Designing Scientific Posters with a Focus on Accessibility

Christy Fillman, Department of Molecular, Cellular and Developmental Biology CTL
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Summary

The aim of this project is to help undergrads understand the importance of making their research accessible to a wide audience and to practice this idea by deliberately designing a scientific poster that is accessible to a more inclusive audience. Undergraduate MCDB students participate in a CURE symposium each semester that they take a lab course (two semesters of lab courses are required for the major), and for each CURE symposium, they present their research in the form of a scientific poster and a video in which they present their research to a general scientific audience. Through this project, I introduced students to the ideas of prioritizing accessibility in design, making accessible graphics, and using accessible language in order to make their research accessible to a more inclusive audience.

Educational Challenge

Disseminating scientific research is an important skill for all STEM majors. One of the most common ways that scientific research is presented at meetings is through scientific posters, and students continue to use this skill after their undergraduate career in graduate school and other research focused careers. However, students are often not explicitly given instruction about how to design an effective poster and how to make their research accessible through their poster. The focus of this project is to introduce students to inclusive design practices and give them an opportunity to use these practices to improve the accessibility of their scientific posters.
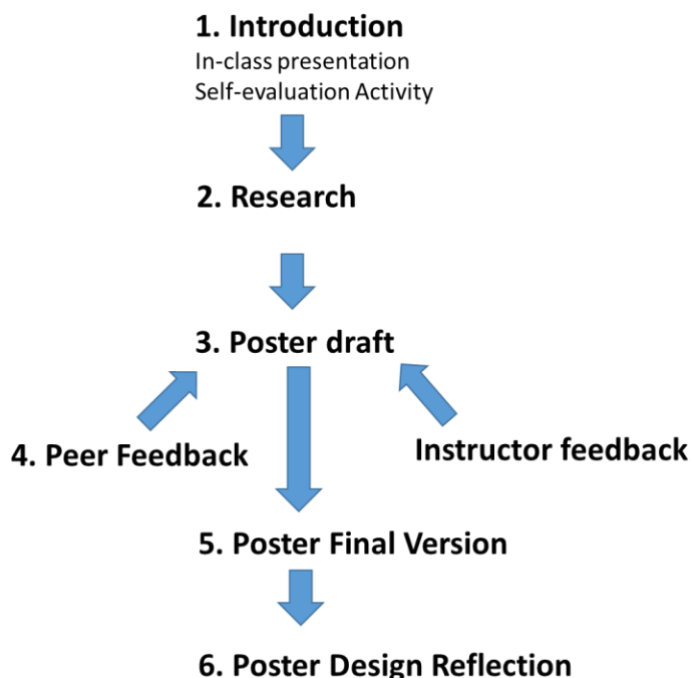
Project Outline

Figure 1: Outline of Poster Design Activities in MCDB 2161

1. Early in the semester, though an in-class PowerPoint presentation, I presented accessible poster design ideas including making the main finding of the research large and written in plain language,

creating a logical flow of information, and designing the poster using accessible fonts and figures (Resource 1). Then, the students completed a self-assessment activity where they reviewed a poster they had created in a previous semester of the course. (Resource 2)

2. Next, the students designed and conducted an original scientific research project based on the mycboacteriophage genome they studied and annotated in the first part of the semester.
3. Students wrote a research report draft with figures based on their research project, received feedback on the draft and wrote a final report. Then, students designed a poster draft based on the data in their report.
4. Students reviewed one peer's poster and received peer feedback from one peer (Resource 3). Students also met with an instructor for a short conference to get instructor feedback about their draft.
5. Students had the opportunity to revise their poster based on the feedback they received, and then they submitted a final version of their poster (Resource 4).
6. After the students presented their poster at the CURE symposium, they completed a reflection activity, which asked them to reflect on their deliberate poster design and propose additional ways they could make their research accessible (Resource 5).

Project Evaluation and Future Directions

I evaluated the success of this project by reading the student's poster design reflections and evaluating the student's final posters. All students made an effort to make their poster accessible, and they all specifically designed different aspects of their posters with accessibility as a focus. Students could list three specific things they did to design their poster to be more accessible, and they could identify how these design practices made their research more accessible. From my evaluation of their final posters, I noticed that students were able to increase accessibility by including large, simple figures and succinct bullet pointed text in the results and conclusions sections of their posters. I found that many students had difficulty stating their main finding in an obvious place and in simple language. In future classes, I plan to add an activity where students write their main finding (before their first poster draft) and get feedback on that statement, and then ask students to use that statement as a central point on their poster.

Students offered several additional ideas for making their posters more accessible including designing their own figures to be used in the background section of the poster to replace more complex figures they found in a research article, adding captions to their poster videos, and including screen reading information in their poster PDF files. While some of these ideas are outside of the technical scope of this class, I plan research some of the ideas to see if I can find relatively simple ways to include them or give the students additional resources to optionally enhance their poster. Additionally, students complete an open-ended project at the end of the semester, and I would offer these ideas to students if they choose to enhance their poster or poster video as part of their project.

Faculty Fellows Reflection

As a part of the ASSETT Faculty Fellows program, I learned more about universal design and why it is important to make course materials accessible to a wide group of students. I chose to work on a project related to accessibility with two goals: first to make students aware of simple ways they can make their research accessible to a wider audience (and why they may want to do that) and second to give students some explicit guidance on how to design a scientific poster, which is something many upper division students including graduate students are required to do but usually get little guidance for how to do

design a poster effectively. Using ideas and discussions from the weekly faculty fellows meeting, I was able to design a project that allowed focus on these goals. I found it extremely helpful to have get feedback from a diverse group of faculty with varied expertise when developing this project. This group of faculty and ASSETT leaders helped me to focus my project on accessibility and find a feasible way to introduce this topic to my students. Additionally, I used the principle of universal design for learning to allow my students to show what they learned in MCDB 2161 by designing their own project. Several students chose to incorporate ideas of accessibility such as closed captioning, handouts and simple language, to their projects. The students were overall very receptive of the idea of making their work accessible and were willing to make efforts to make their projects accessible.

Resources

1. Outline from in class presentation

Why should we intentionally design accessible scientific posters?
- Include more people in the dissemination of your results
  - Topics are complex but not elite
- Draw more diverse people into the scientific field
  - Get more diverse ideas and feedback about your research
- Demonstrate scientific reasoning and scientific literacy to a broader audience

How can we design scientific posters to be more accessible?
- Create a logical flow of information
- Make the main finding large and in plain language
- Use accessible fonts and figures

Start with the most important finding
- Video: https://www.youtube.com/watch?v=1RwJbhkCA58 10:45-13:53

Accessible Text
- Use sans serif font
- Sans serif fonts are easier to read especially for people with dyslexia.
- Make the font large – if the text is too small to read from far away do you need it at all?
- Emphasize text by making it bold.
- Avoid paragraphs of text
  - Use bulleted lists if text is required
  - Make your ideas concise before putting them on your poster

Use accessible language
- Make your research accessible to a wider audience
- If you must use a specialist term define it

Design your poster as a poster – it is not a scientific paper.
- Omit: abstract, a paragraph of introduction text, methods, jargon
- Include: the reason for the study, what you did, your main finding, the take home message or conclusion**.**

Data Figures
- Make the figures large
- Replace text with a figure (introduction)
- Include a large descriptive title – state the main finding in a few words
- Label the figure **in a way that describes it.**

Include a Logical Flow of Information
- Image of different ways to design the flow of information on a poster

Poster Design Activity
- Image of a student's poster
- What is the take home message?
- Is it stated on the poster? Where?
- Is there jargon in the take home message?

- Approximately what % of the poster is text?
    - What text could be removed?
    - Replaced with images?
    - Replaced with bulleted lists?

Presentation References and Resources
- Scientific Graphic Design. 2022. Bristol, England.
    - https://www.sciencegraphicdesign.com/blog/how-do-you-make-your-first-scientific-poster
- Designing for users on the autistic spectrum, who use screen readers, low vision, dyslexia, physical or motor issues, deaf or hard or hearing, or anxiety: https://hub.teachingandlearning.ie/wp-content/uploads/2021/06/128.-accessibility-posters.pdf
- CU Boulder's Digital Accessibility Office (lots of resources linked here)
- https://www.colorado.edu/digital-accessibility/resources

- References for this Presentation
    - How to create a better scientific research poster Youtube 2020. https://www.youtube.com/watch?v=1RwJbhkCA58&t=953s
    - https://www.cdgi.com/2016/09/serif-vs-sans-serif-fonts/

2. Poster Design Activity

Find the poster you made for the last CURE symposium that you attended. See CURE symposium.org and open the PDF of your poster.

1. A) What is the title of your poster? The title usually states the most important result of the research.

B) The take home message is one sentence that communicates what you learned from your research. This is usually a conclusion. An example might be: Mycobacteriophage Gamma is a good candidate for phage therapy because it belongs to a group of phages that can infect Tuberculosis.

What is the take home message from your research?

Is the take home message stated on your poster? If so where (is it easy to find)?

Is jargon used in the take home message?   Which words? If the take home message could be written in simpler language, what would it be?

2. A) How much text is on your poster? – especially consider blocks of text for this question. (25% of the poster, 50%, more?)

B) Could any text could be removed without removing fundamental information? If yes, what?

C) Could any text could be converted to concise bullet points or pictures? If yes, describe.

D) If bullet points are present, are they concise? Could you eliminate some bullet points, decrease the number of words? Describe changes you could make.

3.   Look at the figures on your poster. Comment on how easy you think they are to understand. Is the main point obvious and highlighted in the figure?   Write a short statement about each figure.

4.   Overall, what changes could you make to this poster to make it accessible to a wider audience? Try to think of two changes and describe **how** each change would make the poster more accessible.

3. Poster Peer Review

Student Reviewer:
Poster Author:

1. What is the main finding of the research?

A) Is it large and easy to find?

B) Is it written in simple language?

Write one comment about the main finding of the research:

2. Background
A) What figure or figures is/are included in the background? Are the figures well labeled and easy to understand?

B) Does the background section include everything necessary to understand the research? If not what is missing?

C) Is there any extraneous information? If yes, what?

D) Could any text be removed or consolidated (into bullet points or figures)? If yes, describe.

Write at least one comment about the background section:

3. Results figures

A) What is the main point that each figure is showing?

Write at least one comment about the results figures:

4. Poster Overall
If the answer is no to any of these questions offer suggestions to the poster author.

A) Is the font large and sans serif?

B) is the language accessible and is all jargon defined?

C) Are blocks of text absent and bullet lists concise?

D) Does the poster have a logical flow or order?

5. What aspects of the poster appear to be intentionally designed to increase accessibility of the research presented? (state at least 2 things).

6. What is one suggestion you have that might make the poster more accessible?
4. Examples of students' final posters https://curesymposium.org/phage-genomics-ii-g-posters-spring-2023/

5. Poster Design Reflection

1.   Who was the main audience for your poster? Describe the major group of people that will view your poster and poster video.

2.   What are three things that you did to deliberately design your poster so that it could be accessible to a greater audience?

3.   By intestinally designing your poster to be accessible, were you able to include potential additional groups into your audience? If yes, describe these people.

4.   Why do you think it is important to make your scientific results accessible (specifically the results you presented on your poster)?

5.   Describe one or two things that you could incorporate into any future poster or project that you present to make it more accessible.

6.   What is one thing that you were unable to do on your poster (either due to time or resource limitations) that you think would make it more accessible?