A Railroads Lesson Plan

The Time Machine
by Gwen Whiting

Summary:
In this lesson plan, students will examine how factors like time and distance played into successful railroad planning. They will examine the problem of time and how inexact measuring could lead to problems, sometime fatal, with the running of the railroad.

November 18, 1883 was the “Day of Two Noons”, a day on which many influential railroads resolved fifty-six different American time standards into just four standard time zones. This was done so that trains could follow a set schedule, thus avoiding accidents and arriving at stations at a set time. This curricula examines the importance of this innovation and the impact of time and the creation of time zones (or standards) on people in the West.

Essential Academic Learning Requirements (EALRs):
This lesson plan satisfies the following EALRs: History 2.1.1, 2.2.1, and Social Studies skills 3.1.2d. Click here to print out the material for your reference.

CBA Scoring Rubric and Notes:
The Office of State Public Instruction has created a scoring rubric for the What’s the Big Idea? Classroom-Based Assessment. Click here to download and print this rubric for your information.

Essential Questions for Students:
- Why were time zones created?
- What were the potential consequences of not measuring accurate time?
- What role did the coming of the railroad play in the invention of time standards?
Essential Understandings:

- Ideas and technology have enormous impact on the values, beliefs, and/or attitudes of people.
- Time standards were created as a response to the railroad’s need to measure exact time. Inaccurate measurements and poor planning had a significant impact not only on the public perception of the railroad but also on the lives of passengers and crew.
- The railroad had a significant impact not only on our concept of time, but on how goods and people reached the West.

Primary Sources for Student Understanding:
2. Pacific Coast official railway and steamship guide, 1893
3. Chicago and Atlantic Railway timetable, 1886
4. Map of U.S. Time Zones

Secondary Sources for Student Understanding:
1. Keeping Time

Materials Needed (for optional Water Clock activity):
1. Paper cup
2. Glass or clear plastic container
3. Thumtack
4. Masking tape
5. Markers
6. Water
7. Wristwatch or classroom clock for time adjustment

Instructions for Teachers:
SESSION ONE
Part I.
Prepare yourself by reading through the materials provided for this lesson plan. You may wish to use this lesson plan as part of a larger unit on westward expansion or in connection with science or mathematics activities.

Part II.
Give students an overview of the task ahead of them. Explain to them that they will be looking at how transportation and time changes resulted in differences in the ways that people lived and thought about their lives. In order to complete their final project, students will need to gather facts and analyze situations to decide what will result in the best choices for the activity that they will design.

SESSION TWO (OPTIONAL)
One of the concepts for students to understand is the idea that time was not measured universally prior to the creation of time standards. The activity below provides a way to introduce this idea to students through practical application, allowing them to experience variations in time measurement with a “hands-on” activity.

With your students, you will be making an early time measurement device. This device, known as a water clock, was used to measure time through the regulated movement of
water. This is only one of the many ways that time was measured prior to the advent of the mechanical clock. Water clocks continued to be used after the creation of the mechanical clock.

To engage in this activity, please assemble the following materials for use with your students: one paper cup, glass jar or clear plastic container to collect water, a thumbtack, masking tape, markers, water and a timing device. (A wristwatch or classroom clock will work.)

Perform the following:

- Use the thumbtack to poke a small hole in the bottom of the paper cup. This hole should be in the center of the cup.
- Over a sink or covered surface (this will be messy!), put water in the paper cup.
- Enlarge the size of the hole as needed so that the water drips from the cup at an even rate. You may ask students to time the falling of the water, either with a watch or by counting at an even pace.
- Place the cup on top of the glass jar or container. Make sure that the neck of the jar is narrow enough to keep the cup from falling in. (If you have difficulty finding a jar to fit this purpose, consider washing out a 2-liter soda bottle for use in this activity.)
- Have one student measure out a strip of masking tape.
- Place the tape so that it lines up vertically with the neck of the bottle. Explain to students that they will be measuring how much of the container is filled with water. Time one minute and have a student mark the tape. After this point, use a watch or timer to mark the clock at specific intervals of your choosing (5 minutes, 30 minutes, 1 hour).
- After students have marked and observed the clock in motion, begin the discussion.

Points for Discussion:

- What did you observe about this clock? How is it different from other clocks that you have used?
- How did we "set" this clock?
- Do you think that if we built 2 different clocks in this classroom at the same time, that they would keep the same time? Why or why not?
- Do you think that if we built a water clock here in Washington that it would keep the same time as someone building a water clock at the same time in New York? (Stress to students the variations that can occur when relying on measurements created by different sets of hands. Point out the hole in the cup, for instance, and ask how widening or narrowing it might affect someone's perception of time.)

SESSION THREE

As a class, discuss what might happen if everyone in the room had their watches set to different times. Brainstorm a list of consequences— you might ask, for instance, what kind of effect that might have on planning a birthday party or to getting to school on time.

After students have had a chance to consider this idea, provide them with the What’s the Big Idea? graphic organizer and the Timeline worksheet. Explain to them that they will be using this to keep track of their own ideas as they read.
Project the following map on your classroom wall or provide a copy for students to examine.

Map of U.S. time zones

Ask students to look at the five time zones in continental North America. You may wish to point to them and read the names aloud to the students: Eastern, Central, Mountain, Pacific, and Atlantic.

Discuss the following:
- Where are the different time zones located? Are they right next to each other?
- Can you think of any reason that time zones would have been placed where they are? Who placed them there, anyhow?
- Where do you think the names of these time zones came from?

Reveal to students that they will be finding the answers to these questions in their next assignment. In class or as homework, ask students to read the following essay and do the accompanying worksheet:

Keeping Time  Keeping Time Worksheet

Remind them to use their graphic organizer and timeline throughout the activity to keep track of how these changes affected people. You may wish to explain to students that they will be putting this into practice the next day.

SESSİON FOUR
Bring the class together and discuss some of their discoveries about time zones. Repeat some of the questions asked in session three and introduce the following discussion points:
- What was the "Day of Two Noons"? Why was it important?
- How did things change when time standards introduced?
- What is a timetable? Have you seen one before? How is it used?

Pass out copies of the railroad timetable packet. Ask them to look through the different examples of timetables and consider what each company is trying to promote in its description of service. After they have had a chance to examine the different primary sources, suggest that they note the page with a train schedule. What things do they notice about it?

As homework, assign the timetable worksheet. Remind them to keep their graphic organizers handy in case they find any useful pieces of information for their final paper.

Railroad Timetables  Timetable worksheet

SESSİON FİVE

Prior to 1883, high noon varied from place to place as the earth revolved around the sun. Once noon could be established by observing the sun at its apex in the sky, the other twenty-three hours of local time could be set. As noon varied, so did local time.
Bring the class together and explain to them that they will be using the materials they have gathered to write a one-page essay about their discoveries on time. As support for their essay, remind them to use their worksheets in gathering information. Take a few moments to review and reflect some of the facts that they have learned, focusing on how they think the creation of time standards affected both people in Washington and across the United States.

Tell students that they will need to use their graphic organizer as a starting point, explaining how this outline will help them guide the paper that they are to write.

You may wish to work with a librarian to schedule a research session for the class and use the CBA as an opportunity to strengthen and enrich your students’ skills in using sources. Research strategies can also be utilized to assist students in this process, such as the “Incredible Shrinking Notes” exercise at http://www.education-world.com/a_lesson/03/jp322-02.shtml.

**POSSIBLE EXTENSION ACTIVITIES**

- Take the concept of how time changed history and build upon it to look at other periods in our history. The Lewis and Clark expedition can be used as one example of how long journeys were, prior to the invention of technology. This lesson plan can be used to bridge a lesson about Lewis and Clark with more modern topics in Washington state.

- Have students build other types of clocks and make comparisons between them. Two possible options would be a sand clock (or hourglass) or a sundial. Examinations of how the different clocks worked and their use by different peoples could be incorporated into a science curriculum or used to talk about time in a cross-cultural context for social studies. One internet resource for the evolution of time measurement through the ages is the NIST Physics Laboratory’s “A Walk through Time” online exhibit, located at: http://physics.nist.gov/GenInt/Time/time.html.

- Use a History Lab field trip at the Washington State History Museum to fully build on the concept of time and the “Tools of the History Trade”. Visit the History Lab website to fully explore possible student activities that engage them with this topic.
What’s a timetable?

A timetable is a printed brochure, book, or card with tables inside. These tables tell travelers the schedule times of arrival and departure at stations along one or more railroad routes. Below are two covers from different timetables. These timetables are from the late 1800s. When you look at the covers, notice the different pictures on each one. Why do you think those pictures were used? Read the caption underneath each picture to find out more about it.

December 1891
Koch and Oakley’s Railway and Navigation Guide

This timetable had information on both railroad and steamship travel. It also included a shippers’ guide.

August 1893
Pacific Coast Official Railway & Steamship Guide

All forms of transportation were included in this timetable. Railroad, steamship, and stagecoach schedules were all listed.

All pictures from the Washington State Historical Society Collections.
This inside page from the Railway and Navigation Guide shows arrival and departure times for trains on the Montana Central Railway and the Seattle and Montana Railway.
KEEPING TIME

How Wellington, Washington was the site of one of the worst train disasters in U.S. railroad history. On March 1, 1910, two Great Northern trains were swept off the tracks by an avalanche killing 96 people. Before the coming of railroad, travel often stopped when weather became poor. The railroad used men and equipment to fight the snow. Sometimes, these efforts were more successful than others.

Do you wear a watch? Do you look at a clock? Almost all Americans wear watches or use some sort of timepiece. Our lives are built around keeping schedules for school, work, and play. As people cross the country, time changes and they must change their watches to local time.

It wasn’t always like this. Time hasn’t always been measured in minutes or hours. In the days of covered wagon travel, time was kept by noting where the sun was located in the sky. High noon varied from place to place as the earth revolved around the sun.

Determining time based on the sun’s position had worked well for hundreds of years. Nothing more was needed when people traveled no faster than a team of horses could run or a fast ship could sail. But when railroads came to the West, it changed the face of time.

How do you tell time?

Because of technology, it became important to know exactly what time it was, down to the minute. This was because two trains might be traveling on the same set of tracks going in different directions. Most of the trains in the United States ran on what was called a single-track line. If both trains were moving towards one another at the same time, it could result in a heads-on collision. This was the sort of accident that every railroad worker feared most.

What is that?

You’re looking at a sundial. A sundial is a device that uses the sun to tell the time. It is made of a plate with numbers and a pointer that casts a shadow. It shows the time of day by the movement of the shadow across the numbers.

Does a minute matter?

Was a men used and equipment to fight the snow. Sometimes, these efforts were more successful than others.
Have you ever been late somewhere? How did it make you feel? Imagine if being late could make you get stuck somewhere far away from home. Many travelers were afraid of that happening to them. This was because there were 56 time zones in the United States. So many different time zones caused confusion. This often caused people to miss their trains or barely make it to the station in time to catch them.

Railroad managers wanted only to schedule trains so that passengers could travel safely. The only way to do this was to find a way to solve the problem of time. Together, without any help from the government, American railroad managers decided to introduce time zones.

November 18, 1883 became known as “The Day of Two Noons”. On this day, every clock at each railroad station was reset as noon was reached within each time zone. Some states, like Mississippi, asked the people who lived there to set their watches and clocks at home to match their local station.

Instead of 56 time zones, this helped create just five zones- Pacific, Mountain, Central, Eastern, and Atlantic. These time zones took their names from the railroads that crossed those parts of the country.

Not everyone was happy with the change. Some people thought that railroads were trying to take control of all parts of life. One newspaper, the Indianapolis Daily Sentinel, said:

“Railroad time is to be the time of the future. The sun is no longer to boss the job. People-55,000,000 of people- must eat, sleep and work as well as travel by railroad time.” There were people who refused to change their clocks and watches. In time, however, this would change as Americans learned how useful the new time standards were.

FIND OUT MORE!


by David Jepsen, adapted for student use by Gwen Perkins, Washington State History Museum, 2007
The Time Machine Timeline organizer

Use the timeline below to keep track of important dates in the history of railroads.

1862 The Pacific Railroad Act is passed.
To answer these questions, look at the map above.

1. What time zone is Seattle, Washington in? _________________________________________

2. According to the clock on the map, what time is it in Seattle? _________________________

3. What time zone is New York, New York in? _________________________________________

4. According to the clock on the map, what time is it in New York? _______________________

5. Name two of the other time zones you see on this map. _______________________________

Now, use your imagination and pretend that you live in the early 1800s. Imagine that time zones have not been invented yet. Think about the things that you learned from your reading.

6. How do you tell time? __________________________________________________________________

7. What problems do you have without any time zones? _________________________________

_________________________________________________________________________________

8. Who found the solution to these problems? What was it? ______________________________

_________________________________________________________________________________
1. What railway line is this timetable for?  


2. List three cities that the Seattle and Montana Railway line stopped at.  


3. Looking at the Seattle and Montana Railway, how many miles was it from Meadow Point to Ballard?  


4. How many stations does the Barker Branch have?  


5. If you lived in Montana City and you wanted to go to St. Paul, what train would you catch?  


6. Why do you think a passenger would need a timetable like this?  


7. Why do you think a railroad worker would need a timetable like this?