

## Suggestions for a Good Judging Experience

*Note:* This article was taken from the California State Science Fair website, <http://www.usc.edu/CSSF/Judges/GoodJudge.html>, and modified for use by personnel serving as Naval Science Awards program judges at regional or state science fairs.

Being a Naval Science Awards Judge for a Regional or State Science Fair is hard, but it's worth the effort. You are making a memorable impact on the lives of some very talented young people. For some students, you might be the first professional they have ever met who works in science or engineering. Part of your job at the Science Fair is to be an ambassador for your profession. Some students' perceptions of you could influence their career choices. It is a good idea when you approach a student to introduce yourself and describe your background.

### Conveying Fairness

As a judge, it is most important for you to show the students that you are both fair and knowledgeable. Your fairness is indicated by a few simple actions:

- You spend about the same amount of time with each student
- You listen to the student's explanation of the project
- The questions you ask are intended to find out more about the project and how it was done -- *not* to embarrass or intimidate the student

This sounds simple, but can be challenging to implement.

### Asking Questions

Your best tool in judging is your ability to ask questions. Be sensitive to what the student knows. You can always ask questions that the student can answer. There are some questions all students should be able to answer, including variations on:

- How did you come up with the idea for this project?
- What did you learn from your background search?
- How long did it take you to build the apparatus?
- How did you build the apparatus?
- How much time (many days) did it take to run the experiments (grow the plants) (collect each data point)?
- How many times did you run the experiment with each configuration?
- How many experiment runs are represented by each data point on the chart?
- Did you take all data (run the experiment) under the same conditions, e.g., at the same temperature (time of day) (lighting conditions)?

- How does your apparatus (equipment) (instrument) work?
- What do you mean by (terminology or jargon used by the student)?
- Are there other applications in industry (or in a specific industry) for this knowledge (technique)?
- Were there any books that helped you do your analysis (build your apparatus)?
- When did you start this project? or, How much of the work did you do this year? (some students bring last year's winning project back, with only a few enhancements)
- What is the next experiment to do in continuing this study?
- Are there any areas that we may not have covered which you feel are important?
- Do you have any questions for me?

(Note: these are only suggestions to keep the dialog going. You may find other questions to be more useful in specific interviews.)

One type of question to avoid is "Why didn't you do....?" Probing questions are useful to stimulate the thought processes of the student. A solution or extension to the work presented may be obvious to you with all of your years of experience, but the student may not understand why you're asking such a question. If you ask a question of this type, be sure to imply the correct intent, as in "Could you have done ...?" or "What do you think would have happened if you had done ...?" When phrased this way, the question is an invitation for the student to think about the experiment in a different way, and can turn the question into a positive experience.

### **Guiding the Discussion**

Sometimes we come across projects in technical areas that we are intimately familiar, and the student just did not get it -- they made some incorrect assumptions, missed a key indicator in the data, came up with a false conclusion, or did not look at or understand some common principles. It can be tempting to share your knowledge about the topic, to help the student appreciate what happened (or should have happened) in the experiment. Some judges have been observed to enthusiastically pontificate while a student stood idly listening. Please consider that these students are smart, and the next judge may hear the student parroting back the knowledge you imparted. You may try with your questions to lead the student toward the right answers, but please don't give the answers. If you really feel compelled to make explanations, save them until near the end of the judging time when your knowledge will not be relayed to judges following you. Alternatively, you may give the student your card and invite future discussion about the project. Remember to be sure that your discussion meets the following Science Fair objectives to involve the student in discovery:

- Your conversation should resemble a discussion with an esteemed colleague who is having difficulty with some research -- together, you talk through the situation to mutually arrive at improved answers;

- The student should be doing most of the talking;
- Coax and/or coach the student into realizing and describing the correct conclusions; it's the student's project, not yours;
- Encourage the student to conduct more experimentation in order to verify the new conclusions.

### **Improving Communication**

Since you are a judge, most students instinctively think of you as an intimidating figure. The more you can dispel this image, the more likely you are to help the student be less nervous and have a better discussion. Again, simple things can make a difference:

- Make eye contact with the student;
- If the student is short and you are tall, try to avoid the tendency to “talk down” to the student. At many fairs, judges are provided with chairs to sit at during presentations. Take full advantage of this opportunity if it helps to establish rapport;
- Use non-verbal means to indicate your interest. Remember: indicating you are interested is much easier if you allow yourself to become interested;
- If you wear glasses, look at the student through them, not over the top of the frames;
- Whenever a student shows a good idea, a clear way of communicating his or her idea (chart, graph, photograph), a clever way to get expensive results with inexpensive equipment, or anything you can compliment, do so;
- Use a tone of voice that shows you are interested or inquisitive, and not skeptical or overly doubting.

To assure the perception of fairness, you also need to make sure that one student does not monopolize your time. Some have a well-rehearsed pitch that may prevent you from having a chance to interact with the student. You have to find some way to break the pattern. Your key tool is questioning. Politely interrupt with a question, usually in the form of "I'm sorry, I didn't quite catch the relationship between that adjustment and this result." Simple questions might help you, such as, "How many times did you run the experiment with each configuration?" or "How many experiment runs are represented by each data point?" The idea is not to stop the student from talking, but to get the student to interrupt the “tape recording” and think about what is being communicated to you.

Many of these students are exceptionally bright, and it is easy to think -- when facing an incredibly impressive display and a supremely confident student -- that this student's research is beyond your knowledge. If a project is really and truly completely outside your experience, you are still knowledgeable in the area of problem-solving and the scientific method. Concentrate on these aspects rather than the details of a particular project.

Young people have largely developed their conversation techniques through their interactions with other young people. They tend to actively converse on topics that they are most knowledgeable about. When teenagers are faced with a discussion they don't grasp, they typically lose interest and look bored. If you keep appearing to be interested, no matter what is said, the student will assume you grasp what's going on. When you ask questions, even the "any student can answer this" type of question, the student assumes you have kept up with the discussion and are maintaining an interest in their work. You may be struggling during the student's whole pitch to come up with something -- anything -- to ask that doesn't sound completely ignorant, but the student doesn't know how little of the information makes sense to you. Keep asking questions until it does make sense. No matter how you handle this situation, please do not tell the student how little you understand (we don't want a student to tell a parent that the judges didn't know anything about the topic). Remember, you are not the only judge who will talk to this student. If something is not completely clear, bring it up in the judging meeting; judges who are familiar with the applicable science will have sorted it all out.

At the other extreme there are a few projects that are "snow jobs" which make it to a Regional or State Science Fair. Sometimes you can ferret out a "snow job" by simply asking for explanations of words that the student uses; don't assume the student knows what the technical terms mean. They may also not know what a piece of equipment does, how it works, or why it was used. Go into one of these discussions with the attitude that, if the student can't explain it to your satisfaction, then the student really doesn't understand the science of what's going on. Chances are, if it doesn't make sense to you, it doesn't make sense. Of course, as with all questions or concerns that arise, discuss these projects during the judging session; there will probably be others with similar reservations.

### **Determining Naval Science Award Program Award Recipients**

As you judge projects, you can use a few simple criteria for selecting those to be recognized with awards:

- The quality of the student's work is what matters, not the amount of work;
- The Naval Science Awards Program (regional and State fairs) recognizes individual projects only;
- A less sophisticated project that the student understands should get higher marks than a more sophisticated project that is not understood;
- Access to sophisticated lab equipment and endorsements from professionals does not guarantee a high quality project (You need to ask yourself, "Did the student really understand what was going on?");
- It's okay if the student ended up disproving the objective or hypothesis of the experiment.

High marks should go to:

- A clear scientific approach and appreciation of purpose, aims, and limitations

- Discovering knowledge not readily available to the student
- Correctly interpreting data
- A clever experimental apparatus
- The use of repetition to verify experimental results, especially with controls sufficient to ensure repeatability with the same conditions
- Predicting and/or reducing experimental results with analytical techniques
- In engineering categories, experiments applicable to the "real world"
- Ability to clearly and concisely portray and explain the project and its results

Low marks should go to:

- Ignoring readily available information (e.g. not doing basic Internet and library research)
- An apparatus (e.g. model) that is not useful for the experimentation and data collection proposed
- Improperly used jargon, misunderstood terminology, and/or not knowing how equipment or instrumentation works
- Presenting results that were not derived from experimentation (e.g. relying on results described in the literature searched)
- Presentations that offer reams of data and information without prioritization or adequate organization

Although the most obvious reason for your being a Naval Science Awards Program judge at the Science Fair is to assist in selecting the projects that will receive awards, a good judge knows that their efforts should help make the fair an important experience in the life of every participant. Please do your best to make sure that all of the participants remember the Science Fair as a positive experience and the Navy judge as someone who was encouraging and fair.