Unit 3 -Scratch Programming Copied from: Introduction to Coding: Computer Programming, Copied on: 02/21/22

Content Area: **Sample Content Area**
Course(s): **Sample Course**
Time Period: **OctNov**
Length: **Sample Length & Grade Level**
Status: **Published**

UNIT 1: Scratch Programming - Block Based Programming

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Introduction to Coding - Grades 9-12

Scratch Programming - Block Based Programming

Belleville Board of Education

102 Passaic Avenue

Belleville, NJ 07109

Prepared by: Teacher, Corey Woodring

Dr. Richard Tomko, Ph.D., M.J., Superintendent of Schools

Ms. LucyAnn Demikoff, Director of Curriculum and Instruction K-12

Ms. Nicole Shanklin, Director of Elementary Education

Mr. Joseph Lepo, Director of Secondary Education

Board Approved:

Unit Overview

Computer Programing with Scratch introduces students to the intellectual, physical dimension, and affective dimensions of computer programing. Students will engage with and explore the Scratch Programming Theater and concentrate on how items are sequenced – by identifying and specifying an ordered series of instructions to produce interactions among characters, costumes, backdrops, scripts, and a stage.

The CSE 1 Unit 1 Motion in Scratch unit is a highly interactive and collaborative introduction to fundamental computer science concepts around events and sequencing, as framed within the broader context of motion in Scratch. Through a series of real world scenarios, projects and challenges, students are introduced to foundational concepts that they will return to repeatedly throughout the unit and course. Students learn how they can use Scratch programming to instruct computers to trigger instructions to make things happen within their programs. The unit concludes with students developing a program that incorporates the concepts covered the unit of their choosing.

Enduring Understanding

The way a **computer** represents data internally is different from the way the data is interpreted and displayed for the user. **Programs** are used to translate data into a representation more easily understood by people.

Essential Questions

What is the underlying logic of computer programing?
● How can events help us tell computers what we want them to do? ● How do we tell a computer to make a sprite or object move in Scratch?

Exit Skills

Scratch is a basic coding language that uses a ‘building block’ style coding to create animated stories, interactive games, simulations, and beautiful artwork. In using Scratch, learners will be introduced to basic coding concepts and develop their computational thinking skills while bringing their own ideas to life.

Scratch makes it easy for learners who are just starting out by organizing the types of code you can use into categories. The code blocks are grouped by the following categories: **Motion, Looks, Sound, Events, Controls, Sensing, Operators, Variables** and **My Blocks**. These code blocks can be pieced together in the **Code Area** like placing jigsaw puzzle pieces together. Both the **Code Area** and the **Stage** are visible at the same time which allows learners to run code, test, debug and view their creations.

New Jersey Student Learning Standards (NJSLS-S)

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not needed or used.

Please list only the content-level and cross-curricular **New Jersey Student Learning Standards** applicable to the unit. **Do not list standards that are not used in the unit.**

Interdisciplinary Connections

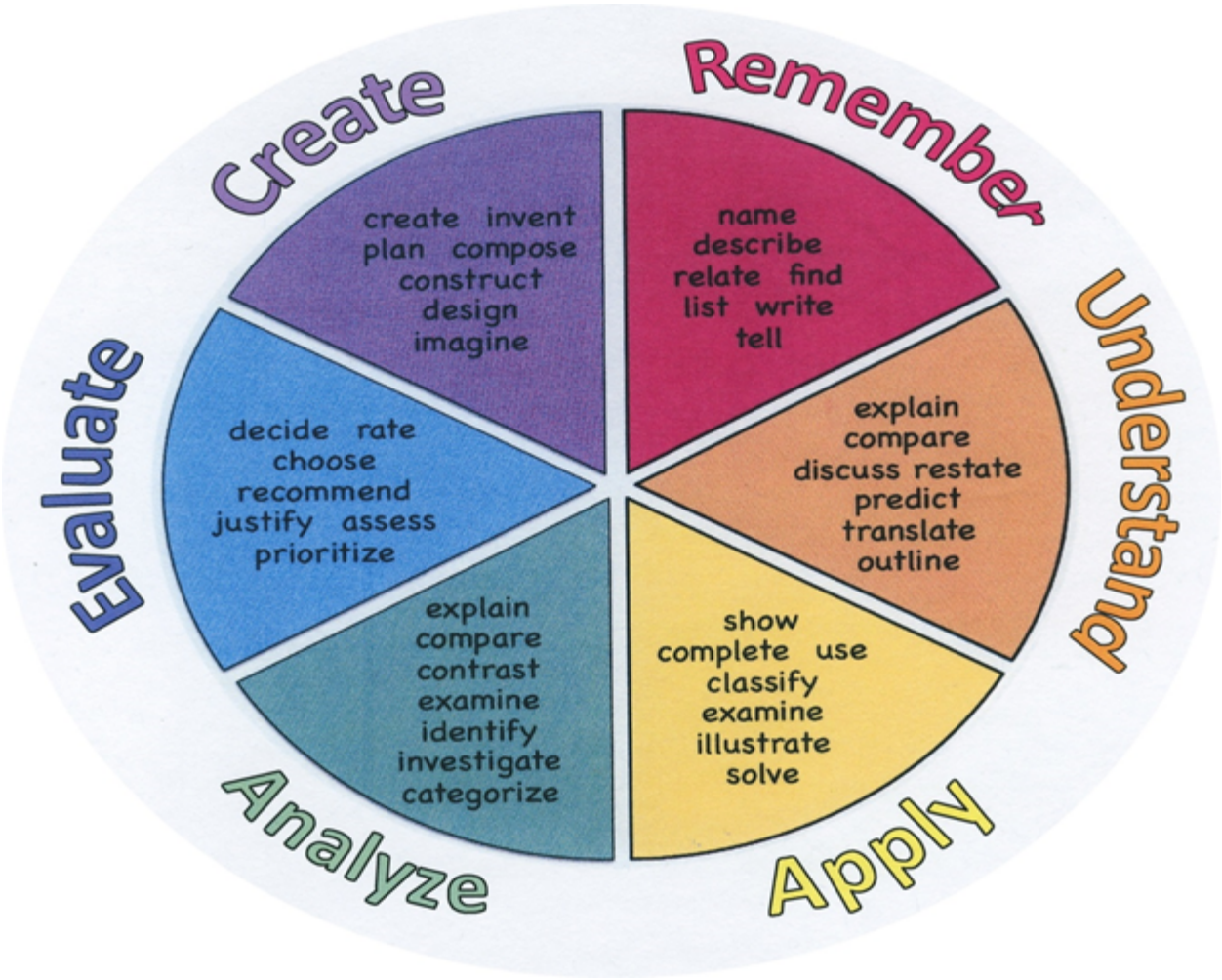
Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not needed or used.

Please list all and any additional **Interdisciplinary Connections/Cross-Curricular** New Jersey Student Learning Standards that link to this unit, and which are not included in the NJSLS section above.

Learning Objectives

When students complete the Scratch unit, they will be able to: **Learn fundamental programming concepts such as custom blocks, lists, variables, and loops** Understand tools to apply logic to sprites and other Scratch elements

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe
Recognize	Show	Compute	Point out		Propose
Repeat	Summarize	Discover	Separate		Reconstruct
Reproduce	Tell	Divide			Revise
	Translate	Examine			Rewrite
	Associate	Graph			Transform
	Compute	Interpolate			
	Convert	Manipulate			
	Discuss	Modify			
	Estimate	Operate			
	Extrapolate	Subtract			
	Generalize				
	Predict				



Suggested Activities & Best Practices

https://waawfoundation.org/waawblog/wp-content/uploads/2016/10/SCRATCH-LESSON-PLAN-1.pdf
Scratch

https://resources.scratch.mit.edu/www/guides/en/EducatorGuidesAll.pdf
https://scratched.gse.harvard.edu/sites/default/files/lp_scratch1.pdf

Assessment Evidence - Checking for Understanding (CFU)

Quizzes

Unit tests-summative assessment

Admit/Exit tickets-formative assessment

Web Based Assesments-alternate assessment

Create a Multimedia poster-benchmark assessment

- Admit Tickets
- Anticipation Guide
- Common Benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- DBQ's
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration
- Journals
- KWL Chart
- Learning Center Activities
- Multimedia Reports
- Newspaper Headline
- Outline
- Question Stems
- Quickwrite
- Quizzes
- Red Light, Green Light
- Self- assessments

- Socratic Seminar
- Study Guide
- Surveys
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Top 10 List
- Unit review/Test prep
- Unit tests
- Web-Based Assessments
- Written Reports

Primary Resources & Materials

Code Combat Platform, Code.org Platform, Game Salad Platform

Ancillary Resources

1. LightBot
2. SpriteBox
3. Hour of Code
4. Code.org
5. Scratch
6. Grasshopper App
7. CS First

Technology Infusion

You Tube

Khan Academy

Office 365

Technology Infusion and/or strategies are integrated into this unit to enhance learning

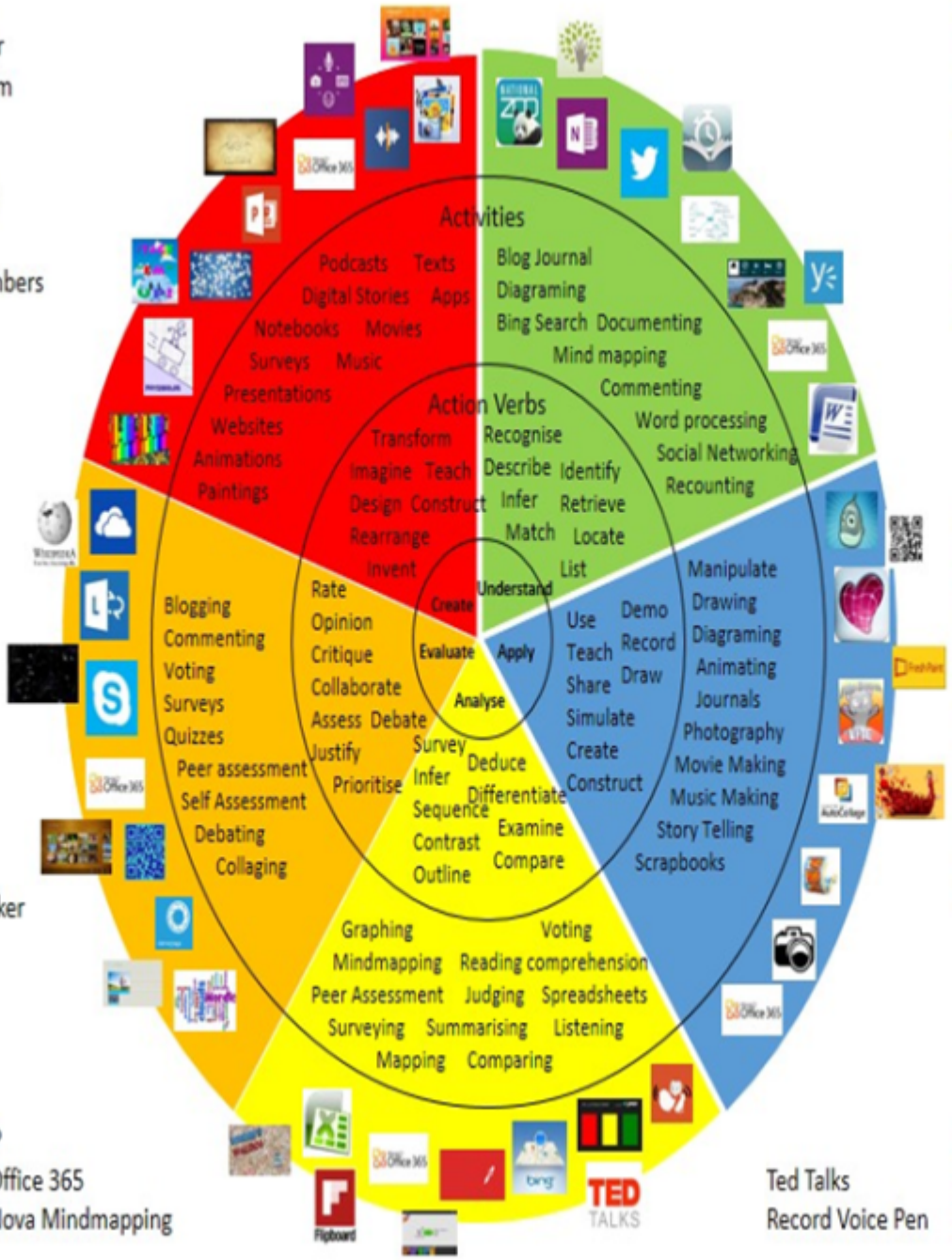
Win 8.1 Apps/Tools Pedagogy Wheel

Podcasts
Photostory 3
Kid Story Builder
Music Maker Jam
Paint A Story
Office 365
MS PowerPoint
Stack 'Em Up
NqSquared Numbers
Physamajig
Xylophone 8

Wikipedia
Skydrive
Lync
SkyMap
Skype
Office 365
Puzzle Touch
Easy QR
Memorylage
Life Moments
Word Cloud Maker

Where's Waldo?
MS Excel
Flipboard
Office 365
Nova Mindmapping

Ted Talks
Record Voice Pen



Originally taken from http://www.coetail.com/vzimmer/files/2013/02/iPadagogy-Wheel.001.jpg
And adapted for Windows 8.1 devices by Charlotte Beckhurst @CharBeckhurst

Alignment to 21st Century Skills & Technology

Mastery and infusion of **21st Century Skills & Technology** and their Alignment to the core content areas is essential to student learning. The core content areas include:

- English Language Arts;
- Mathematics;
- Science and Scientific Inquiry (Next Generation);
- Social Studies, including American History, World History, Geography, Government and Civics, and Economics;
- World languages;
- Technology;
- Visual and Performing Arts.

CAEP.9.2.12.C	Career Preparation
CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.4	Analyze how economic conditions and societal changes influence employment trends and future education.

21st Century Skills/Interdisciplinary Themes

21st Century/Interdisciplinary Themes that will be incorporated into this unit.

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

21st Century Skills

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not

needed or used.

Please list only the **21st Century Skills** that will be incorporated into this unit.

- Civic Literacy
- Environmental Literacy
- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness
- Health Literacy

Differentiation

- Exemplars
- Show students how to find the hints, methods reference cards, error messages, and sample code provided within each level.
- Students struggling with a given level will be automatically directed to additional practice levels within the game.

- Meeting with small groups to re-teach an idea or skill for struggling learners, or to extend the thinking or skills of advanced learners.

  . Varying the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

  Using rubrics that match and extend students' varied skills levels

Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Center-based instruction
- Token economy
- Study guides
- Teacher reads assessments allowed
- Scheduled breaks
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts

- Story guides
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Assistive technology
- Auditory presentations
- Large print edition
- Dictation to scribe
- Small group setting

Hi-Prep Differentiations:

- Alternative formative and summative assessments
- Choice boards
- Games and tournaments
- Group investigations
- Guided Reading
- Independent research and projects
- Interest groups
- Learning contracts
- Leveled rubrics
- Literature circles
- Multiple intelligence options
- Multiple texts
- Personal agendas
- Project-based learning
- Problem-based learning
- Stations/centers
- Think-Tac-Toes
- Tiered activities/assignments
- Tiered products
- Varying organizers for instructions

Lo-Prep Differentiations

- Choice of books or activities
- Cubing activities
- Exploration by interest
- Flexible grouping
- Goal setting with students
- Jigsaw
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Think-Pair-Share
- Reading buddies
- Varied journal prompts
- Varied supplemental materials

Special Education Learning (IEP's & 504's)

- **Exemplars**
- If students struggle with breaking down problems, you can use the printable Engineering Cycle Worksheet to reinforce a step-by-step problem-solving approach.
- If students struggle to follow correct syntax, provide a copy of the printable Python Syntax Guide or JavaScript Syntax Guide

IEP:

1. Adherence to the students' Individualized Learning Plan.

2. Students will have extra time or fewer assignments, one-to-one assistance, and group work will often be enlisted.

3. Students may use speech-to-text or audio/video record assignments

4. Teacher may adapt learning style to fit the needs of the child.

5. Teacher will use graphic organizer to visually help students plan out their work.

6. The teacher will scaffold the lesson with a slow release from assisted support with guided practice to independent practice.

7. Front-loaded notes to enable students to more accurately follow along with teacher's instruction.

8. Step-by-step directions written out for students.

504:

1. Any necessary accommodations will be made as outlined in students' 504 plan.

2. Preferential seating while teacher is lecturing, explaining, etc.

3. Extended time on projects or assessments.

4. Verbal, visual or technology aids.

5. Use of digital audio-visual materials, such as YouTube, to assist the child with directions.

6. Students will have access to "How To" videos, so they may more easily follow along with directions for their assignments.

- printed copy of board work/notes provided
- additional time for skill mastery

- assistive technology
- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- multi-sensory presentation
- multiple test sessions
- preferential seating
- preview of content, concepts, and vocabulary
- Provide modifications as dictated in the student's IEP/504 plan
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

English Language Learning (ELL)

- Exemplars
- Show students how to find the hints, methods reference cards, error messages, and sample code provided within each level.
- Students struggling with a given level will be automatically directed to additional practice levels within the game.
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- Varied supplemental materials

Special Education Learning (IEP's & 504's)

Created By: Droste, George, 4/14/2019 9:45:18 PM, Type: Special Education, Published

Edit Content
Actions

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6. Students will have access to “How To” videos, so they may more easily follow along with directions for their assignments.

Items

Add List Item

- 0x Provide modifications as dictated in the student's IEP/504 plan
- 0x Center-Based Instruction
- 0x additional time for skill mastery
- 0x preview of content, concepts, and vocabulary
- 0x behavior management plan
- 0x have student repeat directions to check for understanding
- 0x teacher initiated weekly assignment sheet
- 0x highlighted text visual presentation
- 0x student working with an assigned partner
- 0x modified test length
- 0x modified assignment format
- 0x assistive technology
- 0x computer or electronic device utilizes
- 0x check work frequently for understanding
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- 0x extended time on tests/ quizzes
- 0x modified test content
- 0x modified test format
- 0x multiple test sessions
- 0x multi-sensory presentation
- 0x preferential seating
- 0x Reduced/shortened written assignments
- 0x printed copy of board work/notes provided
- 0x reduced/shortened reading assignments
- 0x Use open book, study guides, test prototypes

English Language Learning (ELL)

Created By: Droste, George, 4/14/2019 9:45:18 PM, Type: ELL, Published

Edit Content
Actions

Exemplars: English Language Learners: 1. Most of the games have instructions available in other languages, and Google translate will be used as necessary. Students will be allowed to work with partners. 2. Sheltered Instruction Observation Protocol (SIOP) – instructional model that helps teachers plan and deliver lessons that allow English learners the ability to acquire academic knowledge as they develop English language proficiency. 3. Provide leveled texts or translations by using Google Chrome Extension: Snap&Read, which is a reading tool that can cover the most diverse reading needs. It features Read Aloud, Dynamic Text Leveling, Translation, and Study tools, such as pulling text into an outline, then organizing it and adding notes. 4. Teacher creates a culturally responsive classroom. 5. Teacher employs teaching strategies and learning resources that make content comprehensible. 6. Teacher employs Total Physical Response (TPR) – uses a direct action to help students internalize new language

Using videos, illustrations, pictures, and drawings to explain or clarify

English Language Learning adaptations that will be employed in the unit, using the ones identified below.

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

At Risk

Exemplars:

Collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.

Intervention Strategies that will be employed in the unit, using the ones identified below.

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

Talented and Gifted Learning (T&G)

Exemplars:

Gifted and Talented:

1. Students will have the opportunity to publish their writing (reviews/analysis) online, submit their projects to developers, and enter in game design competitions. They may also extend their investigation to some video games, possibly extending their final projects into another format.

2. Teacher can use a pre-assessment to determine students' knowledge of standard being taught in lesson and then provide an extension activity for students

3. Compact lesson

4. Provide students with problem-based learning activity using multiple standards from the unit.

Higher order, critical & creative thinking skills, and discovery

Talented and Gifted adaptations that will be employed in the unit, using the ones identified below.

- Above grade level placement option for qualified students
- Advanced problem-solving
- Allow students to work at a faster pace
- Cluster grouping
- Complete activities aligned with above grade level text using Benchmark results
- Create a blog or social media page about their unit
- Create a plan to solve an issue presented in the class or in a text
- Debate issues with research to support arguments
- Flexible skill grouping within a class or across grade level for rigor
- Higher order, critical & creative thinking skills, and discovery
- Multi-disciplinary unit and/or project
- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Utilize exploratory connections to higher-grade concepts
- Utilize project-based learning for greater depth of knowledge

Sample Lesson

1_1_Lesson_Plan (projectstem.org)

OBJECTIVES

Students will be able to use web based and mobile device based coding applications to demonstrate computational thinking skills.

Students will learn basic computer programming concepts.

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1 HOOK



Kodable

Free to try

This is a great introduction to learning how to code and develop computational thinking in a fun way that learners don't even realize they are working on those skills.

This app is used in my classroom as an introduction to computer programming concepts. We usually spend one period trying it out. Students are free to explore the app without any specific activities required. This gives them a chance to enjoy the fun side of computer programming.

Scratch

Free

This application is a great way for students to become involved in coding in a visual way that is motivating and easy for all students to learn.

This program is used extensively in a Programming 1 classroom at the high school level. Students spend six weeks, one period per day learning about various programming constructs to complete a baseline in computational thinking and computer programming skills. Topics covered include: statements, Boolean expressions, conditions, loops, variables, threads and events. Time is also spent connecting Scratch to the physical world by using Lego WeDo and Makey Makey boards.

Scratch

Free

A deeper dive into Scratch has all of the concepts needed to help students understand and become proficient in computational thinking skills.

Students can use Scratch to create projects that demonstrate their understanding of computational concepts.

Activity:

Presenting

Using the Scratch Studios feature students can add their project and then view the projects of others in the group and offer feedback and suggestions to them.