EDUCATOR'S GUIDE TO ELEARNING

Tools, resources, and strategies to keep your students engaged while learning virtually

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DEAR EDUCATOR,

All of us at Intel recognize that you are being asked to do more than ever before. Teachers everywhere have been adapting to the role of online educator: having to lead your classes remotely with widely varying tools, creating engaging content and resources in an environment that is ever-changing. As a technology industry leader, Intel has developed this guide to help you better leverage technology as all of us continue to evaluate the best ways to support our students with online, virtual and/or hybrid learning models.

Some of you have school systems that have converted to an entirely online model of instruction while many others have adopted a hybrid approach that blends at-home learning with in-person instruction. Regardless of what your school system is doing, the last several months have likely created a profound shift in your work and home dynamic. My sincere wish is that this guide can help you to adjust to this “new normal,” if only just a bit.

As states and districts modify alignment to structured academic standards and testing requirements, I am hopeful that with your help your students will have time to identify personal passions, and have the opportunity to turn those passions into skills that will be beneficial to their futures. Intel has hired some of the top educators in the U.S. to help bring these curated recommendations and resources to you. I hope you find them helpful to your students’ learning journeys.

INTRODUCTION

This is an unprecedented time in education. Advances in technology and changes in pedagogy have uniquely positioned K-12 education to adjust to the COVID-19 disruption that, had it occurred even just a few years ago, would have proved even more challenging.

Intel believes this shifting landscape has provided educators a unique opportunity to explore the benefits of elearning and what it can truly offer. What practices have educators uncovered during this time that are more effective pedagogical methods? How have educators found ways to reach students who they were previously missing? How have leaders leveraged distance to elevate students' creative, collaborative, and critical strengths? Despite all of its challenges, technology has helped to unite us even as we isolate.

THE GOAL OF THIS GUIDE

An agile elearning ecosystem must sustain schools in a time of crisis, but more importantly, it symbolizes a school's leadership within their community.

The goal of this guide is to support educators with a collection of curated strategies, tools, and resources for elearning designed to be adaptable to their unique situation so they can remain dynamic, trusted leaders during these extraordinary times.

"COVID-19 has given us a once-in-a-generation opportunity to rethink and reimagine all parts of the learning experience...We have an opportunity to use this moment to address many of the long-standing challenges that have plagued our education system. But taking advantage of this moment requires action and vision—beyond just 'getting through' the moment."

- US Dept. of Education, COVID Collaborative Report

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One unexpected challenge many educators are now faced with is the need to transition to online learning from an in-person or hybrid instructional environment. Of course, this transition won't be without its missteps. Educators need to be comfortable with making mistakes and learning from them. With that in mind, educators already have their own pedagogical strengths which should serve as a launching point for digital classrooms. Now is not the time for a massive shift if an existing practice is transferable.

ADAPT YOUR LESSONS FOR ELEARNING

A transition to elearning may initially seem daunting, but educators should trust that their pedagogical instincts around designing effective learning experiences also hold true for an online or virtual classroom. While the goal of elearning is not to recreate the physical classroom, educators can make small, incremental changes to adapt their existing curriculum for the shift to elearning.

FOR ELEARNING AND INSTRUCTION

GET THE RIGHT TOOLS AND TECHNOLOGIES

Elearning allows teachers to deliver instruction one-on-one, in small groups, or to the entire class. It also supports student-directed activities and projects where learners make choices about what and how they learn, within content guidelines, and with teacher input. The strategic and thoughtful use of technology allows students to assert control over the methods by which they learn, thereby personalizing their educational experiences with anywhere, anytime connections to subject matter.

EXPLORE INNOVATIVE SKILL DEVELOPMENT

Intel's education for innovation approach is based on supporting and developing the necessary skills for students to succeed in the new collar, industry 4.0 economy. These skills for innovation represent seven categories of knowledge and practice that employers, such as Intel, are looking for in their workforce of tomorrow. As you make the shift to online teaching consider these innovator skill areas as places where you and your students can explore and learn together.

SET UP YOUR VIRTUAL ENVIRONMENT

One unexpected challenge many educators are now faced with is the need to transition to online learning from an in-person or hybrid instructional environment. Of course, this transition won't be without its missteps. Educators need to be comfortable with making mistakes and learning from them. With that in mind, educators already have their own pedagogical strengths which should serve as a launching point for digital classrooms. Now is not the time for a massive shift if an existing practice is transferable.

Moreover, educators are not alone. Whenever possible, they should align their methods with other educators and the needs of their students. What are their colleagues using? What have other educators already created? Flattening the learning curve is beneficial to all.

When designing a virtual classroom for elearning, educators should plan for two types of learning experiences: synchronous and asynchronous learning.

SYNCHRONOUS LEARNING

Synchronous learning experiences happen in real time with learners engaged concurrently. Examples of synchronous experiences include whole group activities and discussions as well as small group project check-ins. Effective synchronous learning experiences require a video conference tool, such as Zoom[1]. Most video conferencing tools support video chat, participant text chat, and screen sharing. Meetings can be recorded, and often can host "breakout" rooms where a large class can be separated into smaller sections to facilitate group work among students. Skype[2], Microsoft Teams[3], Webex[4], GoToMeeting[5], and Google Meet[6] are other video conference options, each with their own features that may best support your own students' needs.

ASYNCHRONOUS LEARNING

Asynchronous learning experiences happen over a period of time with learners interacting with content and completing assignments at their own pace, on their own schedule. Examples of asynchronous experiences include instructional videos, online coursework, and digital assignments. While asynchronous experiences can be delivered through email communications, most educators rely on a Learning Management System (LMS) to organize their digital classroom. Google Classroom[7], with its easy-to-use interface and G Suite for Education[8] integration is an attractive option for schools with Google education domains. Canvas[9], Schoology[10], and SeeSaw[11], are other popular K-12 learning management systems.

VIDEO CONFERENCING TIPS

- Activate closed captions. Many virtual meeting tools such as Zoom, Skype, and Google Meet offer this option. Visual learners, novice readers, and ELLs will benefit from hearing and seeing your words.
- Break larger classes into smaller video chat cohorts. For example, a teacher whose 35-student class meets from 11-12:30 may meet with half of the students from 11-11:45, and the second half from 11:45-12:30.
- Avoid the lecture format. As with flipped learning, "face time" may be better spent going over instruction that students have already received.

CLASSROOM NORMS

When shifting from in-person or hybrid learning, it's important to set up and maintain elearning classroom norms. If possible, involve students in the process of creating an "online class charter" to increase buy-in. You may want to consider some of the following:

- What comments are acceptable?
- When is an assignment late?
- How should students communicate with you outside of class time?

ADAPT YOUR LESSONS FOR ELEARNING

A transition to elearning may initially seem daunting, but educators should trust that their pedagogical instincts around designing effective learning experiences also hold true for an online or virtual classroom. While the goal of elearning is not to recreate the physical classroom, educators can make small, incremental changes to adapt their existing curriculum for the shift to elearning. This presents a growth opportunity for educators and their students, experimenting with new teaching and learning formats and routines, some of which will be added to their toolbox and benefit their instructional practices in the long term.

Well-designed elearning begins with a solid, foundational understanding of what students need to know and be able to do. Without the traditional constraints, educators are free to explore new opportunities for delivering instruction through a combination of independent practice, small group collaboration, project-based learning, and performance-based assessments. Educators may also leverage this opportunity for elearning to explore less-assessed but possibly more powerful skill areas like design and computational thinking. By starting with the existing curriculum, and finding opportunities for enhancement through elearning, educators can turn what feels like a challenging time into a productive time for themselves professionally and their students academically.

DESIGNING FOR ELEARNING

A shift to elearning doesn't require a massive shift in existing pedagogy or instructional design. With the right tools, elearning can present an opportunity to enhance or extend effective teaching practices.

TIPS FOR A SEAMLESS TRANSITION

- Research whether your curriculum providers offer digital activities
- Establish a routine and schedule
- Coordinate with other teachers when selecting digital tools

Existing Instructional Practices	Adapted for Elearning
Morning meetings and daily student check-in	Create a Google Form[12] for students to rate how they're feeling that day, answer a quick question, and share anything else with you
Collaborative project work with students in table groups	Use an online collaboration tool, such as Padlet[13] or Google Docs[14] for real-time group collaboration
Small group explorations with whole-group share out	Use break-out rooms during a Zoom[15] video chat for small group conversations, then groups present their findings to the whole class
Formative assessments to check ongoing progress	Create an online quiz with Quizlet[16] to track student performance and inform your instruction
Exit tickets to check for understanding after a lesson	Use Google Classroom[17] to create and assign exit tickets. Track and manage student scores online to assess understanding and identify at-risk students for additional practice
Engaging in-class learning games to review content before an exam	Set up a friendly online competition with Kahoot[18] to review key concepts before an exam
Performance-based summative assessments	Allow students to show what they know through creative digital tools like Adobe Spark[19]
Round robin instructional design for active student participation	Use online communication tools like Flipgrid[20] to receive a response from each student on a topic you provide
Teacher-directed instruction	Create asynchronous instructional videos using Screencastify[21] or YouTube Studio[22]
Multimedia lessons and multi-modal instructional strategies	Create interactive multimedia presentations and publish them online with tools like Nearpod[23] or Pear Deck[24]
Office hours outside of class for drop-in additional help	Establish digital "office hours" using video chat tools like Google Meet[25] or Zoom[26] where students can drop into a video conference room to ask questions and get help as needed

GET THE RIGHT TOOLS AND TECHNOLOGIES

Elearning allows teachers to deliver instruction one-on-one, in small groups, or to the entire class. A remote learning environment also supports student-directed activities and projects where students make choices about what and how they learn, within content guidelines and with teacher input. The strategic and thoughtful use of technology allows students to assert control over the methods by which they learn, thereby personalizing their educational experiences with anywhere, anytime connections to subject matter.

SUPPORTING LEARNING FOR ALL

When making the shift to elearning, schools must either have enough devices to send home with students, or provide resources that are readily available for all. Educators must assume that students and parents may not be familiar with every (or even any) elearning platform, so instructions must be clear, with enough scaffolding and support provided throughout. Ideally, districts have an idea of what access parents may have at home, and they have established the required infrastructure to provide technical support and access as needed.

As skill-building advances, so does the need for more computing power. For example, digital content in later grades, such as simulation and modeling labs, requires more powerful processors to run complex math formulas and rich data visualization tools. Digital classrooms that rely on collaborative involvement and communication among students also demand more powerful devices, ideally with integrated webcams.

NEW DEVICE PURCHASES

When considering a new device purchase to support students (or advise parents) there are a number of considerations to balance. Cost is often the top consideration, but it is also important to factor the needs of the learner over time. Simply put, while a low-cost device may suffice for this moment in time, it may not support you or your students' needs over time. For instance, a number of elearning approaches relying on rich multimedia applications, coupled with the challenges of distance learning, generally requires a more powerful device. Intel's portfolio of processors covers a wide range of capabilities applicable to different grade levels and for different needs of educators. Intel-based devices also feature hardware-enabled security, helping to protect information and ease the IT department's burden of maintaining devices.

ONLINE LEARNING TOOLS

- Notebook or desktop PC
- Video camera, microphone, speaker, and/or headset
- External mouse and keyboard
- Proper lighting (to work and broadcast)
- Comfortable chair and ergonomic positioning
- High-speed internet connection
- Video conferencing software
- Access to your SIS, LMS, and other teaching tools

"The more opportunities students have to communicate and collaborate with their peers online, the more likely they are to stay engaged in the learning happening online."

-George Couros, 4 Ideas for Student-Led Learning During Emergency Remote Learning

EXPLORE INNOVATIVE SKILL DEVELOPMENT

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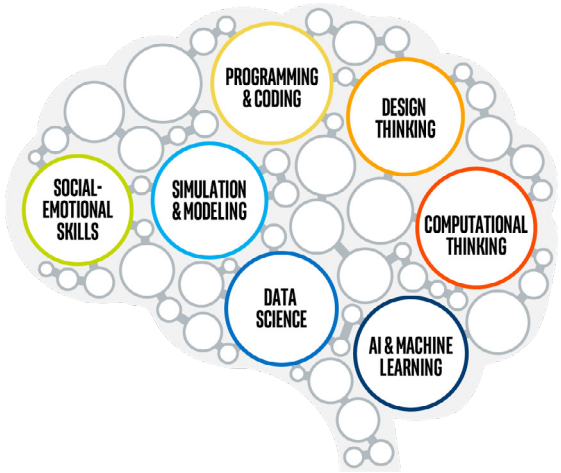


- Design Thinking
- Computational Thinking
- Programming and Coding
- Simulations and Modeling
- AI and Machine Learning
- Data Science
- Social and Emotional Learning

EMPLOYABILITY SKILLS GAP

Nearly every day, educators are inundated with reports about the STEM skills gap—low numbers of students pursuing STEM-based degrees at the university-level. In addition, the lack of classroom and course materials focused on these areas is creating a gap between what employers need and the abilities recent graduates possess.

Many employers cannot fill their vacancies because even highly qualified candidates don't exhibit the necessary skills for the jobs available. The current education systems, some employers argue, teach yesterday's skills to tomorrow's graduates. These skills include basic mathematics, critical thinking, complex and creative problem-solving, and the ability to adapt.

PREPARING FOR THE JOBS OF TOMORROW

Through approaches rooted in these STEM skills, teachers can expose K-12 students to a variety of knowledge domains that employers are seeking—now and in the future—as well as teaching the skills needed for success as lifelong workers and active citizens.

There are many components that make up industry 4.0 including machine learning, internet of things, artificial intelligence, and the rest of the skills for innovation defined by Intel, but what they all have in common is a shift in approach and mindset on the part of educators and students. This shift necessitates learners who can think critically, solve problems collaboratively, and be prepared to help the challenges of the future.

UNDERSTANDING INDUSTRY 4.0

- The Fourth Industrial Revolution
- OECD Future of Work and Skills Report
- Industry 4.0 and Digital Transformation
- The Impact of Industry 4.0 on Education

RIGHT TECHNOLOGY FOR ELEARNING

When it comes to students' devices, considerations such as processor power (which supports multi-tasking needs including participating in a video conference while completing an assignment), memory, and storage should be considered.

"We cannot teach our kids to compete with the machines who are smarter—we have to teach our kids something unique. In this way, 30 years later, kids will have a chance."

-Jack Ma, former head of Alibaba speaking to the 2018 World Economic Forum

INCORPORATE DESIGN THINKING

Design thinking is a process used across all industries to solve complex problems and discover new opportunities. It is an intentional, thoughtful process that starts with the specific audience who you are designing for and ends with a solution that will best fit their unique needs, as opposed to building a generic solution that is ultimately of little value to the end user.

Teaching students the process of design thinking can help them engage in creative solutions to curricular challenges they encounter while becoming deep thinkers and doers rather than merely test-takers. While design thinking is typically practiced with students sharing the same physical space, modern elearning environments can simulate the experience nicely. Online and/or virtual learning could also serve to draw out the contributions of students who might otherwise be too shy to present their thoughts and opinions in person. Design thinking utilizes a variety of elearning tools while leading students through an iterative process to create real-world solutions.

Design thinking is often broken down into the following six elements based on a model created by the d.school[27] at Stanford University:

- **Empathy**: the process of coming to deeply understand the needs and concerns of others;
- **Define**: coming up with an actionable problem statement that includes the insights and needs uncovered during the Empathy phase;
- **Ideate**: ideation, or idea generation, encourages people to think expansively and without constraints;
- **Prototype**: the production of an early, rough, tangible, and inexpensive version of the idea brought to life, so that its impact can be explored before its final execution; and,
- **Test**: if a student's prototype works, then this step can be the most rewarding. If not, it could be the most frustrating!

Seamless collaboration can often seem a challenge for teachers when overseeing elearning. But luckily, due to the strict phases of design thinking, students collaborate and interact with focused goals and expectations, keeping the project moving.

PROJECT IDEA: OUR HUNGRY PLANET DESIGN THINKING CHALLENGE

The Hungry Planet Design Challenge[28], from the California Academy of Sciences, tasks students with rethinking their food systems at home, at school, and in their communities. How healthy are the snack options in the school vending machine? Is there uneaten food that just gets thrown away at home? To extend this project into an elearning environment, virtual collaboration tools can be used.

For example, video chats can be used to conduct interviews and gain insights, with teams sharing their findings and defining themes. Next, students can work on shared documents or spreadsheets to refine problem statements before collaborating yet again to brainstorm ideas that solve the problem, with students voting on their favorites. Independently, students create prototypes of the ideas, then use video chat to give and receive feedback from others on the desirability and feasibility of the ideas. After the feedback sessions, the teams can create a virtual roadmap of ideas to put into action in the real world.

TAKE ACTION

One way to incorporate design thinking into elearning is to invite students to join you in designing your online or virtual classroom. The d.school at Stanford University has created a design challenge: Redesign Your Morning Routine.

What ideas will your students create when given the opportunity?

BE EMPOWERED AND EMPATHETIC

Design thinking shows students that their questions truly matter. It also allows a practical process for them to realize that they are problem-solvers, and that this process actually embraces mistakes as learning opportunities. This emboldens them to take positive risks—avoiding the pitfalls of perfectionism—while collaborating deeply and meaningfully with others. But perhaps most important of all, design thinking teaches empathy: putting students in someone else's shoes to see the world from a variety of perspectives in order to create relevant solutions.

SUPPORT THE SOCIAL AND EMOTIONAL NEEDS OF STUDENTS

Social and emotional learning (SEL) is the process of developing the self-awareness, self-control, and interpersonal skills that are vital for school, work, and life success. When students spend their time with adults who try to build strong relationships and acknowledge that students are human, they become more engaged learners. While SEL and human connection are most commonly employed in face-to-face environments, the structure can be embedded in synchronous and asynchronous elearning as well.

Social and emotional learning is often broken down into five abilities:

- **Self-awareness**: recognizing one's own feelings, strengths, and limitations;
- **Self-management**: regulating one's emotions, thoughts, and behaviors effectively in different situations;
- **Social Awareness**: taking the perspective of others from diverse backgrounds and cultures and empathizing with them;
- **Relationship Skills**: establishing and maintaining healthy and rewarding relationships with diverse individuals and groups; and,
- **Responsible Decision-making**: making ethical, constructive and respectful decisions regarding personal behavior.

To put these SEL abilities in context, ask students to practice these abilities in a situation that many are experiencing right now: stress around the uncertainty of the pandemic.

> **Problem**: *Experiencing fear during an international pandemic is normal and expected. How do we help students to soothe these concerns so that they can be emotionally and cognitively ready to learn?*

When interacting with students in a synchronous video or online chat, consider starting with a welcoming activity or routine. This can be a low-vulnerability activity such as asking students to share what is new with them or providing them with a list of numbered emotions and asking them to list as many numbers as they are feeling in the chat window. Model the usage of calming techniques such a "brain breaks" and "mindful minutes" where students can place their hands on their bellies and use their own breath to calm themselves down. When students see these techniques modeled by educators, they are more likely to utilize them themselves. Finally, when winding down an interaction, provide a reflection which highlights an individual and shared understanding of the importance of the work.

ACTIVITY IDEA: JOURNAL WRITING

Journal writing is one of the classic ways to encourage children of all ages to take a moment to reflect on themselves, their decisions, and their relationships. Give students the opportunity to practice free writing in their journal about whatever comes to mind without worrying about grammar or spelling. Prompts can be as simple as a single word that is relevant to your class, or involve student choice.

For example, you can allow students to choose a story from the StoryCorps[29] collection and write about how it might be to live a day in the life of the storyteller. StoryCorps is an independent, non-profit recording the lives and stories of everyday Americans. To develop this into a project, you can invite students to produce their own StoryCorps stories by recording interviews online with family and friends.

TAKE ACTION

Extend your learning with these resources:

» **The Collaborative for Academic, Social, and Emotional Learning (CASEL):** A resource for educators interested in specific activities for social and emotional learning

» **How to Teach Social-Emotional Learning When Students Aren't in School:** Specific strategies to help students maintain social connections, manage stress, and build supportive environments through distance learning

QUICK TIPS TO BUILD CLASSROOM COMMUNITY

» **Begin each live class with a chat prompt**. Ask students a silly, creative question that they can answer in the chat window.

» **Invite students to sign up as a field trip host.** Students can submit a short video of a tour of their home, their workspace, their yard, their pets...or, anything they'd like to share.

» **Ask students to teach mini-lessons themselves**. This could be a topic within the curriculum or a hobby they can do at home.

INTEGRATE COMPUTATIONAL THINKING

Computational thinking is a cognitive strategy that students employ to create solutions that deal with complexity and open-ended problems. Though computational thinking is often associated with computer programming, these processes and skills can help students approach and solve problems across many subjects.

Ideally, elearning environments create opportunities for students to do much more than simply study and memorize subject matter material. By leveraging computational thinking in projects, educators can facilitate elearning environments that challenge students to apply learning in relevant, realistic ways.

Computational thinking is often broken down into four elements:

- **Decomposition**: breaking down a problem into a hierarchy of smaller and more manageable problems;
- **Pattern** Recognition: identifying similarities across sets of problems or data;
- **Abstraction**: ignoring the details to be able to focus on what's most important; and,
- **Algorithmic Representation**: identifying a step-by-step or procedural solution to a problem.

Imagine asking students to practice these elements of computational thinking with a challenge many educators and students are encountering right now: the challenge of video conferencing.

> **Problem**: *Video conferencing is messy. How do we make sure that each student is engaged in the conference and feels valued?*

Ask students to break this problem down into smaller, more manageable parts, for example: too many students speaking all at once. Next, have students use the other computational thinking skills to better understand the problem and propose realistic solutions. Instead of the educator creating a video conferencing routine, students will be co-creating video conferencing norms with their teacher.

PROJECT IDEA: CONWAY'S *THE GAME OF LIFE*

The Game of Life[30], a cellular automaton created by mathematician John Conway, provides an ideal playground for practicing the elements of computational thinking. The "game" provides a low-floor, high-ceiling environment for students of all levels to explore varied math and science concepts. To start, give students an opportunity to explore The Game of Life in an open-ended manner. Ask them what they notice and what they wonder about the model. Give students the space to ask and answer their own questions. For example, they may investigate whether they can design cells that are "still lifes", "oscillators", or "spaceships." Others might investigate Conway's design criteria. In any case, students will be developing decomposition, abstraction, pattern recognition, and algorithms skills.

TAKE ACTION

Extend your learning with these resources:

- **ISTE U course: Introduction to Computational Thinking for Every Educator:** A 15-hour self-paced course to help you connect with other educators interested in designing learning experiences for computational thinking
- **Harvard GSE: Computational Thinking with Scratch:** A resource for educators interested in developing and assessing computational thinking
- **K-12 Blueprint: Video Collection of Computational Thinking Resources:** Noted educator Kiki Prottsman introduces concepts and approaches to integrated computational thinking into the classroom.
- **OER Tools for Computational Thinking and Computer Science:** Open Educational Resources (OER) are teaching and learning materials that are freely available online for everyone to use and can be remixed, revised, and redistributed at no cost.

START CODING AND INVESTIGATING COMPUTER SCIENCE

Futurists often say that the jobs of the future—the jobs that will form our students' careers—have yet to be invented. Therefore, the role of educators becomes less about teaching specific skills (such as computation and keyboarding) and more about facilitating students' development into flexible thinkers.

One aspect of the future that is certain is that it will require technological fluency—including the ability to use devices productively in life and career—as well as fluency in the processes and languages we use to communicate with computers. The current elearning environment provides an optimal opportunity for educators to increase student exposure to the languages, systems, and impacts of computing. For one, students will likely be using devices more often for learning: researching topics, completing assignments, and communicating and collaborating with peers and teachers. Second, the increased time for project-based learning creates an opportunity for students to creatively apply computer science fundamentals within the context of other subject matter material.

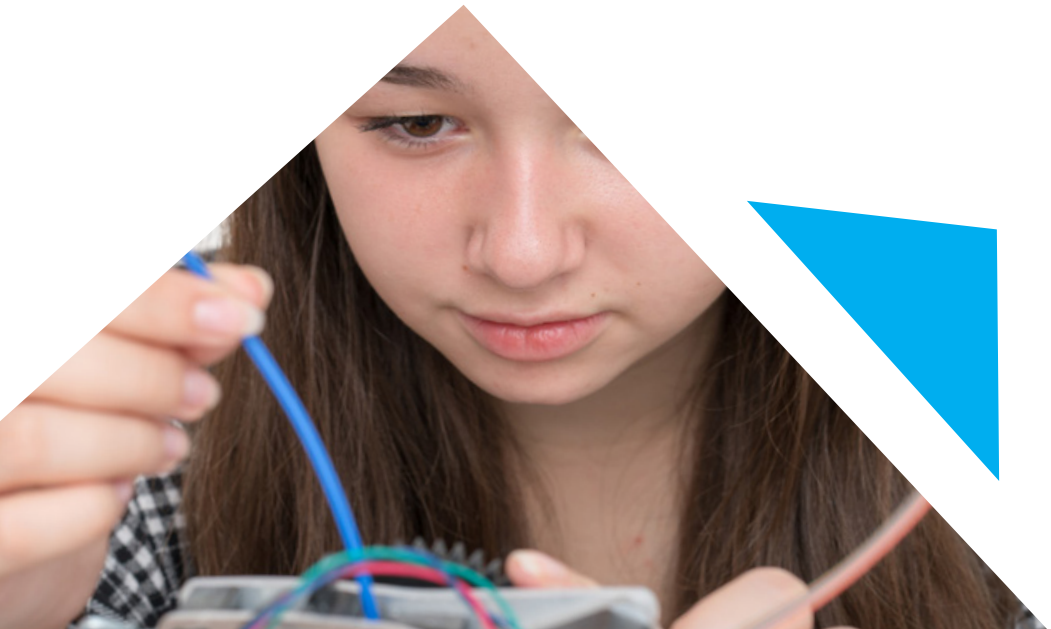
PROJECT: GAME DESIGN WITH SCRATCH

Scratch[31], the block based coding environment from MIT, is a great first-step in learning to code. Programmers across the age and ability spectrum can use Scratch to develop their coding skills and build increasingly sophisticated games. Initially, educators may use existing projects on Scratch to introduce important principles such as level design and game mechanics as part of video game design. Then, students can prototype their own games in Scratch. For a curricular extension, have students tie the characters, backgrounds, and storyline of the game to a relevant subject matter topic. Use the following resources to get started and learn more:

- Scratch for Educators
- Make a Game in Scratch Curriculum

EQUITY AND INCLUSION

Historically, the computer science industry has suffered from an underrepresentation of female and minority professionals. This lack of diversity means that the industry is missing a vast pool of talent; one with important perspectives that can help to solve the problems of tomorrow. Fortunately, Code.org[32] research is showing that earlier exposure to coding and computer science can help narrow the diversity gap, increasing the likelihood that women and minorities will take advanced computer science courses and enter the profession.



TAKE ACTION

Before students can apply computer science concepts effectively, they must learn the fundamentals. Many online resources can help students of all levels pick up these concepts in a self-guided, self-paced environment.

» The Hour of Code Express Course: leads learners through the progression of basic computer programming with a secondary emphasis on internet safety

» Khan Academy Computer Science: offers an overview of computer science fundamentals from algorithms to information theory

UNPLUGGED PROGRAMMING

Elearning does not mean that students are using devices exclusively; in fact, students should be learning without devices for a significant amount of their learning day.

Explore the following resources for teaching computer science in an unplugged environment:

» Hello Ruby

» CS Unplugged

APPLY SIMULATIONS, MODELING, AND ARTIFICIAL INTELLIGENCE

The modern world is exploding with data! This treasure trove of information can help us to better understand the world around us and improve human lives. Now more than ever, being able to understand, analyze, and make use of this data is a vital skill for success in both life and career. Online resources, such as those from the Concord Consortium[33], create opportunities for students of all grade levels to create and interact with models and simulations, ranging from patterns in mass transit data to the carrying capacity in the population of African lions!

Computers not only generate enormous amounts of data; they can also be trained to use this data to perform tasks that normally require human intelligence. These systems, referred to as Artificial Intelligence (AI), have evolved considerably over the past 50 years. The first examples of artificial intelligence—knowledge-based systems—used manually-programmed rules to define responses. Currently, computer scientists are building machine learning systems that use neural networks (similar to those in the human brain) to train themselves with huge amounts of data.

Digital modeling and computer simulations are equally as important mechanisms for creating visual and interactive representations of data. 2D and 3D modeling software helps architects and designers plan before they build, and helps researchers and engineers create prototypes of solutions to problems they are trying to solve.

PROJECT IDEA: AI IN THE WORLD AROUND US

Launch an investigation with students into artificial intelligence. First, give students a chance to explore one of the first examples of AI: Eliza[34], a knowledge-based computer program that acts as an online therapist. Then, introduce Google's Teachable Machine[35], and allow students to experience first-hand what it is like to train an AI model. With these experiences in mind, invite students to take a fresh look at the world around them. What examples of AI can they find in their homes and their communities? How do these work? What do students think are the ethical implications of AI?

ESPORTS

Online and video gaming has risen to the point where it can no longer be ignored by schools. With hundreds of schools participating in various leagues across the U.S. and the world, esports is set to have a major impact on STEM learning, college- and career-readiness, and the tech industry as a whole. A transition to elearning provides an opportunity to pause and rethink traditional approaches to education, including the introduction of esports.

While first-person-shooters and multi-player online battle arenas are often the first thing that comes to mind when it comes to esports, there are also a number of esports-related titles that are rooted in simulation and modeling. From connecting with students virtually in a simulated world modeled in Minecraft or a virtual farm created in the Farming Simulation to developing collaboration skills in a team role-playing game, consider the value and the opportunity of esports as an elearning medium. For more information on the value of esports in K-12 education, read Leagues of Learning: The Rising Tide of Esports in K-12 Education[36].

TAKE ACTION

Challenge students to keep up with computers by flexing their data literacy muscles and expanding their understanding of artificial intelligence, simulations, and modeling with the following resources:

- YouCubed Data Science: A collection of resources for increasing students' data literacy
- ISTE U Artificial Intelligence Explorations and Their Practical Use in Schools: A 30-hour, self-paced course on introducing artificial intelligence to students
- Two Point Hospital: A simulator where users are put into the role of hospital administrator
- Farming Simulator Esports League: A growing simulation-based esports league with players competing from across the globe
- Minecraft: Education Edition: helps educators develop project-based challenges focused on STEM curriculum
- Tinkercad: A robust simulation and modeling tool designed for students of all ages

ED-TECH INFLUENCERS

» Teaching During COVID-19
Request to join via your Facebook account, then explore this group sharing tips, strategies, and advice about remote teaching and learning.

» Naomi Harm
An ed-tech thought leader with an incredible passion for infusing STEM innovation into all of her professional learning offerings.

» Kathy Schrock
An education-technologist and presenter.

» Vicki Davis
Educator, author, and speaker.

» Tim Lauer
Principal, educator, and ed-tech specialist.

» Eric Sheninger
Principal, educator, and author.

» George Couros
Education researcher and blogger.

» Hall Davidson
A serial early adopter of new technologies that support teaching and learning.

SOCIAL MEDIA AND OTHER SITES

» #remotelearning
A Twitter hashtag sharing teaching and remote learning thoughts.

» #edchat
A general hashtag used on Twitter about education issue.

» #CovidEdu
A COVID-19 and education-related feed on Twitter.

» Distance Learning Technologies

» Online Museum Tours

» Social Distancing Scavenger Hunts

» Wide Open School

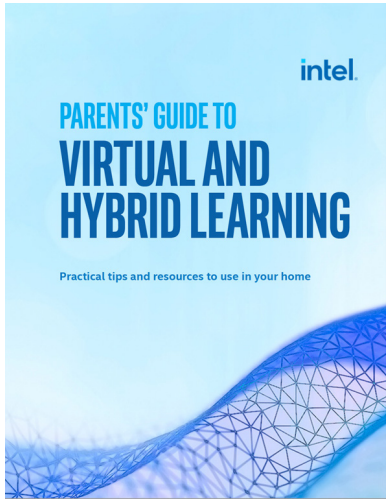
» The Albert Team Tools for Distance Learning

» Coding and Machine Learning for Kids

» Google Experiments

» K-12 Blueprint

PARENTS' GUIDE TO REMOTE LEARNING



In addition to this guide for educators, Intel has commissioned the creation of a Parents' Guide to Virtual and Hybrid Learning[37] along with a collection of supplemental resources you can provide to parents.

ABOUT THIS GUIDE

Clarity Innovations

This guide was authored by the educational technology experts at Clarity Innovations, Inc.[38] They bring together current and former education practitioners with technologists to develop solutions that improve the process and practice of teaching and learning. Contributors include Lisa Fisher, Dale Basye, Laura Davis, Tod Johnston, Kailey Rhodes, and Steve Burt.

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