End of Semester Project

Session Time: Five, 50-minute sessions

DESIRED RESULTS

ESSENTIAL UNDERSTANDINGS

Appreciate the rich, global history of aviation/aerospace and the historical factors that necessitated rapid industry development and expansion. (EU 1)

Gain essential thought processes and life skills, such as good citizenship, critical thinking, informed decision making, which are useful to all learners, whether or not they eventually pursue a career in aviation. (EU 8)

ESSENTIAL QUESTIONS

1. What is one of the most significant innovations or periods of development in aviation and aerospace history?
2. Can I encourage a young person to choose a career in aviation by creating an exhibit on an important aviation innovation?

LEARNING GOALS

Students Will Know

- How to research innovations and technology in aviation and aerospace
- How to communicate a topic learned during the semester in a museum exhibit format

Students Will Be Able To

- *Display, summarize, illustrate* and *retell* a significant innovation learned about this semester. (DOK-L1, L2)
- *Design, construct* and *present* a museum exhibit that illustrates an innovation learned about this semester. (DOK-L3, L4)
- *Defend* the exhibit choice (DOK-L4)

ASSESSMENT EVIDENCE

Warm-up
Students write responses to questions about key concepts learned during the semester and the concepts' importance to aviation and aerospace.

Formative Assessment
Students conduct peer reviews of each others' museum exhibits.

Summative Assessment
Students evaluated on the quality and completeness of their exhibits using comprehensive rubric.

LESSON PREPARATION

MATERIALS/RESOURCES

- End-of-Semester Project Presentation
- End-of-Semester Project Student Activity 1
- End-of-Semester Project Student Activity 2
- End-of-Semester Project Teaching Aid

Exhibit Construction

- Suggestions for physical exhibits include, but are not limited to, poster board/foam board, markers, pencils, scissors, glue, video presentation device, other basic presentation materials

LESSON SUMMARY

Lesson 1: End of Semester Project

At this point in the course, students have learned about innovations and technology development in aviation and space history, beginning with the earliest recorded histories of human flight, continuing through the space age and into modern developments. They have had opportunities to examine airspace systems and to look into the roles that government and commercial industries play in current and future endeavors. At each step of the way, students most likely have developed individual interests in some of these areas.

For the end-of-semester project, students will have the opportunity to create a model of a museum exhibit will allow students to dig deeper into one specific aspect of this semester's curriculum that really interested them and communicate this knowledge to a specific audience.

Project description: Students will design, build and defend a museum exhibit based on one of the innovations learned about during the semester. This project should reflect the main emphasis of this course, which is that students recognize the innovation and problem solving that guided the evolution of aviation and aerospace as we know it today. Students should justify why their chosen topic is of importance to aviation and aerospace. This project can be completed individually or in small groups.

A group of aviators is in the process of planning to open a new, local aviation and aerospace museum.

There is nothing like it nearby and they hope it will get young people excited about aviation and possibly prompt them to enter the field. They don't have a very large budget to get the museum started, so each one of the small number of exhibits with which they will begin must be very effective at attracting interest and generating enthusiasm in visitors.

To help them get started, they are soliciting ideas for exhibits.

The flexibility of this project begins with the teacher and extends to students. Depending on limitations in classroom size, materials availability, and other constraints, the size of exhibits can be altered or even completed as a series of virtual exhibits. Projects can be completed individually or in small groups; projects can be showcased within the classroom or in a larger, more public setting; exhibit topics can be either selected by the teacher or open for students to choose; and the introduction to museum exhibits can be completed as an in-class showcase of existing museum exhibits or through a field trip to a local museum, paying particular attention to not only exhibit content but also layout, style and other exhibit elements. The final exhibit showcase can occur within the classroom among classmates, be expanded to include participants/evaluators from the outside, or even be turned into a design challenge where exhibits are chosen to be utilized or highlighted in the school or elsewhere. Some teachers have used this project to recruit younger students for next year's class.

This end-of-semester project is designed to be completed over five sessions. Due to the nature of project research and completion, extra student work outside of class will increase overall project quality and is recommended. In particular, students may need more research time and more time for exhibit preparation.

Session 1: Introduction to project, student topic selection
Session 2: Topic research, exhibit rough layout
Session 3: Continued research, exhibit preparation, optional peer review
Session 4: Exhibit/presentation preparation
Session 5: Gallery walk/presentations

BACKGROUND

Before the semester project, students may have had the opportunity to visit a museum and study certain exhibits (this is not limited to aviation or aerospace museums, since all museums contain exhibits). However, students may not have paid much attention to the layout and finer details of the exhibits themselves. Some time will need to be spent showing students these aspects of museum exhibits before the start of their projects. This can be completed through pictures of exhibits or by looking at virtual exhibits that many museums now have available. Some virtual exhibits are walking tours of the museum itself, while other exhibits are created specifically for online use.

DIFFERENTIATION

The flexible design of the end-of-semester project allows for built-in differentiation based on the needs of all students. At the teacher's discretion, projects can be completed individually or in groups, allowing students who need more support to work with other students as necessary. For additional differentiation options, the exhibit requirements and design parameters can be adjusted for students, either increasing or decreasing demands based on individual students. For more support, resources can be provided to help certain students, while other students may be encouraged to find additional resources of their own. Topics also can be assigned to students if desired, allowing the teacher to assign topics based on difficulty levels.

LEARNING PLAN

ENGAGE

Teacher Material: End-of-Semester Project Presentation

Slides 1-3: Introduce the end-of-semester project and learning objectives.

Slide 4: Conduct the **Warm-Up**.Collect student papers when they are done for grading. Student responses to each question are worth up to 5 points. [DOK 3; appraise, explain]

Warm-Up

Ask students to write two to four sentences answering the following questions:

- What key concept have you learned this semester that interests you the most, and why?
- How did this concept address a problem that needed to be solved in aviation and aerospace?
- How important is the concept to aviation and aerospace?

EXPLORE

Teacher Material: End-of-Semester Project Presentation
Slides 5-8: Explain to students that in this project will defend a museum exhibit based on one of the topics explored during the semester. Use the slides to describe what an effective museum exhibit does and give them an opportunity to explore exhibits online.

EXPLAIN

Teacher Material: End-of-Semester Project Presentation, End-Of-Semester Project Teaching Aid
Student Material: End-of-Semester Project Student Activity 1

Slides 5-11: Review the set-up, objectives, judging parameters and schedule of the project with the students. Provide copies of End-Of-Semester Student Activity so they can follow along with the project requirements. Also provide copies of End-Of-Semester Teaching Aid which has the rubric with which their projects will be graded.

During session two of the project, students will utilize content learned throughout the semester, along with additional research, in order to develop exhibits that meet the needs of the project.

During session three, students will continue to research any additional information needed for their exhibits, start to assemble them, and prepare to defend the selections made for the exhibit, either in writing or through an oral presentation.

EXTEND

Student Material: End-of-Semester Project Student Activity 2

Peer reviews, if utilized for this project, also will be conducted in session three to allow for feedback and an opportunity to improve their exhibits before final presentation. Students will use **End-of-Semester Project Student Activity 2** for peer review purposes, and they can view this sheet ahead of time so they can understand how they will evaluate other students and how they will be evaluated.

Conduct the **Formative Assessment.** Each student submits one peer review, which is worth 5 points. After evaluating student reviews, give them to the exhibit creators so they can use it to improve their exhibits. [DOK 4; evaluate, assess]

Formative Assessment

Have students complete their peer reviews using the **End-of-Semester Project Student Activity 2.** Pre-assign students to review one exhibit. Guide students to fill out the activity sheet completely about their assigned exhibit. Reviews should accurately describe the exhibit and highlight multiple strengths and areas for improvement.

EVALUATE

Teacher Material: End-Of-Semester Project Teaching Aid

During session five, fellow students and any other evaluators will conduct a gallery walk to view all exhibits or participate in presentations.

Conduct the **Summative Assessment.** [DOK 3; draw conclusions, DOK 4; connect]

Summative Assessment

Students can be evaluated on the quality and completeness of their exhibits. Use the rubric in **End-of-Semester Project Teaching Aid** to evaluate student exhibits.

GOING FURTHER

The exhibit project can be turned into a design challenge, where exhibits can be ranked and potentially displayed either in the school or in a more public setting, such as a local museum or other venue. If completed as a virtual display, the projects also can be displayed on the school or classroom website. The class can also take a trip to a local museum or invite a museum exhibit specialist to speak to students (in person or remotely). In addition, these exhibits and the student presentations could be utilized to recruit others for aviation pathway courses.

Basic math skills can be incorporated into the project by asking students to calculate display areas, ratios of pictures, text areas, white space, etc.

STANDARDS ALIGNMENT

NGSS STANDARDS

Three-dimensional Learning

- **HS-ETS1-1** - Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
    - Science and Engineering Practices
        - Asking Questions and Defining Problems
        - Constructing Explanations and Designing Solutions
    - Disciplinary Core Ideas
        - ETS1.A: Defining and Delimiting Engineering Problems
    - Crosscutting Concepts
        - Systems and System Models
        - Influence of Science, Engineering, and Technology on Society and the Natural World
- **HS-ETS1-2** - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
    - Science and Engineering Practices
        - Constructing Explanations and Designing Solutions
    - Disciplinary Core Ideas
        - ETS1.C: Optimizing the Design Solution
    - Crosscutting Concepts
        - none

- **HS-ETS1-3** - Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.
    - Science and Engineering Practices
        - Constructing Explanations and Designing Solutions
    - Disciplinary Core Ideas
        - ETS1.B: Developing Possible Solutions
    - Crosscutting Concepts
        - Influence of Science, Engineering, and Technology on Society and the Natural World

COMMON CORE STATE STANDARDS

- **HSN-Q.A.2** - Define appropriate quantities for the purpose of descriptive modeling.
- **HSA-REI.B.3** - Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- **RST.9-10.1** - Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- **RST.9-10.2** - Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- **RST.9-10.4** - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- **RST.9-10.7** - Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- **WHST.9-10.2** - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
- **WHST.9-10.4** - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- **WHST.9-10.6** - Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
- **WHST.9-10.7** - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- **WHST.9-10.8** - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
- **WHST.9-10.9** - Draw evidence from informational texts to support analysis, reflection, and research.
- **WHST.9-10.10** - Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

- **SL.9-10.2** - Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

- **SL.9-10.5** - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

REFERENCES

http://naturalhistory.si.edu/VT3/

https://postalmuseum.si.edu/exhibits/virtual/

http://www.sciencemuseum.org.uk/online_science

http://www.nwhm.org/online-exhibits/