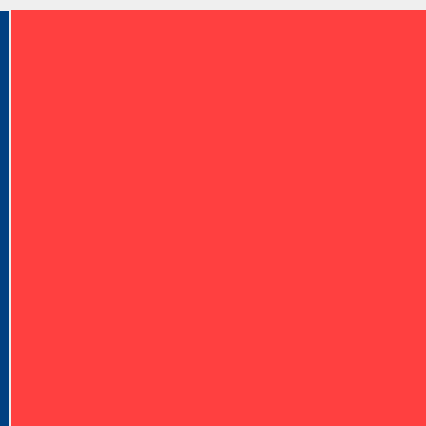
Here are some guideline we shared with our mentees for creating slides:

1. Introductions – keep the number of slides for this section to a minimum. A reasonable guideline is to assume 1 minute of presentation time per slide and give 10-20% of your time to the introduction. As you practice, the timing of your slides may vary and the number of introduction slides could change depending on the complexity of your topic.
2. Methods – Your methods do not need to be so detailed that the audience can reproduce your work step-by-step. They need to provide enough context so that your audience understands the general steps you took, the research question you are addressing with that task, and what data they should expect you to show. Consider inserting method slides immediately before the relevant data slides, rather than having all of the methods immediately after the introduction. This helps the audience understand when and how each method was used.
3. Results – give the bulk of your presentation time to this section. Take the time to label all results clearly and avoid using "lab jargon" or abbreviations that are uncommon outside of subject matter experts.
4. Conclusions/Future work – similar to the introduction plan 10-20% of your presentation time to the conclusions of your work. Include future directions that you would/will take as you continue on the project, and how your results have added or changed the previous understanding of the topic.
5. Acknowledgements – it is critical to acknowledge the people and funding agencies that helped with this work.
6. Final slide – Consider putting a model slide or visual summary slide as your final slide for you to refer to as you answer questions.
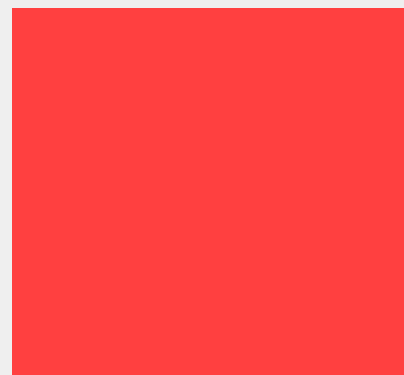
If you are including visual summaries, do not forget the Alt Text and describing it while recording.

If you are recording your talk, describe your images out loud for people with low visibility.

1. Referencing – rather than putting all the references on a final slide that is too small to read and goes by too quickly, include first Author last name, year and journal on the slide where you are using the referenced information.
2. Slide accessible designs: How to make your slides accessible: https://youtu.be/vTzLkYYU3fw and https://youtu.be/xiR0QZ9pA_M
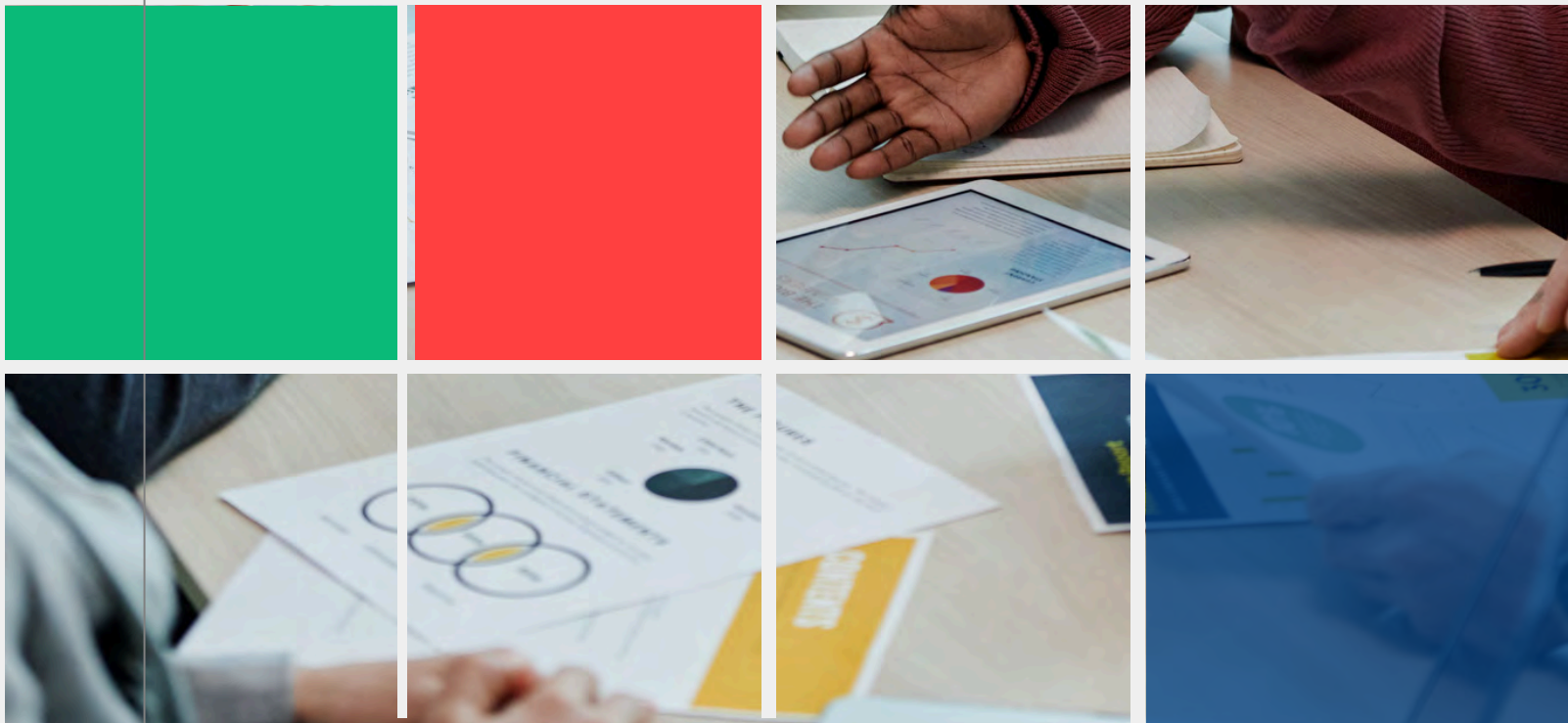
Posters
- Many of the available poster templates follow guided pathing to easily move the audience through the poster in the order you want them to take. The audience will look in the top left corner first, so make that spot eye-catching and engaging.
- Using the university template is a good move so as to promote the university and it will be easier to put in the various sections. The lab may also have a template available for use.
- Use large font sizes and no font size smaller than 24pt Arial.
- Images, if possible, should be provided along with Alt text.
- Avoid text heavy posters as it will be illegible and may put off readers.
- Include the acknowledgements of funding agencies and any non-author contributor.

Use accessible design principles discussed for talks. Here are some further resources about color blindness.
1. Vengage has a nice blog post on this topic and a palette generator:
2. https://venngage.com/blog/color-blind-friendly-palette/
3. https://venngage.com/tools/accessible-color-palette-generator

Appendix

Tasks and Timeline

Description:

Meeting Times:

Researchers:

Outputs/Deliverables

Week	Focus/Goals	Meetings Tasks	Students Tasks & Products

Authorship Agreement

This agreement template is to prompt discussions between you and the co-authors before the paper is written. It will also help when you submit the manuscript and are prompted to list the author's responsibilities.

Create this section for each author on the manuscript by simply copying and pasting the form provided below.

---

1. Author name:

- Author position in the list of authors (for example: first author, second, last and so on):

- Author's responsibilities:

I agree to adhere to my responsibilities in my role as an author on this manuscript.

Signature:

---

2. Author name:

- Author position in the list of authors (for example: first author, second, last and so on):

- Author's responsibilities:

I agree to adhere to my responsibilities in my role as an author on this manuscript.

Signature:

Project Report

Project Title

Submitted to

Department of ABC

University XYZ

By

Researcher's name

In fulfillment of the requirement for 20% of the Final grade of the course.

Prof. EFG

Project Report

Abstract (Problem Overview)
A brief statement of the project objective and a summary of the steps you used to achieve it.
A. Why is it important to address these questions?
B. Are you, for example, examining a new topic?
C. Why is that topic worth examining?
D. Are you filling a gap in previous research?
E. Applying new methods to take a fresh look at existing ideas or data?
F. Resolving a dispute within the literature in your field?

Insert link to Abstract figure

Key words
Relevant words that can describe your research. If you were to google this topic which words would you use?

Table of contents
Regular index

List of tables/figures
Document attached here as there are a ton of tables/plots. DO NOT include the tables/figures/images here. This is just a regular index/list of the figures/tables/images in the document.

Introduction
This is the section of the paper where you set up/describe your topic for the reader. Some of the main goals of the introduction are the following:
A. This is the time to pull your reader in. Make a case for why this topic is interesting to the reader.
B. Providing background of the topic and summaries of current research.
C. Description of your research question and its significance.
D. Summary of the paper's sections

Visit the following website for more information about how to write an introduction

Project Report

Social Justice problems

Following the spirit of the International Council of Scientific Unions, we use the term "teaching mathematics for social justice" to encompass all mathematics instruction which aims for improved human well-being.

Human wellbeing in turn is defined as a "context- and situation-dependent state, comprising basic material for a good life, freedom and choice, health and bodily well-being, good social relations, security, peace of mind, and spiritual experience" [7].

For our purposes, however, the essence is captured by the United Nations: "Social justice may be broadly understood as the fair and compassionate distribution of the fruits of economic growth" [9].

Studying mathematics for social justice is an expansive project. It involves, among other things, what we do in the classroom as students to create classroom environments where social justice is practiced.

It also involves understanding and dismantling various structural and systemic barriers confronting large groups of students through mathematics.

Describe some aspects of your project that involve/contribute to a Social Justice problem.

Results and discussion

Provide answers to the questions posed. Discoveries. Also, talk about possible future directions the project can take.

Feedback and difficulties

Provide a summary of how you worked, summarizing any challenges faced, what you did to overcome them or why you were not able to archive results.

Conclusions

In one crisp paragraph, summarize the results of this project. Do not present new information in the Conclusion.

References/Bibliography

Appendix 1: Codes

Appendix 2: Resources

Mentorship Expectation Discussion Guide

This agreement outlines the parameters of our work together on the research project.

Mentee Name: Mentor Name:

1. Major goals:
a. Proposed research project goals:
b. Mentee's personal and/or professional goals:
c. Mentor's personal and/or professional goals:

2. Shared vision of success in this research project:

3. Number of hours to work per week:

4. Primary means of communication:

5. Meeting timings and goals:
a. In preparation for these meetings, the mentee will:
b. In preparation for these meetings, the mentor will:

6. Mentee & mentor's preferred way to provide feedback on the mentee's performance and specific suggestion to improve or progress:
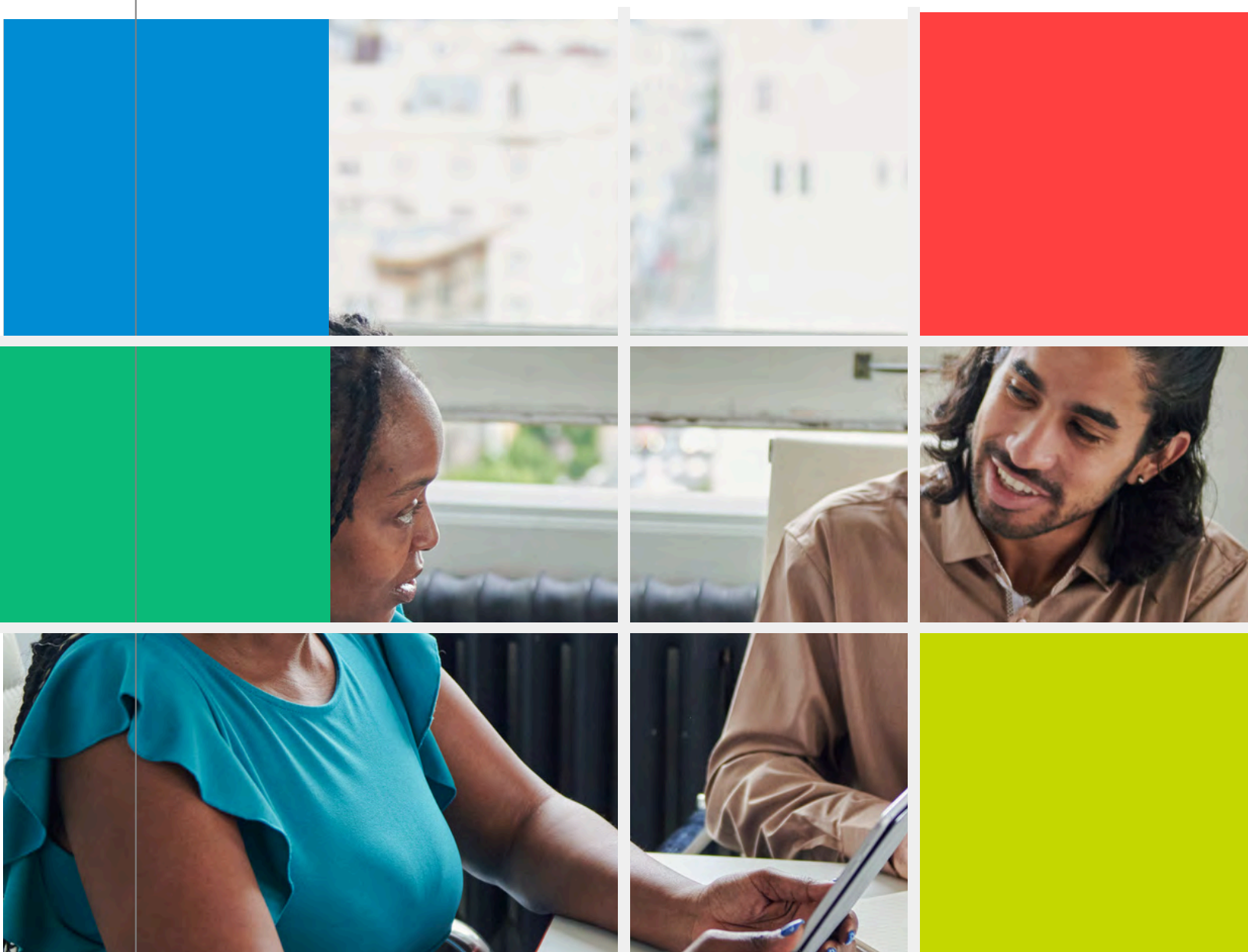a. Written feedback
b. Verbal feedback
c. Other:

7. New techniques and procedures for mentee training:

8. Documenting research results:

9. When the mentee gets stuck while working on the project (e.g. has questions or needs help with a technique or data analysis), the procedure to follow will be:

Signature mentee: Signature mentor:

Want to share feedback?

✉ cereslab2021@gmail.com