

Methods II

Lesson Plan for High School Computer Science Class

Name: Harrison Fung

Unit Plan: Data Abstraction

Grade and Content: Grade 12 Computer Science

Class Context: 25 students with 3 who are English Language Learners (moderate level), 3 Students who have Learning Disabilities (ADHD) 1 Student who has Attention Difficulties, 4 Students who are immigrants (China), 2 Students who are labeled as “gifted”. A smart board and overhead are available.

Aim/Goals: The goal of the unit is defining higher-order functions and using the filter/map/reduce higher-order functions. Essentially, higher-order functions are functions that taken in a function as a parameter also return another function. This other function does some work on the original input/array. For example, the filter function is useful for abstracting a specific result from an input/array. So, if a shopping list has a certain number of items and the code requires one of the items from the list, we can use the filter function, which will in turn use another function to return the said item. The rationale is that higher-order functions ultimately allow us to use less code, because they have built-in processes that do the work for us. This lesson is fitting for the class as students will learn about a more complex function, which is the next step in learning to code more difficult and larger projects. The mini unit will start with an infographic and then go into an activity. Students with IEPs will be assigned a group with other students. Students who are gifted will lead the groups that they are a part of, some groups might not have a gifted student. Those who are deemed weaker will be partnered with the gifted students.

The standard from the New York City Common Standards for Computer Science, that are important for this mini unit are:

9-12.CT.5 Modify a function or procedure in a program to perform its computation in a different way over the same inputs, while preserving the result of the overall program. *The focus is on understanding that the same abstract concept can be performed in different ways in a program, as long as the same inputs yield the same results*

Essential Questions:

- What is a function?
- What is a callback function?

- Can you define what is a higher-order function?
- What do you use a higher-order function for?
- What is a pure function?
- The higher-order function _____ is used to select a specific item from an array.
- The higher-order function _____ is used to perform a certain function on an array and it returns a different array.
- The higher-order function _____ is used to perform a certain function on an array and it returns a single value.

Instructional Resources:

Before class starts, students are expected to know what functions are and what are callback functions. Functions are simply chunks of code that can be used later when they are “called”. A callback function is a function that is passed into another function as an argument, which is then invoked inside the outer function to complete kind of routine or action. We will go over the infographic after the students answer, “What is a function?” and “What is a callback function?”. The infographic will go through the definition of higher-order functions, as well as the uses of filter, map and reduce. After the infographic, students will be broken up into groups and do an activity. Since the students will be at different levels, some of them might be asked to do the activity on filter and map, while others will be asked to do the activity on reduce.

Infographic: attached

PowerPoint: attached

Assessments: There will be two assessments that take place during the lesson. Some students will take on the activity that includes filter and map, while others will focus on filter, map, and reduce. This is readiness differentiation seeing that there will be students who have different levels of overall English, which might make them require more time to complete the exercise. Also, a homework assignment will be given to the students.

Sequence of Integrated Lesson Plan:

Teachers: Harrison Fung

Unit Plan: Data Abstraction

Grade and Content: Grade 10 Computer Science

Date: -

Overall Goal/Objective of Lesson: The goal of the unit is defining higher-order functions and using the filter/map/reduce higher-order functions.

<p>Content Objectives:</p> <ol style="list-style-type: none"> 1. Students will understand what a higher-order function is. 2. Students will understand what a pure function is. 3. Students will understand the filter function. 4. Students will understand the map function. 5. Students will understand the reduce function. 	<p>Formative Assessment:</p> <p>Students are given an infographic. After going over the infographic, students will have to complete an assignment on filter, map and reduce.</p>
<p>Skill Objectives:</p> <p>Students will: Use filter, map and reduce.</p> <p>9-12.CT.5 Modify a function or procedure in a program to perform its computation in a different way over the same inputs, while preserving the result of the overall program.</p>	<p>Formative Assessment:</p> <p>Students will be presented a PowerPoint presentation and will answer the questions for the filter, map and reduce functions.</p>