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CONFERENCE ON
**EDUCATION DATA
AND STATISTICS**

CONFERENCIA SOBRE
**DATOS Y ESTADÍSTICAS
DE EDUCACIÓN**

CONFÉRENCE SUR LES
**DONNÉES ET STATISTIQUES
DE L'ÉDUCATION**

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UNESCO HEADQUARTERS, PARIS, FRANCE



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2024 CONFERENCE ON EDUCATION DATA AND STATISTICS

Andreas Schleicher

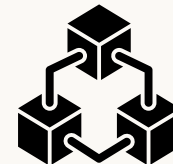
OECD Director for Education and Skills

Using technology in education data production – OECD examples

- ▶ Automating data validation process of data submitted to OECD by Member Countries
 - Reducing the number of iterations needed for validation
 - Saving time for Member Countries and Secretariat

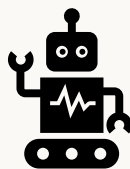


- ▶ Exploring generative AI to process and structure information (work-in-progress)
 - Make better use of information (published and unpublished) available to the OECD
 - Facilitate drafting of standardised outputs such as country notes



Using technology in education data production – OECD examples (*cont.*)

- ▶ PISA uses machine-supported coding systems
 - To reduce human-coding burden and minimize the error present in human-coded data.
 - In PISA 2022 Man Survey, for example, the coding burden was reduced by 35% on trend mathematics items.

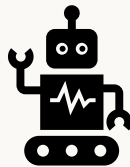


- ▶ PISA 2022 applied automated assembly of test items
 - To prepare parallel test forms based on well-defined test specifications.
 - Assembly of parallel test forms has been increasing important as PISA started applying multi-stage adaptive testing as of 2018.



Using technology in education data production – OECD examples (*cont.*)

- ▶ Leveraging AI to analyse responses to open-ended questions (work-in-progress)
 - Saves time and expands analytical potential (e.g. pattern and sentiment analysis)
- ▶ Big data web scraping to collect real-time data (work-in-progress)
 - Complementing regular data collection
 - No burden on target population (e.g. teachers)
 - Provides more timely information (yet, based on non-probabilistic data)



Challenges and opportunities for the use of big data in education data production

► Opportunities

- Non-official data exceeds the amount of official data by many magnitudes
- Allows to capture aspects of education beyond official statistics (e.g. student well-being)
- May enable near-real time data production
- Allows use of new analytical methods (e.g. machine learning) to link education to outcomes

► Challenges

- Lack of established methodologies
- Harmonisation of data sources needed
 - Data sources fragmented across providers
 - Cross-country data mostly limited to a few large digital platforms
- Data often highly confidential and less of a culture of working with student data (in contrast to e.g. patient data in medicine)
- Analytical challenges similar to surveys administered to non-probabilistic samples

PISA 2025 Learning in the Digital World

Recycling Claw

Introduction

Hi, I am Jay.

In the next 30 minutes, you will learn how to program a robotic claw to recycle objects!

First, show me what you already know by answering some questions.

Then we can learn together.

Conservation

Introduction

Hi, I am Kim.

In the next 30 minutes, you will learn how to build a model to explore how marine species interact and to make predictions about population size!

First, show me what you already know by answering some questions.

Then we can learn together.

Digital Art

Introduction

Hi, I am Andie.

In the next 30 minutes, you will learn how to create digital art!

First, show me what you already know by answering some questions.

Then we can learn together.

Fitness App

Introduction

Hi, I am Sam.

In the next 30 minutes, you will learn how to use an application that helps astronauts stay healthy at low gravity!

First, show me what you already know by answering some questions.

Then we can learn together.

Safe Landing

Introduction

Hi, I am Alex.

In the next 30 minutes, you will learn how to use a computer to simulate space exploration!

First, show me what you already know by answering some questions.

Then we can learn together.

Dolphin Calls

Introduction

Hi, I am Nyna.

In the next 30 minutes, you will learn how to communicate with dolphins and keep them away from danger!

First, show me what you already know by answering some questions.

Then we can learn together.

Robotics Path

Introduction

Hi, I am Pat.

In the next 30 minutes, you will learn how to program a robot to follow a path!

First, show me what you already know by answering some questions.

Then we can learn together.

Art Exhibition

Introduction

Hi, I am Kerry.

In the next 30 minutes, you will learn how to plan an art exhibition using a computer simulation!

First, show me what you already know by answering some questions.

Then we can learn together.

Bus Schedule

Introduction

Hi, I am Sara.

In the next 30 minutes, you will learn how to use a simulation to help a bus driver get students to school in time!

First, show me what you already know by answering some questions.

Then we can learn together.

Learning in the Digital World Data

Response data

```

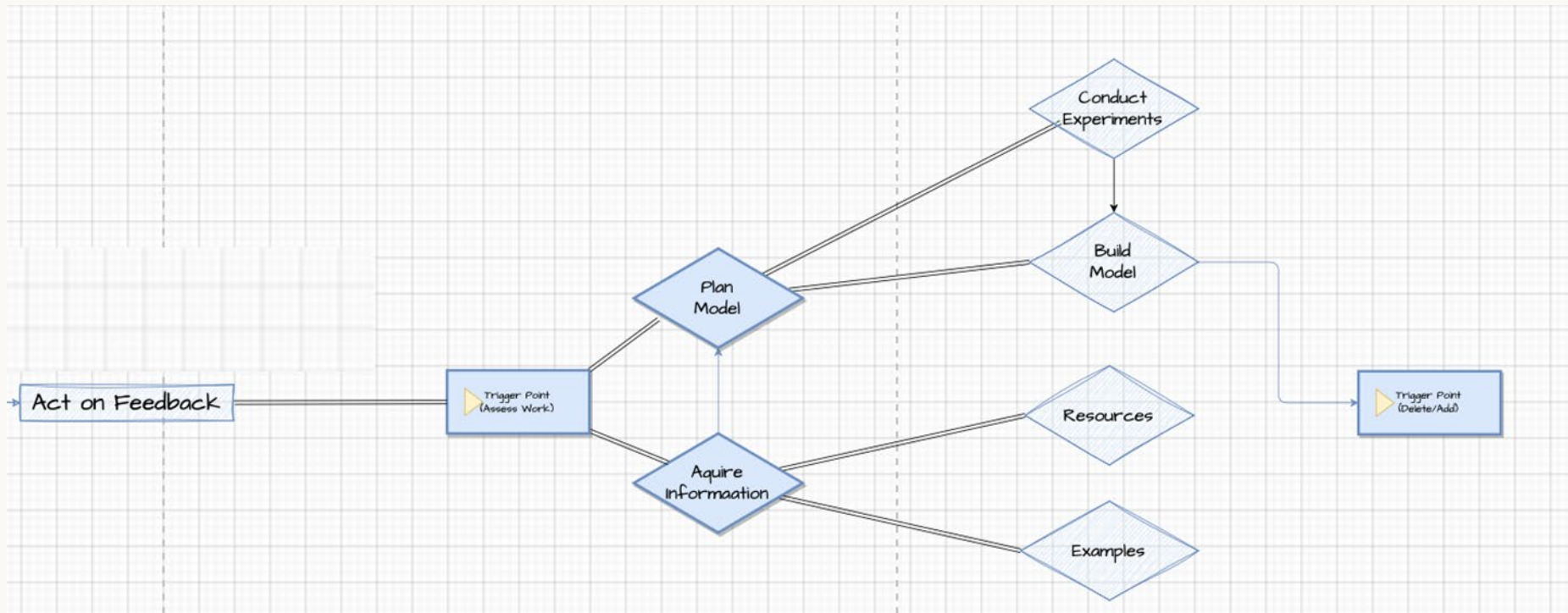
{"runCount":{"roboworld1":2},
"workspaceData":{"blocks":{"languageVersion":0,"blocks":
:[
{"type":"when_run","x":20,"y":20,"next":{"block":{"type":
:"g_repeat_do","fields":{"TIMES":2},"inputs":{"DO":{"blo
ck":{"type":"ra_pickup","next":{"block":{"type":"g_repea
t_do","fields":{"TIMES":4},"inputs":{"DO":{"block":{"type
":"ra_move_right}}},"next":{"block":{"type":"ra_place",
"next":{"block":{"type":"g_repeat_do","fields":{"TIMES":4
},"inputs":{"DO":{"block":{"type":"ra_move_left}}}}}}}}}}
}}}}}},
"workspaceResult":
"\nra-
worldarm,E,E,E,E,\nE,E,E,E,E,\nE,E,E,E,E,\nE,E,E,E,E,\nE,E
,E,E,E,\nE,E,E,E,ra-world-shape ra-world-
shapeA,\nE,E,E,E,ra-world-shape ra-world-
shapeA,false"}

```

Event data

c	Time-stamp	event_name	id	data
1	1.676541e+12	auto	timer.set	1503
2	1.676541e+12	Click	.g-btn-blockly-main.run	A data list containing intermediate solution information including: <ul style="list-style-type: none"> Workspace Data Workspace Result
3	1.676541e+12	drag	{B}Q8b:g,zk^o){\$Bm5.8	ra_move_right
4	1.676541e+12	drop	{B}Q8b:g,zk^o){\$Bm5.8	A data list containing intermediate solution information including: <ul style="list-style-type: none"> Workspace Data Workspace Result

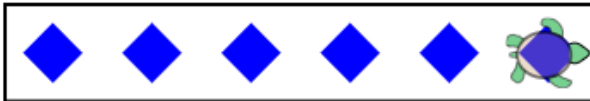
Measuring higher-order thinking and self-regulation skills



The value of advanced data analytics to better measure performance

Better recognition of progress towards solution, even in simpler tasks

Goal:



```
define main
  place stone
  while front is clear
    move forward
    place stone
```

Best solution

Diagram illustrating different quality partial solutions for the goal:

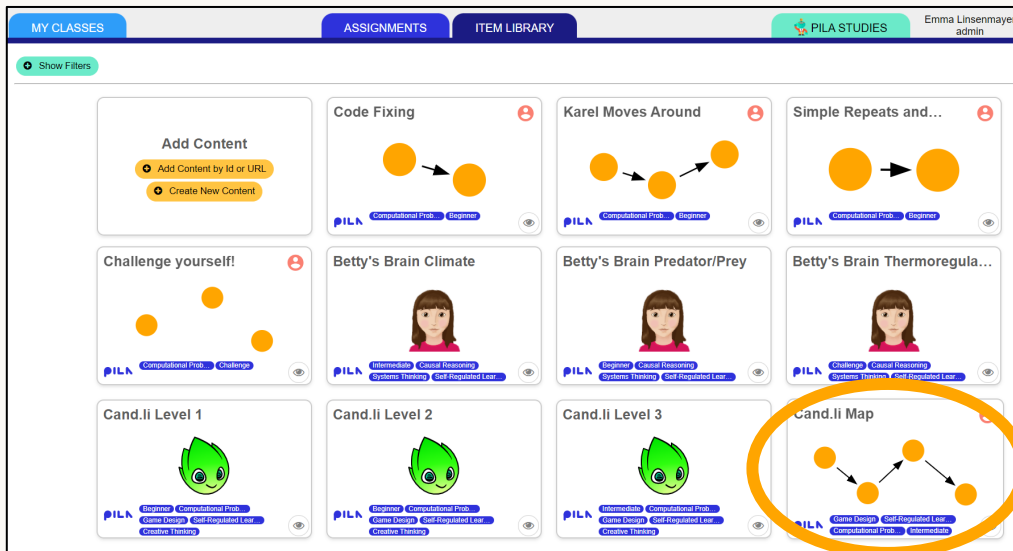
- Top Left:** A partial solution with a `while front is clear` loop containing `place stone` and `move forward`.
- Top Middle:** A partial solution with a `while front is clear` loop containing `move forward`, `place stone`, and `move forward`.
- Top Right:** A partial solution with a `while front is clear` loop containing `place stone`, `move forward`, and `place stone`.
- Middle Left:** A partial solution with a `while front is clear` loop containing `place stone` and `move forward`.
- Middle Right:** A partial solution with a `while front is clear` loop containing `place stone`, `move forward`, and `place stone`.
- Bottom Left:** A partial solution with a `while stones not present` loop containing `place stone`, and a `move forward` block below the loop.
- Bottom Right:** A partial solution with a `while front is clear` loop containing `place stone`, `move forward`, and `place stone`.

Different quality partial solutions

Platform for Innovative Learning Assessments

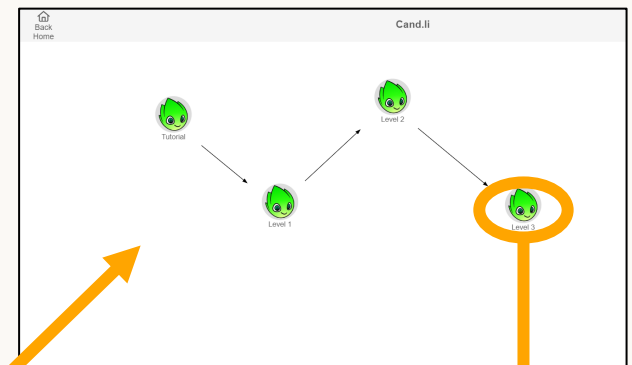
Game-based assessment 

Assessment “sequence”




The screenshot shows the PILN platform interface with a grid of assessment items. The items include:

- Add Content (Add Content by Id or URL, Create New Content)
- Code Fixing (Computational Prob., Beginner)
- Karel Moves Around (Computational Prob., Beginner)
- Simple Repeats and... (Computational Prob., Beginner)
- Challenge yourself! (Computational Prob., Challenge)
- Betty's Brain Climate (Intermediate, Critical Reasoning, Systems Thinking, Self-Regulated Lear.)
- Betty's Brain Predator/Prey (Beginner, Critical Reasoning, Systems Thinking, Self-Regulated Lear.)
- Betty's Brain Thermoregula... (Challenge, Critical Reasoning, Systems Thinking, Self-Regulated Lear.)
- Cand.li Level 1 (Beginner, Computational Prob., Game Design, Self-Regulated Lear., Creative Thinking)
- Cand.li Level 2 (Beginner, Computational Prob., Game Design, Self-Regulated Lear., Creative Thinking)
- Cand.li Level 3 (Intermediate, Computational Prob., Game Design, Self-Regulated Lear., Creative Thinking)
- Cand.li Map (Game Design, Self-Regulated Lear., Computational Prob., Intermediate)



Individual task



The screenshot shows the Cand.li Level 3 individual task interface. The task is titled "2 / 5 Collect and deposit" and involves allowing a character to collect or throw forgotten toys. The task instructions are:

- Programme to delete the forgotten toys and increase their counter when in contact with the character.
- Programme to show a +1 visual indication when a toy is collected.
- Programme to throw the toy when pressing B.
- Programme to show a -1 visual indication when a toy is thrown.
- One more thing you do not want to allow to throw more toys than you have collected.

AI-supported conversation tools



Causal Map ▶ Science Book ▶ Quiz Results ▶ EN

Betty **Mr. Davis**

I need you to go take a quiz now, please.
You - 10:03 AM

Sure! Which quiz would you like me to take?
Betty - 10:03 AM

A quiz on everything
You - 10:03 AM

Notes

2. If **vehicle use** increases, then what happens to **carbon dioxide**? ✓

Answered: Carbon dioxide will increase.

3. If **vehicle use** increases, then what happens to **global temperature**? ✓

Answered: Global temperature will increase.

3. If **vehicle use** increases, then what happens to **global temperature**? ⚡

I learned if vehicle use, increases global temperature, will increase. Here is my map: -
✗ - That's a shortcut link!
It's correct, but you are missing something in-between!

Concept Map used for this Quiz

```

graph TD
    Deforestation -- reduce --> Vegetation
    Vehicle use -- increase --> Fossil fuel use
    Fossil fuel use -- produces --> Carbon dioxide
    Vegetation -- absorbs --> Carbon dioxide
    Carbon dioxide -- adds to --> Heat_reflected[Heat reflected to earth]
    Heat_reflected -- raises --> Global_temperature[Global temperature]
    
```

Student - AI agent conversation

Student - Student conversation

Character runs right

Rule comments

Desmond
I don't get why my animation isn't playing when my character runs or jumps left

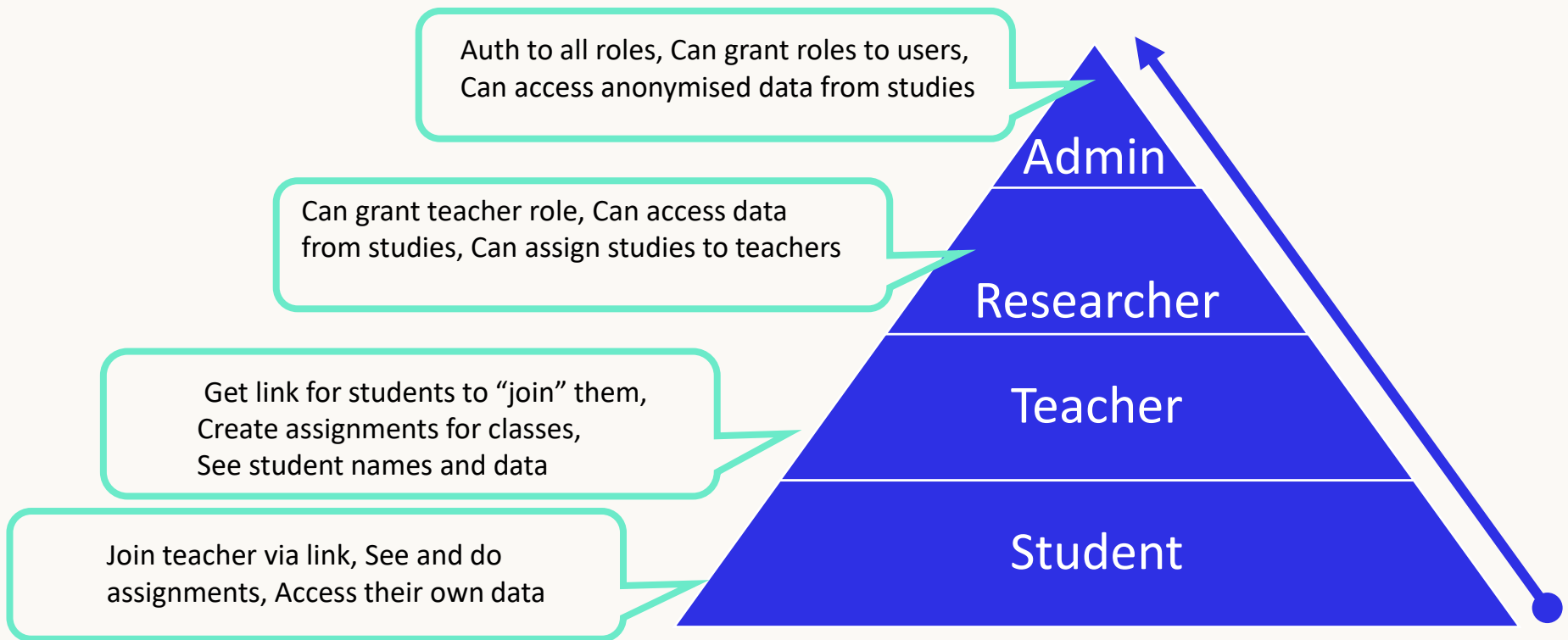
Emily
I have the same problem

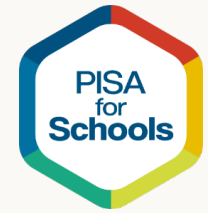
Miguel
You put the animation to "Idle". You should put your running animation there.

Click here to add a comment...

Character jumps left

Data security





PISA for School: Using Multilingual AI for Assessment

- ▶ **Development of Multilingual AI Model for Marking**
 - Utilised data from more than 10 countries to develop a sophisticated AI model for marking open-ended responses.
- ▶ **Comparable Results to Human Markers**
 - Preliminary results demonstrate that the AI model's marking capabilities are on par with human markers.
- ▶ **Forging an Optimal Human-AI Collaboration**
 - Trial: Establishment of an effective Human-AI collaboration for PISA for Schools assessment in Q4 2024/Q1 2025.



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