

AI for K-12

ReadyAI's Workshop and WAICY as a Classroom Example

Roozbeh Aliabadi, ReadyAI

New York, NY
Feb 9, 2020

Who we are

Empowering **all**
students to **improve**
our world with **AI.**

“
What We've

Tried

”



AI-IN-A-BOX

2018

A bundled solution of robots,
accessories, and curricular
resources

10000+ students





WAICY

The World Artificial Intelligence
Competition for Youth

2018 & 2019

600+ Students

150+ Projects

8 Countries

- global competition
- students learn and use AI technology to solve real problems



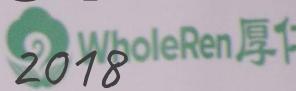
WAICY

2018



ReadyAI





WAICY

WAICY 2018

WAICY 2018



WholeRen 厚仁®

Ready

WholeRen 厚仁®

Ready

Evan
Zhao

Ji
Li

WholeRen 厚仁®

Ready

Song Jia

Cyber
chart





WAICY

2018





WAICY

2018



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WAICY

2018



ReadyAI

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WAICY

2018



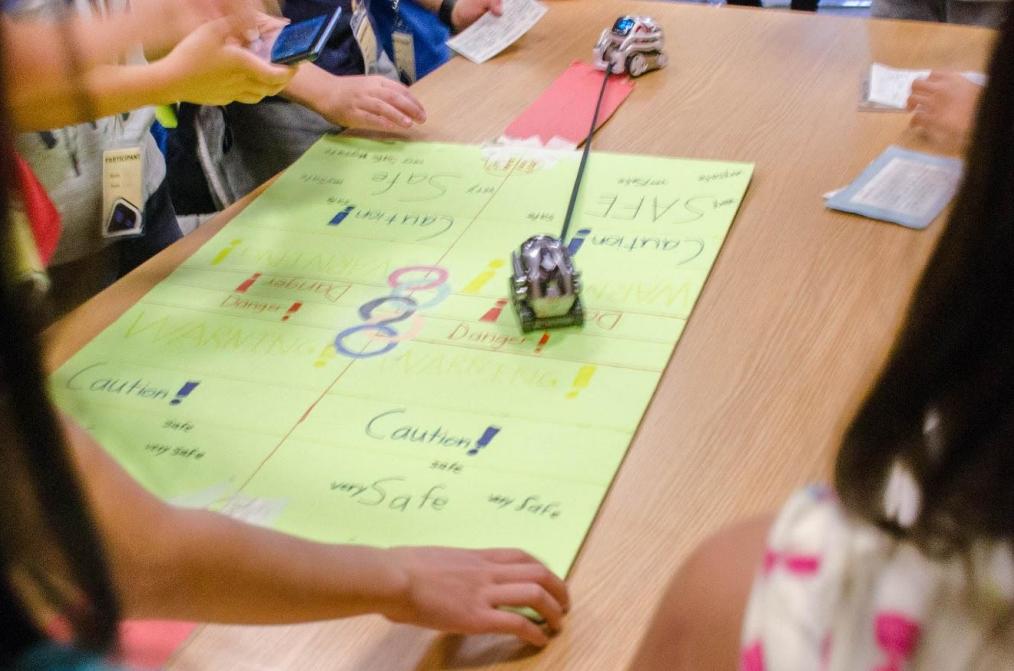


WAICY

2018













WAICY

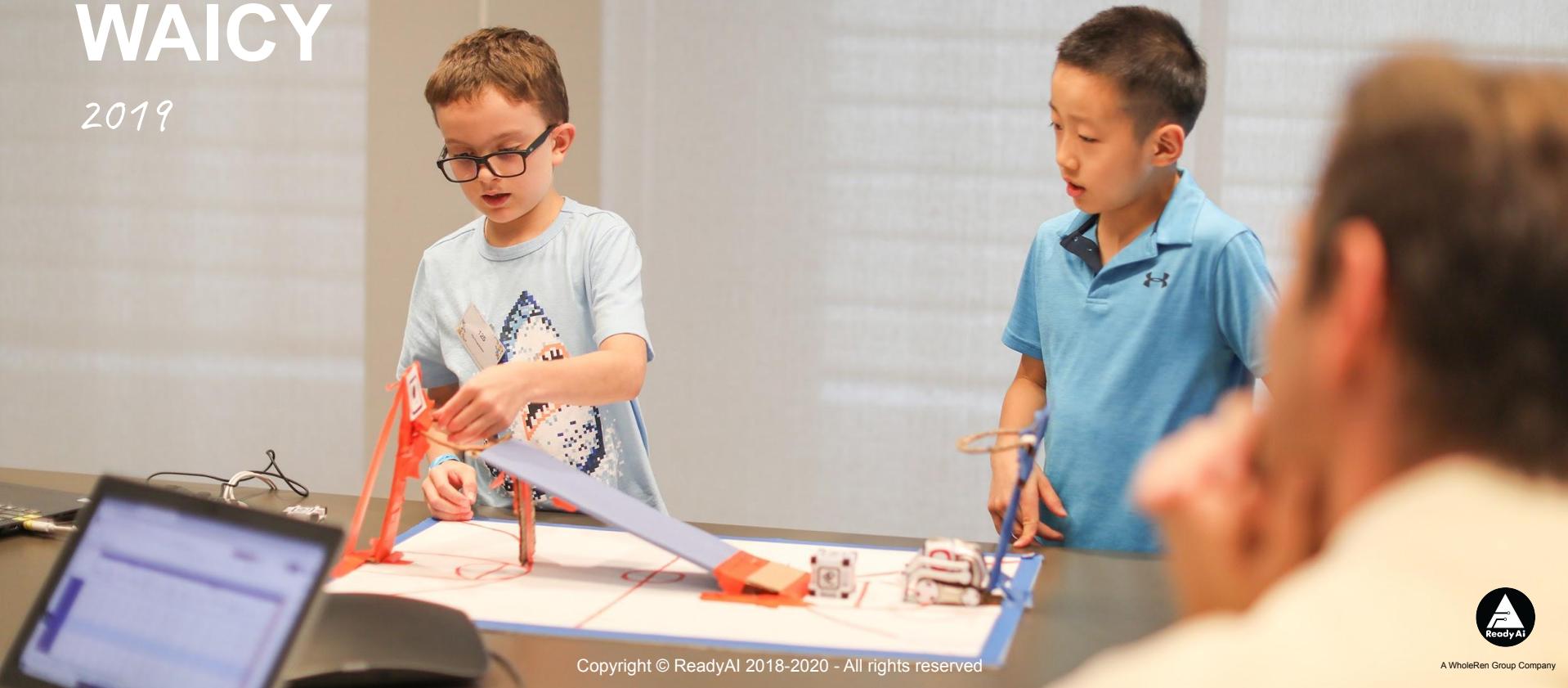
2019





WAICY

2019





WAICY

2019



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WAICY

2019



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Assessment

WAICY Grading Rubric WAICY 2019 - AI Showcase								
Artificial Intelligence Criteria	Big Idea #1	Big Idea #2	Big Idea #3	Big Idea #4	Big Idea #5	Points (Maximum 50 points)		
Definition	Computers perceive the world using sensors.	Agents maintain models/representations of the world and use them for reasoning.	Computers can learn from data.	Making agents interact comfortably with humans is a substantial challenge for AI developers.	AI applications can impact society in both positive and negative ways.	/50		
Score								
Multimedia Criteria	Areas for Improvement (0-2 points)		Meet Expectations (3-5 points)		Beyond Expectations (6-8 points)		Outstanding (9-10 points)	Points (Maximum 10 for each criterion)
Story Line/Game Logic	Clarify the story line or the game logic; Make sure the project is original		The story line or the game logic is clear; The story line or the game logic is adapted from existing material		The story line or the game logic is clear and shows creative thinking		The story line or the game logic is very clear, creative, and entertaining	/10
Visual Design	Include a set design so that the scene is complete		Set design and set construction create an environment that fits the scenario in the presentation		Set design and set construction enable the robot to interact with the set; Custom objects show good design and are visually appealing		Set design and set construction show intricate design and fabrication; Custom objects interact with the robot on multiple levels; Overall non-robot components are visually appealing and/or artistic	/10
Audio Design	Include sound effects, narration, or music to enhance the overall viewing experience		Some use of audio; Sound effects, narration, or music create an environment that fits the scenario in the presentation		Good use of audio; Sound effects, narration, or music include customized audio that creates an environment that fits the scenario in the presentation		Overall creative and thoughtful audio design; Sound effects, narration, or music are integrated in a way that enhance the story line or the game experience	/10
Theme/Message	Focus on a theme or message that you want your presentation to have		There is a relatively concise and clear theme or message		The theme or message is clearly demonstrated through interactions and scenes in the presentation		The theme or message shows social awareness and/or meaningful human-robot interaction	/10
Preparation and Delivery	Become more familiar with the presentation; Spend more time preparing for the questions		Presenter is knowledgeable about the presentation and the entire design; Presenter stays on point and shows enthusiasm; Presenter has good interaction with the judges and audiences		Presenter reflects a deep understanding of the entire design; Presenter conveys enthusiasm and enhances the presentation; Presenter responds readily and comfortably to questions		Presenter reflects a deep understanding of the entire design and shows thoughtful preparation; Presenter strongly conveys enthusiasm and affects the audience to a great extent; Presenter reflects on and can make suggestions to improve the presentation	/10
Judge				Team ID		Total Score	/100	



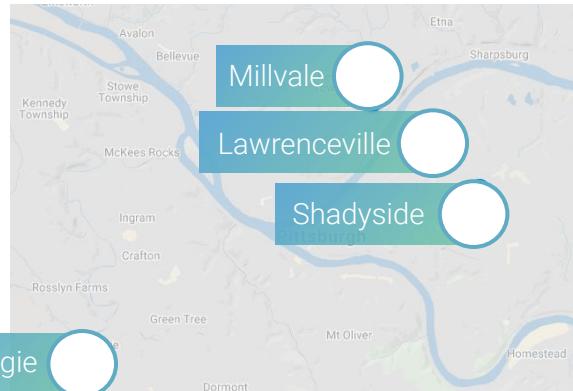
BOYS & GIRLS CLUB

2018



► BOYS & GIRLS CLUB 2018

Western
Pennsylvania



- 16-week programs
- Piloted in Fall 2018
- 4 locations
- 4 instructors
- ~120 total students

Nationwide



WE TEACH AI

- Community centers
- Libraries
- Schools
- 2000+ students



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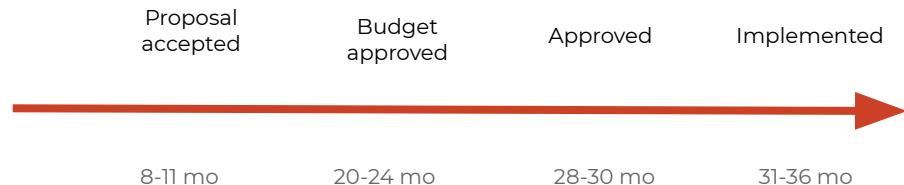
WE TEACH AI

0

Classrooms in Pittsburgh
teaching AI



Time to classroom is **too slow**



Lack of access for
underserved students



Continued lack of
diversity in tech



Girls

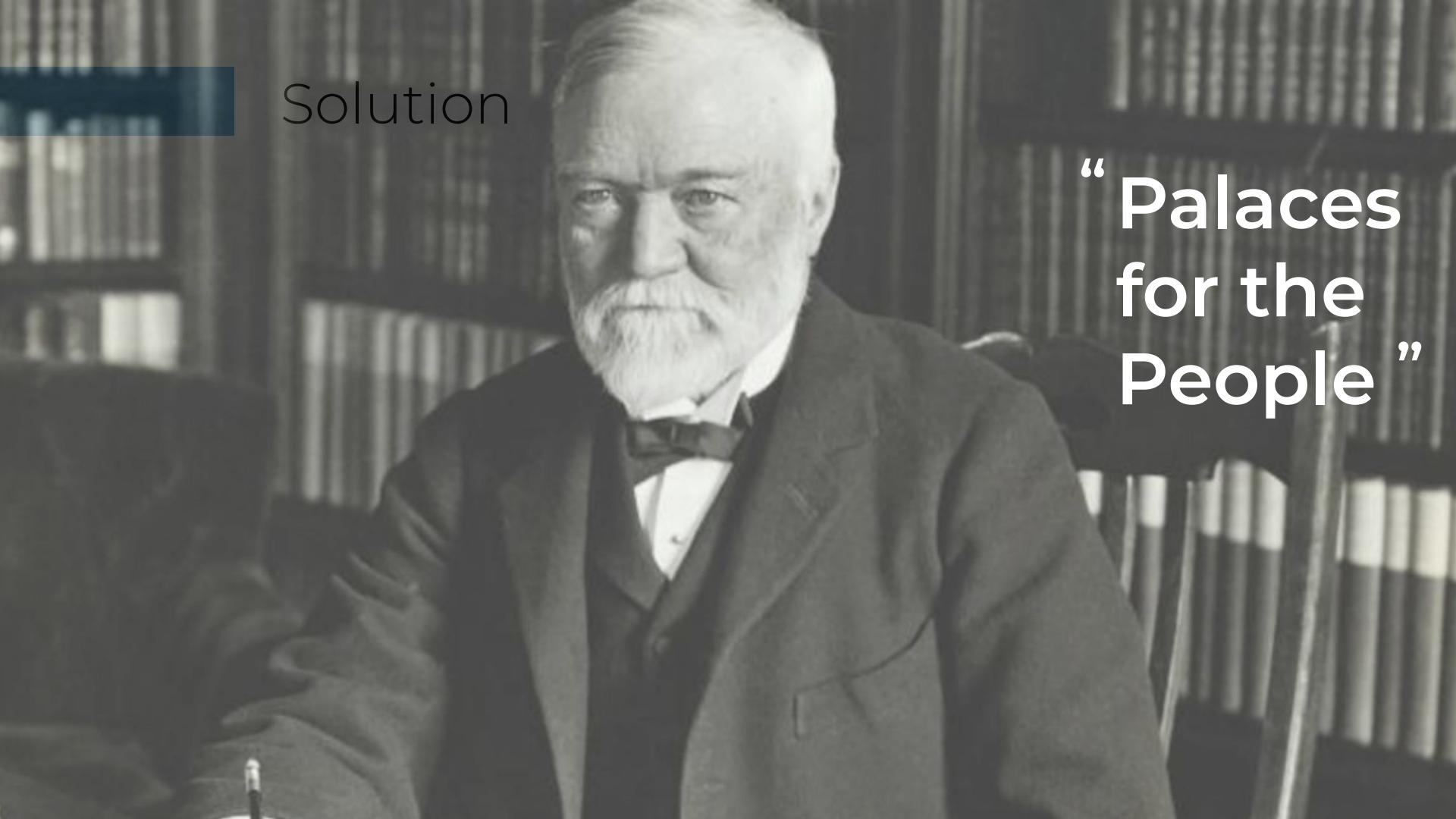


Low-income
students



Minorities





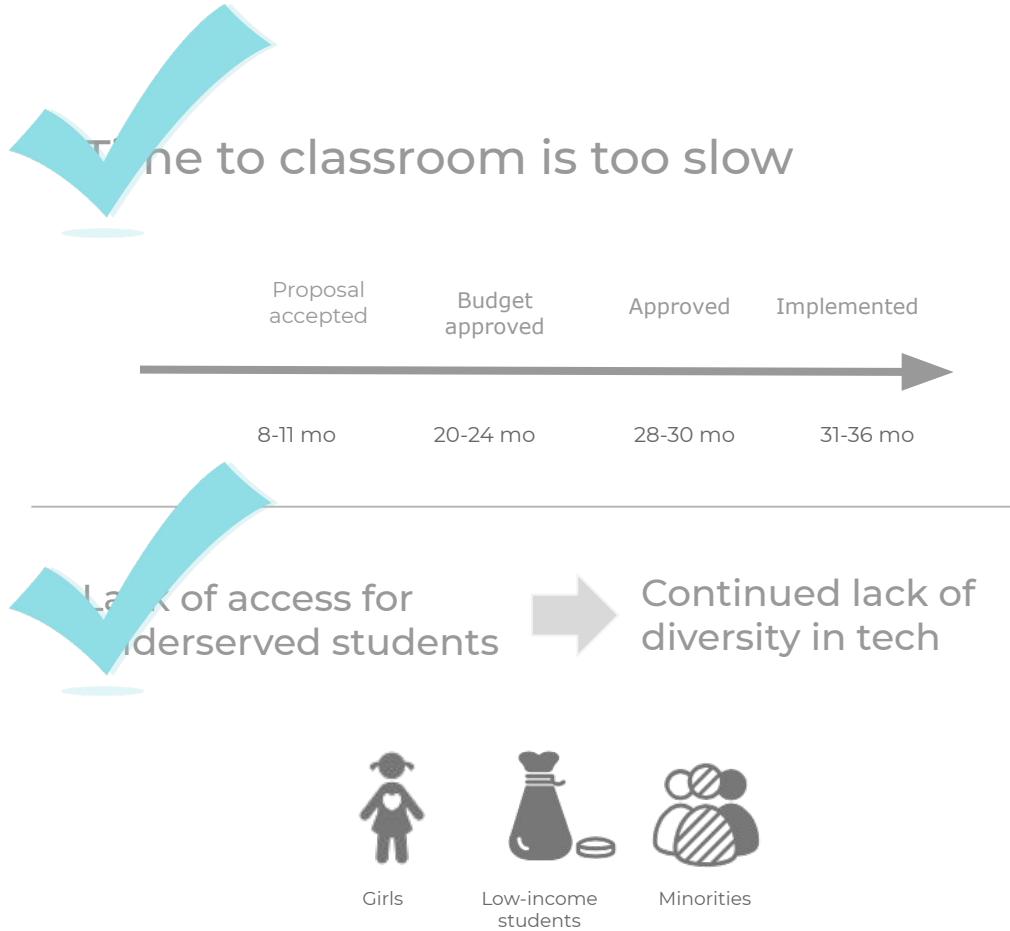
Solution

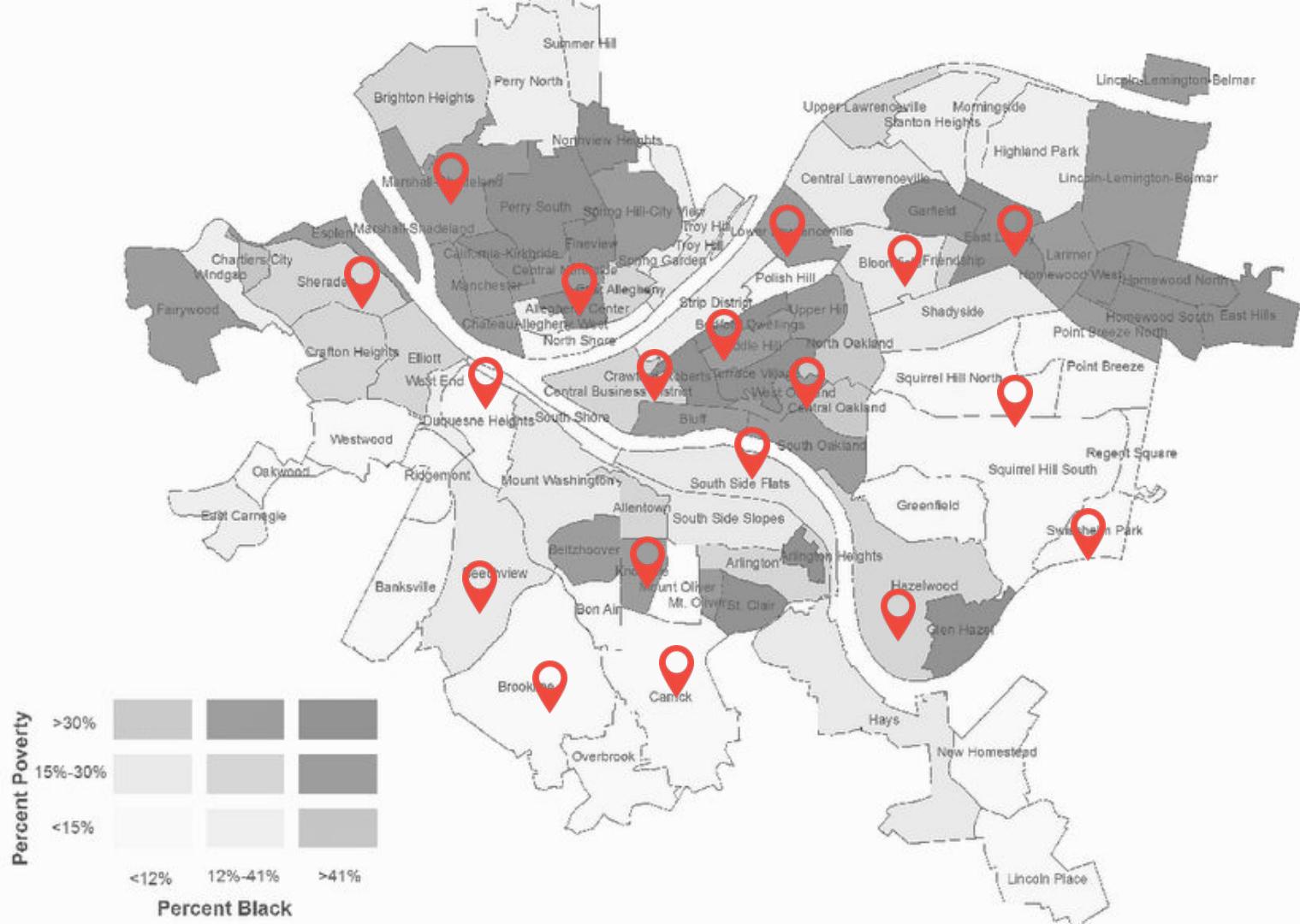
“ Palaces
for the
People ”

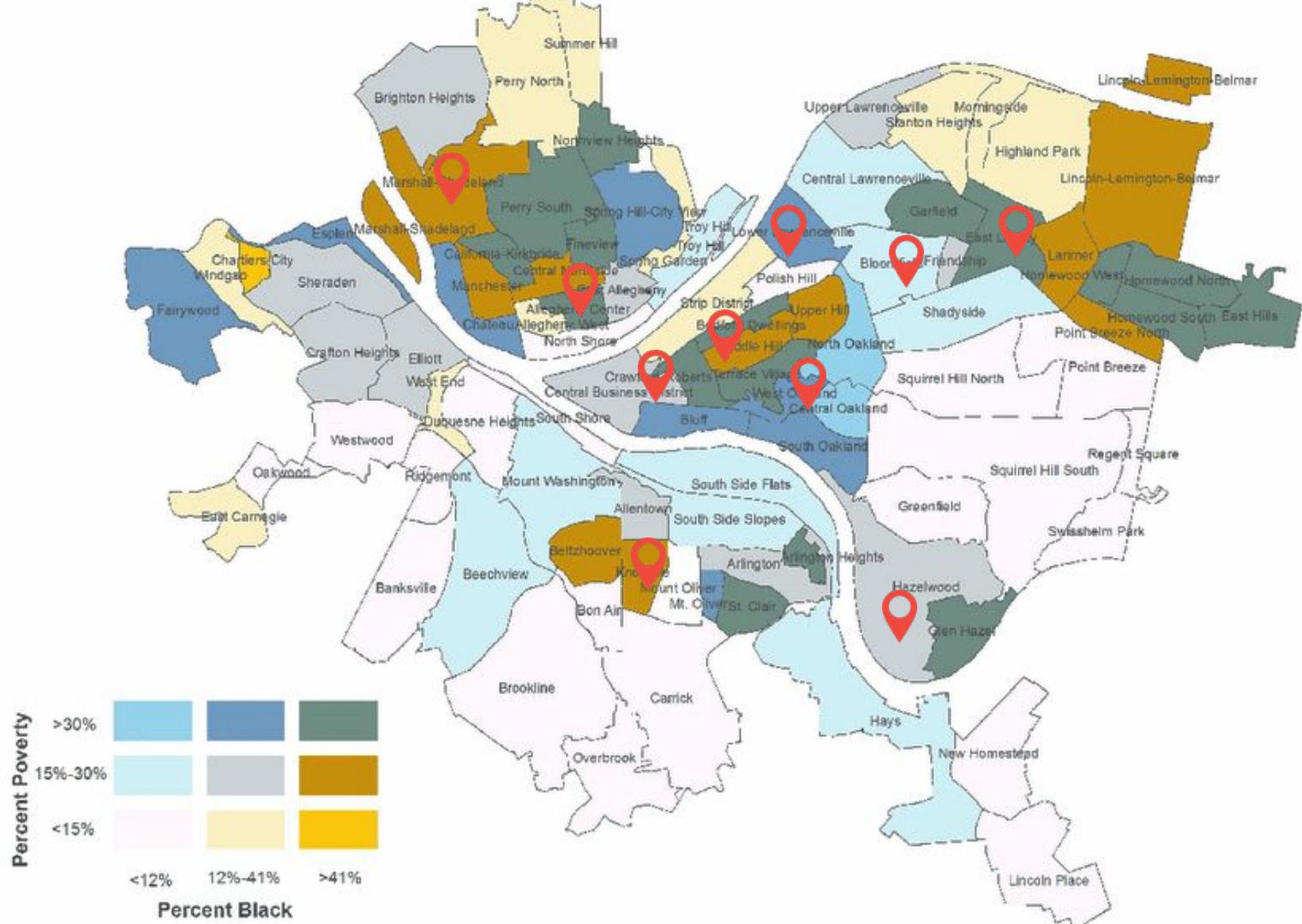
Solution



ReadyAI at Boys and Girls Club







Why the Carnegie Libraries?

2.5

Million
Foot traffic

8

Avg. # of visits
per resident



1/15/20

On behalf of Carnegie Library of Pittsburgh, I look forward to working with you as a programming partner. This letter is to outline the terms of our partnership. Please contact me at 412.924.8063 or at programsandpartnerships@carnegielibrary.org with any questions.

After careful consideration, I am pleased to include you as a partner for all Carnegie Library of Pittsburgh locations for the programming that you outlined in your proposal. You will be eligible to participate in our partner programming until CLP requests to review this partnership after December 31, 2020.

CLP offers the following support to programming partners:

- Assistance scheduling programs through the Office of Programs and Partnerships on a quarterly basis.
- Advertising of the program in standard library marketing channels, including on our website, print calendar, and in-library signage. Host locations will determine specific advertising channels. Program registration is available on request.
- Staff assistance using our programming facilities, including room set-up and projector.

CLP requests that partners:

- Provide programming at no cost to participants or CLP.
- Schedule programming through CLP's Office of Programs and Partnerships.
- Contact CLP's Office of Programs and Partnerships if programming you wish to offer is substantially different from the programming that was reviewed by CLP.

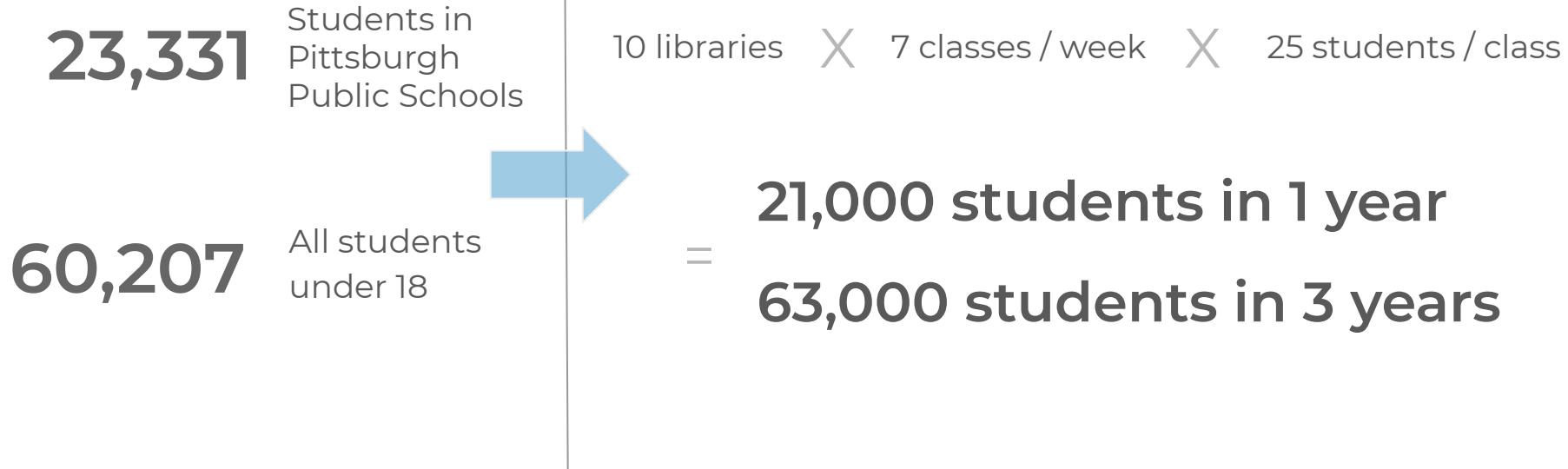
We look forward to collaborating with you to present programming that supports our shared goals for the community. Please do not hesitate to contact me with any questions.

Sincerely,

Daniel Hensley

Carnegie Library of Pittsburgh
Office of Programs &
Partnerships
130 S. Whiting Street
Pittsburgh, PA 15212-3895
Phone: 412.924.8063
Fax: 412.363.4457
www.carnegielibrary.org

Opportunity & Implementation Plan





TEACHER TRAINING

- AAAI, CSTA, ISTE
- Monthly local teacher training
- Online training course
- 900+ teachers







City of Pittsburgh

AI Learning Day for Kids



Pittsburgh City Council proclaimed July 27th, 2019, the day of WAICY as AI Learning Day for Kids







AI Education Exchange

In China





ReadyAI Lab

July 2019



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What Students Learn

1 7 Skills to Access								
2 Five Big Ideas								
3 Six AI Applications								
4 PBL								

Big Ideas

Five Big Ideas in Artificial Intelligence

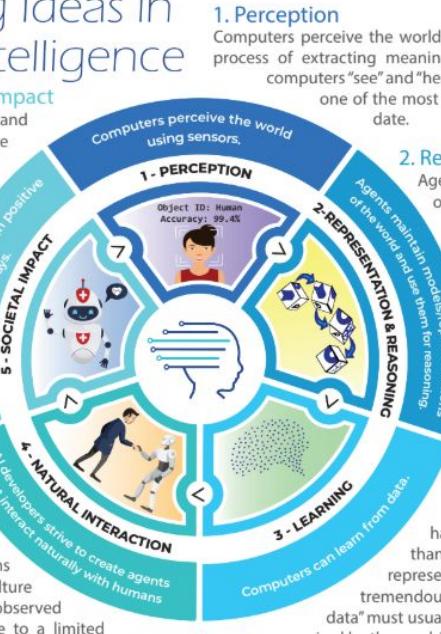
5. Societal Impact

AI can impact society in both positive and negative ways. AI technologies are changing the ways we work, travel, communicate, and care for each other. But we must be mindful of the harms that can potentially occur. For example, biases in the data used to train an AI system could lead to some people being less well served than others. Thus, it is important to discuss the impacts that AI is having on our society and develop criteria for the ethical design and deployment of AI-based systems.

4. Natural Interaction

AI developers strive to create agents that interact naturally with humans. Humans are among the hardest things for AI agents to understand. To interact naturally with humans, agents must be able to converse in human languages, recognize facial expressions and emotions, and draw upon knowledge of culture and social conventions to infer intentions from observed behavior. Today's AI systems can use language to a limited extent, but lack the general reasoning and conversational capabilities of even a child.

The AI for K-12 Initiative is a joint project of the Association for the Advancement of Artificial Intelligence (AAAI) and the Computer Science Teachers Association (CSTA), funded by National Science Foundation award DRL-1846073



1. Perception

Computers perceive the world using sensors. Perception is the process of extracting meaning from sensory signals. Making computers "see" and "hear" well enough for practical use is one of the most significant achievements of AI to date.

2. Representation & Reasoning

Agents maintain models or representations of the world and use them for reasoning. Representation is one of the fundamental problems of intelligence, both natural and artificial. Computers construct representations using data structures, and these representations support reasoning algorithms that derive new information from what is already known. While AI agents can reason about very complex problems, they do not think the way a human does.

3. Learning

Computers can learn from data. Machine learning is a kind of statistical inference that finds patterns in data. Many areas of AI have progressed significantly in recent years thanks to learning algorithms that create new representations. For the approach to succeed, tremendous amounts of data are required. This "training data" must usually be supplied by people, but is sometimes acquired by the machine itself.



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READYAI LAB

July 2019





READYAI LAB

July 2019





edu.readyai.org

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ReadyAI

Completed

ReadyAI Lab Kit - Beginner Course

by ReadyAI

The ReadyAI Lab Kit includes all teaching resources... [See more](#)

[SEE MORE...](#)

7 Lessons

Completed

AI+Me Unplugged Lesson Plans for 3-5

by ReadyAI

[SEE MORE...](#)

7 Lessons

Completed

AI-IN-A-BOX™
LESSON PLANS

AI-IN-A-BOX™ Lesson Plans - Elementary School

by ReadyAI

These lesson plans require the AI-IN-A-BOX™. In t... [See more](#)

[SEE MORE...](#)

12 Lessons

Completed

AI+Me Unplugged Lesson Plans for K-2

by ReadyAI

These lesson plans center around the five big idea... [See more](#)

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7 Lessons

Completed

AI-IN-A-BOX™
LESSON PLANS

AI-IN-A-BOX™ Lesson Plans - Middle School

by ReadyAI

These lesson plans require the AI-IN-A-BOX™. In t... [See more](#)

[SEE MORE...](#)

8 Lessons

Completed

AI Course with Cozmo and Calypso

by ReadyAI

The first lesson of the course is open for preview... [See more](#)

[SEE MORE...](#)

Completed

Teacher Training Course - Cozmo and Calypso

by ReadyAI

This course serves as a guide to facilitating the ... [See more](#)

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Completed

Teacher Training Course - Cozmo and Code Lab

by ReadyAI

This course serves as a guide to facilitating the ... [See more](#)

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Completed

AI Course with Cozmo and Code Lab

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The first lesson of the course is open for preview... [See more](#)

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Completed

AI + ME

by ReadyAI

"AI+ME" is an online experience intended to provid... [See more](#)

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<https://edu.readyai.org>

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“ What We Learned ”

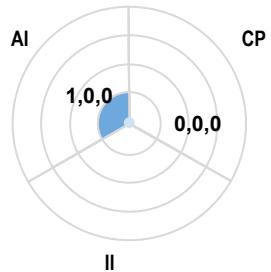


Curriculum Tested



AI+ME

45 mins





We will explore *5 Big Ideas* in AI

- AI perceives
- AI decides
- AI learns
- AI interacts with us
- AI impacts society in different ways

Topic Progress: ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

Can you *perceive* these emotions?

Drag the feeling to the right faces

Scared	Surprise
Neutral	Sad
Angry	Happy
Disgusted	Bored

Check

3 / 11

AI + ME

Welcome to AI + Me!

Perception

Representation and Reasoning

Machine Learning

Human-AI Interaction

Societal Impact

Notes

Return to AI + ME

My AI Journey

English



简体中文



Português



العربية



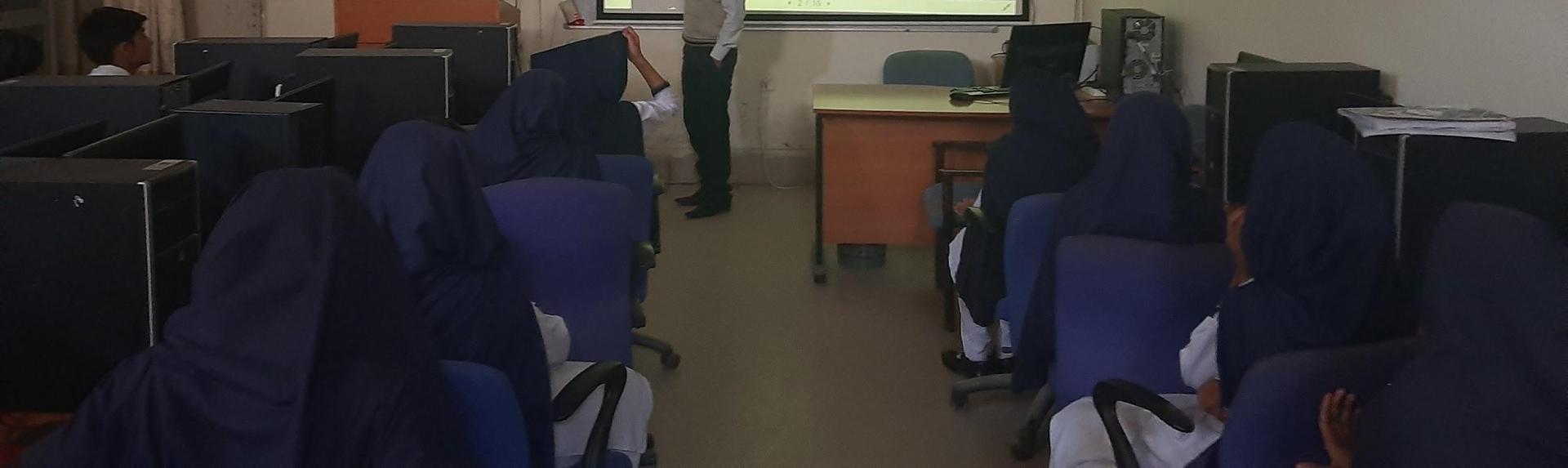
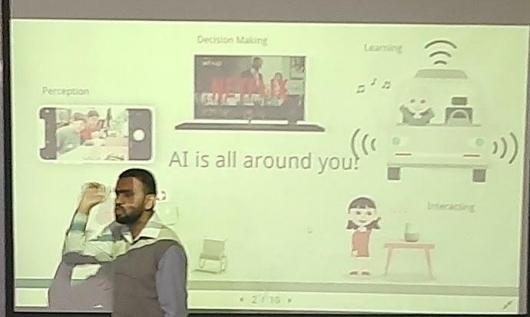
Español



עברית









Curriculum Tested



AI+ME



Beginner
Course

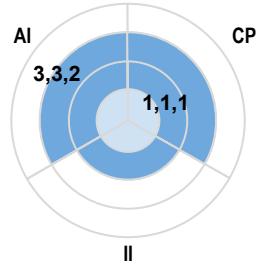
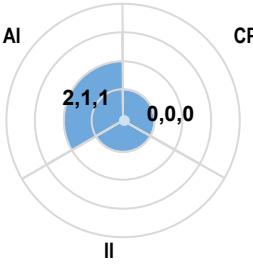
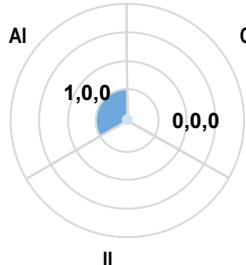


Intermediate
Course

45 mins

90 mins * 4 sessions

90 mins * 4 sessions





Beginner Course

CLASSROOM SET-UP & LOGISTICS

Please use the following list as you set up your classroom and prepare supplies for students. All printable materials (including posters) are linked to their respective pdfs so you can print and use directly.



Lesson Plans

Lesson 3: Object Manipulation

Summary of Lesson

Applying the principles of **object identification**, students will assist their AI units to identify the objects around it and create a world view map of their environment. Applying the principle of landmark-based navigation, students will learn how their AI unit can navigate around objects and manipulate the objects. Students will also be introduced to the limitations of AI manipulation not only with their own units but also in general.

Agenda

- Warm-up (10 minutes)
- Guided lesson (35 minutes)
- Break (10 minutes)
- Teacher Presentation (15 minutes)
- Student Production (15 minutes)
- Closure (5 minutes)

Assessment

- Can students:
- program Cozmo to navigate to any cube?
 - program Cozmo to navigate to a specific cube?
 - evaluate uses for the AI principle of landmark-based navigation?
 - identify what Cozmo can and cannot manipulate?
 - program Cozmo to manipulate his cubes?
 - create uses for the AI manipulation in a variety of fields?

Essential Question:
How does AI navigate?
Why does AI need to be able to manipulate objects?

Objectives

- Students will be able to
- explain how landmark-based navigation works and where it is applied in our lives
 - read and write multiple lines of rules that involve landmark-based navigation
 - be aware of what their AI unit can do with objects it can manipulate
 - describe what their AI unit can and cannot manipulate and why

Tools and Materials

- AI-IN-A-BOX™ (1 per 2-5 students)
- Large sheets of paper or similar for carousal activity
- PowerPoint 3
- Teacher Resources 3.1 - 3.2

Connecting to Prior Knowledge
Who and what can AI recognize?

Support
If you have any questions about the lesson plan, please contact info@ReadyAI.org



Email Template

What we learned
Hi Parents,

We had a wonderful second class -- students learned about object and facial recognition!

1. Computer vision works by detecting edges, lines, and patterns
2. Cozmo can differentiate his three cubes by recognizing their unique markers
3. Facial detection involves extracting facial landmarks such as eyes and nose

What we accomplished
Students coded a short demo that simulates how AI can promote manufacturing safety. They programmed Cozmo to notify humans when he detects someone was entering a hypothetically dangerous setting.

Additionally, students learned about how facial recognition works at the basic level -- computer software detects facial features, such as eyebrows and eyes, which are interpreted as a face altogether.

What's Next
In the next lesson, students will learn about object manipulation. By the end of the next session, students will be able to program Cozmo to pick up his cube. They will also learn about indentation, an important logical concept that some programming languages such as Python rely on to distinguish structure. It allows students to code even more complex programs!





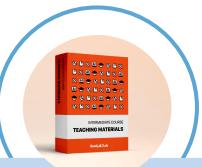
Curriculum Tested



AI+ME



Beginner Course



Intermediate Course



Intermediate Project



Summer Camp 4+1

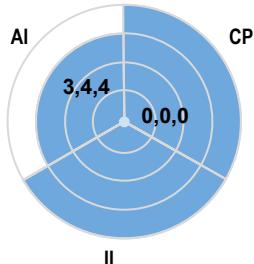
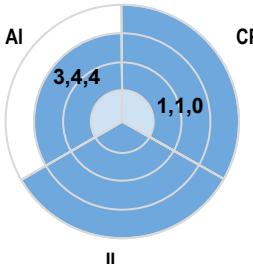
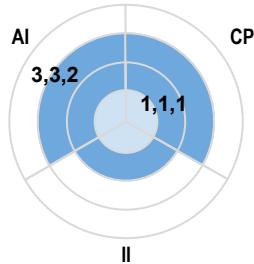
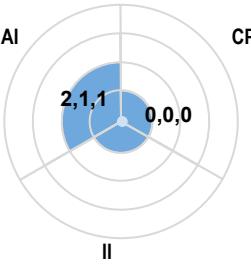
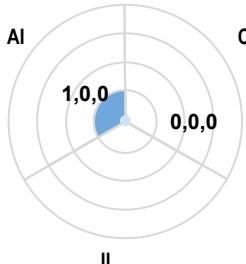
45 mins

90 mins * 4 sessions

90 mins * 4 sessions

90 mins * 4 sessions

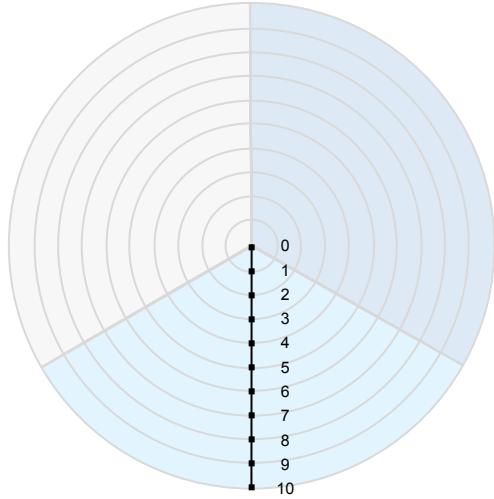
4 half days + demo day





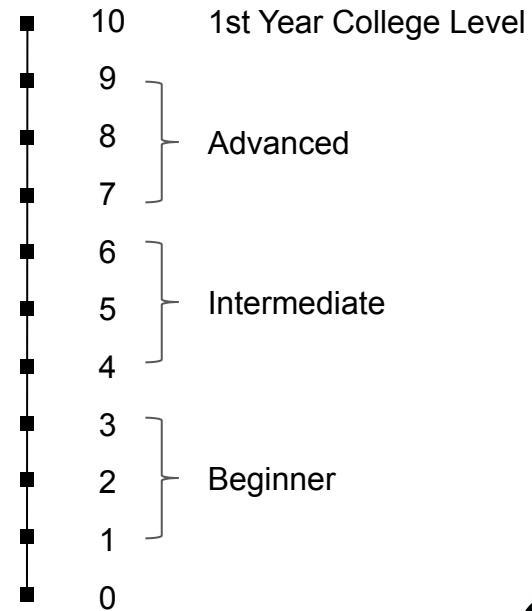
AI Competency Framework

AI
Artificial
Intelligence



II
Innovation & Impact

CP
Computational
Thinking &
Programming





Course Assessment



Quiz questions



Applying AI



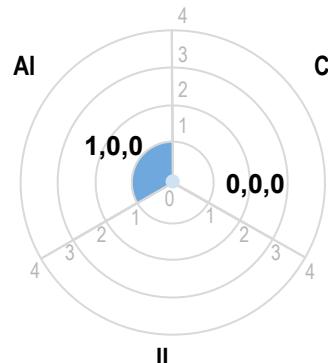
Applying AI +
Programming



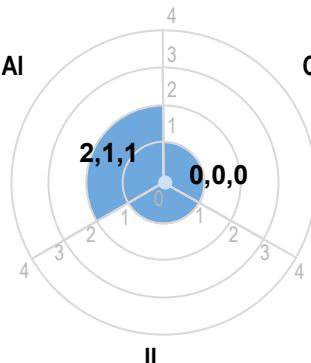
Applying AI +
Programming



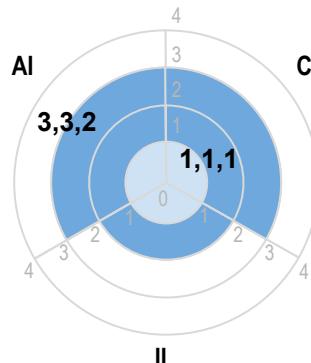
WAICY Rubric



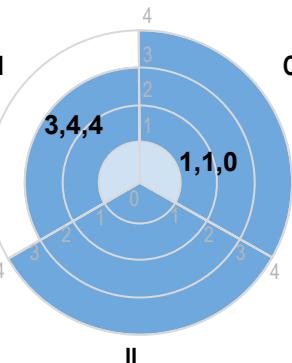
3000+ students



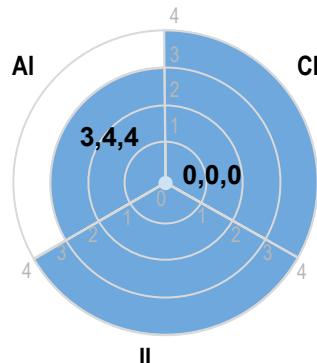
450 students



450 students



450 students



600+ students



Student Personas



Sadie



Kevin



Anthony



Luke

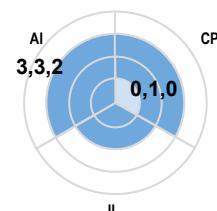
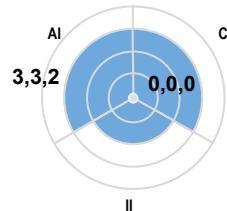


Sophia



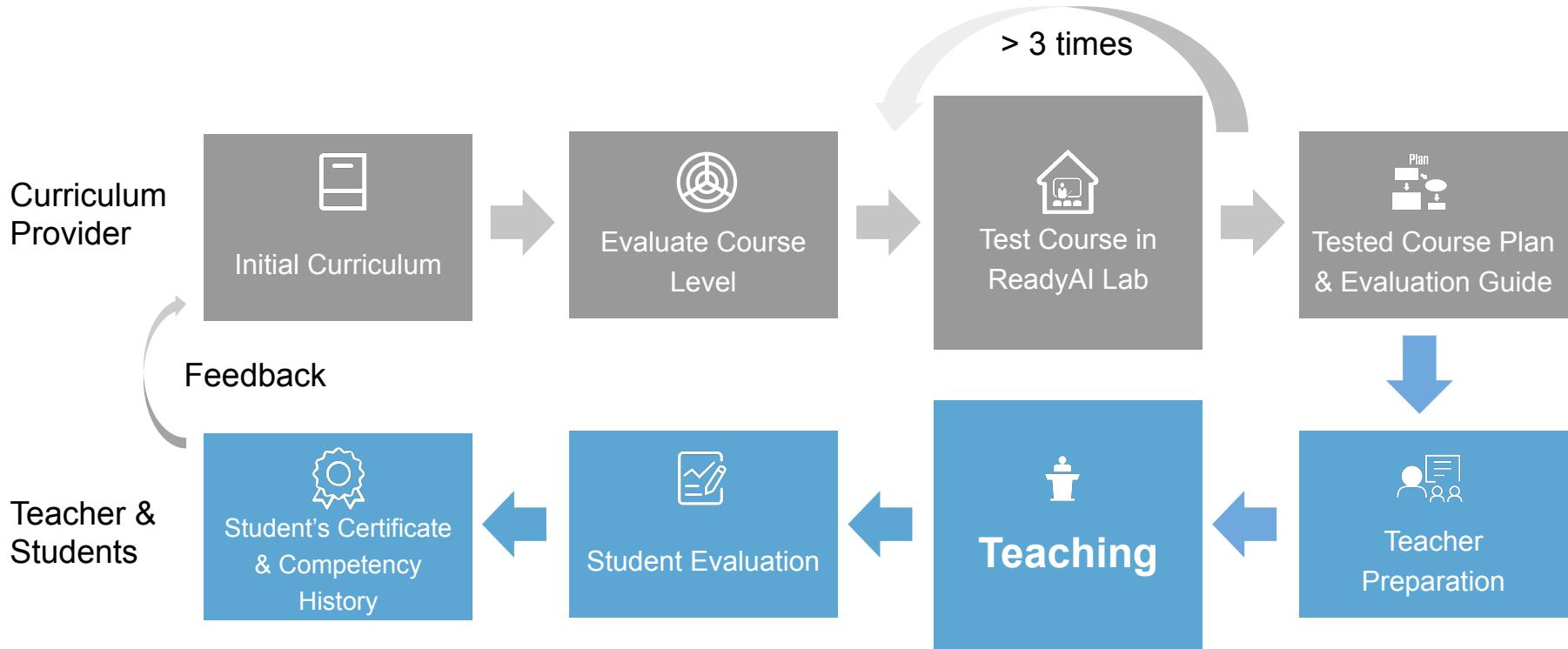
Emily

Grade	K	K	6	6	5	6
Prior coding/robotics?	✗	✗	✗	✓	✗	✓
Course taken	Beginner course	AI+Me	Beginner course	Intermediate, Project	Advanced	Summer camp
Before	0, 0, 0	0, 0, 0	0, 0, 0	0, 1, 0	0, 0, 0	0, 1, 0
After	3, 3, 2	1, 0, 0	2, 2, 2	3, 4, 4	2, 2, 3	3, 3, 2





How we can work together



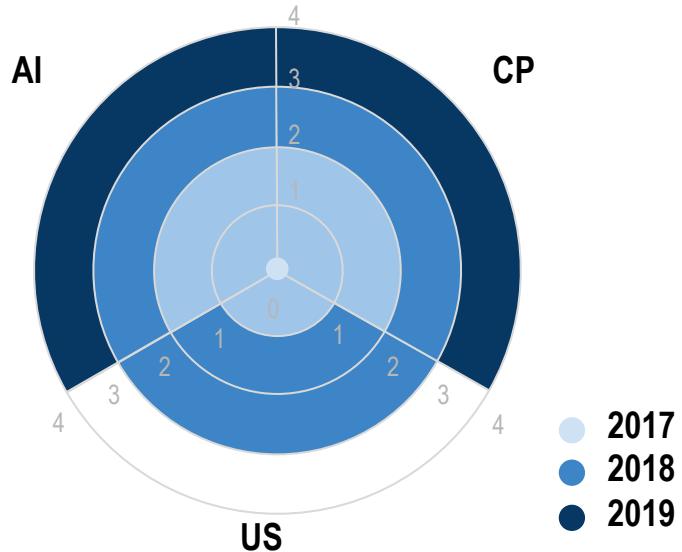


How we can work together

Certificate



Competency History



Key Takeaways

- Curriculum
- Measurement
- Student Engagement

<https://edu.readyai.org/>

“Let's talk! ”

Rooz Aliabadi

+1 (412) 254-8945

partner@readyai.org