

IT and Me Works

Lesson Plan for Programming Strand

Topic: Program Development

Teacher: Karen Olmstead
Cheryl Allen

Subject: IT & Me Works

Grade: 9th

Time: 8-20 hours (based on length of course)

Objectives: At the end of this lesson students will:

- Identify critical terminology used to write programs.
- Explore how a sequence of game moves can be expressed in simple statements.
- Expand their understanding of the construction of if-then logic sequences
- Debug their code by testing it

Standards:

- Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content.
- Students will use mathematical reasoning.
- Students will use oral and written communication, mathematical representation, and physical and conceptual models to describe and explain scientific concepts and ideas, and will be able to apply scientific knowledge.

Setting: Classroom or computer lab (depending upon whether students will use pseudocode or a programming language for the application.)

Materials: None

Note –This activity can be used in introductory programming using any programming language.

Teacher’s Role: Upon entering class, students should be directed to select a partner and to perform the following:

- Play a game of tic-tac-toe.
- Explain that the “X” and “O” are the constants, the position of the letters on the board are the variables.
- Think about and write the answers to the following questions:
 - What are the rules of tic-tac-toe?
 - What decisions does a player need to make before taking a turn?
 - How would you verbally describe each of those decisions?
 - What is the sequence or order of each decision? Should there be an order?
- Have the students share some of their responses with the class.
- What kinds of statements are used to describe the rules and moves of the game?
- Discuss If-Then statements and how they are used in this context. The concepts of decision-making, looping, and flowcharting can be included in this area.
 - Ask some students to share some “if-then” statements about everyday situations and write a few on the board.
 - How do the terms “if” and “then” govern a logical sequence?

- What makes an “if-then” statement true for tic-tac-toe? (the rules of the game)
 - To show how an if-then statement can be applied to tic-tac-toe, demonstrate the opening move for a game of tic-tac-toe on the board. Draw a nine-space grid and label the squares one through nine. Then ask the students where to place the first X. Depending on where it is placed, have students create an if-then statement that determines the next move. This is the first command in an application for the robot. What would be the next line of code?
- Have the students work in pairs to complete the application (or pseudocode) to direct robots to play tic-tac-toe. Refer to flowchart to develop program flow.
 - Begin by looking at the rules of the game.
 - What goals does each player have?
 - Who starts the game?
 - Is there a “best place” to put the first X? (variable)
 - What are some winning strategies for the next move? (For example, if the X is in the center, then where should I put an O?)
- Have students follow the lines of pseudocode to play a game of tic-tac-toe following only the commands they have written.
- Students should review and revise their pseudocode, looking for areas that may be weak. Students should be preparing their pseudocode for the Final Tournament.
- Students then play against each other in a Tic-Tac-Toe Tournament. Each “team” will be acting as a single robot programmed by the application: one student will read a command from their application, and the other student will execute the command. Each game should be observed by the rest of the class and monitored to ensure the teams only execute the commands as read.
- To demonstrate the concept of User Documentation, the winning team should be prepared to verbally explain how their program was developed and be prepared to answer questions from the class.

Evaluation/Assessment:

Students will be evaluated on initial reflections on the rules and strategies of tic-tac-toe, participation in class discussions, participation in pairs writing and debugging an application for their “robot” and participation in the tournament.

School to Career Connection:

Employability:

Adapted from “The Games Robots Play” at

<http://www.nytimes.com/learning/teachers/lessons/20010802thursday.print.html>.