

2004 Transportation Education Academy Activity:

Title: Transportation Career Research and Exploration of Transportation System Operations

Educational Level: 10th – 12th grades

Time to Complete: 16-week semester, estimated 40 hours in-class and homework hours

Standards Being Met:

Standards for Technology Literacy:

1. Number 2 - The Core Concepts of Technology
2. Number 11 - Apply Design Processes
3. Number 12 - Use and Maintain Technological Products and Systems
4. Number 18 - Transportation Technologies

Brief Description:

This activity will help students identify key concepts in the transportation of products in the world economy. The student will choose one area of transportation from Terrestrial, Marine, Atmospheric or Space and research one mode of transportation in the area of their choosing. The student will then research how to better serve the community with that means of transportation.

Objectives:

At the completion of this activity, students will be able to:

1. Identify the four types of transportation
2. Describe the modes of transportation
3. Identify core concepts of technology
4. Apply design and processes to a type and mode of transportation
5. Use and maintain technological products and systems in their chosen area
6. Assess the impact of products and systems in their chosen area
7. Describe the relationships between the various types and modes of transportation technologies

Group Size:

Students may choose to work individually or with a partner.

Background Information:

The four **types of transportation** are: Terrestrial (land transportation), Marine (water transportation), Atmospheric (air transportation) and Space (transportation beyond

the earth's atmosphere). All four types have the following **modes of transportation** within their categories: Propulsion, Suspension, Guidance, Control, Structure, and Support.

The **Core Concepts of Technology** the students must be familiar with: How transportation systems work and the benefit they bring to society. Students must be aware that there are resources available to help the transportation economy. There are also requirements that must be met to operate a transportation environment at its optimal handling capacity. There are ways to optimize and trade-offs that can be made that enable a business to best serve the industries they work with. There are processes a business can follow to determine if they are doing a job the best way possible. And there are rules and regulations that control the businesses that are in operation.

Apply Design Processes to a type and mode of transportation: The students must be aware that there are design problems within a company that need to be identified. Once the problem is identified there may be criteria and constraints that can or cannot be overcome. But there may be ways that the design can be refined to better utilize time and materials involved in a business. There are also ways to evaluate if the design is working to the full potential that is needed and required. With the use of quality control the system can be developed to better handle a product. And there should always be reevaluating whether the solution is the best that it can be.

Use and Maintenance in Technological Products and Systems in transportation: The student will need to know how to collect information about the system and judge the quality of the product. With the information data synthesized there must be a way to come to a conclusion that best serves the customer. Employing assessment techniques in the transportation field will benefit the business. And design forecasting techniques would help to serve the future of the business.

Assessing the Impact of the Products and Systems: Students must be able to collect information about the transportation system and make judgments that would improve the business. Through the information gathered, the student must be able to group synthesized data gathered and draw a useful conclusion. To make useful changes there must be assessment techniques to support the findings. Finally having techniques in place that will forecast the design changes will help support the next stage of change.

The **relationship between the various types and modes of transportation technologies:** There are many ways transportation systems interrelate in transporting materials, and this relationship is integral. That integral relationship is intermodalism, the working together to transport materials. Transportation services and methods provide the support behind the physical handling of the products. With the moving of products there will be positive and negative side effects on the environments and people. Therefore it is necessary to evaluate transportation processes and efficiency to best control the environment around the transportation environment.

Supplies, Tools, Materials Needed:

1. Computer access to research needed information
2. Paper and writing utensil or computer for note taking
3. Interviewing abilities and visits to transportation sites

Safety Precautions:

1. Make sure safety glasses are worn in appropriate places
2. Drive safely when making a site visit

Procedure:

1. Decide group size.
2. Describe all types and modes of transportation.
3. Choose a career from one of the types of transportation to research.
4. Use ISeek to research transportation career.
5. Identify salary range, education needed, outlook on job opportunity, where jobs are located and any other helpful information related to that career.
6. Identify what resource or product is being transported.
7. List the regulations (federal, state, local, industry) that affect operation of the transportation system.
8. Identify what can be done to optimize the transportation system and what trade-offs may be faced.
9. Determine what processes must be gone through to make the transportation system operate better.
10. List natural or human conditions that may affect operation of the transportation system.
11. Identify and list criteria and constraints that are placed on the system.
12. List out ideas that could refine the transportation design and make the system more efficient.
13. Evaluate the design changes and identify final solution that makes system operate better.
14. Evaluate the final solution.
15. Prepare a document that would monitor quality control.
16. Determine what is necessary to troubleshoot and maintain the system.
17. List related technologies needed for operating the system
18. Describe intermodalism of this type of transportation system that may be involved.
19. Identify positive and negative impacts on society and environment.
20. Evaluate what ways this type and mode of transportation is value-adding to the product.

Evaluation and Assessment:

Weekly notebook evaluation:

- Week 1 - Descriptions of types and modes of transportation
- Week 2 – Career identification
- Week 3 – ISeek results
- Week 4 – Identification of transported resource or product
- Week 5 - List of regulations (federal, state, local, industry) that affect operation of the transportation system
- Week 6 – One page summary of what can be done to optimize the transportation system and what trade-offs may be faced
- Week 7 – One page description of changes that can be made for the transportation system for optimal operate
- Week 8 – List natural or human conditions that may affect operation of the transportation system
- Week 9 – List of criteria and constraints that are placed on the system
- Week 10 – A record of brainstormed ideas for refining the transportation design to make it more efficient
- Week 11 – A paragraph evaluation of each idea from Week 10, with a final solution identified
- Week 12 – Brief paper evaluating the final solution determined in Week 11
- Week 13 – Document for monitoring quality control and troubleshooting and maintenance plan for the system
- Week 14 – List of related technologies for operating system and description of intermodalism involved with this transportation system
- Week 15 - Chart of positive and negative impacts on society and environment
- Week 16 - Brief evaluation of how this type and mode of transportation is value-adding to the product