AFTER SCHOOL ACTIVITY PLAN

SESSION 4: Building Your Prototype Part 1

LESSON OVERVIEW
Using knowledge gained from previous lessons, students will go through the invention process. First, they will complete the Intent to Invent form in their YIP Inventor's Journals to outline their plans. Then, they will build and test the prototypes of their inventions. They will record their activities, data, and observations in their YIP Inventor's Journals.
OBJECTIVE
Students will be able to create a solution to solve the problem they identified in earlier lessons. Students will use their previous research to develop and draw a design of their invention. They will build a model from this design and work with peers to share and receive feedback as they make modifications and improvements.
MATERIALS
• YIP Inventor's Journals • Build materials (such as, but not limited to: recycled materials, tape, glue, scissors, clips, string, fabric, markers…) • YIP Prototype Requirements and Restrictions (for teacher only) • Pens/pencils • Notebook or other paper for writing and drawing **Teacher/Leader Preparation:** • Set up any materials to create a "maker space" for your students.

TEACHER/LEADER TIPS
The more time you can devote to building and testing, the better. Two sessions are necessary, but more are encouraged. Students are encouraged to make at least 2 iterations of their models before completing the project. You may wish to seek additional volunteers to help students with building. Parent and community volunteers are good resources if permitted. Hot glue guns are recommended for class because they dry quickly and securely so students can maximize their build time in class. If hot glue guns are used, it is recommended that an adult do the gluing.

A 3-D model or prototype of the invention is strongly recommended, but not required for competition. A detailed, labeled drawing of the design is sufficient for the display and presentation. Prototypes and models may be *working or non-working.* Inventors are encouraged to build models that are "materials neutral", meaning they can be made of reused and recycled materials and the overall product should not require money to buy materials. Any materials that are used, whether purchased or found/borrowed, should be listed in the Materials List in the YIP Inventors' Journal.

You may choose to allow students to take their inventions home to work on between sessions. If so, you are encouraged to communicate the requirements and expectations of the project with families, as well as the family's role in this project. You may use the following letter/email templates and adjust information as needed:

- YIP Program Letter to Families

If you are not allowing students to take their inventions home, be sure to find a safe and secure place to store them between sessions.

When completing the Intent to Invent form and other parts of the YIP Inventor's Journal, please remember that the expectations for writing are age appropriate. K-2 students may have an adult write for them and may use key words and phrases rather than complete sentences.

INSTRUCTION & ACTIVITIES

Teacher may lead the following lesson plan with flexibility to adapt as needed to fit technology and class format:

Teacher Instruction:

Today is build day! For the next two sessions (or more if possible), you will be working to build your prototypes. You want to be sure that you also test them as you design and when you finish so that you can make changes as needed to be sure your model is as good as it can be. Look back to your notes and your design plan to help you build. Remember that you should continue to record all of the steps you take during your build in your YIP Inventor's Journal.

Before you build, however, you will need to declare your Intent to Invent.

Activity: Intent to Invent

1. Turn to the Intent to Invent page in your Inventor's Journal. This is your commitment to your invention and where you will write down your building plans and draw your design.

2. Take the next 10 minutes to complete this form. Be sure to put something in each section.
    - I intend to invent
    - The problem it will solve is
    - I have determined to the best of my ability that my invention is original by taking these steps
    - I will use the following materials in my invention

You may decide to change things a bit as you build, but this will serve as your "recipe" or your basic instructions to your approach.
Circle the room and support students who need help in developing and writing their plans. Please remember that the detail in the writing may be age appropriate. Younger students may have an adult write for them and may use key words and phrases rather than complete sentences.

3. Finally, you will also need to include your design drawing. You can draw your labeled design of your model in the box provided, or you can insert another page that has your labeled design on it. Do not forget to label the parts of your design and make note of any special features it may have (example: things that move, or things that light up).

4. You must show me your completed Intent to Invent form before you can gather materials and begin to build.

Note: The Intent to Invent worksheet is an important component of the YIP Inventor's Journal and is required for both the Northern New England Regional Invention Convention and Invention Convention US National competitions.

Activity: Build Your Prototype

Give students most of the class time to work on their projects independently. Circle the room to check-in and provide support as needed.

Note: Recommendations for Activity
During the building session, have students Pair-Share. Allow them to meet and share where they are in the process, any testing they have done, and challenges they are facing. Encourage students to provide constructive feedback and positive comments to support the invention process.

Note: Be sure to leave time for students to clean up and prepare their projects to be stored (or taken home, if allowed) until the next session.

We will spend most of the next session doing more building and testing.

Optional: If you would like to bring in any materials from home to help you build, you may do so. All materials must be appropriate and safe to bring to school. Come see me if you have questions.