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Learning Wright

A Cross Curricular Social Studies Unit

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WAYNESBURG UNIVERSITY

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Title of Learning Unit: Learning Wright

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Subjects: Social Studies, Math, Science, English Language Arts

Grade Level/Range: 3rd-4th Grade

Unit Overview:

In this unit, students will learn about the Wright brothers and the incredible process by which we came to have our modern airplane. This unit is designed for an inclusion classroom, where there are two students with learning disabilities related to ELA and one student with emotional needs. To begin the unit, students will complete the pre-assessment to see how much they already know about the Wright brothers. Following this, the lessons are to be presented in the following order:

1st: Averaging flights

2nd: Center Lesson

3rd: Designed to Fly: Using the Engineering Design Process to Make Planes

4th: Building a Lego Structure: Learning About the Patent Process

5th: Write to a Wright: Letter Writing

After all lessons have been completed, students will make their presentations for the final assessment (detailed at the end of the unit).

Pre-assessment

1. Students will go to the following website on a Chromebook and complete the assessment:
   http://www.softschools.com/quizzes/biographies/wright_brothers/quiz3811.html
   Note to teacher: There are ads on this webpage.
2. After they complete the assessment, students will write down the score in a notebook. Students are to let the teacher know that they have finished.
3. Students are to review the questions that were missed. Students are to be on the lookout for the answers to these throughout the unit.

Title of Lesson/Activity #1: First Flights: Making graphs

Created By: Ronald Adam Hein

Overview of Lesson: This lesson will allow students to learn about the Wright Brothers and some of the obstacles the inventers overcame. The students will take the time and distance of the first five flights and graph them. Students will first record the information on a bar graph and then transfer it to a line graph. After this, students will find the mean, median and mode of the flights.

PA Standards:

Standard CC.2.4.4.A.2 - Translate information from one type of data display to another.

Standard 8.4.4.D - Distinguish between conflict and cooperation among groups and organization that impacted development of the history of the world.

Investigative Question for this activity: How much has the airplane changed from the 1900s to now?

- What were the first flights like?

Objective(s):
After reading the article, students will be able to:

- Understand how the Wright Brothers first five flights began in 1903
- Solve mathematical problems related to the Wright brothers first flights
- Record time and distance of flights and transfer them to bar and line graphs

Materials:

- Colored pencils
- Calculator

Print Sources:

- First flights Worksheet (Original Worksheet)
- https://www.loc.gov/item/2001696552/ (Image on Worksheet)

Online Collections/Exhibits/Websites:

- https://newsela.com/read/bio-inventor-wright-brothers/id/20851/ (Newsela Article) NOTE: Membership (free) is required to access this resource. http://www.thewrightbrothers.org/fivefirstflights.html (Information on first five flights)

Student Learning Process:

1. The lesson will begin with a group discussion. **What is one of the fastest ways to travel today? Has anyone ever been on an airplane? How long do you think airplanes been around? Have any of you ever heard of the Wright Brothers?**
2. After the discussion, the Newsela article about the Wright brothers will be accessed.
3. Students will read the article with a partner. As they read, students use a highlighter and highlight at least three things they found interesting.
4. Students are to discuss with their partner the things they highlighted. **What did the partner notice that the other partner didn't? Is there something both partners found interesting?**
5. Following the discussion, the teacher will give each student a work sheet with an empty line graph and an empty bar graph.
6. Using the information at the top of the worksheet, students will take the times and distances from the first five flights and graph them onto the paper. Students are to ask themselves: **How did the flights change over time?**
7. The student will use two different colors: one to represent the time of each flight, the other to represent the distance of each flight. They will need to find the mean, median, and mode of the five flights.
8. After making the graphs, students will answer the questions at the end of the worksheet.

Closure: As a whole class, discuss the graphs students created about the flights. Ask students the following questions:

- What flight went the furthest distance?
- What flight stayed in the air the longest?
- How did their working together impact us?
- Do you think we would be where we are today in aviation if the brothers had conflict with one another?

Modifications/Accommodation Techniques for Students with Special Needs:

- Learning Disabilities: students with reading difficulties will be able to receive a modified version of the article
- Emotional Support: students with emotional needs will be reading the article with a partner of their choosing

Formal Assessment:

Students will complete the worksheet and answer questions about the article.

Informal Assessment:

As students work in pairs, the teacher will be able to monitor how they work with a partner.

Name_____

The Wright Brothers

Directions: Find and record the mean, median, and mode of the first 5 flights.

1. First flight: Mean _____ Median _____Mode _____
2. Second flight: Mean _____ Median _____Mode _____
3. Third flight: Mean _____Median _____ Mode _____
4. Fourth flight: Mean _____ Median _____ Mode _____
5. Fifth flight: Mean _____ Median _____ Mode _____

6. Use the box to draw your graph.

7. Compare and contrast the two pictures of the airplanes. What do they have in common? How much has changed?

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Title of Lesson/Activity #2: Thinking Wright: Designing a Power Source

Created By: Kayla Coughlin, Adam Hein, Beau Jackson

Overview of Lesson: In this lesson, students will design their own source of energy for an imaginary car. They will be directed to think about things like weight, size, and power. Their sources of energy do not have to be entirely realistic, but students must be able to provide reasoning for their design. The goal of the lesson is to see students think creatively and express their thinking.

PA Standards:

Social Studies: History Elementary Standard 8.3.4.B – Locate historical documents, artifacts, and places critical to United States history.

ELA Standard CC.1.4.4.E – Use precise language and domain-specific vocabulary to inform about or explain the topic.

Investigative Question for this activity: How are weight, size and power related to each other when developing a source of power?

- What is a power source?
- What are the necessary steps in order to design an energy source?

Objective(s):

- As students look at the picture of the motor, they will be able to discuss with each other what they notice about the artifact.
- After learning about how the Wright brothers designed their own engine for their plane, students will design their own source of power and describe with five to seven sentences in terms of weight, size, and power.

Materials:

- Pencils
- Chromebooks

Print Sources:

1. Left front side of the Wright brothers' 1903 reconstructed motor http://www.loc.gov/pictures/item/2001696580/
2. Builder's Space Worksheet (attached)

Online Collections/Exhibits/Websites:

http://www.kids.esdb.bg/basic.html (*Sources of Energy*)

Student Learning Process:

1. To begin, students will look at the picture of the motor. This is one of the models the Wright brothers designed and built. Students are to ask themselves: **What do I notice about it? What surprises me? What do I notice about the design of the object? What is a power source? Can I think of some of examples of a power source?**
2. After students have looked closely at the picture, they are to go to the *Sources of Energy* website to look at different common sources of energy.
3. Students are to pick up a *Builder's Sp*ace worksheet. They will be building an energy source for an imaginary car.
4. Students will design their own source of energy in the box provided. They are to be thinking about how much it will weigh, how big it will be, and how much power it will provide. They can use Chromebooks to research and find materials that they can use for an energy source. Students will write their answers on the sheet in the space provided. They are reminded that they are not creating an actual object for this activity. The teacher just wants to see them go through the designing process.
5. When students have finished designing the energy source for a car, they are to share it with the people around them in the center. **Compare and contrast ideas with each other. Ask members of the group: Who had a bigger source of energy? Why was it so big? Did a bigger design always make it more powerful? Whose was the heaviest? Why was it so heavy? What can be concluded about weight, size, and power based on the designs?**
6. After they have finished the discussion, students are to turn in their design to the teacher.

Modifications/Accommodation Techniques for Students with Special Needs:

Learning Support: the teacher will facilitate the discussion to ensure students are using appropriate vocabulary to communicate their ideas.

Emotional Support: the teacher will join the learning center to promote student-centered ideas and discussion.

Formal Assessment:

- The formal assessment will be the *Builder's Space* Worksheet, which will be turned in to the teacher at the end of the center activity.

Informal Assessment:

- The informal assessment will be the teacher observing the students as they have their discussion comparing and contrasting their designs with one another.

Name:_____

Builder's Space

Draw a design for your source of energy. Include as much detail as possible. Label the parts that you create.

About how much does your energy source weigh? _____

About how big is your energy source? (ft./in.) _____

About how powerful is your energy source? (lbs of force) _____

Why did you make your energy source the way you did?

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Title of Lesson/Activity #3: Designed to Fly: Using the Engineering Design Process to Make Planes

Created By: Kayla Coughlin, Beau Jackson, and Adam Hein

Overview of Lesson: In this lesson, students will learn about the Engineering Design Process and how the Wright brothers applied it in their invention of the first plane. They will begin by watching a video on the Wright brothers. After the video, students will learn about the seven steps of the Engineering Design Process. Following this, groups of students will discuss how the Wright brothers applied each of the steps. Finally, students will be able to discover the process for themselves as they work to design paper airplanes in a competitive setting.

PA Standards:

Science and Technology Standard 3.4.4.C2 – Describe the engineering design process: Define a problem. Generate ideas. Select a solution and test it. Make the item. Evaluate the item. Communicate the solution with others. Present the results.

Social Studies Standard 8.3.3.A - Identify and describe the social, political, cultural, and economic contributions of individuals and groups in United States history.

Investigative Question for this activity: How does the Engineering Design Process result in technological advancements?

- What are the steps in the Engineering Design Process?
- How did the Wright brothers apply the Engineering Design Process?

Objective(s):

- Social Studies: After learning about the steps of the Engineering Design Process, groups of students will be able to express orally at least one way the Wright brothers applied at least one of the steps.

- Science and Technology: Following the lesson, students will be able to number the steps of the Engineering Design Process accurately.

Materials:

- Pencils
- Notebooks
- Construction Paper

Print Sources:

https://www.loc.gov/resource/mwright.04003/?sp=1&st=grid **(**Subject File: Chanute, Octave--Photographs, Kitty Hawk, North Carolina, Originals, 1901)

Engineering Design Process Worksheet (original worksheet)

Online Collections/Exhibits/Websites:

https://www.youtube.com/watch?v=bjRFYg34zmI ("The Wright Bros!" Sung History)

Student Learning Process:

1. First, students will watch the YouTube Video "The Wright Bros!" as a whole class. The teacher will ask: **What is one thing you learned from the video?**
2. After watching the video, students will get out their notebooks and write down the seven steps of the Engineering Design Process as the teacher goes through them.
3. Student will be put into groups of 4 (table). The teacher will assign one step of the process to each group for their table to discuss: **How did the Wright brothers apply the step of the Engineering Design Process you were assigned?**
4. As a group, students will present what the Wright brothers did during their assigned step and listen to what their classmates thought the Wright brothers did during the other steps.
5. After all groups have presented, each student will get two pieces of construction paper. They will try the steps of the process themselves.
6. First, they will define the problem. Ask: **How can a paper airplane be made that will glide in the air as long as possible?**
7. Next, students will generate ideas. Ask: **How might the paper airplane be folded to get the desired result?** Students can sketch out designs in their notebook.
8. Then, students will select a solution and test it. Ask: **Can the design you had in mind be built?**
9. Students will make the item. Using one of the pieces of paper, students will fold it into their chosen design.
10. Students will evaluate the item. Ask: **After testing out the plane, did it fly like you planned? What changes could you make?** At this point, the students may use their other piece of paper to adjust their plane's design if they would like.
11. Students will communicate the solution with others. Students will talk with table partners about the choices they made regarding their design and how they expect their plane to fly. Ask: **Did others make the same or similar choices as you?**
12. Students will present the results. The class will go to the gym to compete with their planes. Flying two at a time as assigned by the teacher, they will keep track of where each plane falls to see which classmate had the best design.
13. After they find out who has the first, second, and third place design, they will go back to the classroom.

Closure: To complete the lesson, the students who had the first, second, and third place paper airplanes will present to the class what they did during each stage of the Engineering Design Process. After the presentations, each student will be given the

Engineering Design Process worksheet to complete independently. They will turn in their work to the teacher and the lesson concludes.

Modifications/Accommodation Techniques for Students with Special Needs:

- Learning Support: the teacher will read the steps on the Engineering Design Process worksheet.
- Emotional Support: the teacher will carefully group them with students who they feel comfortable with and can interact with in an appropriate manner.

Formal Assessment:

The teacher will grade the Engineering Design Process worksheets (attached at the end of the lesson).

Informal Assessment:

The teacher will observe how students work together in groups to discuss what their group's step of the Engineering Design Process and how it was applied by the Wright brothers. The teacher will also observe how students adapt their designs according to the process while designing paper airplanes.

Name:_____

Directions: Number the steps of the Engineering Design Process correctly from 1 to 7 beginning with the first step.

___ Communicate the solution with others.

___ Generate ideas.

___ Evaluate the item.

___ Present the results

___ Define a problem.

___ Select a solution and test it.

___ Make the item.

Answer the question: How did the steps of the Engineering Design Process help you as you made your plane?

_____

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Title of Lesson/Activity #4 Building a Lego Structure: Learning About the Patent Process

Created By: Beau Jackson

Overview of Lesson: Students will begin the activity by examining a patent that was given to the Wright brothers for improvements in flying-machines. They will then watch a quick video and read a simplified description of a patent. Following this, students will create a structure using Legos, which will be their "invention." Students will be asked to write a step by step description on how to create their "invention." Students exchange their descriptions and will see if they could recreate their classmates' structure by reading their description.

PA Standards:

Standard - 8.3.4.B Locate historical documents, artifacts, and places critical to United States history.

Standard - CC.1.4.4.K Choose words and phrases to convey ideas precisely.

Investigative Question for this activity:

- What is a patent?
- What is the point of a patent?
- What does one need to provide in order to receive a patent?

Objective(s):

- ELA: After learning basic information about patents, students will be able to create their own structure out of Legos and will be able to write a description on how to create that structure with enough detail that another student can read the description and create the same structure.
- Social Studies: While observing the patent given to the Wright brothers, students will be able to examine the document by pointing out what stands out to them.

Materials:

- Pencils
- Legos
- Paper

Print Sources:

Subject File: Patents--By Wright Brothers--USA--filed 23 March 1903, patented 22 May 1906 from https://www.loc.gov/resource/mwright.04135/?sp=26

Online Collections/Exhibits/Websites:

1. https://www.uspto.gov/kids/inventors-kids.html
2. https://www.uspto.gov/kids/build.html

Student Learning Process:

1. Students will be given a document titled “Department of Commerce United States Patent Office.” This is an official copy of a patent certification that the Wright Brothers received for their work and improvement in flying-machines.
2. Students will examine the document. Ask: **What stands out to you in the document? What evidence do you see that might hint to this being an official document?**
3. Students will get out Chromebooks and login.
4. Students will visit https://www.uspto.gov/kids/inventors-kids.html, and watch the video on the page.
5. After watching the video, students will read the following section from the same website:

   > “A patent gives the inventor the right to exclude others from making, using, or selling their **invention** for a certain time period. In exchange, the public (society) gets to learn the information in the patent to improve upon the invention or to create their own. The inventor has to provide enough details in their patent for a person with ordinary skill in the subject matter to make the invention.”

6. After reading this section, students are to think about: **What is the reason for a patent? Why would one want a patent?**
7. Students are to think back to the video they watched. Ask: **What will the young girl have to do to have the rights to her invention? What will she have to provide to the public?**
8. Following this, students will be given five different colored Legos. They will then work to create a unique structure by using the Legos. This will be their invention.
9. Following the completion of the structure, students will write a clear description on how to make their structure. Their description should be detailed enough that a person with ordinary skill could create that structure.
10. Once they finish the description, students with swap their description with another student. They will then attempt to create their partner’s structure as their partner attempt to build their structure.
11. Once each structure is finished, students will compare the two structures**.** Ask**: Did your partner successfully recreate your structure? Were your directions clearly stated? If not, how could it be changed?**
12. Lastly students will make any corrections or add whatever is needed to make their description better. Students will then turn their descriptions in to the teacher.

Closure: Once students have completed the activity, bring students together for a class discussion. Tell students that a patent gives an inventor the exclusive right to produce and sell what they invented. Then tell students that in order to receive a patent, the inventor needs to provide many documents about their invention. These documents need to be very detailed in order to have the right to the patent. Tell students that the

activity they did today represents one of the many stages that people need to go through in order to receive a patent.

Modifications/Accommodation Techniques for Students with Special Needs:

- Learning Support: for students who struggle with reading, the teacher or an aide can read the information from the patent to the students. Students who have trouble with writing can describe their “invention” verbally rather than writing it down.
- Emotional Support: Students could be assisted by a classmate to help them avoid frustration with the activity. If Students become increasingly frustrated, the teacher can work with the student to help them stay calm.

Formal Assessment:

The teacher will grade each student’s description of their Lego structure according to the rubric.

Informal Assessment:

Teacher observation of classroom participation and student collaboration.

Rubric for Lego Structure Description

	5 Points	3 Points	1 Point
Detailed Step-by-Step Description	Student presents instruction in clear and logical manner.	Student presents instruction that somewhat detailed. Step-by-step instructions may be hard to follow.	Students description is lacking an appropriate amount of detail and order of steps may be illogical.
Detailed Vocabulary	Student is using language that is clear, concise, and easy to comprehend.	Student is using language that is somewhat clear.	Student description is unclear and difficult to follow.
Punctuation and Capitalization	There are no capitalization or punctuation mistakes.	There are some capitalization or punctuation mistakes.	There are many capitalization and punctuation mistakes.

Title of Lesson/Activity #5: Write to a Wright: Letter Writing

Created By: Kayla Coughlin

Overview of Lesson:

In this lesson, students will learn how to write letters to communicate information and ask questions. They will begin by looking at letters Wilbur Wright wrote and highlighting important things mentioned in the letters. After discussing what they found with a group, the students will watch a brief video on formal versus informal letter writing and the five main parts of a letter. The teacher will then detail how students will be writing letters according to a rubric. Finally, students will present their letters to one another.

PA Standards:
Social Studies Standard 8.3.3.A - Identify and describe the social, political, cultural, and economic contributions of individuals and groups in United States history.

ELA Standard CC.1.5.4.E – Differentiate between contexts that require formal English versus informal situations.

Investigative Question for this activity:

- How can letters be used to ask questions and tell information?
- What did you learn about the Wright brothers?
- What would you like to ask the Wright brothers?

Objective(s):

- Social Studies: In reading some of Wilbur Wrights's letters, students will be able to independently identify at least three key ideas of the letters.
- ELA: After a brief discussion of the rubric, students will be able to write letters to the Wright brothers telling them at least two things they learned, asking at least two questions, and including all five key parts of a letter.

Materials:

- Pencils
- Highlighters
- Dry Erase Markers
- Dry Erase Board
- Letter Writing Paper

Print Sources:

1. https://www.loc.gov/resource/mwright.02055/?sp=1&st=grid (Family Papers: Correspondence--Wright, Wilbur, 1900-1901)
2. Letter Writing Template (Teachers Pay Teachers) This needs the actual site: https://www.teacherspayteachers.com/Product/Letter-Writing-Paper-Friendly-Letter-596390

3. Letter Writing Rubric (Original)

Online Collections/Exhibits/Websites:

1. https://www.commonlit.org/texts/letters-from-wilbur-wright (Letters from Wilbur Wright to Various Recipients)
2. https://www.youtube.com/watch?v=y2d-0dIimgY ("Letter Writing for Kids" by Andie Worsley)

Student Learning Process:

1. First, students will look at the primary source letters Wilbur wrote to his father. They will compare these with the letters from commonlit.org
2. As students look at the letters, they will highlight some important details they see.Ask: **Does Wilbur talk about his discoveries? What kinds of questions does he ask?**
3. After they highlight at least three things, students will share what they found with their assigned table group. Ask: **Did you find the same types of information? What did you find that was different from everyone else?**
4. Once everyone has finished speaking, students will watch the YouTube video, Letter Writing for Kids, as a whole class.
5. Students will look at the dry erase board as the teacher writes out the five main parts of the letter. Students will need to know these as they write their own letter.
6. Each student will get a letter writing template and a copy of the rubric. They will be writing letters to the Wright brothers.
7. Students will listen carefully and follow along as the teacher reads out the expectations from the rubric. Ask: **Do you have any questions about the assignment?** Students are encouraged to ask any questions before they start writing.
8. Students will write their letter, paying special attention to include all five main parts of the letter. Ask: **Think, what did you learn about the Wright brothers that you want to tell them about? What do you want to ask them about?**
9. Once each student has finished writing the letter, he or she will review it with the rubric. Ask: **Did you do your best work? Did you include everything you needed to get your best score?**

Closure: To complete the lesson, students will be paired up and instructed to read their letters to their partner. After all of the letters have been read, the teacher will ask if anyone would like to share their letter with the whole class. The teacher will allow up to three students to share, after which all letters will be turned into the teacher for grading. Once the letters are turned in, the lesson concludes.

Modifications/Accommodation Techniques for Students with Special Needs: For students with ELA needs, the letters will be read out loud by a teacher. Additionally, when these students write their letter, they can orally dictate what they want to say as it is transcribed by a teacher. For students with emotional needs, clarify the meaning of formal writing by relating it to their background knowledge (e.g. write like you are writing to your teacher, not your friend).

Formal Assessment:

- For the formal assessment, the teacher will grade the letters according to the rubric provided (20 point scale).
- The student will be given a FINAL ASSESSMENT paper with directions to complete the assignment.

Informal Assessment:

- For their informal assessment, the teacher will observe the key ideas students highlighted from the letters and how they discussed these ideas with their peers.

RUBRIC

Write to a Wright: Letter Writing

	5 Points	3 Points	1 Point
Five Key Parts of a Letter	All five key parts of a letter are included.	At least three key parts of the letter are included.	Two or less key parts of the letter are included.
What I Know/Want to Know	There are at least two sentences talking about something learned and at least two questions for the Wrights.	There is at least one sentence talking about something learned and at least one question for the Wrights.	The letter does not have a sentence talking about something learned or a question for the Wrights.
Formal Writing	The body of the letter is written respectfully and using proper grammar.	The body of the letter is written in a friendly way and has mostly correct grammar.	The letter has no structure and has several grammar mistakes.
Punctuation and Capitalization	There are no capitalization or punctuation mistakes.	There are some capitalization or punctuation mistakes.	There are many capitalization and punctuation mistakes.

Final Assessment

It's time to show what you learned! Tell a story, act it out, make up a song or poem, write a paper, or do anything you can think of (with teacher approval) to tell the class what you've learned about the Wright brothers. Make sure your presentation answers at least three of the five following questions:

What are some differences between the airplanes the Wrights made and the airplanes today?

Why did the Wrights need a source of energy?

How did the Wright brothers use the steps of the Engineering Design Process?

Why did the Wrights apply for a patent?

What types of letters did the Wrights send?