Online Computer Science Learning Opportunities for High Schools

QUESTION

What can I do if I don't have a qualified teacher in my school to teach computer science? What online student learning opportunities exist?

TOOL DESCRIPTION

This tool identifies online computer science learning opportunities for high schools, focusing on options for schools where there are no existing computer science courses.

WHY DO YOU NEED TO KNOW THIS?

School leaders who want to offer computer science courses often have a difficult time recruiting and hiring qualified teachers. Online options exist that enable schools to offer computer science courses as a first step toward developing a robust computer science program with properly credentialed teachers.

HOW DOES THIS TOOL HELP?

This tool identifies online computer science student learning opportunities high schools may consider offering to students when there are no regular computer science courses available. It also provides guidance for deciding which resources might be the best fit for your students.

TOOL CONTENT

CATEGORIES OF ONLINE LEARNING OPPORTUNITIES

There are, generally speaking, two categories of online computer science learning opportunities for students: **self-paced** and **instructor-led**. While there is some overlap between the two, this is a useful way to consider the various options available.

Self-Paced Online Learning Opportunities

Self-paced online learning opportunities include guided tutorials that lead learners through pages of content (often slides) coupled with periodic prompted questions to check learner understanding. Some of these opportunities involve occasional online interaction between students and instructors and require students to periodically sign in to complete assessments and/or receive feedback on assignments. Since these learning opportunities are self-paced, students can complete the online work in or out of the classroom.

Self-paced opportunities also include massive open online courses commonly known as "MOOCS." For example, Edx offers high school courses, including computer science and some programming options, (see https://www.edx.org/courses and filter for high school and CS). Coursera is another MOOC provider that offers computer science courses that could be used in a high school.

Other offerings have similar structure but do not attempt to cover the same amount of content that would be included in a full quarter or semester-long course. For instance, Code.org offers a series of activities organized within an introductory 20-hour computer science "course" for K-8 classrooms and Kahn Academy provides short online tutorials in computer programming and computer science. These offerings provide easy-to-use supplements for additional practice or enrichment for existing courses.

Instructor-Led Online Courses

Instructor-Led courses have an instructor who interacts regularly with learners. Many instructor-led options are intended for use in the high school classroom, with a classroom teacher serving as a course "proctor" or facilitator. As proctor, the teacher's primary role is to provide encouragement to the student, help students stay on track and complete homework, track student progress, ensure local criteria such as seat time are met, and to administer assessments. Most of the resources and instruction are online (e.g., students participate in question-and-answer activities, video lectures, chats, and video conferencing).

Instructor-led online courses often have registration fees. Further, some are open to all students, while others have selective enrollment criteria. Some are self-paced, while others are more structured, with specific instructional schedule requirements. Upon completion of an instructor-led online course, learners can request transcripts and/ or some type of record of completion. Examples of open enrollment, instructor-led online courses for high school include K12 International Academy, FLVS Global School, Connections Academy, and K12. Courses with selective enrollment requirements include Stanford University Online, the Institute for Mathematics and Computer Science (IMACS) distance learning program, Amplify's AP Computer Science online course, and the Johns Hopkins Center For Talented Youth (CTY).

Making Decisions About Online Computer Science

There are many things to consider when deciding on online options for computer science at your school. For example, school leaders will want to carefully review all resources provided by providers and consult with key school and district community members about what implementation can, and should look like to meet the specific needs of their school and students. While the effectiveness of online learning opportunities in general is not known, schools that do not currently have the teacher capacity to offer a computer science course may want to explore how to use these resources to support their developing goals for computer science learning.

Below are a few key issues to consider, listed alphabetically.

Bandwidth

Before adopting an online course to be delivered in a school building, it is important to determine the level of internet bandwidth that will be needed in order for students to fully engage in and with all course communications, tools, and learning activities. This is particularly important if the online learning opportunities in consideration are data-intensive (e.g., live video streaming). See the **An Introduction to Bandwidth in School Systems** tool to learn more about bandwidth needs and options in school-based settings.

Course Goals and Content

There are a large variety of computer science courses available, all with different course goals, content, and instructional designs. Some courses focus on a particular programming language, so ensuring that both hardware and software are available is critical. Others have prerequisites that are often not clearly defined. (e.g. Coursera's offerings require "basic high school math.") Review the course goals and structure carefully so that the online opportunity meshes appropriately with other content and expectations students will encounter on their trajectory through high school.

Credit

Most providers of instructor-led online courses offer grades or certificates of completion to students at the close of the course. The specifics vary, and determining if and how your district and state will accept these credits will be based in local and state requirements (e.g. some states and districts have rules that require a certain number of participation hours for students to be able to include course credit on their high school transcript). Be sure you understand the requirements in your location.

School-based "Proctors"

Local policies (and, frequently, teacher contracts) will often dictate the precise role of the teacher proctor. In many cases, the proctor needs to be an individual with a current teaching credential (in any subject) scheduled to mentor the student through the online class. Some online providers and school districts require some professional development for the proctor teacher, and their responsibilities include communicating with the online instructor, gathering course materials for the students (printers, headphones, workstations, reading materials, etc.), monitoring student progress, and administering assessments.

Suitability

It is important to keep in mind that online learning is a different experience for students used to interacting with a teacher in the classroom to push their thinking and field their questions. For some students, this different format can be challenging; for others who are more comfortable working at their own pace, and with little additional direct support, this type of learning opportunity may be a good fit.