GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

BUSINESS & COMPUTER SCIENCE

PATHWAY: Computing

COURSE: Computing in the Modern World

UNIT: 6-Programming and Problem Solving

INTRODUCTION

Annotation:

This unit attempts to introduce problem-solving, algorithm development, and programming concepts (including object-oriented programming concepts) for Computing in the Modern World. Methods used will include lecture, demonstration, individual work, group work, and project-based learning. Students will use many different pieces of technology, including productivity software, programming tools, the Internet, audio and video files, and modeling tools.

Grade(s):

X	9th
X	10th
X	11th
X	12th

Time: 8-10 weeks

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Additional Author(s):

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.

FOCUS STANDARDS

GPS Focus Standards:

BCS-CMW-16 Students will discuss examples that identify the broad interdisciplinary utility of computers and algorithmic problem solving in the modern world.
a. List the different ways computers are used.
b. Define algorithm.
c. Identify examples of algorithmic problem solving in everyday life.

BCS-CMW-17 Students will apply strategies to solve various problems.
a. Solve a variety of logic problems and identify the strategies used.
b. List strategies for solving problems.

BCS-CMW-18 Students will apply algorithmic thinking to solve problems.
a. Evaluate algorithmic definitions for various problems and identify errors and or weaknesses.
b. Correct algorithmic definitions for various problems.
c. Complete, evaluate, and adjust an algorithm for a problem.

BCS-CMW-19 Students will demonstrate an understanding of the basic steps in algorithmic problem solving.
a. Formulate a formal problem statement.
b. Explore the problem using strategies.
c. Communicate the design of an algorithm.
d. Code, test, and verify a solution.

GPS Academic Standards:

ELA10W1 The student produces writing that establishes an appropriate organizational structure, sets a context and engages the reader, maintains a coherent focus throughout, and signals closure.

ELA10W2 The student demonstrates competence in a variety of genres.

ELA10LSV1 The student participates in student-to-teacher, student-to-student, and group verbal interactions.

SCSh3 Students will identify and investigate problems scientifically.

ELA10RL5 The student understands and acquires new vocabulary and uses it correctly in reading and writing.

ELA10RC3 The student acquires new vocabulary in each content area and uses it correctly.

National Standards:

UNDERSTANDINGS & GOALS

Enduring Understandings:

- Students will be able to discuss the importance of problem solving and logical thinking in Computer Science. Not only will students have an opportunity to analyze algorithms, but they will also have the opportunity to develop their own algorithms to solve problems. Students will also be able to solve problems using different strategies. Once algorithmic problem solving has been introduced, students will apply those skills to solve problems using various Computer Programming tools, including Alice, Jeroo, and Java. Students will be introduced to object-oriented programming concepts. Finally, students will use programming concepts to develop original movies/interactive games.

Essential Questions:

- What is an algorithm?
- How is problem solving used in computing?
- How can algorithms be evaluated?
- How can algorithms be adjusted?
- What is a problem statement?
- How is a flowchart used to solve problems?
- What is psuedocode and how is it used to develop solutions?

Knowledge from this Unit:

- Students will be able to communicate the design of an algorithm in both verbal and written form.
- Students will demonstrate the ability to use object-oriented programming concepts to create programs.
- Students will use procedures to solve problems (including procedures with parameters).
- Students will use basic programming constructs, including conditional statements, iteration, and variables to solve problems.
- Students will debug and test programs.

Skills from this Unit:

ASSESSMENT(S)

Assessment Method Type: Select one or more of the following. Please consider the type(s) of differentiated instruction you will be using in the classroom.

_____ Pre-test
_____ Objective assessment - multiple-choice, true- false, etc.
__ Quizzes/Tests
__ Unit test
_____ Group project
X Individual project
_____ Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
__ Self-check rubrics
__ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
_____ Subjective assessment/Informal observations
__ Essay tests
__ Observe students working with partners
__ Observe students role playing
_____ Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
__ Peer editing and/or critiquing
_____ Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
__ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
_____ Constructed Responses
__ Chart good reading/writing/listening/speaking habits
__ Application of skills to real-life situations/scenarios
_____ Post-test

Assessment(s) Title:

Assessment(s) Description/Directions:

Students will be assessed on their ability to express solutions algorithmically and use programming concepts to create a completed programming. The attached files are to be used as practice problems for students.

Attachments for Assessment(s): **Jeroo beginning assignments.**

Web Resource Title:

Alice website (free download)

Jeroo website (free download)

Web Resources:

http://www.alice.org/

http://www.cc.gatech.edu/~dorn/JerooWeb/

Web Resources Description:

Alice can be downloaded from the following website. The website includes links for PowerPoint files and possible textbooks to be used with Alice. Jeroo is a programming tool that can be downloaded. Jeroo can be downloaded from the second website listed below.

LEARNING EXPERIENCES

Instructional planning: Include lessons, activities and other learning experiences in this section with a brief description of the activities to ensure student acquisition of the knowledge and skills addressed in the standards. Complete the sequence of instruction for each lesson/task in the unit.

Sequence of Instruction

1. **Identify the Standards. Standards should be posted in the classroom for each lesson.**
2. **Review Essential Questions.**
   - What is an algorithm?
   - How is problem solving used in computing?
   - How can algorithms be evaluated?
   - How can algorithms be adjusted?
   - What is a problem statement?
   - How is a flowchart used to solve problems?
   - What is psuedocode and how is it used to develop solutions?
3. **Identify and review the unit vocabulary.**
4. **Assessment Activity.**

Sequence of Instruction and Learning:

(Based on a 50 minute period)

Days 1-5 (Problem-solving, algorithm development)

Days 6-20 (Alice assignments) --either teacher developed or from textbook

Days 21-25 (Alice project and presentations)

Days 26-33 (Jeroo assignments)

Days 34-40 (Jeroo project and presentations)

Student Checklist: This is an abbreviated student checklist for this unit. Specifically, this attachment includes a daily checklist for students to use as they practice programming.

Computer Programming Unit Student Guide

Student Checklist: Track your progress by using the list to make sure you complete the following items in the programming unit.

Pre-programming

- ☐ Complete directions for peanut butter and jelly sandwiches (Day 1)
- ☐ Conversion of directions into psuedocode and a flowchart (Day 2)

Part 1: Alice Movies/games:

- ☐ Complete tutorials 1-4 in Alice (Day 3-4)
- ☐ Completion of Island Part 1 and Soldiers movie (Day 5)
- ☐ Completion of Snowman and Island Part 2 movies (Day 6)
- ☐ Completion of Dog to Fire Hydrant movies (Day 7)
- ☐ Completion of Snowman to Stool movie (Day 8)
- ☐ Completion of Beetle Band movie (Day 9)
- ☐ Completion of Evil Ninja movie (Day 10)

Part 2: Alice Project

- ☐ Project proposal and approval (Instructor approval:_____) (Day (11)
- ☐ Sketches for movies/games (Day 11-12)
- ☐ Delivery of project/movies (Day 12-15)

Part 3: Jeroo Introduction Practice

- ☐ Read e-textbook Chapter 1 & Chapter 2 (Day 16)
- ☐ Completion of first Jeroo program (Day 16)
- ☐ *Teacher's choice: Chapter 1 & Chapter 2 definitions (Day 16)*
- ☐ Read e-textbook Chapter 3 (Day 17)
- ☐ Completion of Example 3.1, Assignments 1 & 2 (Day 17)
- ☐ *Teacher's choice: Chapter 3 definitions (Day 17)*
- ☐ Read e-textbook Chapter 4 (Day 18)
- ☐ Completion of Example 4.1 & 4.2 (Day 18)
- ☐ *Teacher's choice Chapter 4 definitions (Day 18)*
- ☐ Completion of Beginning Activities 3 & 4 (Day 19)
- ☐ Completion of Beginning Activities 5 & 6 (Day 20)
- ☐ Read Chapter 5 (Day 21)
- ☐ Completion of Example 5.1 (Day 21)
- ☐ *Teacher's choice Chapter 5 definitions (Day 21)*
- ☐ Read Chapter 6 (Day 22)
- ☐ Completion of Examples on page 52, 53, 54, 56 (Day 22)
- ☐ *Teacher's choice Chapter 6 definitions (Day 22)*

Part 4: Jeroo Project

- ☐ Completion and delivery of Activity 8 (Day 23-25)

Technology Connection/Integration

Technology is used in this unit on a daily basis. Students will use the Internet to research and explore related websites. Programming tools and software will be used to develop programs. Students will work with audio and video files to possibly embed into their programs.

Attachments for Learning Experiences: Please list.

Notes & Reflections:

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title:

This is a final project where students will create a program, movie, or interactive game in Alice from scratch.

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

The attached files are to be used as an end to the unit project where students will produce an original program from start to finish. Students will create a psuedocde (or flowchart), complete storyboard sketches, and then use programming skills to create a completed program.

Attachments for Culminating Performance Task:

Rubric for Performance Task:

Alice Project Guidelines

Below you will find some general guidelines for completing your Alice Design Project. Include the components and you will receive credit for the project. The content for the animation/movie is your choice.

Require Components:

1. Animation/game corresponds with sketches on storyboard cards (5 sketches should be turned in-refer to PPT slide for instructions).
2. Include an event in your animation/game (mouse click, button pushed)
3. Include a functional loop.
4. An If…Then statement is used and includes statements for each condition.
5. A Do…Together or Do In Order statement is used to include multiple events.
6. Import a sound is that plays during the animation/movie.
7. Write a method that is written and called in the animation/movie.
8. Create and use a variable in the animation/movie.
9. Import a Billboard that includes an introduction/instruction for your animation/movie (this is new but accomplished very easily. Go to File→Import Billboard and place an image as an object in your movie).
10. Comment your code and explain what your code is dong. Include proper documentation.

Task	**Does not meet expectations**	**Needs Improvement**	**Exceeds Expectation**	**Student Score**	**Teacher Score**
Animation corresponds w/ sketches	Animation/game does not corresponds with sketches(0)	Most of the animation/ game corresponds with sketches (.5)	Animation corresponds with sketches(1)		
Event is included	No events are included(0)	Event is attempted but is not functional(1)	A working event is included in the animation(2)		
Loop	No loop is used(0)	Loop is used but not functional(1)	Loop is used and is functional(2)		
If…Then Statement	No If…Then Statement is used (0)	If…Then statement is used but not functional(1)	If…Then statement is used and is functional(2)		
Do Together or Do In Order statement is used	No Do Together/In order(0)	Do…Together/In order	Do Together/In order statement is used and functional(2)		
Sound Imported	No sound is imported(0)		Sound is imported or recorded(1)		
Method is written & used	No method is written(0)	Method is written but not used or is not functional(1)	Method is written, used and functional(2)		
Variable is Used	No variable is used(0)	Variable is attempted(.5)	Variable is used at some point in the program(1)		
Billboard Imported	No billboard is imported(0)		Billboard is imported(1)		
Comments	No comments exist(0)	Comments exist but do not clarify code(0.5)	Comments are used and clarify code(1)		
			Total Points (out of 15)		

Alice Sketches

- Create 10 sketches on index cards that will act as storyboard for your animation
  - Each sketch should correspond to an event/scene
- Include the following on the front of each card
  - Sketch number
  - Rough drawing of scene
  - Description of scene
  - Any sound/text that occur in scene
- On the back of each card include the following
  - Objects in scene
  - Events that occur in scene
  - Method calls/variables updated in scene

Title of the Student Work Sample

Alice program. YMCA movie.

UNIT RESOURCES

Web Resources:

Attachment(s):

Materials & Equipment:

Computer

Alice 2.0

Jeroo

Microsoft Word

Flowchart software (PowerPoint or Inspiration)

LCD projector

Paper

Pencil

Poster board (for flowchart development)

What 21st Century Technology was used in this unit:

X	Slide Show Software		Graphing Software	X	Audio File(s)
	Interactive Whiteboard		Calculator		Graphic Organizer
	Student Response System	X	Desktop Publishing	X	Image File(s)
	Web Design Software		Blog		Video
X	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email	X	Website		