

The Integration of Computational Thinking and Block Coding Basics
into Educational Studies Courses

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Endeavor STEM Teaching Certificate Project

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Practicum in STEM Leadership

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1. Project Title: The Integration of Computational Thinking and Block Coding Basics into Educational Studies Courses

2. Justification:

According to a recent study by Code.org, the vast majority of schools in the US do not provide a rigorous computer science curriculum (<http://code.org/promote/ks>). One skill that is critically ignored in schools is the actual coding of computers, with many computer science skills focusing instead on office skills like using Microsoft Word and PowerPoint. In fact, 90% of American schools don't even discuss computer programming.

A recent poll by the US Department of Labor, computer science is one of the most rapidly growing job areas of the last decade, with well over 500,000 new job openings anticipated in the next ten years (<http://www.bls.gov/ooh/computer-and-information-technology/home.html>). On top of this statistic, almost every job in America, even previously blue-collar jobs like manufacturing or auto repair, now requires some ability to handle and navigate computer programs. Without these skills, students are leaving the educational system woefully unprepared to fill that need.

The most helpful step would be for adjuncts in Educational Studies courses to start integrating computational thinking and block coding basics into Educational Studies courses: Math (EDUC 389), Science (EDUC 390) and programming class, by finding materials that can also help them learn programming. Since many of these adjuncts don't have time for a new college course, what they need now are resources to help them learn at home or on their own. This project will compile a short list of handy resources that can help teachers learn code, and learn how to teach code.

3. School Name: University of LaVerne

Number of Educators: 10

Grade Level: Higher Education

Audience:

10 University of LaVerne (ULV) LaFetra College of Education (LFCE) adjunct instructors.

4 Technology Instructors

3 Math Methods Instructors

3 Science methods Instructors

4. Brief Summary of Project:

Learning Outcomes: Learners will be able to integrate educational technologies relevant to teaching CT and block coding into their curricula in ways that are pedagogically sound and developmentally appropriate for their students.

Purpose:

- To provide a comprehensive professional development for LFCE adjunct faculty that teach EDUC 389, EDUC 390 and EDUC 407.
- This training is designed to offer you the opportunity to give your students room to explore, experiment and solve problems logically.
- Teaching STEM concepts in elementary grades opens the door for teachers and students to become tomorrow's movers and shakers.
- To become competent in integrating computational thinking (CT) and coding in their classrooms.
- The training is aligned to the 2017 [Computer Science Teachers Association \(CSTA\) standards](#). [Lesson plans](#) identify connections to CSTA standards and provide opportunities to support learning in other subjects. [Click here](#) for the comprehensive list of CS Fundamentals standards alignments.

Objectives:

Through completing this training, participants will:

- Learn the basics of block coding
- Review best practices for teaching these basics to your students
- Access free curriculum and resources for teachers
- Plan for how you might get started teaching [Computer Science Fundamentals](#)
- Connect with a community of fellow educators who are making positive change in their classrooms through coding

NASA Assets/Curriculum

STEMWORKS: NASA Coding

<http://stem-works.com/subjects/12-space/activities/626>

NASA announces coding content for school kids to 'help' ISS

<https://timesofindia.indiatimes.com/gadgets-news/nasa-announces-coding-content-for-school-kids-to-help-iss/articleshow/75329775.cms>

NASA Data Intensive Research and Education Center for STEM

https://www.calstatela.edu/centers/NASA_DIRECT_STEM

Design a NASA Mission Patch

<https://www.tynker.com/weekly-projects/nasa-mission-patch>

NASA's App Development Challenge (ADC)

https://www.nasa.gov/education/nextgenstem/moon_to_mars/app_challenge.html

Learn to code with Wonder Woman, Smithsonian Learning Labs, and NASA

<https://educationblog.microsoft.com/en-us/2020/09/learn-to-code-with-wonder-woman-smithsonian-learning-labs-and-nasa/>

Pedagogy learned through Endeavor?

Coding, Robotics, and 1:1 Devices 3 credit course

Learn applications of Coding as a mathematics pedagogy, explore opportunities for Robotics, and learn cutting-edge implementation of One-to-One Devices (1:1) in K-12

classrooms. Participants learn about and explore best practices in the newest learning pedagogies and technologies. Whether you are already involved, or looking to integrate these cutting-edge tools and strategies for the classroom, you will begin to expand your reach for enhancing student learning. Scaffolded to allow success at all grade levels, Coding, Robotics, and 1:1 Devices offers resources for application into elementary, middle, and high school. Participants will interact with no-fee computer programming, robotics opportunities, and the latest uses of devices. All participants have the opportunity to work with innovative technologies and interact with talented educators, practitioners and special guests who are already making a difference in K-12 classrooms.

What Participants will Do:

Utilizing the Hour of Code site (<https://code.org/hourofcode/overview>) one-hour tutorials which are designed for all ages.

They will complete the 10 tutorials.

When integrating this into your curriculum try to sequence it with CS Education Week. CSEdWeek is an annual call to action to inspire K-12 students to learn computer science, advocate for equity in computer science education, and celebrate the contributions of students, teachers, and partners to the field. This week is held in recognition of the birthday of Admiral Grace Murray Hopper (December 9, 1906), who invented the first compiler and coined the term “bug” (an error in a program) after removing an actual moth from a computer in 1947.

Completion:

- Each person earns [a certificate](#) of completion.
- Upon completion of the 10 Hour Code lessons submit Certificate of completion
- Submit their update syllabus showing how Coding will be integrated in your course.

5. Reflection: The adjuncts were required to show how they would integrate what they learned into their courses (syllabus were submitted for review). Below is the feedback from them on how they would do this and what programs they would use.

ADJUNCT Course Taught	REQUIRED KNOWLEDGE	ASSIGNMENT	TOOL	LINK TO EVIDENCE
1 Tech	Understand Coding and Computer Science	<ul style="list-style-type: none"> Complete one hour of code 	Code.org	<ul style="list-style-type: none"> Create a Flipgrid video to explain what you made
2 Tech & Math	Innovative Designer & Computational Thinker	<ul style="list-style-type: none"> Students will explore my HyperDoc of Coding platform and evaluate their effectiveness, engagement, and ease of use 	Google for Education: https://csfirst.withgoogle.com/s/en/home	<ul style="list-style-type: none"> Students will create a Google Slide Book with recommending a coding program for 5 different grade levels or content areas.
3 Math & Science	Computational Thinking	<ul style="list-style-type: none"> Animate Your Name in Scratch 	Scratch Scratch Jr	<ul style="list-style-type: none"> Post a reflection of your experience in your BLOG
4 Tech	Game Design & Computational Thinking	<ul style="list-style-type: none"> Research classroom gamification techniques, such as Class Craft, or others. Digital Escape Rooms: https://www.breakoutedu.com/live, 	Class Craft breakoutedu.com	<ul style="list-style-type: none"> Reflection: How you think you could use gamification techniques in your classroom. Solve the Digital Breakout EDU. Entering all "locks" in the form at the end will prompt your name or your group names.
5 Science		<ul style="list-style-type: none"> In the Coral Reef Cleanup activity, students are equipped with a VR Ocean Cleaning Robot to help 	VEX Hour of Code	<ul style="list-style-type: none"> The knowledge gain in VEXcode VR can be applied to other Coding

		clean the Mangrove Reef. Collect as much trash as you can before the solar-powered batteries on your robot run down. Each level will complete the same activity, but the instructions will be tailored to your experience level with coding.		platforms -
6 Tech	Computational Thinking: Learn basic programming skills and practice using core coding commands without the use of a device.	<ul style="list-style-type: none"> • All students have a Kodable unplugged worksheet packet • Unplugged Worksheets for K-1st graders • Unplugged Worksheets for 2nd-3rd graders • Unplugged Worksheets for 4th-5th graders 	<p>kodable.com</p> <p>https://hoc.vexrobotics.com</p>	<ul style="list-style-type: none"> • Define code and communicate its importance • Explain what a programmer does • Break down the steps needed to solve a problem • Express themselves creatively

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