



AFTER SCHOOL ACTIVITY PLAN

LESSON 3: Planning Your Invention

LESSON OVERVIEW

In this lesson, students will research their problem and their solution to discover whether it already exists. If it does, they must innovate on the solution by making it better in some way. Finally, students will also practice giving instructions and writing a plan as they learn the importance of details and descriptions in communication.

OBJECTIVE

Students will be able to record their ideas and research in their own design process. They will organize their steps and create a plan to complete their invention project and they will understand how to use their YIP Inventor's Journal as a record keeping tool as they design their invention.

MATERIALS

- YIP Inventor's Journals
- Access to library, media space or digital devices and internet
- YIP Suggested Research Websites
- My Invention Research Worksheet (included in YIP Inventor's Journal)
- Pens/pencils
- Notebook or other paper for writing and drawing
- Drawing Twins Line Drawing Template (for teacher to distribute to partner groups)

Teacher/Leader Preparation:

- If leading research with students, prepare any electronic devices or make plans to visit the library or other media space available.
- Suggested websites for finding out if students' invention ideas are unique include:
 - US Patent and Trade Office: www.uspto.gov
 - Amazon: www.amazon.com
 - Target: www.target.com
- Print copies of the Drawing Twins Line Drawing Template for the Drawing Twins activity.

TEACHER/LEADER TIPS

If possible, spend some class time doing research on student invention ideas. You may be able to use a library or media space in your location or use digital devices for internet research. Help students navigate the internet, understanding which sources are reliable and which will be useful as they research their problem, solution and their invention idea. Use the YIP Suggested Research Sites handout for sources.

The activity plans below will help you lead a discussion and a research session. Use the plans below to lead the discussion. If you chose to focus on research, you may eliminate the Drawing Twins activity if time is limited.

If you do not have access to research materials and digital devices, skip the instruction plans about research and move on to the Drawing Twins instructions and activity. If you are unable to do the research in class, you may recommend that students to do a bit of research at home to find if their invention ideas already exist (internet search of shopping websites such as Amazon or Target). Students can record their findings on the My Invention Research pages in their YIP Inventor's Journals or write on separate paper to insert later.

INSTRUCTION & ACTIVITIES

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

Teacher Instruction:

Note: If you did not complete the following activity in Session 2, do so now. If students have already selected their invention ideas, then go on to the next section of Teacher Instruction.

Find a partner and take several minutes to each share your invention ideas. *(If you wish, give each student a specific amount of time to share and then switch. This will ensure that one student does not dominate the conversation before their partner has the opportunity to share in the allotted time.)* Think about how realistic each idea is. Can you build a model (the model does not have to work, but should be a visual representation of your idea)? Is your idea doable? After the share, you will select your best idea and circle it. This will become the idea for your own invention project that we will be working on for the next several weeks in our class.

If you are having trouble thinking of something to invent, or if you just want a challenge, you can also take the YIP Challenge. This year's YIP Challenge is Weather or Not? Create an invention that will help solve a problem related to our weather. Tools to help us manage or predict weather, keep us more comfortable in different weather, or to help with climate and weather-related challenges. The sky's the limit in this weather focused challenge.

Teacher Instruction:

I hope you all have been thinking about your invention projects and ideas for problems and solutions. If you are still deciding, come see me today and we'll talk about it.

Today, we are going to begin to plan out your invention. Do you remember from our first class when we talked about how all inventors go through a similar process of identifying problems, brainstorming solutions, planning and drawing their ideas, and then they can finally begin to build and test them? You are going into the planning phase. You have some great ideas, but now you need to think carefully about how you can turn your idea into something real, or at least a model, also known as a prototype. And like we talked about last time, it is important that you record all of your ideas and drawings in your Inventor's Journals.

Note: If you choose not to do research in class, please move ahead to the Drawing Twins instructions and activity. See Teacher/Leader tips for guidance.

Note: If a student discovers that their invention already exists, do not be discouraged. Encourage the student to think about how their idea is different or how they can improve what already exists. Changing the existing invention in some way makes it original and they can continue their project.

So now you have your ideas for an invention. But before you start to design and build, do you know if your invention is original? Is it unique or does it already exist somewhere? You need to do some research so you do not duplicate another product. Where can we do research? Who could we ask for help?

Allow students to respond- internet sites such as Google, shopping sites, such as Amazon or Target. Use the YIP Suggested Research Websites resource for guidance on reliable and safe internet sites for students. You may also encourage students to talk to experts in a field related to their problem (Consider local famers, doctors, veterinarians, local business owners, teachers or family friends. Interviews with professionals are wonderful research resources.)

And besides knowing if the invention already exists, you also want to know things like:

- Who is affected by your problem? What audience does your invention target?
- How widespread is your problem?
- How would your invention benefit others?

Activity: Invention Research

Let's take some time together today to do a bit of research. In your groups or if you are working alone, we will use the computers to research. Everything you find should be recorded in your Inventor's Journal. You may use the My Invention Research pages in your journal to help you.

1. First begin with a general search of your idea. Use key words in your search bar to find out more about your problem or about your invention idea.
2. Then, do a search on an internet shopping site. Search for your idea and see if a product already exists. If it does, how might yours be different or how you can improve on the existing version.
3. *You may direct students the My Invention Research pages in the YIP Inventor's Journal for guided research and space for notes. Spend about 20-30 minutes researching (or you may ask students to do this at home.)*

[ALTERNATIVE/ADDITION TO RESEARCH ACTIVITY]

Teacher Instruction:

As you plan your invention design and building, it is really important that you have a detailed plan so that you can be most efficient as you build. You need to consider what materials you want to use and how they can fit together, and also how big or small you want your model to be. Is it life-size or a miniature version. Make sure that you plan something that is realistic for you to do in YIP with the materials and time that you have. Your model does not have to work and it does not have to be made of the ideal materials. It is a

representation of your vision. As you draw your design, you want to be sure that you label parts and make note of any special features, like does this part move, or can this piece be removed. The little details become big components to the overall success of your final project.

We're going to practice first. Do you think you describe things in detail? We're going to find out.

Activity: Drawing Twins

Now we are going to do a little activity to demonstrate the importance of being detailed in your design process.

1. Divide participants into pairs. Ask them to sit back-to-back so they cannot see each other.
2. Give one member of the pair a picture (From the Drawing Twins Line Drawing Template) which must not be shown to their partner. The person with the picture must give instructions to their partner so that they can draw it, but must not say what it is, eg, 'draw a circle, draw two more circles inside the circle about half way up'. The person with picture cannot watch their partner draw.
3. When finished, ask the students to turn to face each other. Compare the drawing with the original.
4. Bring the class together and facilitate a discussion.
 - Why don't many of the pictures look like the original? (Interpretation: everyone has a different interpretation, directions were not clear, not able to give or get feedback).
 - What were your frustrations as the source of the message (giving instructions), as the receiver of the message.
5. Now ask the partners to swap roles. Hand out more pictures. The person with the picture can give instructions in a similar manner as in part 1 but this time the person drawing can ask yes/no questions and the person with the picture can watch as they draw.
6. When finished, ask the students to turn to face each other. Compare the drawing with the original.
7. Bring the class together and facilitate a discussion.
 - Did it help to be able to watch the person drawing?
 - Did it help to be able to ask questions?
8. Relate this process back to writing down detailed plans and ideas for your invention. Why is it important to list every step when writing your invention plan? Who might need to use it and why? Think of replicating the invention for mass production and market, or having someone else build it. Why do inventors need to share their ideas with others? Is it important that they are clear in their communication? Why? Inventors must prove that their invention works, that it is unlike anything else available, and that the invention has use and value to others. Detailed and clear communication is important in this process.

Teacher Instruction:

Now that you have a good idea about how to be detailed, you can spend the rest of the time planning your invention project. What steps do you need to take to build the model? What materials can you use? Draw out some sketches of what it looks like from different angles. Label parts and special features. You may use other paper or your journal for your planning.

Allow students the rest of the time in class to brainstorm ideas.

When we meet again for YIP, we will begin to build your invention ideas.