

A PARENT INTRODUCTION TO SCIENCE FAIR PROJECTS

By Deb Bogard, Delaware City Schools

What's a science project all about?

This project probably is NOT what you remember from Science Fair! It looks quite different from the rushed, often haphazard science fair assignment many of us completed in junior high.

Today's science fair project is a multidisciplinary undertaking that the student works on over an extended period. The work involved in the project is modeled after the work of professional research scientists. Internationally acclaimed gifted education researchers such as Jerome Bruner (author of "The Basic Structure of a Discipline") and Joseph Renzulli (author of the Enrichment Triad model.) strongly endorse this type of authentic learning experience.

While the study of the discipline of research science is beneficial for students of all ages and ability levels, its emphasis on the interplay of inductive and deductive reasoning holds particular appeal for the high ability student who takes pleasure in exploring the realms of "why?" and "what if...?"

What will my student learn by doing a science fair project?

- ❖ Scientific method and experimentation skills
- ❖ Logical thinking and problem-solving skills
- ❖ Improvement of writing and public speaking abilities
- ❖ Advanced library research skills
- ❖ Deepened understanding and appreciation of the discipline of science and careers in science

How is this type of science project accomplished?

The student chooses a specific scientific topic to explore in depth, then learns to use the same techniques as a true researcher: reading up on the topic, designing and executing a data collection task, and communicating findings through the writing of a research paper and presentation of the results to others.

How complicated and in-depth should my child's science project be?

The complexity of your student's science project should be in keeping with his/her ability to absorb and comprehend the principles and theories behind the experiment. It's important to encourage your student to stretch beyond his/her current knowledge level, but not to the point that s/he has only a very superficial understanding. It's better to develop a simpler experiment that the student can grasp well and communicate about effectively, than to have a complex one where the student has a shaky understanding.

Your student should do enough background reading to have a thorough grasp of the principles and theories relating to the experiment. Depending on your child's current reading abilities, it's best to encourage a combination of information sources that are both at and somewhat above that level. Be prepared to help your student with the more complex vocabulary as s/he reads.

How much, and what type of, data analysis should my student do after completing the experiment?

Again, much depends on your child's current level of knowledge and ability. By the intermediate grades, students have been introduced to the concepts of mean (average), median, mode, and range. They also have had substantial experience with bar and line graphs. However, they will need some adult guidance when interpreting their results in relation to their hypothesis.

What's my role in my child's project?

- You'll actually have **two** official roles in the project: as the Adult Sponsor, and as a parent.

Adult Sponsor Responsibilities:

- Accepts responsibility for the health and safety of the student conducting the research, and for the humans or animals used as subjects.
- Reviews the student's plans and forms to be sure that proper procedures are followed and all forms are completed correctly
- Has close contact with the student during the course of the project
- Enlists the help of a mentor or Qualified Scientist if necessary

Parent Responsibilities:

Think of yourself as a "guide on the side" - your child should be in charge of the project and doing the actual work. You're there to encourage, support, and help your child overcome obstacles that may be encountered.

How much am I allowed to help my child?

A science fair project is intended to be a learning experience for the student. If your child is to learn anything, s/he must do the work. Nonetheless, parents can give valuable guidance and supervision.

- To help get the project off to a good start, **guide your child to information** that will help explain the principles and theories behind the experiment. Do this early, and your child will be able to answer many of his/her own questions as they arise during the rest of the project.
- Help your student avoid "overload" stress by working with him/her on good time management skills. **Routinely check** your child's progress on the project. Work with your child to develop a project schedule that fits with your child's other activities and obligations. Forms deadlines are not generally flexible; be sure your child sticks to them (or even better, stays ahead!)
- Be prepared to **assist in a variety of roles**: chauffeur, proofreader, lab assistant, library aide, etc.
- Make sure your child follows all necessary **safety precautions** when doing an experiment.
- **Provide an extra set of hands when needed**, but be sure your child is the one directing the action.
- **Let your child be the problem-solver**. When your child experiences a problem, or you see a problem in the making, avoid jumping in with answers and suggestions. Instead, try making dispassionate observations, and answering your child's questions with focused, strategic questions of your own that will help refine his/her thinking processes.
 - Examples of strategic questioning:
 - "How do *you* think this should be done?"
 - "Can you think of *other* ways to do this?"
 - "Which way do you think you can get more consistent results?"

Other ways to help

- **TAKE PHOTOS!** Display rules have changed drastically over the years - now it is almost exclusively a poster display. Photos are a crucial part of an effective visual display and a good record of the work put into the project.
- "Hold their feet to the fire" when necessary - every student needs a push at least now and then

Arranging for outside Mentors/Advisors

- For certain projects, a scientist's supervision and guidance is required
- For most projects, having a mentor scientist isn't required but is recommended and encouraged, as s/he can:
 - Answer questions about difficult concepts the student encounters during library research
 - Offer advice when your student is working on designing the experiment
 - Be a go-to resource as the student encounters problems or questions during and after the experiment
- Studies have shown that students who work with science professionals generally have a more positive science fair experience, not just in terms of the quality of the finished project, but also in terms of the level of the learning accomplished, and the student's overall enthusiasm for the field of science being investigated.

Where to find an expert to mentor your child:

- Family members, work colleagues
- Contact university departments; professors or graduate students may be available to help
- Contact organizations or companies working in that particular field of science
- Contact science teachers - they might be able to recommend someone

Mentoring Precautions:

- Make sure mentors, qualified scientists, etc. are well aware of all science fair rules and regulations
- Make sure all appropriate forms are filled out and signed properly
- Follow "safe child" rules: supervise all personal interactions between your student and the mentor

THE QUEST FOR A PROJECT TOPIC

Choosing the research topic is probably the most difficult part of the entire project! No "perfect" method exists...but here are some ideas that might help.

When looking at possible projects, be sure to keep these things in mind:

The project should be:

- **Measurable** (in numeric terms)
- **Reproducible** (others can get the same result)
- **Affordable and practical:** remember that several trials will be necessary!

What to avoid:

- Brand comparison experiments
- "Pop psychology" themes
- Too few trials and/or too small of a sample size

IDEA #1: The Science Buddies website is a great science project resource. Their article titled "Your Question" and their Topic Selection Wizard survey tool help students identify areas of scientific interest and suggest project ideas.

IDEA #2: The Internet is loaded with good science project idea sites. Several excellent websites are listed on this Handbook's "Online Resources" page.

IDEA #3: School and public libraries have great collections of science project ideas. Librarians are happy to help.

IDEA #4: Adults who are experts in a particular field of interest often have great ideas; they might even be willing to mentor (assist) a student through a project! Check with science teachers, too.