JSO JOURNAL of STEM OUTREACH

Vol. 3, Issue 1, September 2020

Flipped Science Fair - Benedetti

Supplemental Material 1: Preparation Guidelines for the Research Story Workshop.

FLIPPED SCIENCE FAIR

Story Workshop – Preparation Guidelines

Thank you for your interest in the Flipped Science Fair! We're very excited to work with you in preparation for this event, and one of the most crucial elements to focus on is your **story** – what will you be sharing, and how will you be sharing it?

Unlike presentations at conferences, lab meetings, or retreats, you'll be talking to middle schoolers at this event. These judges won't have the background, the vocabulary, or the interests shared by almost everyone you've presented to previously. Your goal is to keep these judges engaged, interested, and following along throughout your entire presentation, and the purpose of our first workshop is to help you achieve exactly that.

As such, this first workshop is entirely focused on the verbal aspect of your talk. Prior to the workshop itself, please prepare a 5-10-minute oral presentation on your presentation topic, with no visuals, diagrams, or graphs allowed. This is meant to be challenging! Relying on visuals is a crutch we often use, and often lets us forgo paying attention to and developing the narrative we're communicating. Preparing your narrative will require some time, thought, and practice from you for this workshop to be mutually beneficial. To help you with this, think about how your narrative addresses the following questions:

- **Why should we care?** This is a crucial distinction when talking to middle schoolers. Unlike other scientists, who will give you the benefit of the doubt that what you're doing is important and interesting, you need a hook to grab the attention of a middle schooler and make them care about what you're doing. Find a way to relate what you're doing to their lives, to something they can comprehend and find important. This is often the most challenging yet most critical part of the talk; if they're on board early, they have a better chance of sticking with you throughout your talk.
- **What question/problem are we trying to answer/solve?** Now that they know why what you're doing matters, let's focus in. What question or problem is out there that we don't have an answer to? Why is this important and relevant? Why hasn't it been answered or solved yet? What would answering or solving it mean? Be careful to phrase this in terms that your audience will understand and can relate to.
- **What's your hypothesis or goal?** Time to bring in the scientific or engineering method here, and really root your way of doing STEM into the way the judges know how to do STEM. Your narrative prior to this should either lead to why this hypothesis is the obvious course of action or into why your goal is the obvious answer to the problem you've outlined.
- **How can we answer or solve it?** It's time to tackle your materials and methods. This is a danger spot for jargon, and it's easy to obfuscate your purpose with unnecessary details. Figure out the simplest way to get across the goals of the methods rather than the technicalities, so that your audience understands generally how you'll acquire your results without getting scared of the details.

FLIPPED SCIENCE FAIR

- **What did you discover?** Results time. You may find this the hardest to do without data or graphs, and again, that's the point of this exercise! Oftentimes we rely on the data to be the story all on its own, rather than be the *means* to tell a story. If your story is solid on its own, then adding data simply makes this story easier to tell, so let's focus on what you found! Figure out a way to distill all the graphs or tables you'd include into key points, key trends, and talk about them in such a way that your big picture results can be described even if you don't have axes or column headings.
- **What do these discoveries mean?** Let's discuss those results. This will likely be hand in hand with the results themselves and is a key step for tying meaning to what you've found. Connect back to the "why do we care" aspect of the beginning of your talk, imbue the results of your work with meaning that directly connects back to your goals and whether they were supported or not. This is especially important in the latter case, sharing negative results is something these judges won't be as used to, and can be a strong teaching moment if results are inconclusive or negative. Talk that up!
- **Why were these good experiments?** The validity of experiments is something a lot of science fair posters have that many research posters do not; we typically assume experiments are well designed and researchers are competent. Well, this is a time to be explicit about why these experiments are good ones. Talk through the reasoning of why they should believe what you did, why you used the proper controls, why your experiments were valid. Again, leverage the teaching moments here.
- **What are the next steps?** Often in the world of middle school science you do an experiment because you're assigned to, you complete it, and that's all packaged up and finished. In our world, research is never-ending, and answering two questions prompts three more. It's time to explicitly address that, to tie them in to what we can do next, what additional information and experiments will make this work more impactful and interesting, whether they'd be done by you or the next researcher or someone else.
- **Is our hypothesis supported or goal met?** Time to conclude and bring everything back together. Tie it back to the start of your talk. Did you demonstrate what you wanted to? Why or why not?
- **So why do we care again?** In the vein of tying things back, it's time to finish things off about why this work is important, why you're so excited about it, and why they should be to. Everything before this part of your talk was simply leading to this grand conclusion, so revel in it, hit it home, leave them with a sense of understanding and appreciation for the work that you're doing.

Please come prepared to the story workshop with a narrative that answers all ten of these questions. Practice delivering this narrative ahead of time, being sure to cut out jargon and words a middle schooler wouldn't understand to the best of your ability. Use your peers (or family/non-science friends) as an initial barometer, and we will work with you to refine and hone it further. Please feel free to reach out to the organizers with any questions you may have prior to this meeting, and we're looking forward to seeing you there!

FLIPPED SCIENCE FAIR 

If you want help in structuring your narrative, feel free to fill in the blanks below:

- You should care about this research because _____

  _____.
- The question I'm trying to answer or problem I'm trying to solve is _____

  _____.
- My hypothesis or goal is _____

  _____.
- I can solve it by _____

  _____.
- I discovered _____

  _____.
- These discoveries mean _____

  _____.
- These were good experiments because _____

  _____.
- The next steps are _____

  _____.
- Our hypothesis/goal was/was not met because _____

  _____.
- This is important research because _____

  _____.

3/3