Suggestions for Mentors – by John Corboy, M.D.

Mentoring Facts:

Need:
Any grade 6-12 student who is undertaking a science project for presentation in regional and/or state science competition is encouraged to seek guidance from a supervising adult. Teachers may not feel comfortable with the science topic or discipline and often have other students they are supervising, so a mentor can provide the specialized assistance that will make the difference in the quality of the project.

Background:
You may be approached by a student who has selected you as a potential mentor because of your field of expertise, your proximity to the student, or the facilities you may be able to provide. This usually occurs early in the academic year, September or October, in preparation for school and area competition. Success may lead up to the State Fair held in March or April. Projects are classified as **Display** or **Research**.

> **Display Projects** for grades 6-8 are usually simple, instructional, communicative, expository, and colorful. And lots of fun!
>
> **Research Projects** are divided into Junior Research for grades 6-8, and Senior Research for grades 9-12. As the name implies, these projects should represent true research--involving scientific thought, hypotheses, materials and methods, controls, results, and conclusions. Some projects are beautifully simple, while others can be astonishingly complex, on a collegiate or higher level.

Present Practices:

1. Once the project is well-organized, the student is allowed to choose a volunteer mentor in the field, who helps the student further develop and polish the project, preparing it for presentation.
2. In recent years, it seems as though students expressing an interest in creating a science project are simply given a list of mentors, and urged to contact them. Thus, students reach the mentor asking for ideas for a project, or with a laundry list of possible projects, most of which prove impractical in terms of time, money, student knowledge and ability, etc.
3. The busy mentor quickly becomes frustrated by trying to help an unknown student sort out a jumble of ideas, while having to explain by telephone or email how to outline a project, propose hypotheses, organize materials, choose methods, collect data, etc.
4. This introductory work really is a job for the classroom teacher, who knows

the student, his skills, abilities, study habits and discipline. Knowing the student's previous science experience, and perhaps budget, the teacher can work with the student *in person* to cut through a forest of ideas to create a simple, coherent outline for a reasonable project.
It is only at this point that the student should be contacting you to help with advice and suggestions for carrying out the project, interpreting findings, displaying and writing up results, as well as guidance in polishing and preparing the presentation.

MENTOR TIPS:

1. Your time and patience are limited, conserve and use both wisely.

   When first contacted by the student make sure that they have discussed and crafted their project plans in detail with their teacher, use Planning Your Project, at http://www.hawaii.edu/acadsci/students.html

   SAMPLE reply that directs student to get preliminary work completed before seeking mentor assistance:

   Aloha, ----:

   Congratulations on your interest in producing a project for the Science Fair!

   Here is how it works, -----: the Hawai‘i Academy of Science has prepared guidelines for producing your project:

   http://www.hawaii.edu/acadsci/students.html

   Please print these instructions and show them to your science teacher.

   After you and your teacher have worked the first four steps in Planning Your Project, it is time for you to choose a mentor best suited to your plans.

   Thanks for your email, and best wishes in your endeavors! Let me know if I can be of further assistance.

2. Once the fairly well-organized student contacts you again, you will be able

to help guide them.

Do not hesitate to refer the student to someone who can be of more assistance. If the proposed experiment proves completely out of your expertise, consider recommending another mentor with more experience or ability in that field.
For healthcare projects, we often find that students overlook asking assistance from the scientists they already know, such as parents or relatives. The family physician or dentist is often eager to provide guidance and access to necessary supplies.

3. Usually consultation is conducted by email or phone calls. Rarely, you may wish to meet the student in person: *this must be in a public place, always in the presence of a parent or teacher.*

4. The mentoring process usually continues back and forth, as charts, photos, and data arrive by fax or email, while you gently make suggestions and guide the student. Think in terms of "parental advice." You also may be able to open doors for the student, refer them to colleagues, suggest reference materials, loan books, or even provide access to lab equipment. It's okay to provide a few Petri dishes if appropriate, but never monetary assistance.

ADDITIONAL ADVICE:

- The best projects are some of the simplest. "KISS" wins every time!
- *In vivo* is always more expensive than *in vitro.*
- Avoid **anything** to do with live animals or animal tissue, if possible.
- Human subjects should sign simple consent forms to participate or photographed.
- Watch out for unforeseen expenses hidden within the plan: even a dozen agar plates may exceed a student's budget.
- Usually only two or three months are available for completing a project. Discourage experiments that may take too long, such as growth of plants or crystals, or which involve rust or corrosion, or dental caries.
- If you will be a judge when your student's project is presented, stop by to see and congratulate the final result (but disqualify yourself from judging.) You may also be disqualified from judging in that category altogether.
- You cannot give too much praise or encouragement. Be generous; you were once young and disorganized, too.
- Guide the student to the Hawai‘i Academy of Science website: they will be able to find links and other important information like essential forms there. (http://www.hawaii.edu/acadsci/)

FINAL COMMENTS:

Encourage - It is very important to encourage these budding scientists, praising their energy and curiosity, while at the same time helping them mold their rough-hewn plan into a worthwhile project. Very gentle constructive criticism is often necessary, and most appropriate.

Guide - Students frequently need guidance in simplifying the scope, complexity, or duration of their projects. They often plan to do more than is possible, given their time and budget, or they'll propose a protocol that can only be accomplished in an unavailable laboratory setting.

Focus - Keep students focused on the scientific method. They usually need your help to simplify, reduce variables, add controls, re-state hypotheses, and interpret data. Assist them to differentiate between true and false conclusions, causal relationships versus mere associations, etc. Commonly, they'll base statistical conclusions on sample sizes that are simply too small for validity.

Polish - Once they have got the essence of the science down, stating clearly their hypotheses, materials and methods, findings, and conclusions, students may benefit from your suggestions as to how best to package their project, using color, graphics, and story boards to present their graphs, photos, etc. Ultimately, they should be creating a three-panel presentation of their project for tabletop placement in competition. Guidance on board design can be found on the internet or at this website: http://www.hawaii.edu/acadsci/