

## Scientific Literacy Center

### The Scientific Method Activity 2

Class Time: Several Hours

Grade Level: High School, College

Assignment Type: Homework

Author: Dr. Lycurgus L. Muldrow

#### Write a Designing Proposal (Design a Maker Project)

In this assignment you are to develop and write a design proposal. In writing this proposal please label and include the following six sections: 1) Summary; 2) Statement of Problem; 3) Design Objectives; 4) Technical Approach; 5) Project Management; and 6) References. Clearly articulate details in your design proposal following the instructions below. The paper should be single spaced, Arial, 12 pitch with one inch margins. At the top of the design paper, give a title, and print your name, email address and telephone number. The paper should have a minimum of 600 words or a maximum of 1,000 words. Email your paper to the instructor or designated individual.

1. **Summary:** The purpose of this short summary section is to give the reader a short overview of the reasons for your design, and what you propose to design and make.
2. **Statement of Problem:** In this section, sometimes called the “Introduction,” you are to describe the need for your design (and need for what you propose to make). In other words why is what you plan to design (and make) needed by people, and/or wanted by people, and/or in some way will improve the lives of people. Here are four examples of needs or problems: 1) a particular electronic game has a joystick that does not feel natural; 2) many commercial drones are hard to control; 3) there is a lack of community surveillance in very dangerous communities; and 4) there is a need for more customers to notice and come into an old, uninteresting looking building that sells high-tech equipment; and etc. You do not have to choose one of these examples, be creative, and remember to discuss a problem. Do not discuss the design solution (i.e. what you will design or make). This will be done in the following sections. This section is strengthened by backing up your assertion of need with evidence. Evidence generally can be reference listings from journal articles, books, or other sources that are well respected. The evidence could also be surveys or testimonies of users.
3. **Design Objectives:** The Design Objectives section formally states what you propose to design and make. For example, let’s use the four problems listed above and give four example objectives to solve these programs. The objective is to: 1) design and make a joystick that feels natural in the palm of your hand; 2) design and make a drone that is easier to control; 3) design a prototype community surveillance system to enhance safety in dangerous communities; and 4) design and decorate the front of an old building with an aesthetically pleasing, electronically controlled, moving sculpture in order to attract more customers in the high-tech store that is in the building.

4. **Technical Approach:** This section discusses how the objective you presented in the above section will be accomplished. You should present a logical sequence of events that you will do to design and make what you propose. In this section discuss how you will generate your design concepts, and the technical approach to making your design.

You should start out by writing a paragraph that explains how you will generate your design concept. For example, if your objective is to make a better joystick that feels more natural, explain how you will generate a concept for a design that feels more natural. Maybe you may choose to squeeze a piece of clay until it molds in your hand and feels natural. Or maybe you will survey, try out and study the designs of other joysticks and come up with a hybrid. After describing the design concept, then describe the technical approach you will use to make joysticks. For example, you may propose to 3D print several different joystick designs, in several different sizes. Please note you can be as creative as you desire, as long as what you are designing can be made in two weeks with the equipment and supplies that will be provided to you in the Morehouse College Makerspace Exploration Center ([morehousemakerspace.org](http://morehousemakerspace.org)). This facility has 3D printers and plastic, a laser cutter, Arduino and Raspberry pi electronic equipment, soldering irons, Lego Mindstorms and Vex robotics equipment, and hand tools. Some of these items are explained in the Morehouse College Makerspace Exploration Center website; however, for more details it is suggested that you search the functionality and use of these items in YouTube.

5. **Project Management:** In this section you will discuss how you will manage the project. This section should have the following subsections: Time Schedule; Equipment and Supplies; Deliverables and Qualifications.
- a. **Time Schedule:** In this subsection indicate what is your timeline to complete the project within the two-week (10 working days) Residential Program. For example, if you plan to make better joystick, you might proposed that the first three days you will work on generating designs, and learning how to do 3D printing. The next four days you will 3D print several designs, and connect them to the appropriate gaming system. Then on the last three days you will decide which of the 3D printed joysticks feels more natural, and create a presentation to promote and introduce your product to others.
  - b. **Equipment and Supplies:** Please list the specific equipment and supplies you will need to make your proposed design. If you desire this can be placed in a table. See Technical Approach section for a list of equipment and supplies that you can choose from. Please note, the program does not have a budget to purchase additional supplies or equipment. If your project requires additional items then you will have to provide them. For example, the joystick that feels natural is being mounted on a gaming system that belongs to the student.

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- c. **Deliverables:** Here you simple state what deliverables you will make (i.e. a natural feeling joystick). Also in this section state where you might present your product, such as in the 2016 Maker Faire Atlanta (<http://makerfaireatl.com/>)
  - d. **Qualifications:** Please briefly describe any unique qualifications you have to do this design/maker project. In the example of designing a more natural feeling joystick, the student's unique qualifications may be that he is a national competitor for the gaming system he plans to design a better joystick for. Other examples are he has taken a high school engineering course, or he has done 3D printing in the past.
6. **References** Format your references as follows:
- Journal Example
1. Newell, W., Hall, J., Hutkins, S., Larner, D., and Oates, K. 2003. Interdisciplinary in Longstanding Interdisciplinary Programs. *Issues in Integrative Studies*, 21: 9-42
- Web Site Example
2. Project Kaleidoscope. 2007. What Works: Twenty-First Century Science and the Facilities of the Future. [www.pkal.org/documents/21stCenturyScienceAndFacilities.cfm](http://www.pkal.org/documents/21stCenturyScienceAndFacilities.cfm)