

Overview of Day

- Mini-Lecture - Questions / Issues
- Presentation: AI in Education
- Activity 1: What is AI?
- Introduction to Week 7: Design Thinking



Questions / Issues



**DRIVING
QUESTION:**
How will Artificial
Intelligence impact
Learning and Work?

Activity: What is AI?

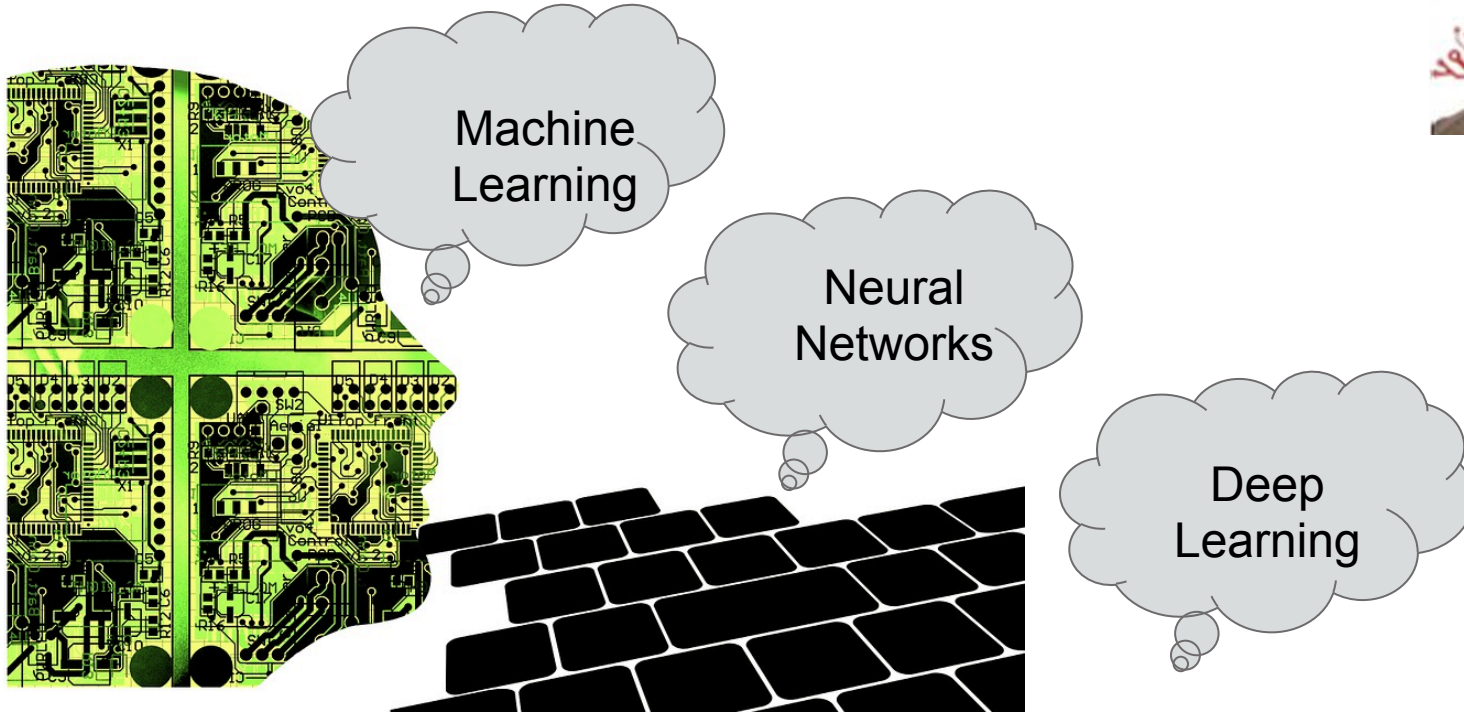
- Write as many ideas as you can think of that you think about when you hear the words “Artificial Intelligence.”
 - Put each idea on a Post-It Note. Try to keep your ideas to no more than 3-5 words
-

What is AI?

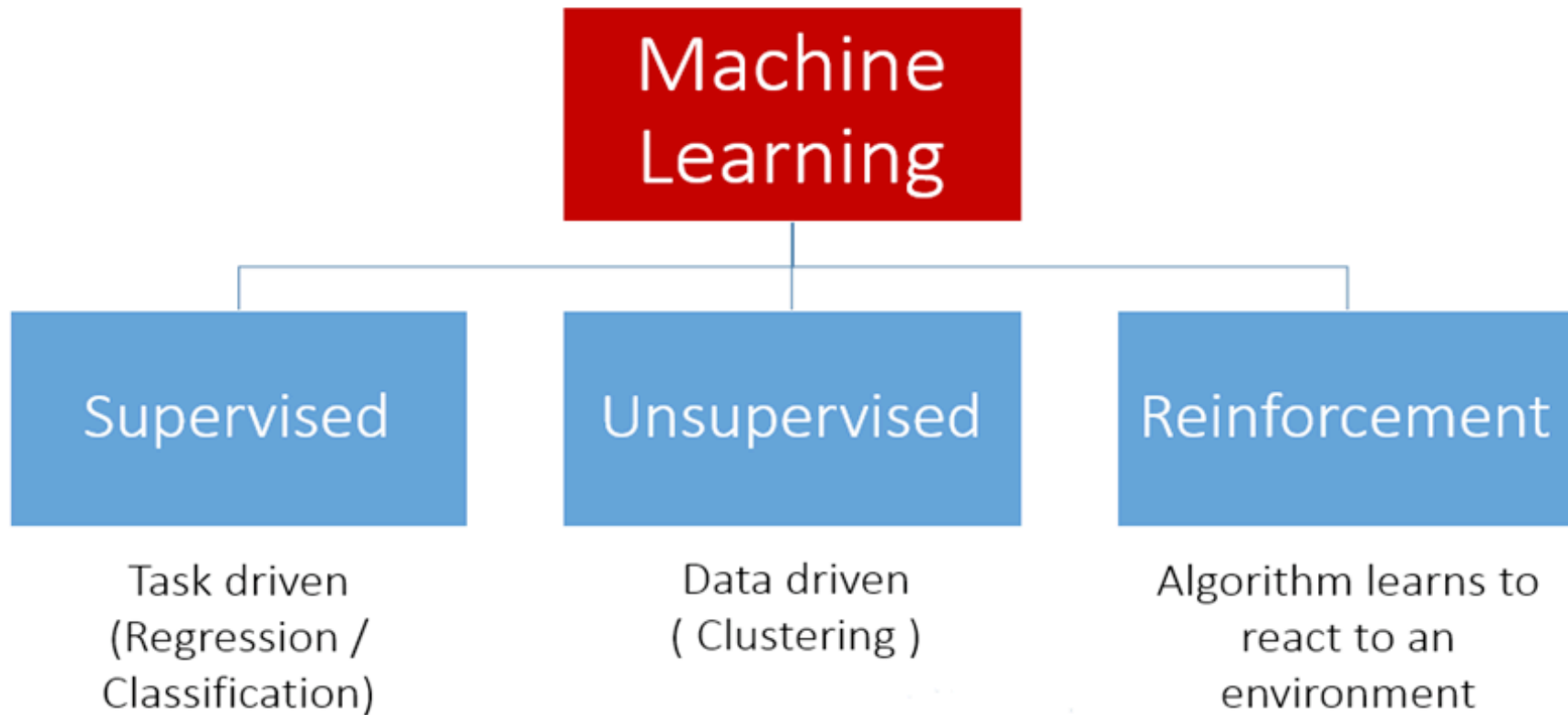


Field of computer science focused on systems that can “think” independently to solve problems.

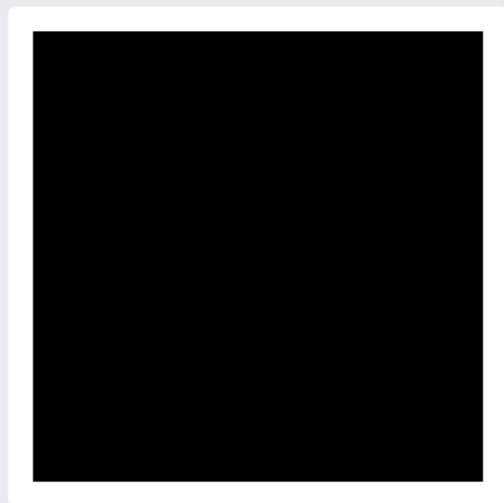
Ingredients of Contemporary AI



Types of Machine Learning



INPUT






LEARNING

0 EXAMPLES	CONFIDENCE
	<input type="text"/>
	TRAIN GREEN
0 EXAMPLES	CONFIDENCE
	<input type="text"/>
	TRAIN PURPLE
0 EXAMPLES	CONFIDENCE
	<input type="text"/>
	TRAIN ORANGE

OUTPUT

[GIF](#) Sound Speech

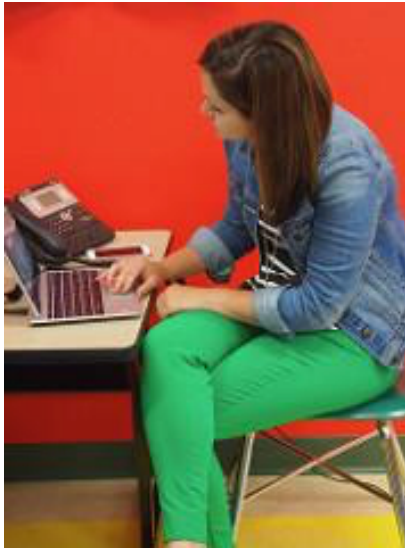
  

Potential of AI in K-12

Micro-personalized learning



Pedagogical support for teachers



Insight for administrators



AI in Education: Now and the Future

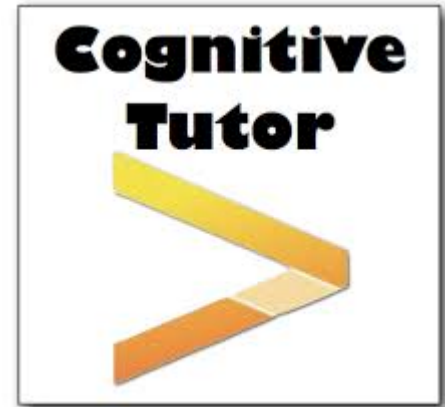
Mixed Reality: Montour



IBM's Watson Classroom



Cognitive Tutor: MATHia



Augmented Reality: Montour



Carnegie Learning: Cognitive Tutor

- Developed out of learning science research at Stanford and Carnegie Mellon
- Began in 1980s

In vivo study: Correct and incorrect worked examples in Algebra learning

Julie Booth, Ken Koedinger

Ben was asked to solve the following equation for x , and he made a WRONG first step to solve the problem. Look at his first step.

$$3 = 2x - 7$$

$$2 = 2x$$

What did Ben do?

Added 3 to 3x

Added -3 to 5x

Why is that a WRONG step for Ben to take?

It is illegal because

It is illegal because

It combines terms that are not like terms.
It performs the operation to one side of the equation.
It moved a term without changing the sign.
The math was not correct.

Incorrect worked example with self-explanation prompt, built with CTAT

Ben was asked to solve the following equation for x , and he made a GOOD first step to solve the problem. Look at his first step.

$$3 = 2x - 7$$

$$10 = 2x$$

What did Ben do?

Choose One

Why is that a GOOD step for Ben to take? Please answer both why it was a LEGAL and a HELPFUL step.

It is legal because

It is helpful because

Correct worked example with self-explanation prompt, built with CTAT

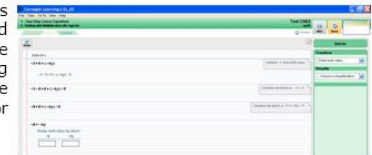
Study Design

Self-Explanation of Correct Examples

Self-Explanation of Incorrect Examples

	No	Yes
No	Control	Typical
Yes	Corrective	Typical + Corrective (half of each)

CTAT tutors interleaved with Carnegie Learning Cognitive Tutor



MATHia: New Directions in AI

The screenshot shows the MATHia X web interface. The browser address bar displays the URL: cdn.carnegielearning.com/apps/k12/1.0.29/sap/index.html#lesson/7?configUrl=http:%2F%2Fk12-svc.carnegielearning.com%2Fservices-k12-webapp-1.0.29%2Fconfig. The page title is "MATHia X". The navigation bar includes "Home", "System Help", "Glossary", and a user profile for "John F.". The main content area is titled "Current Workspace 1 of 1: Solving with Multiplication (Type In)" and "Go to Workspace". The lesson content is as follows:

a. To determine whether $x = 10$ is a solution of the equation $\frac{x}{2} - 1 = -4$, substitute 10 for x into the equation and simplify.

$$\frac{10}{2} - 1 \stackrel{?}{=} -4$$

Substitute 10 for x wherever x occurs in the equation.

$$5 - 1 \stackrel{?}{=} -4$$

Divide: $10 \div 2 = 5$.

$$4 \neq -4$$

Subtract: $5 - 1 = 4$.

The resulting equation is not true, so $x = 10$ is not a solution of the equation $\frac{x}{2} - 1 = -4$.

b. To determine whether $x = -6$ is a solution of the equation $\frac{x}{2} - 1 = -4$, substitute -6 for x into the equation and simplify.

$$\frac{-6}{2} - 1 \stackrel{?}{=} -4$$

Substitute -6 for x wherever it occurs.

$$-3 - 1 \stackrel{?}{=} -4$$

Divide: $\frac{-6}{2} = -3$.

$$-4 = -4$$

Subtract: $-3 - 1 = -4$.

The equation resulting equation is true, so $x = -6$ is a solution of the equation $\frac{x}{2} - 1 = -4$.

Key Terms: equation, variable

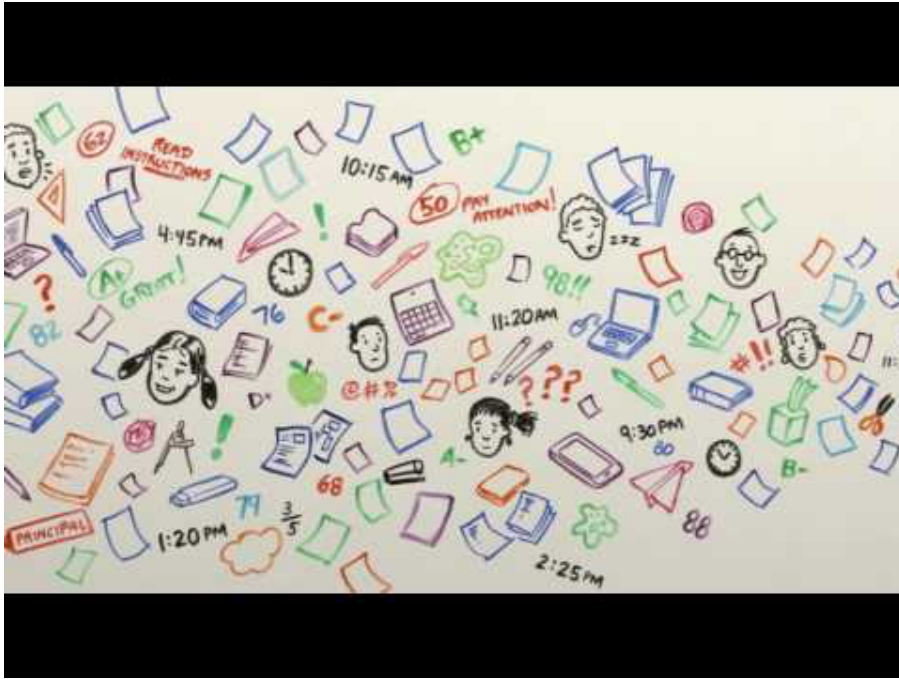
Skills You Will Learn:

- Check a solution of an equation using substitution.
- Solve equations using division and addition or subtraction.
- Solve equations using multiplication and addition or subtraction.

© 2013 Carnegie Learning Carnegie Learning

Steve Ritter: “We want to solve math problems not necessarily in the best way, but in the way that *students* solve problems.... So when a student makes a mistake, we know why.”

IBM's Watson Classroom



- Watson Wins Jeopardy
- Jill Watson Goes to College
- Watson gives cancer doctors a new tool
- Watson takes on Education

Carnegie Mellon: Mixed Reality



Ken Koedinger: Because the AI vision algorithms can “see” what students are doing, the system can provide targeted and structured— but minimal — guidance that’s “very much oriented towards active learning and maximizing students’ constructing their own knowledge.”

Norilla in Action: Mixed Reality



- AI + 3D learning = force multiplier.
- 5 Times better learning compared with video
- 2 Times better than hands-on

Focus on Learning

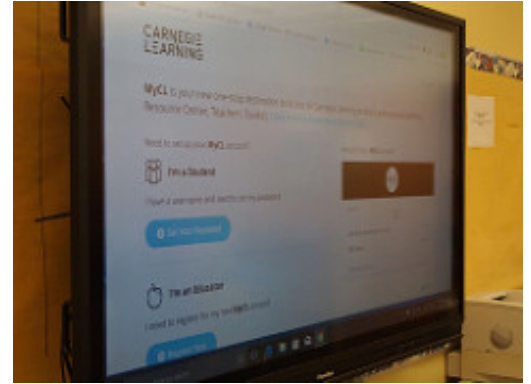
“Montour School District is Student-Centered... Future-Focused. Montour’s pioneering **AI initiative** will provide students with expanded **inquiry-based** learning opportunities and a platform to **interact with data**. Our goal is to empower students to be **creators** of the future.”

Time to Reflect

Based on what you've heard about AI in Education what do you think Montour incorporated into their middle school program – the first comprehensive approach in the country?

Focus for Learning: Montour MS

- Digital Ethics
- Data Literacy
- Autonomous Robotics
- Music
- Creative Problem-solving
- Career Awareness

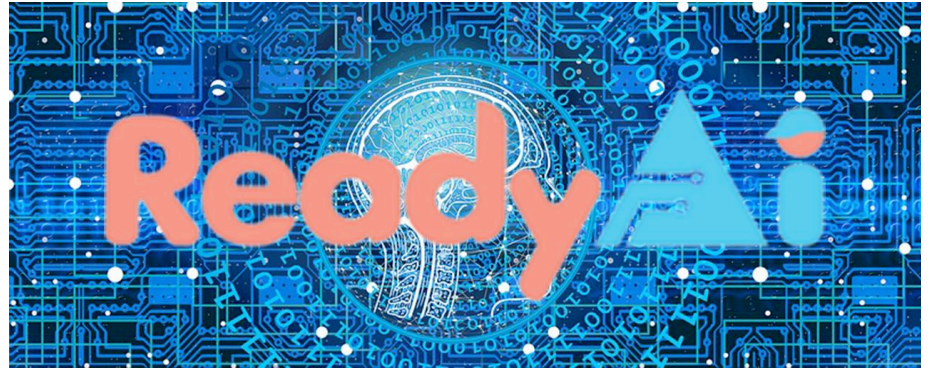


Autonomous Robotics



Autonomous Robotics

First
Comprehensive
K-12 AI program to
“use AI to change
the world” (Justin
Aglío)



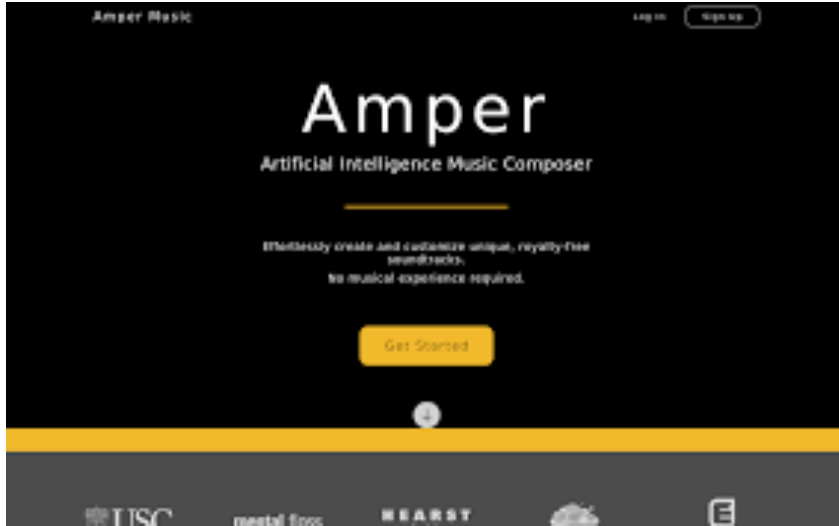
Digital Ethics



Project

AI + Ethics Curriculum for Middle School

AI Music



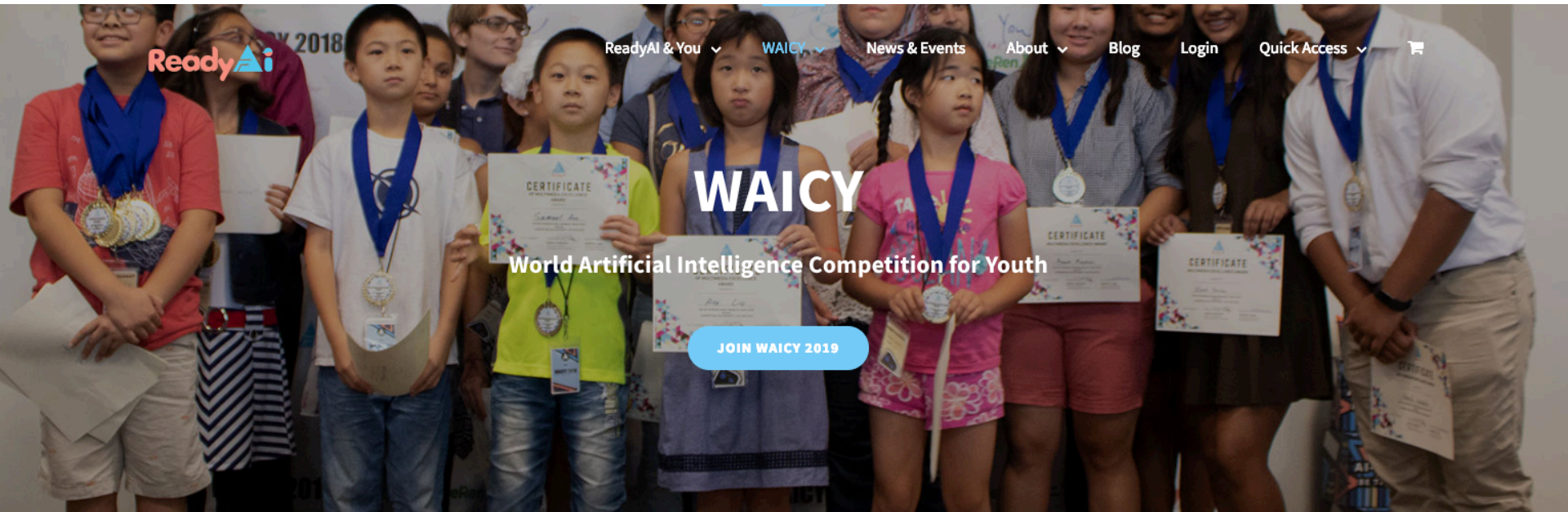
Whether you need music for a video, podcast, or another project, ... Creative AI quickly makes music that fits the exact style, length, and structure you want.

Problem Solving: PBL online

I am not sure I have EVER seen students so enthusiastic to not only learn, but to demonstrate and present to me what they learned about computer programming and artificial intelligence. - Jamie Sterling (Carnegie Learning)



World AI Competition for Kids



Ready AI

2018

Ready AI & You

WAICY

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World Artificial Intelligence Competition for Youth

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Higher Education Success Stories



Deakin Genie

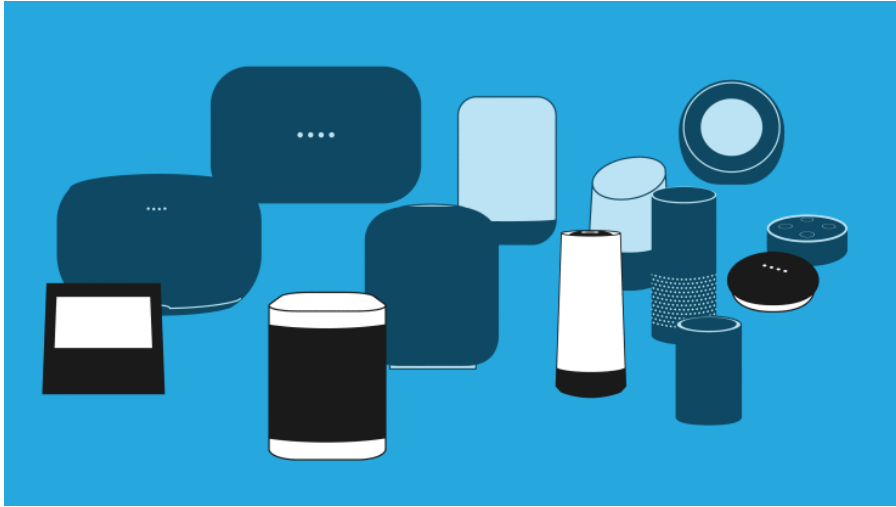
- Chat Interface
- Voice Recognition
- Machine Learning



Pounce

- Chat Interface
 - Address “Summer Melt”
 - 21% reduction
-

Issue: Voice-activated Devices



Lynette Attai: “Some schools are beginning to use tools like Alexa, but they need to be very cautious that here is also a very complex matrix of federal and state student data privacy laws, and since many of the commercial AI products were not initially built for schools, some have not yet been configured to work within those requirements.”

Tips from Experts



Expert
tips

- Get Smart about Data (Donna Williams)
 - Algorithmic Bias
 - Algorithmic Aversion
 - Over-reliance on Algorithms
 - Take Stock of your Technology Readiness
 - Train Teachers
 - Protect and Model Safe, Ethical Use of Data
 - Partner with Experts
-

Week 6: Design Thinking

Read: article Energy Innovation Center Design Challenges

View: Video or other resources

Expert: Norton Gusky
