GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

BUSINESS & COMPUTER SCIENCE

PATHWAY: Computing

COURSE: Intermediate Programming

UNIT: 3-User Interface Design and Problem Solving

INTRODUCTION

Annotation: Topics in this unit include user interface design principles and working collaboratively with others to develop a solution to a problem. Methods include: lecture, discussion, demonstration, guide practice, and group work. Technology will be used as a productivity tool to present materials and help students collaborate.

Grade(s):

	9th
X	10th
	11th
X	12th

Time: 20 hours (4 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-IP-4 Students will demonstrate knowledge of the important principles in user interface design.

a. List the criteria used to determine the effectiveness of an interface.

b. Apply user interface design criteria to critique common user interfaces (car door handle, steering wheels, light switches, cell phones, and VCRs).

c. Perform a user-centered task analysis. Identify sub-groups of users and their characteristics.

d. List examples of good and bad user interface designs. Discuss the impact of bad user interface designs.

BCS-IP-5 The student will collaboratively develop solutions for specific problems.

a. Collaboratively determine a course of action for problem resolution.

b. Design algorithms for problem resolution.

c. Break a task into subtasks required for problem resolution.

d. Select appropriate tools and technology resources to accomplish a variety of tasks.

e. Collaboratively design, combine, test, analyze, and adjust coding solutions based on problem-solving algorithms.

f. Review and discuss coding solutions for elements of thoroughness and correctness.

GPS Academic Standards:

ELA12W1 The student produces writing that establishes an appropriate organizational structure, sets a context and engages the reader, maintains a coherent focus throughout, and signals a satisfying closure.

ELA12W2 The student demonstrates competence in a variety of genres.

ELA12W3 The student uses research and technology to support writing.

ELA12LSV1 The student participates in student-to-teacher, student-to-student, and group verbal interactions.

SCSh3 Students will identify and investigate problems scientifically.

National Standards:

UNDERSTANDINGS & GOALS

Enduring Understandings:

- At the conclusion of this unit, students should be able to discuss and apply the principles of user interface design. Additionally, students should be able to critique existing user interfaces. Ultimately, students will build a program using proper design techniques and principles. Finally, students will be able to collaboratively to create solutions to problems.

Essential Questions:

- What is an interface? What determines its effectiveness?
- What are user interfaces?
- What are user sub-groups?
- How are algorithms designed to solve problems?
- How are technology and resources selected to solve problems?

Knowledge from this Unit:

- Students will examine interfaces using specific criteria to determine effectiveness.
- Students will compare and contrast various user interfaces (cell phones, remote controls, websites, etc.)
- Students will identify sub-groups of users and identify their characteristics.
- Students will be able to discuss the impact of bad user interface designs.
- Students will design algorithms collaboratively to solve problems.
- Students will choose appropriate technology and resources to create solutions.
- Students will design, test, analyze, debug, and adjust solutions to advanced problems.

Skills from this Unit:

- Students will exhibit proper interpersonal communication skills.

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
_X_ Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
_x_ 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: **Practice GUIs**

Assessment(s) Description/Directions:

Throughout the unit, students should be given an opportunity to create programs that use GUIs. Each program should focus on one part of a GUI. This progression will ultimately lead to putting interface design skills together in the design of a large scale program.

Attachments for Assessment(s):

Web Resource: http://java.sun.com/docs/books/tutorial/uiswing/

Web Resource Title: Sun Microsystems Java Programming Resources

Web Resource Description: A complete summary, along with lessons, of creating GUIs in Java.

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.**

   BCS-IP-4 Students will demonstrate knowledge of the important principles in user interface design.

   BCS-IP-5 The student will collaboratively develop solutions for specific problems.

2. **Review Essential Questions.**
   - What is an interface? What determines its effectiveness?
   - What are user interfaces?
   - What are user sub-groups?
   - How are algorithms designed to solve problems?
   - How are technology and resources selected to solve problems?
3. **Identify and review the unit vocabulary.**
4. **Assessment Activity.**

Sequence of Instruction and Learning:
Week 1: Effective User Interface Design Principles
Week 2: Analyzing Existing User Interface Design Principles
Week 3: User-Centered Task Analysis
Week 4: Identifying Tasks and Sub-tasks, Designing Algorithms
Week 5: Reviewing Tools and Technology Resources
Week 6: Unit Performance Task (Tic-Tac-Toe GUI)

Technology Connection/Integration
Students will use technology as a productivity tool to complete programming assignments. Students will also use technology to communicate with their partner (email or Web 2.0 tools). Teachers will use technology to present content and demonstrate difficult concepts.

Attachments for Learning Experiences: Please list.

Notes & Reflections:

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title: **Tic-Tac-Toe GUI**

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Using existing code, students will create a Tic-Tac-Toe GUI. The teacher will provide students with the existing code. This is a project that will be completed in pairs. Not only will students solve the problem, but they will also learn to work cooperatively. Please see attached specifications sheet and rubric.

Attachments for Culminating Performance Task:

Rubric for Performance Task:

Programming a Tic-Tac-Toe GUI

Directions: Using a Two-Dimensional array program a Graphical User Interface (GUI) Tic-Tac-Toe game in Java. You will use a Tic-Tac-Toe class developed by the Beginning Programming class as a back end for your GUI. Thus, your task is to create a GUI that displays Xs and Os based on the users selection. At the conclusion of the game the winner should be displayed and the user given a option to quit the program or play again.

Grading Checklist

Task	Possible Points	Points Earned
Documentation/Comments	10	
Proper Style/Conventions used	10	
GUI/Interface Design	20	
Program Appropriately Responds to User Events	20	
Program uses Tic-Tac-Toe class as a backend	20	
Program display appropriate winner and allows user to play again	20	
	Total Points	100

UNIT RESOURCES

Web Resources:

Attachment(s):

Materials & Equipment:

Computer

Internet connection

Projector

Interactive White board (optional)

Examples of interfaces (cell phones, remote controls, MP3 players, etc.)

Network storage space

Java Software Development Kit (SDK)

Java Integrated Development Environment (Blue J, Dr. Java, Eclipse, etc.)

What 21st Century Technology was used in this unit:

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