Coding/Gaming Environment/App Development

Revised UBD Curriculum

Egg Harbor Township High School

Industrial Arts Department

CTE Career and Technical Education

Created By: Mary Ann Cassidy, Kim DeMaggio and Jessica Fairchild

Coordinated By: Dr. Carmelita Graham

June 2018

DISTRICT MISSION STATEMENT

Our mission in the Egg Harbor Township School District is to partner with the student, family, school, and community to provide a safe learning environment that addresses rigorous and relevant 21st Century standards and best practices which will develop academic scholarship, integrity, leadership, citizenship, and the unique learning style of students, while encouraging them to develop a strong work ethic and to act responsibly in their school community and everyday society.

CAREER AND TECHNICAL EDUCATION

Mission:

New Jersey's Office of Career and Technical Education seeks to prepare students for career opportunities of the 21st century, succeed as global citizens and support healthy economic growth for New Jersey. Career and Technical Education prepares students to succeed as global citizens for career opportunities for the 21st Century and to support healthy economic growth within the state.

INTRODUCTION

The most precious resource teachers have is time. Regardless of how much time a course is scheduled for, it is never enough to accomplish all that one would like. Therefore, it is imperative that teachers utilize the time they have wisely in order to maximize the potential for all students to achieve the desired learning.

High quality educational programs are characterized by clearly stated goals for student learning, teachers who are well-informed and skilled in enabling students to reach those goals, program designs that allow for continuous growth over the span of years of instruction, and ways of measuring whether students are achieving program goals.

EGG HARBOR TOWNSHIP SCHOOL DISTRICT CURRICULUM TEMPLATE

The Egg Harbor Township School District has embraced the backward-design model as the foundation for all curriculum development for the educational program. When reviewing curriculum documents and the Egg Harbor Township curriculum template, aspects of the backward-design model will be found in the stated enduring *understandings/essential questions, unit assessments,* and *instructional activities*. Familiarization with backward-design is critical to working effectively with Egg Harbor Township's curriculum guides.

GUIDING PRINCIPLES: WHAT IS BACKWARD DESIGN?

WHAT IS UNDERSTANDING BY DESIGN?

"Backward design" is an increasingly common approach to planning curriculum and instruction. As its name implies, "backward design" is based on defining clear goals, providing acceptable evidence of having achieved those goals, and then working 'backward' to identify what actions need to be taken that will ensure that the gap between the current status and the desired status is closed.

Building on the concept of backward design, Grant Wiggins and Jay McTighe (2005) have developed a structured approach to planning programs, curriculum, and instructional units. Their model asks educators to state goals; identify deep understandings, pose essential questions, and specify clear evidence that goals, understandings, and core learning have been achieved.

Program based on backward design use desired results to drive decisions. With this design, there are questions to consider, such as: What should students understand, know, and be able to do? What does it look like to meet those goals? What kind of program will result in the outcomes stated? How will we know students have achieved that result? What other kinds of evidence will tell us that we have a quality program? These questions apply regardless of whether they are goals in program planning or classroom instruction.

The backward design process involves three interrelated stages for developing an entire curriculum or a single unit of instruction. The relationship from planning to curriculum design, development, and implementation hinges upon the integration of the following three stages.

Stage I: Identifying Desired Results: Enduring understandings, essential questions, knowledge and skills need to be woven into curriculum publications, documents, standards, and scope and sequence materials. Enduring understandings identify the "big ideas" that students will grapple with during the course of the unit. Essential questions provide a unifying focus for the unit and students should be able to answer more deeply and fully these questions as they proceed through the unit. Knowledge and skills are the *"stuff"* upon which the understandings are built.

Stage II: Determining Acceptable Evidence: Varied types of evidence are specified to ensure that students demonstrate attainment of desired results. While discrete knowledge assessments (e.g.: multiple choice, fill-in-the-blank, short answer, etc...) will be utilized during an instructional unit, the overall unit assessment is performance-based and asks students to demonstrate that they have mastered the desired understandings. These culminating (summative) assessments are authentic tasks that students would likely encounter in the real-world after they leave school. They allow students to demonstrate all that they have learned and can do. To demonstrate their understandings students can explain, interpret, apply, provide critical and insightful points of view, show empathy and/or evidence self-knowledge. Models of student performance and clearly defined criteria (i.e.: rubrics) are provided to all students in advance of starting work on the unit task.

Stage III: Designing Learning Activities: Instructional tasks, activities, and experiences are aligned with stages one and two so that the desired results are obtained based on the identified evidence or assessment tasks. Instructional activities and strategies are considered only once stages one and two have been clearly explicated. Therefore, congruence among all three stages can be ensured and teachers can make wise instructional choices.

At the curricular level, these three stages are best realized as a fusion of research, best practices, shared and sustained inquiry, consensus building, and initiative that involves all stakeholders. In this design, administrators are instructional leaders who enable the alignment between the curriculum and other key initiatives in their district or schools. These leaders demonstrate a clear purpose and direction for the curriculum within their school or district by providing support for implementation, opportunities for revision through sustained and consistent professional development, initiating action research activities, and collecting and evaluating materials to ensure alignment with the desired results. Intrinsic to the success of curriculum is to show how it aligns with the overarching goals of the district, how the document relates to district, state, or national standards, what a high quality educational program looks like, and what excellent teaching and learning looks like. Within education, success of the educational program is realized through this blend of commitment and organizational direction.

INTENT OF THE GUIDE

This guide is intended to provide teachers with course objective and possible activities, as well as assist the teacher in planning and delivering instruction in accordance with the New Jersey Core Curriculum Content Standards. The guide is not intended to restrict or limit the teacher's resources or individual instruction techniques. It is expected that the teacher will reflectively adjust and modify instruction and units during the course of normal lessons depending on the varying needs of the class, provided such modified instruction attends to the objectives and essential questions outlined below.

Coding/App Development/Game Design - Power Standards

Standard Number	Standard
Two Marking Periods	
CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.
8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).

Unit Name: Coding Unit 1 - Computational Thinking **Time Frame: 3 days**
Author: Mary Ann Cassidy & Kim DeMaggio

UNIT

Subject: **Technology** Country: **United States of America**

Course/Grade: **Coding/App Dev./Game Design 7/8** State/Group: **NJ**

School: **Egg Harbor Twp Middle School**

UNIT SUMMARY

Overview on what a computer is with an explanation of hardware vs. software. All students will learn the fundamentals of computer programming and understand that it is a language. Students create algorithms, understand the process of encoding and encoding a message and write binary code.

UNIT RESOURCES

Stacking cups

Binary code worksheet

Internet Resource Links:

www.code.org Course 4

https://classic.csunplugged.org/wp-content/uploads/2014/12/unplugged-01-binary_numbers.pdf

https://www.sciencefriday.com/educational-resources/write-your-name-in-binary-code/

STAGE ONE

GOALS AND STANDARDS

8.2.3.E.2 Demonstrate an understanding of the relationship between hardware and software.

8.2.8.E.3 Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.

CRP2 Apply appropriate academic and technical skills.

ENDURING UNDERSTANDING

Develop computational thinking skills to help prepare to learn to write code and solve problems.

ESSENTIAL QUESTIONS

1. **What are the fundamentals of computer programming?**
2. **How are algorithms used in coding?**
3. **How is computer programming useful in real life?**

KNOWLEDGE AND SKILLS

1. **Identify what computer science is and why it matters.**
2. **Apply the problem solving process to approach a variety of problems.**
3. **Write programs using algorithms.**
4. **Learn how data in computers is stored and transmitted as a series of zeros and ones.**

STAGE TWO

PERFORMANCE TASKS

Students learn a new language or code to communicate with a cup-stacking robot.

Create algorithms that their classmates will follow to complete a task.

Experience the process of encoding and decoding a message similar to the way a computer program works.

Through worksheet activities, students learn binary code.

OTHER EVIDENCE

Teacher observation, assessments.

STAGE THREE

LEARNING PLAN

Students enroll in Course 4 on www.code.org and complete Lesson 2: Maze and Bee and write programs using algorithms to direct the bee to complete a series of challenges.

Students learn their own language of communicating and create algorithms that their classmates will follow to complete a task.

https://sites.google.com/a/sfusd.edu/mycs-teacher/0-2

Students learn what binary code is by completing activities.

https://sites.google.com/a/sfusd.edu/mycs-teacher/b-2

Unit Name: Coding Unit 2 - Block Coding/Programming Time Frame: 20 Classes

Author: Kim DeMaggio & Mary Ann Cassidy

UNIT

Subject: **Technology** Country: **United States of America**

Course/Grade: **Coding/App Dev./Game Design 7/8** State/Group: **NJ**

School: **Egg Harbor Township MS**

UNIT SUMMARY In this unit, students build on their coding experience as they create programmatic images, animations, interactive art, and games. Starting off with simple, primitive shapes and building up to more sophisticated sprite-based games, students become familiar with the programming concepts and the design process computer scientists use daily. They then learn how these simpler constructs can be combined to create more complex programs. Along the way, they practice design, testing, and iteration, as they come to see that failure and debugging are an expected and valuable part of the programming process.

UNIT RESOURCES

- Desktop PC
- Google Drive
- Google Docs
- Scratch/Scratch 3.0
- Code.org - Course 4
- Lightbot (
- codecademy

Internet Resource Links:

- https://scratch.mit.edu/
- https://curriculum.code.org/csd-1718/
- http://lightbot.com/hour-of-code.html

STAGE ONE

GOALS AND STANDARDS

8.2 Technology Education, Engineering, Design and Computational Thinking - Programming
All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

- 8.2.8.B.2 Identify the desired and undesired consequences from the use of a product or system
- 8.2.8.C.1 Explain how different teams/groups can contribute to the overall design of a product.
- 8.2.8.C.2 Explain the need for optimization in a design process.
- 8.2.8.C.4 Identify the steps in the design process that would be used to solve a designated problem

- 8.2.8.E.1 Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used.
- 8.2.8.E.3 Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.
- 8.2.8.E.4 Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).
- 21st Century.9.CRP2 Apply appropriate academic and technical skills.
- 21st Century.9.CRP6 Demonstrate creativity and innovation.

ENDURING UNDERSTANDING

Technological literacy skills enable learners to adapt to a rapidly changing, man-made world by using problem solving to generate solutions from the conceptual stage to the final product.

The design process is fundamental to technology and engineering.

ESSENTIAL QUESTIONS

- What is a computer program?
- What are the core features of most programming languages?
- How does programming enable creativity and individual expression?
- What practices and strategies will help me as I write programs?
- How are algorithms used in coding?
- How do you edit, compile, run and test a program?

KNOWLEDGE AND SKILLS

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

STAGE TWO

PERFORMANCE TASKS

- 8.2.8.B.2, 8.2.8.C.1, 21st Century.9.CRP2, 21st Century.9.CRP6
  - Students use Scratch to create various programming projects and demonstrate computational thinking and the design process
- 8.2.8.C.2, 8.2.8.C.4, 8.2.8.E.1
  - Students will utilize the interface and gain an understanding for Interactive projects and the design flow of creating a program functionality
- 8.2.8.E.3, 8.2.8.E.4
  - Algorithms, Loops, Animation, Sounds implemented in all projects

OTHER EVIDENCE Teacher observation, assessments

STAGE THREE

LEARNING PLAN

- Students use Scratch to learn block programming and the design process of block programming
- Students follow various tutorials to complete programming projects: Animate your name (https://resetonline.org/wp-content/uploads/2017/09/Programming-with-SCRATCH-

Animate-A-Name.pdf), Design a virtual pet (https://cdn.scratch.mit.edu/scratchr2/static/__47a22975971da211e378073966d69ffb__/help/en/howto/vptip-intro.html), creating a dance party(https://csfirst.withgoogle.com/clubplan/music-sound/dance-party , maze game (https://msmangelsdorf.weebly.com/uploads/8/9/1/5/8915849/making-a-maze-game-in-scratch-1.pdf) and Mad Labs (https://scratch.mit.edu/discuss/topic/212442/).

Unit Name: Coding Unit 3 - App Development **Time Frame: 8 days**

Author: Mary Ann Cassidy & Kim DeMaggio

UNIT

Subject: **Technology** Country: **United States of America**

Course/Grade: **Coding - App Development Grade 7 & 8** State/Group: **NJ**

School: **Egg Harbor Twp. Middle School**

UNIT SUMMARY

All students will follow instructions to learn to use App Inventor to build a mobile application. Students learn programming using App Inventor while testing, evaluating, modifying, and debugging their app.

UNIT RESOURCES

- **Computer or Android device**

Internet Resource Links:

- https://sites.google.com/site/appinventoredu/curriculum/introcs
- http://www.scholastic.com/samsungacademy/downloads/SS4_C&B_TeacherGuide.pdf
- http://appinventor.mit.edu/explore/ai2/tutorials.html
- https://sites.google.com/site/middleschoolandroid/home/app-inventor-tutorials

STAGE ONE

GOALS AND STANDARDS

- 8.1.8.A.3. Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
- 8.2.8.E.4 - Use appropriate terms in conversation
- 8.2.8.C.4 - Identify the step in the design process that would be used to solve a designated problem.
- 8.2.8.C.6 - Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
- 21st Century.9.CRP2 Apply appropriate academic and technical skills.
- 21st Century.9.CRP6 Demonstrate creativity and innovation.

ENDURING UNDERSTANDING - Technological literacy skills enable learners to adapt to a rapidly changing, man-made world by using problem solving to generate solutions from the conceptual stage to the final product.

ESSENTIAL QUESTIONS

How does technology extend human capabilities?

What is programming?

Is a cell phone a computer?

KNOWLEDGE AND SKILLS

Students are introduced to App Inventor and learn the basics of app building. They'll learn how to design the user interface for an app, and how to code the blocks that specify the app's interactive behavior. Studentss learn how to code blocks that specify how an app responds to events, and about conditional blocks that allow an app to make decisions.

STAGE TWO

PERFORMANCE TASKS

- 8.1.8.A.3, 8.2.8.C.4, 21st Century.9.CRP2, 21st Century.9.CRP6
  - Students create apps in App Inventor
- 8.2.8.E.4.
  - Students learn vocabulary for major components of the App Inventor program
- 8.2.8.C.4
  - Students follow tutorial to create an app
- 8.2.8.C.6
  - Debug the apps

OTHER EVIDENCE

Teacher observation, assessments

STAGE THREE

LEARNING PLAN

https://sites.google.com/site/middleschoolandroid/home/app-inventor-tutorials

Day 1 : Bouncing Balls / Variables

Day 2 : Block Editor / Buttons and Labels

Day 3 : Calculator / If Statements
Scavenger Hunt /
https://sites.google.com/a/sfusd.edu/app-inventor/unit-0/5
Day 4 : HelloPurr / Media

Day 5 : PaintPot / Events
https://sites.google.com/a/sfusd.edu/app-inventor/unit-2/1
https://sites.google.com/a/sfusd.edu/app-inventor/unit-2/2

Day 6 : MoleMash / Timers

Day 7 : To Do List / TinyDB

Day 8 : Music Player / Working with Screens

Unit Name: Coding Unit 5: HTML Coding **Time Frame: 5 lessons**

Author: Kim DeMaggio, Mary Ann Cassidy

UNIT

Subject: **Technology** Country: **USA**

Course/Grade: **Coding/App Dev./Game Design 7/8** State/Group: **NJ**

School: **Egg Harbor Township MS**

UNIT SUMMARY

In this unit, students create their own web pages and display them in their web browser. Students learn the tags to build their webpage using Hyper Text Markup Language (HTML)

UNIT RESOURCES

Notepad

Web browser

Internet Resource Links:

https://curriculum.code.org/csd-18/unit2/1/ Unit 2 Lesson 3-7

STAGE ONE

GOALS AND STANDARDS

8.2 Technology Education, Engineering, Design and Computational Thinking - Programming

- 8.2.8.B.2 Identify the desired and undesired consequences from the use of a product or system
- 8.2.8.C.1 Explain how different teams/groups can contribute to the overall design of a product.
- 8.2.8.C.2 Explain the need for optimization in a design process.
- 8.2.8.C.4 Identify the steps in the design process that would be used to solve a designated problem
- 8.2.8.E.1 Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used.
- 8.2.8.E.3 Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.
- 8.2.8.E.4 Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).
- 21st Century.9.CRP2 Apply appropriate academic and technical skills.
- 21st Century.9.CRP6 Demonstrate creativity and innovation.

ENDURING UNDERSTANDING

Students start thinking about the role of the web, and how it can be used as a medium for creative expression. As students develop their pages and begin to see themselves as programmers, they are encouraged think critically about the impact of sharing information online and how to be more critical content consumers. They are also introduced to problem solving as it relates to programming, as they learn valuable skills such as debugging, commenting, and structure of language.

ESSENTIAL QUESTIONS

Why do people create websites?
How can text communicate content and structure on a web page?
How can HTML be used as a design tool?

KNOWLEDGE AND SKILLS

Students learn how to communicate both the content and structure of a website to a computer.

Learn the basics of HTML to create simple web pages.

Learn to critique webpages.

STAGE TWO

PERFORMANCE TASKS

Learn basic HTML tags.

Create a SimpleText program on Notepad using basic HTML tags.
Create several web pages which will include the following elements: an image, a list.
an unordered list, and nested list.

OTHER EVIDENCE

Teacher observation and assessments

STAGE THREE

LEARNING PLAN

Create a SimpleText program on Notepad using basic HTML tags.
Student create a simple web page using more HTML formatting tags and an image.
Students create a simple web page including a list.
Students create a simple web page including an unordered list.
Students create a simple web page including a nested list.

Unit Name: Coding Unit 5: MS Animation & Gaming **Time Frame: 5 Lessons**

Author: Kim DeMaggio, Mary Ann Cassidy & Jessica Fairchild

UNIT

Subject: **Technology** Country: **USA**

Course/Grade: **Coding/App Dev./Game Design 7/8** State/Group: **NJ**

School: **Egg Harbor Twp MS**

UNIT SUMMARY

In this unit you'll develop a personalized, interactive game using Scratch or MIT App Inventor.

UNIT RESOURCES

Internet Resource Links:

https://scratch.mit.edu/
https://code.org/educate/csd

STAGE ONE

GOALS AND STANDARDS

CRP2. Apply appropriate academic and technical skills

CRP4. Communicate clearly and effectively and with reason.

CRP6. Demonstrate creativity and innovation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP11. Use technology to enhance productivity.

8.2.8.E.4 Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).

ENDURING UNDERSTANDING

Analyze and apply a design-based approach to learning.

Use computational thinking and computer programming in design and engineering.

ESSENTIAL QUESTIONS

How do you use block coding in the context of Scratch?
How do you use the design process?
How do you create an interactive project?

KNOWLEDGE AND SKILLS

Students will understand the concept of computational creation in the context of their own Scratch game design.

STAGE TWO

PERFORMANCE TASKS

CRP2--Apply appropriate academic and technical skills.

> **Students understand the knowledge needed to create dynamic/interactive games by creating a game using Pong in Scratch.**

8.2.8.C.4--Identify the design process that would be used to solve designated problem.

> **Students develop a greater fluency with computational concepts/practices by working on a self-directed game complete with scoring system.**

OTHER EVIDENCE

Teacher observation and assessments

STAGE THREE

LEARNING PLAN

Students understand the concept of computational creation, in the context of Scratch.

Students practice creating a game based on the knowledge used from Scratch and MIT App Inventor.

Students use the design process to create their own interactive game with a scoring system

Curriculum Resources - Differentiated Instruction

Special Education Interventions in General Education

Visual Supports
Extended time to complete tests and assignments
Graphic Organizers
Mnemonic tricks to improve memory
Study guides
Use agenda book for assignments
Provide a posted daily schedule
Use of classroom behavior management system
Use prompts and model directions
Use task analysis to break down activities and lessons into each individual step needed to complete the task
Use concrete examples to teach concepts
Have student repeat/rephrase written directions
Heterogeneous grouping

Resources:

Do to Learn:
http://www.do2learn.com/

Sen Teacher:
http://www.senteacher.org/

Intervention Central:
http://www.interventioncentral.org/

Learning Ally:
https://www.learningally.org/

English Language Learners Interventions in Regular Education

Resources:

FABRIC - Learning Paradigm for ELLs (NJDOE)
www.nj.gov/education/bilingual/pd/**fabric**/**fabric**.pdf

Guide to Teaching ELL Students
http://www.colorincolorado.org/new-teaching-ells

Edutopia - Supporting English Language Learners
https://www.edutopia.org/blog/strategies-and-resources-supporting-ell-todd-finley

Reading Rockets
http://www.readingrockets.org/reading-topics/english-language-learners

Gifted and Talented Interventions in Regular Education
Resources:

Who are Gifted and Talented Students
http://www.npr.org/sections/ed/2015/09/28/443193523/who-are-the-gifted-and-talented-and-what-do-they-need

Hoagies Gifted Education Page
http://www.hoagiesgifted.org/programs.htm

21st Century Learning
Resources:

Partnership for 21st Century Learning
http://www.p21.org/

Career Ready Practices (NJDOE)
http://www.nj.gov/education/cte/hl/CRP.pdf

Curriculum Resources - Differentiated Instruction

Special Education Interventions in General Education

Visual Supports
Use captions tool when available with audio
Extended time to complete tests and assignments
Graphic Organizers
Mnemonic tricks to improve memory
Study guides
Use agenda book for assignments
Provide a posted daily schedule
Use of classroom behavior management system
Use prompts and model directions
Use task analysis to break down activities and lessons into each individual step needed to complete the task
Use concrete examples to teach concepts
Have student repeat/rephrase written directions
Heterogeneous grouping
Screen reader for visually impaired
Use captions tool when available with audio

Resources:

Do to Learn:
http://www.do2learn.com/

Sen Teacher:
http://www.senteacher.org/

Intervention Central:
http://www.interventioncentral.org/

Learning Ally:
https://www.learningally.org/

English Language Learners Interventions in Regular Education

Resources:

FABRIC - Learning Paradigm for ELLs (NJDOE)
www.nj.gov/education/bilingual/pd/**fabric**/**fabric**.pdf

Guide to Teaching ELL Students
http://www.colorincolorado.org/new-teaching-ells

Edutopia - Supporting English Language Learners
https://www.edutopia.org/blog/strategies-and-resources-supporting-ell-todd-finley

Reading Rockets
http://www.readingrockets.org/reading-topics/english-language-learners

Gifted and Talented Interventions in Regular Education
Resources:

Who are Gifted and Talented Students
http://www.npr.org/sections/ed/2015/09/28/443193523/who-are-the-gifted-and-talented-and-what-do-they-need

Hoagies Gifted Education Page
http://www.hoagiesgifted.org/programs.htm

21st Century Learning
Resources:

Partnership for 21st Century Learning
http://www.p21.org/

Career Ready Practices (NJDOE)
http://www.nj.gov/education/cte/hl/CRP.pdf