GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

BUSINESS & COMPUTER SCIENCE

PATHWAY: Computing

COURSE: Computing in the Modern World

UNIT: 7-Limits of Computing

INTRODUCTION

Annotation:
The purpose of this unit is to explore the future of Computer Science and explore areas where Computer Science has not been implemented. Students should realize that some problems cannot be solved by computers and understand the limits of computing.

Grade(s):

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

Time: 10 hours (2 weeks)

Author: Jason Naile

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-21 Students will demonstrate an understanding of the limitations of algorithms.
a. Discuss problems for which an algorithm can't be written.
b. Compare and contrast faster and slower ways to solve problems.

BCS-CMW-22 Students will identify limits on computing imposed by the laws of physics.
a. Define miniaturization.
b. Explore alternatives to transistors.

GPS Academic Standards:

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.

ELA10W2 The student demonstrates competence in a variety of genres.

ELA10W3 The student uses research and technology to support writing.

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

National Standards:

UNDERSTANDINGS & GOALS

Enduring Understandings:

- Students should understand that given the current state of Computer Science, there are still areas that computers have not penetrated. Students should also explain why computers are not able to enter those areas. Additionally, students should be able to critically examine an area and explain whether computers will one day be able to be used in that particular area. Finally, students should identify the limits of computing that are due to the laws of physics.

Essential Questions:

- Students will understand there are areas where computers cannot solve problems.
- Students will identify possible alternatives to transistors.
- Students will explain why computing is constrained by the laws of physics.
- Students will list possible alternatives to transistors.

Knowledge from this Unit:

- Students will understand there are areas where computers cannot solve problems.
- Students will identify possible alternatives to transistors.
- Students will explain why computing is constrained by the laws of physics.
- Students will list possible alternatives to transistors.

Skills from this Unit:

- Students will demonstrate the ability to summarize information and present a topic through an oral presentation.

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
_____ Individual project
x 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
x Subjective assessment/Informal observations
__ Essay tests
_x 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:

Throughout the unit, the teacher should conduct informal checks to make sure students are progressing through the development of an oral presentation. Teacher should arrange meetings (one per week) with each student to ensure they were gathering the information needed to present. At the second meeting, the student should produce a rough draft of a handout to be given to their classmates during the presentation.

Attachments for Assessment(s):

Web Resource Description: This article identifies three new areas where Computer Science is making an impact.

Web Resource: http://www.microsoft.com/presspass/press/2008/apr08/04-06CHI2008PR.mspx

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-CMW-21 Students will demonstrate an understanding of the limitations of algorithms.
   a. Discuss problems for which an algorithm can't be written.
   b. Compare and contrast faster and slower ways to solve problems.

   BCS-CMW-22 Students will identify limits on computing imposed by the laws of physics.
   a. Define miniaturization.
   b. Explore alternatives to transistors.

2. **Review Essential Questions.**

   - Students will understand there are areas where computers cannot solve problems.
   - Students will identify possible alternatives to transistors.
   - Students will explain why computing is constrained by the laws of physics.
   - Students will list possible alternatives to transistors.

3. **Identify and review the unit vocabulary.**

4. **Assessment Activity.**

Sequence of Instruction and Learning:

(Based on a 50 minute period)

Week 1:

Day 1 & 2: Introduction and discussion of topic

Day 3: Choose topic for presentation

Day 4 & 5: Research (conduct first student meeting)

Week 2:

Day 6 - 8: Research (conduct second student meeting)

Day 9 & 10: Presentations

Technology Connection/Integration: Technology is used for preparation of handout and for research. Audio and video files can be used in the presentation.

Attachments for Learning Experiences: Please list.

Notes & Reflections:

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title: **Limitations of Computing Presentation**

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:
Option 1: Have students prepare a profile of an emerging piece of technology and describe the implications/effects this technology will have on Computing. Then, have the student prepare a summary and present the findings to the class.

Option 2: Have students prepare a profile of an area where computers are not being used. Then, have them prepare a summary and present the finding to the class.

See attached document for complete details.

Attachments for Culminating Performance Task:

Rubric for Performance Task:

Are Computers Limited?

There are two options for this project. Both options require a one page summary of your findings as well as a 5 minute presentation on a topic that you become the expert through research.

Option 1: Choose a piece of emerging technology and prepare a profile (or handout) of that technology as well as a 5 minute presentation to share with your classmates. In this case your handout will act as your summary. Please clear your topic with the instructor before beginning.

Option 2: Profile a situation, profession, or area where Computers are not present. Then prepare a list of five pieces of technology that could be used in this situation. Make a determination on whether you think Computers will one day be a part of this situation. Support your conclusions though research. Prepare a 1 page summary or handout to be used during your presentation.

Criteria	Possible Points	Total Points Earned
Topic/technology is identified and explained	10	
Resources (at least three) are used in summary/presentation	15	
One page summary/handout	50	
5 minutes presentation	25	
Total Points	100	

Comments:

UNIT RESOURCES

Web Resources:

Attachment(s):

Materials & Equipment:

Computer

Internet connection

Books

Magazines

Newspapers

Storage medium

Presentation software (optional)

Microsoft Word

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	X	Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email	X	Website		