Introduction to Computational Thinking for Every Educator
Online Course Syllabus

Course Description

The goals of this course are to increase awareness of Computational Thinking (CT) among educators world-wide and encourage them to integrate CT into their curricula. The course is divided into five sections, each focusing on the following:

- **Introducing Computational Thinking:** What is computational thinking, where does it occur, why should you care and how can it be applied?
- **Decomposition:** Explore what decomposing computational problems into sub-parts looks like, why it is foundational and how to support your students in doing this essential skill.
- **Pattern Recognition:** Explore examples of data/data sets in various subjects and develop your own integration ideas for helping your students approach a problem through pattern recognition.
- **Abstraction**: Walk through examples of abstraction as they relate to patterns in data/data sets used in your subject. Recognize how abstraction brings meaning to the data and help simplify the complexity of the computational problem.
- **Algorithms**: Explore and understand what an algorithm is, why and how they are powerful, and their relationship to solving the computational problem.
- **Designing with CT in Mind**: Applying the CT process. Design, implement, and reflect on a computational thinking-based lesson/PD integrated into a content area.

Course Structure

This course consists of six modules including a two-part final project. Each module includes a mix of lessons and activities. Examples of lesson activities includes simulations, programs, and exercises that increase awareness of CT, showcase the integration of CT, and allow you to interact and develop CT into your subject area. The lesson activities also provide how-to steps for accomplishing tasks in the activities, links to learning more, activities for practicing the skills and getting feedback, and a discussion community for sharing ideas and getting help. The final project provides a chance for you to apply skills learned in the course.

Course Goals and Outcomes

As a result of completing this course, educators will achieve the following outcomes:

1) Develop a thorough understanding of computational thinking, the components of computational thinking, and how computational thinking can be integrated across a variety of subject areas, including your own.

2) Explore and reflect on a wide variety of computational thinking examples, activities, and lessons to deepen your own understanding of the topic and develop a collection of integration ideas and possibilities.
3) Design a computational thinking lesson that you will integrate into your own classroom, and reflect on this lesson to explore how it could be revised for future implementations.
4) Advocate for the integration of computational thinking at the school and/or district level, using your newly gained knowledge, examples, strategies, and lesson ideas.

Participant Profile

This Computational Thinking course is designed for all K-12 education audiences seeking to integrate computational thinking into their classroom.

ISTE Standards and Competencies

The course is designed and developed around ISTE's Standards, with a strong emphasis on the ISTE Standards for Educators, and ISTE Standards for Computer Science Educators.

Module Descriptions

MODULE 1: INTRODUCING COMPUTATIONAL THINKING

In this module, you will explore the foundations of computational thinking and where these concepts occur within different subject areas. You will also identify what defines a computational thinking problem.

MODULE 2: DECOMPOSITION

In this module, you will explore the difference between problem decomposition and task decomposition. You will also apply he skill of problem decomposition by scaffolding student learning.

MODULE 3: PATTERN RECOGNITION

In this module, you will explore the various modalities that can be considered data and identify some strategies to work with data to examine patterns. You will also reflect on the importance of data and pattern recognition in the computational thinking process.

MODULE 4: ABSTRACTION

In this module, you will work to define abstraction and explain its importance in the computational thinking process. You will also investigate using some patterns to abstract out essential information needed to create a solution for a problem.

MODULE 5: ALGORITHMS

In this module, you will be introduced to algorithms as an element that can help solve a computational thinking problem. You will work you activities to build your understanding of developing algorithms and the importance of developing clear and efficient algorithms.

MODULE 6: DESIGNING WITH CT IN MIND

In this final module, you will pull together the concepts you have learned and applied so far. Using the four elements of computational thinking as a process, you will create an artifact (lesson plan / unit plan / professional development plan) to implement into your own educational pedagogy. In the end, we'll ask that you actually give your artifact a test run, and report back on how it went, what you learned and what changes you might make.

Completion Criteria

To receive the certificate of completion, you must submit all assignments and turn in your final project with a score of at least 80% on each assignment.

Disclaimers

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NOTE: A variety of applications are highlighted throughout this course. Prior to using any of them with students, it is imperative that participants check the account requirements for each application against their school/district student data privacy policy to insure the application complies with district policy. In addition, some applications' Terms of Service may require parental permission to be COPPA and FERPA compliant for students younger than 13 years of age.

Content in this course is subject to change at instructor's or ISTE's discretion.