



Does my Invention Already Exist

Lesson Overview

Students perform research on their problem and on their solution to make sure it is an original idea. Students come up with key words they use in their originality search. Research is in the form of online searches (shopping sites, general searches) and through patent sites. In addition, research includes talking to experts in the field and performing user feedback interviews.

Lesson Objectives

Students will be able to:

- use search engines and survey people to research their problem and products on the market and receive feedback on their ideas and designs.
- analyze research and data to determine if their invention is original.
- modify their invention if there are similar products on the market.

Materials

- Lesson worksheets
- Computers

Learning Plan

Classroom Lesson:

Understanding Your Problem (60 minutes)

Students should have at least one problem they would like to solve, but they will probably be interested in solving many problems. Researching problems may help narrow their focus. Ask students how they could find answers to these questions:

- How can we find out more about our inventions?
- Who else is affected by this problem?
- How many people are affected by this problem?
- Where are the people who are affected by the problem located?

Discuss their thoughts as a class. Record their brainstorm ideas of ways to research on a white board/wall. Have students add to their list of ways to find out more about their problem. Encourage

Virtual considerations:

Most of this activity was done online, even in the classroom.

User feedback

Students can meet in groups in breakout rooms to discuss their ideas.

Students can use shared documents to write comments to each other about their invention ideas.

students to research their problem both in and out of class. You can assign out of class work by asking students to talk to the adults in their lives about the problem they hope to solve. Provide them computer access or ask them to access the internet at home to perform the research necessary to understand the problem they hope to solve. If students have more than one problem they are interested in solving, this step could narrow their focus down to one particular problem as they learn more about it.

Inventor Meetings (60 minutes+)

Once students have a design for their invention drawn out or an idea for their invention, have them meet with peers to gain feedback on their idea/design. Encourage peers to listen to the inventor, look at drawings and notes the inventor completed, ask questions to get the inventor thinking differently about their invention, and offer 2 positive items for feedback and 3 areas of concern or things to think about. Listeners can write these comments on post-it notes and talk to the inventor about their thoughts. Have students switch groups/partners after 10 minutes to gain more feedback. The goal is to have each inventor speak with at least 3 classmates for feedback.

At the end of the session, ask inventors to review all of the feedback they received. Students should reflect on and prioritize the comments to formulate a plan. Students should think about the following questions:

- What comments should I act on?
- What comments should I keep in mind but maybe not act right away?
- What comments am I ignoring and why?

Have students design a plan to address the comments. They can add this plan and the comments and reflections to their Invention Log.

Encourage inventors to meet with adults in their lives or find experts to meet with to gain even more feedback about their invention. If time allows, brainstorm as a class what experts inventors from the class could talk to. Assign at least one meeting with an adult in their life for homework. Assign students to research experts in their invention's field for homework and encourage them to meet with an expert (with adult assistance if needed).

Internet Research (45 minutes)

First, students must summarize their inventions with a few key words. This will help them in their searches.

Students need to research their ideas using search engines such as Google and Yahoo.

Students need to do research using shopping sites like Amazon, Target, etc. (this may have to be done at home or at the library if sites are blocked at school). Students should be analyzing what is already out on the market and how their idea may be different.

Students should research their invention on patent sites, such as the USPTO or Google Patents. These sites can be difficult to understand and navigate, so you can either show a couple of inventions on the board or have multiple adults assisting your students through these sites. Type keywords about the invention idea into the USPTO.gov website: <http://www.uspto.gov> and/or Google Patents: <https://patents.google.com/>.

Encourage students to consider extending their research outside of class. Students can notice commercials for similar products while watching television or take note of advertisements popping up while on their devices. The more students know, the better their inventions will be!

At the end of their internet searches, students should analyze the research they obtained and decide what information will help them create their invention.

Creating a Survey (45 minutes)

Ask students if they have ever participated in a survey. Is a survey a good way to obtain information about an invention?

If surveys are a new concept to your inventors, share this resource from Zapier - it contains helpful tips for writing surveys.

<https://zapier.com/learn/forms-surveys/writing-effective-survey/#best>. You can also share sample surveys. There are many on the internet, but we have two on our site, one from Baskin Robbins and one about product customer satisfaction.

Instruct students to think about the problem they want to solve or their solution and come up with an aspect of their invention they could survey others about (the initial problem, the design, the function).

Have students write 5 questions for a survey. Have them determine if answers will be written or given on a numerical scale. Encourage them to create a survey that contains both types of answers. Surveys can be done electronically as well. There are many online survey generators (e.g. Survey Monkey).

Once the survey is written, have students exchange surveys for peer and teacher review. Students should edit as necessary.

When the survey is ready, students should send or hand out the survey to as many people of varying ages as they can. Instruct them that their data may be more informative if they use many people from different backgrounds, careers, ages, and so on. The more diverse the survey population, the more helpful the information.

When survey results are ready, students should analyze what the results told them and reflect on how this can impact their invention and plan.

My Invention Is Original (45 minutes)

Students should make a claim, using evidence and reasoning, as to whether their current solution is an original invention. Students can also claim that their invention is an innovation, citing evidence

from research on the existing invention as to whether it needs some modification to make it new/better/different/cheaper/easier.

If time allows, ask students to present their research to the class with their new plans.

All information the students obtain from these research activities should be recorded in their Invention Log.

Closure/Exit (10 minutes)

Ask students why it is important for inventors to do research and survey/talk to people about their inventions. Ask students to describe 3 things they learned about their invention after researching it and talking about it with other people.

Assessments

- Class and group discussions
- Worksheets
- Self-assessment reflection
- Lesson rubric

Content Standards

Next Generation Science Standards:

NGSS.3-5-ETS1-1

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

NGSS.3-5-ETS1-2.

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

NGSS.MS-ETS1-1

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

NGSS.MS-ETS1-3.

Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

NGSS.MS-ETS1-4.

Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Science and Engineering Practice 1

Asking questions and defining problems.

Science and Engineering Practice 2:

Developing and using models

Science and Engineering Practice 4:

Analyzing and interpreting data

Science and Engineering Practice 6:

Constructing explanations (for science) and designing solutions (for engineering)

Science and Engineering Practice 7:

Engaging in argument from evidence

Science and Engineering Practice 8

Obtaining, evaluating, and communicating information.

Common Core ELA Standards:

CCSS.ELA-Literacy.W.3.2

Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-Literacy.W.3.7

Conduct short research projects that build knowledge about a topic.

CCSS.ELA-Literacy.W.4.2

Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-Literacy.W.4.7

Conduct short research projects that build knowledge through investigation of different aspects of a topic.

CCSS.ELA-Literacy.W.4.8

Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

CCSS.ELA-Literacy.W.4.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

CCSS.ELA-Literacy.W.5.2

Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-Literacy.W.5.7

Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

CCSS.ELA-Literacy.W.5.8

Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

CCSS.ELA-Literacy.W.5.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

CCSS.ELA-Literacy.W.6.1

Write arguments to support claims with clear reasons and relevant evidence.

CCSS.ELA-Literacy.W.6.2

Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

CCSS.ELA-Literacy.W.6.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-Literacy.W.6.7

Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

CCSS.ELA-Literacy.W.6.8

Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.

CCSS.ELA-Literacy.W.6.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

CCSS.ELA-Literacy.W.7.1

Write arguments to support claims with clear reasons and relevant evidence.

CCSS.ELA-Literacy.W.7.2

Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

CCSS.ELA-Literacy.W.7.7

Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.

CCSS.ELA-Literacy.W.7.8

Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

CCSS.ELA-Literacy.W.7.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

CCSS.ELA-Literacy.W.8.1

Write arguments to support claims with clear reasons and relevant evidence

CCSS.ELA-Literacy.W.8.2

Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

CCSS.ELA-Literacy.W.8.7

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

CCSS.ELA-Literacy.W.8.8

Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

CCSS.ELA-Literacy.W.8.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

CCSS.ELA-Literacy.SL.3.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.3.2

Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

CCSS.ELA-Literacy.SL.3.3

Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

CCSS.ELA-Literacy.SL.3.4

Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

CCSS.ELA-Literacy.SL.3.6

Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification.

CCSS.ELA-Literacy.SL.4.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.4.2

Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

CCSS.ELA-Literacy.SL.4.3

Identify the reasons and evidence a speaker provides to support particular points.

CCSS.ELA-Literacy.SL.4.4

Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

CCSS.ELA-Literacy.SL.5.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.5.2

Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

CCSS.ELA-Literacy.SL.5.3

Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.

CCSS.ELA-Literacy.SL.5.4

Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

CCSS.ELA-Literacy.SL.6.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.6.4

Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

CCSS.ELA-Literacy.SL.6.6

Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

CCSS.ELA-Literacy.SL.7.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.7.2

Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

CCSS.ELA-Literacy.SL.7.4

Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

CCSS.ELA-Literacy.SL.7.6

Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

CCSS.ELA-Literacy.SL.8.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.8.4

Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

CCSS.ELA-Literacy.SL.8.6

Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

CCSS.ELA-Literacy.RI.6.1

Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.