

Synchronization of Traffic Lights

Students evaluate the effectiveness of various traffic-light synchronizations. For grades 6-8; DOK-4.

INTRODUCTION

Culminating Activity:

You are a transportation engineer for your hometown. To relieve traffic congestion during rush hour, the City is considering an alternative method to coordinate traffic lights. You will research the impact of different systems of traffic lights (for example, traditional timing, synchronized timing, and adaptive timing) on traffic flow and give a 10-minute PowerPoint presentation on the subject to your supervisors.

Objectives (Students Will Be Able To...)

- Students will evaluate the impact of three different types of traffic light coordination systems on traffic flow.
- Students will analyze the transportation engineering career field.
- Students will develop a PowerPoint for a persuasive presentation.

ACTIVITIES

Vocabulary Development

Lecture

Activity

Using rehearsal and elaboration cognitive strategies* (including SDAIE techniques**), the instructor develops vocabulary for the following terms:

- *Adaptive, synchronize* (and its variants), *coordinate* (and its variants)

Checking for Understanding & Engagement

- Write the following words in sentences: *adaptive, synchronization, coordinate*
- Let's all say *synchronize* out loud.

- Which of the words we learned today do you think will be the toughest to remember? Why?

* See pp. 105–06 of *The Art and Science of Lesson Design*.

** Specially Designed Academic Instruction in English. See Wikipedia entry.

Technical Vocabulary

Lecture

Activity

Using rehearsal and elaboration cognitive strategies, the instructor teaches students the definitions of a *traffic light coordination system*.

Using elaboration cognitive strategies, the instructor teaches students the definitions of an *adaptive traffic light coordination system* and *synchronized traffic light coordination system*.

Checking for Understanding & Engagement

- In your own words, describe what is meant by: a *traffic light coordination system*, an *adaptive traffic light coordination system*, & a *synchronized traffic light coordination system*.
- What is the difference between an *adaptive traffic light coordination system* and a *synchronized traffic light coordination system*?
- If you were designing a traffic light coordination system, what factors would you consider?
- Is there a traffic light near where you live that seems to take a long time to turn green?
- Do you think the timing of traffic lights in your hometown can be improved? If so, why?
- Have you ever had to wait for a green light, yet there was no cross-traffic?

Resources and Materials

- Traffic Light Control and Coordination

Research

Research/Annotate

Activity: Why Syncing Stop Lights May Not Solve Traffic Woes

Using a think-aloud,* the instructor teaches students how to find research articles using a Google and Google Scholar search. Then, the instructor releases students to find at least three relevant articles on

the issue of which traffic light system coordination is best.

Issues to analyze include the following:

- How inappropriately timed traffic lights can contribute to traffic congestion.
- The drawbacks and benefits of adaptive and synchronized traffic light coordination systems.

Student curations may vary. For those students who struggle, the following articles will prove insightful for this lesson.

- “Why Syncing Stop Lights May Not Solve Traffic Woes”
- “Traffic Signal Synchronization”
- “Traffic Lights: There’s a Better Way”
- “Do Synchronized Traffic Lights Really Solve Congestion Woes?”
- “Adaptive Traffic Lights Could Achieve ‘The Green Wave’”

For each article, students identify the main point, the conclusion, and three major points of contention.

Checking for Understanding & Engagement

- For each of the articles you found, describe the main point, conclusion, & at least three major claims that the author makes.
- From the articles, identify at least three factors that would influence the decision which traffic coordination system to choose.
- In your own words, describe how inappropriately timed traffic lights can contribute to traffic congestion
- Which article did you find the most interesting? Why?
- Was there anything stated in any of the articles you found surprising?
- How would you rank your articles in terms of importance to your objective? Why?

* See p. 108 of *The Art and Science of Lesson Design*.

Community Involvement (Optional)

Research/Annotate

Activity

If feasible, students can contact their local city hall (or one of a neighboring community) and inquire as to how traffic lights are currently synchronized. (This is an opportunity to Skype with a local administrator or invite them as a guest speaker.)

Checking for Understanding & Engagement

- How are traffic lights in your city synchronized?
- What did you find most interesting about your discussion with the city/traffic official?

Graphic Organizer Completion

Guided Practice

Activity

Students choose the traffic light coordination system they think is best and fill out a graphic organizer they will use to structure their PowerPoint, such as the graphic organizer found on the Perry & Hazel blog page.

Checking for Understanding & Engagement

- Instructor examines the contents of each graphic organizer for completeness and reasonableness.
- Is there any part of the graphic organizer that you wish you had more time to strengthen? What would you do?

Career Exploration

Independent Practice

Activity

The teacher asks students to explore the transportation engineering career field using online searches. Then, students identify such features as the average salary and roles/responsibilities. They are then asked to research online those traits that make for effective engineers. Finally, they self-evaluate their own traits to determine which areas align the most and least to the transportation engineering field.

Checking for Understanding & Engagement

- State three facts about the transportation engineering field.
- Who hires transportation engineers?
- How much do transportation engineers in your region make each year?
- Does a transportation engineering field interest you?
- What is the one thing you would like/dislike about being a transportation engineer?
- Do you think city planners will be increasingly needed as cities grow?

PowerPoint Development

Group Work

Activity

Find and download suitable images online to spruce up your PowerPoint.

Using these images and the contents of your graphic organizer, create a PowerPoint, with each section of the graphic organizer devoted to an individual presentation slide.

Note: Students unfamiliar with PowerPoint should be paired with more experienced students.

Checking for Understanding & Engagement

- Instructor examines PowerPoint slides to ensure (1) the content matches that of their graphic organizer and (2) the text is short and concise.
- How do the images affect your presentation?
- How did you select the typeface for each portion of the PowerPoint slide?

SUMMATIVE ASSESSMENT

Assessment Type: Observations

Each student group will present their PowerPoint slides. The instructor will gauge the quality of PowerPoint presentation using their own rubric. Emphasis should be placed on content, especially the student's ability to explain and elaborate each bullet point found in the presentation.

NOTE: The approach used to develop this lesson plan derives from *The Art and Science of Lesson Design* by Walkup and Squire (Rowman Littlefield). This lesson spans beyond one class period. Throughout the lesson, students will complete a Metacog Log (p. 112, Walkup & Squire) to assess their own understanding and confidence.

* See p. xxi of *The Art and Science of Lesson Design*.

Lesson Times

Vocabulary Frontloading: 10 minutes

Research: 15 minutes

Graphic Organizer Completion: 20 minutes

Career Exploration: 10 minutes

PowerPoint Development: 20 minutes

Presentations: 20 minutes

Industries / Subjects / Grades

Industries / Pathways

- Transportation

K-12 Subjects

- English-Language Arts
- Technology Education

Grade Levels

- 6, 7, 8

Standards and Objectives

Standards

California English Common Core Standards

- **SL.K.5** Add drawings or other visual displays to descriptions as desired to provide additional detail.
- **SL.K.6** Speak audibly and express thoughts, feelings, and ideas clearly.
- **SL.1.5** Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

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First Authored: January 05, 2020

Last Revised: January 12, 2020