

Unit 05: Putting it all Together: Coding Final Project

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **FY**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

Practice 1. Asking questions (for science) and defining problems (for engineering)

Asking questions and defining problems in 6–8 builds on K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.

Ask questions that arise from careful observation of phenomena, models, or unexpected results, to clarify and/or seek additional information.

Ask questions to identify and/or clarify evidence and/or the premise(s) of an argument.

Ask questions to determine relationships between independent and dependent variables and relationships in models.

Ask questions to clarify and/or refine a model, an explanation, or an engineering problem.

Ask questions that require sufficient and appropriate empirical evidence to answer.

Ask questions that challenge the premise(s) of an argument or the interpretation of a data set.

Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.

Practice 2. Developing and using models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

Evaluate limitations of a model for a proposed object or tool.

Develop or modify a model—based on evidence – to match what happens if a variable or component of a system is changed.

Use and/or develop a model of simple systems with uncertain and less predictable factors.

Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena.

Develop a model to describe unobservable mechanisms.

Develop and/or use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales.

Practice 3. Planning and carrying out investigations

Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.

Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.

Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions

under a range of conditions.

Collect data about the performance of a proposed object, tool, process or system under a range of conditions.

Practice 5. Using mathematics and computational thinking

Mathematical and computational thinking in 6–8 builds on K–5 experiences and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.

Use mathematical representations to describe and/or support scientific conclusions and design solutions.

Create algorithms (a series of ordered steps) to solve a problem.

Apply mathematical concepts and/or processes (e.g., ratio, rate, percent, basic operations, simple algebra) to scientific and engineering questions and problems.

Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.

Practice 6. Constructing explanations (for science) and designing solutions (for engineering)

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

Construct an explanation using models or representations.

Apply scientific reasoning to show why the data or evidence is adequate for the explanation or conclusion.

Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system.

Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.

Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and re-testing.

Practice 7. Engaging in argument from evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

Make an oral or written argument that supports or refutes the advertised performance of a device, process, or system based on empirical evidence concerning whether or not the technology meets relevant criteria and constraints.

Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.

Practice 8. Obtaining, evaluating, and communicating information

Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.

Communicate scientific and/or technical information (e.g. about a proposed object, tool, process, system) in writing and/or through oral presentations.

Crosscutting Statements

4. Systems and System Models – A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems.

Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems.

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.2	Create a document (e.g., newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
TECH.8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
TECH.8.1.8.D.4	Assess the credibility and accuracy of digital content.
TECH.8.2.8	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.
TECH.8.2.8.A	The Nature of Technology: Creativity and Innovation: Technology systems impact every aspect of the world in which we live.
TECH.8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
TECH.8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.
TECH.8.2.8.B	Technology and Society: Knowledge and understanding of human, cultural and society

	values are fundamental when designing technology systems and products in the global society.
TECH.8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.
TECH.8.2.8.C	Design: The design process is a systematic approach to solving problems.
TECH.8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
TECH.8.2.8.C.2	Explain the need for optimization in a design process.
TECH.8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
TECH.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.
TECH.8.2.8.C.5b	Create a technical sketch of a product with materials and measurements labeled.
TECH.8.2.8.D	Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.
TECH.8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
TECH.8.2.8.E	Computational Thinking: Programming: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.
TECH.8.2.8.E.2	Demonstrate an understanding of the relationship between hardware and software.
TECH.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.
TECH.8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).

Interdisciplinary Connections: NJSL for ELA, Social Studies, Science and/or Math Section

	Range of Reading and Level of Text Complexity
LA.K-12.NJSLSA.R10	Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.
LA.RI.8	Reading Informational Text
LA.K-12.NJSLSA.W	Writing
LA.K-12.NJSLSA.W2	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
	Production and Distribution of Writing
LA.K-12.NJSLSA.W4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LA.RI.8.10	By the end of the year read and comprehend literary nonfiction at grade level text-complexity or above, with scaffolding as needed.
LA.K-12.NJSLSA.SL	Speaking and Listening
	Comprehension and Collaboration
LA.W.8.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

LA.W.8.2.A	Introduce a topic and organize ideas, concepts, and information, using text structures (e.g., definition, classification, comparison/contrast, cause/effect, etc.) and text features (e.g., headings, graphics, and multimedia).
LA.W.8.2.B	Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. Presentation of Knowledge and Ideas
LA.K-12.NJSLSA.SL4	Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
LA.W.8.2.C	Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
LA.W.8.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
LA.K-12.NJSLSA.SL5	Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
LA.W.8.2.E	Establish and maintain a formal style/academic style, approach, and form.
LA.K-12.NJSLSA.SL6	Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.
LA.W.8.2.F	Provide a concluding statement or section that follows from and supports the information or explanation presented.
LA.W.8.4	Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
LA.SL.8.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
LA.SL.8.5	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
LA.SL.8.6	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit...

Bug Reporting, Student-developed App Creation, and Publication

Students will use all they have learned in class to complete their own robust apps with rich UX designs. A finished product will be created and published to the Google Play App Store, available for anyone to download and use. Through this process, students will also learn the importance of setting and following a schedule and how to present their own apps and evaluate others'.

Meaning

Essential Questions

Essential Questions

How does sharing program prototypes help create a better app?

What information should a bug report include?

What are the benefits of creating and sticking to a schedule for a long-term project?

What are some strategies that can be employed to market a new product?

Enduring Understanding/Indicators of Understanding

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Programs go through many revisions before being released.

When coding, it is important to share prototypes of your program with others to receive feedback.

Any long-term job or assignment requires time management skills to complete.

Presenting an app for publication is a process of marketing and refinement.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know...

Programming prototypes are divided into categories based their stage in development: Pre-alpha; Alpha; Beta; and Release Candidate.

Bug reports are needed for delivering feedback to an app developer so code can be fixed and improved for a better UX.

Creating and sticking to a schedule help to ensure a project and any benchmarks/goalposts will be finished on time.

Marketing is the process of planning and executing the conception, pricing, promotion, and distribution of an idea to satisfy the needs of consumers or organizations.

Skills

Skills

Student will be skilled at ...

Preparing a task schedule based on knowledge of time spent on previous, similar tasks.

Developing bug reports for a program.

Completing and publishing an Android App.

Devising a marketing strategy to promote an app.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

Bug Reporting:

“What is a Bug Report?” - <https://usersnap.com/blog/what-is-a-bug-report/>

“How to Write a Bug Report” - <https://rubygarage.org/blog/how-to-write-a-quality-bug-report>

“10 Questions to Ask When a Bug Report is Created” - <https://reqtest.com/testing-blog/10-questions-ask-bug-report-created/>

“How to File a Good Bug” - <https://developers.google.com/web/feedback/file-a-bug>

Marketing:

“Marketing: the Basics” - <https://www.business.qld.gov.au/running-business/marketing-sales/marketing-promotion/marketing-basics>

“33 Creative Ways to Promote Your App for Free” - <https://buildfire.com/free-app-promotion/>

“How to Market Your Android App” - <https://www.androidauthority.com/market-android-app-385416/>

“How to Promote Your Android App/Game” - <https://www.shoutmeloud.com/how-to-promote-android-app-game.html>

Android Marketing Tools - <https://developer.android.com/distribute/marketing-tools/>

“65 Simple Ways to Promote Your Mobile App” - <https://www.forbes.com/sites/allbusiness/2015/11/07/65-simple-ways-to-promote-your-mobile-app/#7b46204848c4>

“What are the Best App Marketing Strategies?”: <https://www.forbes.com/sites/quora/2018/03/28/what-are-the-best-app-marketing-strategies/#58079500fea0>

Software Release Cycle - https://en.wikipedia.org/wiki/Software_release_life_cycle

MIT's AppInventor - <http://appinventor.mit.edu/explore/>

App Inventor EDU - <https://sites.google.com/site/appinventoredu/curriculum>

Google's Computational Thinking for Educators - https://computationalthinkingcourse.withgoogle.com/course?use_last_location=true

Google CS-First - <https://csfirst.withgoogle.com/en/home>

K12 Computer Science Framework - <https://k12cs.org/wp-content/uploads/2016/09/K%E2%80%9312-Computer->

[Science-Framework.pdf](#)

Technopedia - <https://www.techopedia.com/>

“I Love my Smartphone: Mobile App Development V2” -
http://www.royalsoced.org.uk/1035_MobileAppDevelopment.html

“Android Game Development with AppInventor” by Anshul Bhagi -
http://explore.appinventor.mit.edu/sites/all/files/Resources/Thesis_FINAL_AnshulBhagi.pdf

“MIT App Inventor: Enabling Personal Mobile Computing” - Shaileen Pokress, Jose Veiga -
<https://arxiv.org/pdf/1310.2830.pdf>

The App Inventor Course-in-a-box - <http://www.appinventor.org/content/CourseInABox/Intro/courseinabox>

Middle School Android - <https://sites.google.com/site/middleschoolandroid/home/app-inventor-tutorials>

CS128 Introduction to Software Application Development Fall 2012 -
<https://sites.google.com/a/jcu.edu/cs128fall2012/home>

“Python Methodologies for Data Sciences” by Lars Sorenson - <https://www.cs.rutgers.edu/~biglars/PMDS/>

Formative Assessment Strategies

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Teacher observation

Class discussion

Google Classroom Questions

Coding Final Project Goalposts and Check-ins

Final Project Schedule

Learning Activities/Unit of Study

Learning Activities/Unit of Study

Google Classroom Daily Questions

AppInventor Coding for Final Project

Prototypes and Group Evaluation

Research into published App Store apps

Bug Reporting activities

Publication and marketing strategies discussions/activities

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native

language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.