Example of Geospatial Teaching Unit from EROS Class (2002) - Trains, Planes, Autos, and Boats: A Brief History of Transportation Modes in The Upper Missouri River Valley

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### Concept Statement

The analysis of the reasons for the development of various modes of transportation can lead to social, political, and economic inquiry.

### South Dakota Standards Relevant to This Lesson
- Geography Standard: Analyze the flow and interaction of people, products, and ideas as they are influenced by transportation systems.

### National Geography Standard Relevant to This Lesson
- Standard 17: Application of geography to interpret the past.
- Standard 18: To apply geography to interpret the present and plan for the future.

### Suggested Grade Level

Upper elementary to junior high school

### Materials

1. A PC or Macintosh with Arcview 3.0
2. Arcview usable shp. Files from the Prairie to Mountains Explorer (PTME) CD set (Idaho, Wyoming, Montana, North Dakota, and South Dakota) loaded on the computer
3. Student Guided Worksheet
4. Assessment Criteria

### Estimated Time to Complete the Lesson

A fifty-minute period

### Overview

This lesson will use the PTME CD set to build the lesson. Students will develop several differing views of the region by adding and comparing various themes contained on the CD.

Before the lesson, students will need to be proficient in using Arcview and retrieving regional, state, and county datasets from the CD.
Lesson Background

The migration west began in the early 1800s with many courageous pioneers making the journey hoping to find fame, fortune, and wealth in the land beyond the Rockies. In some cases, these individuals were escaping religious persecution or were new arrivals to these shores. Whatever the reason, the upper Great Plains regions had to be crossed. The journey was fraught with danger and hardships.

In the earliest days of this era, the primary mode of transportation was either by boat or wagon trains. The notion of having roads or railroads as a means of travel was still well off in the future. The automobile and the airplane had not been invented. However, the migration west did occur and the future network of region’s cities, roads, railroads, and even airports was to follow. This lesson is the story of how those modes developed.

If we were to look at the last 200 years of this country’s transportation history, we would see that there are four clearly identifiable periods.

<table>
<thead>
<tr>
<th>Years</th>
<th>Primary Transportation Medium</th>
<th>Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800 - 1850</td>
<td>Rivers</td>
<td>Boats</td>
</tr>
<tr>
<td>1850 - 1900</td>
<td>Railroads</td>
<td>Trains</td>
</tr>
<tr>
<td>1900 - 1950</td>
<td>Highways</td>
<td>Automobile</td>
</tr>
<tr>
<td>1950 – present</td>
<td>Airports</td>
<td>Airplane</td>
</tr>
</tbody>
</table>

While the invention and adoption of each differing vehicle did not occur at a uniform pace throughout this period, the chart above does portray approximate utilization of the various vehicles as common travel sources. However, there may be situations even today where a specific mode of travel may be preferred when considering length of haul, cargo or load carried, time-critical nature of the transport, or environmental conditions.

The impact of transportation systems though on where people finally settled and how they carry on their daily lives has been significant. We will investigate some of those relationships using GIS information. While not within the scope of this lesson, students may want to expand the lesson with added population density themes.
Student Guided Worksheet

1. Open Arcview
2. Select transportation.apr from the data files that are stored on the computer/server that your class is using.
3. Open the file. You should see that the outline of the 5 states, ID, MT, WY, SD, and ND is the opening view. This view will be used for the entire lesson.
4. Check and see that the following Arcview themes are available. If you are missing any of these .shp files, you will need to install them to complete the lesson.
   a. State Outlines
   b. Major Rivers
   c. Cities
   d. State Capitols
   e. Railroads
   f. Highways
   g. Interstates
   h. Airports
   i. Rivers

The following questions that you are to answer will require you to make various changes in Arcview. Specific changes are contained with each question.
Remember, the state outlines themes should always be shown!!!

1. Add the major rivers theme and add the cities theme. Why are the cities located on the rivers? ______________________________
2. Now add the state capitols theme, make it active, and remove the cities theme. Can you name the state capitols for the 5 states? Hint: use your identify tool.
   a. SD
   b. ND
   c. MT
   d. WY
   e. UT
3. Why were the state capitols established in the locations where we find them today?
4. What’s different about the capitol in WY?
5. Is there a reason for this? Hint: Do a web search for the Goodnight Loving Trail.
6. What about the capitols of ID?
7. Turn off the state capitols and major rivers themes and add the railroads theme. There are many areas where there are no railroad lines. Why do you think the railroads are located in only certain places?

8. Add the cites theme; does that explain anything more?

9. Remove the cities theme and add the major highway theme. Where were the roads located and why?

10. If you go back and forth between the railroad and cities theme, you will see some areas where the roads go beyond the railroad lines. What is your explanation for the phenomena?

11. Remove the cities and railroads theme and open the highways and interstate highways themes. Why were the interstate highway routes placed in those locations?

12. If we were to add a terrain elevation theme to the view, would your answer to the question above be the same or different?

13. Remove the highway theme and open the state capitols theme. Are all the state capitols on interstate highways?

14. What’s the reason for your answer?

15. There are many more airports in the 5 state view than those that are shown by the airports theme. However, the airports that are contained in the theme are probably those with some form of airline service. Examine the combination of airports and state capitols. Do all the state capitols probably have airline service?

16. Why did you answer the question above as you did?

17. If you have enough time, use your hot link tool and look at the airport close to the capitol of MT and answer the following questions.
   a. What is the name of the airport?
   b. What are the numbers of the longest runway and what do these numbers mean?
   c. How high is the airport above seal level?
   d. Is there a control and if so, where is it located?
   e. If you wanted to program your GPS receiver to Go To a point in the middle of the airport, what co-ordinates would you use?
Assessment Criteria

On the completion of this lesson, the student should be:

1. More proficient in the use of Arcview.
2. Able to trace the development of transportation modes in the region.
3. Capable of explaining why specific transportation routes were sited in certain locations or using unique routes.
4. Able to explain the influence of differing transportation modes on the growth of specific cities.

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