

Science and Engineering Fair of Houston
Science Inquiry Investigation Projects
Curriculum Introduction

Many students love science but dread doing an inquiry investigation or “science fair project.” You also have the students that do not feel confident in science, so they do not like it and the thought of doing a project is overwhelming. The purpose of this curriculum is to make the process of doing an inquiry investigation not only easy, but enjoyable. Another underlying purpose is to foster an appreciation of science and Science, Technology, Engineering and Math (STEM) careers..

Curriculum Goals:

1. To guide and model the process of doing a scientific inquiry project incorporating Scientisteer.
2. To share strategies on choosing topics that are interesting and which leads to instilling an appreciation and hopefully love of science.
3. To facilitate scientific literacy and the research process.
4. To show that doing research is a process that is thorough, educational, skill building, fun and rewarding.
5. To lead to an interest in careers in STEM fields.

The curriculum document consists of three parts. One part includes guidelines for doing different parts of the project. Another part models an example of a student’s scientific inquiry investigation. The last part is an example of a project using the engineering design process.

The guidelines in the curriculum were created and based on the idea that the projects will be entering a building, district, regional, state or international science fair. The links included in the guidelines will take you to important documents and areas on the Science and Engineering Fair of Houston and to the International Science and Engineering Fair websites. All scientific research projects will have mostly the same common elements. Projects that are entered into science fairs have a higher standard of quality that they have to meet, for example safety rules. This curriculum will make the process of doing a science fair project easier for the student, teacher and parent.

One of the most important of the guideline areas covers topic selection. The topics that are chosen should be something that is of personal interest, resources that are accessible and is cost effective. If interested in the topic then anyone will strive to do a better job and will get more out of it. Do not fall into the trap of choosing anything just to get through the topic selection process.

Other guidelines for different parts of the inquiry investigation are equally as important as the topic selection. The logbook is a very vital part of the project and an information sheet on setting up a logbook is included. Doing research on your topic is critical and there are pointers for what to look for and doing this step including bibliographies. A design diagram graphic organizer is included to help brainstorm and identify key parts of the experiment. Writing a scientific research paper can be a very difficult process. An outline including each part and pertinent information to address is provided. Peer review can be a helpful and productive part of the inquiry process. A peer review sheet example is included. Another part of a project is an abstract. An information sheet on what should be in an abstract available. The last parts give pointers on doing the display (goes beyond the rules and guidelines) and how to have a great oral presentation.

What the guidelines section does not include is detailed worksheets on doing each step of inquiry. By the time most students get to 7th grade and higher they can write a research question or problem and hypothesis. There are also other parts of the experimental design that students have to include in their research plan. Since different students are at different levels in the inquiry process they may need some additional help. There are many different online programs that can give them tutorials on any design step they may be having trouble with. One of the online sources that gets high reviews and is popular is *Science Buddies*. You can go to sciencebuddies.org and find out a wealth of information on doing a project from start to finish. The resources there can be printed out and used in the classroom as well. A word of caution- this website has projects that have been done in the past. You must understand that these projects are not to be copied, they are just there to get ideas from. They have a section with each of these ideas that says, "Making It Your Own". The scientific inquiry investigation should be original work.

The other two sections of the curriculum step you through an engineering design project and a scientific inquiry investigation using scenarios. Both of these processes are similar, and inquiry based but they do have some differences that need to be addressed. An example of the differences can be seen in logbook set up. The engineering logbook will have design diagrams and places for prototype testing that you would not find in the scientific inquiry logbook. The guidelines and project scenarios are just that- guidelines and models. There is always that out-of-the box thinker that will come up with a project that does not follow any model exactly.

If done properly and the topic is meaningful and of interest, doing a scientific research project should be seen as doable and enjoyable. There is a certain freedom and reward going through the process of designing an experiment, collecting and analyzing data and reporting the results. The completion of a well-done project is gratifying. Hopefully, this process will lead to pursuing a STEM career.