PISA Innovative Assessments of Learning Skills

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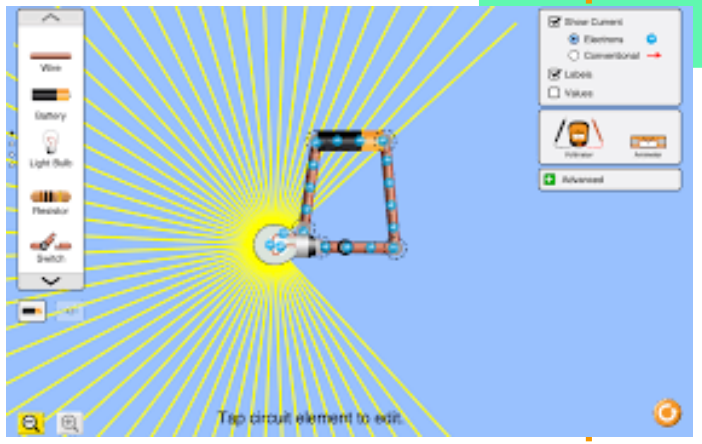
Research Forum on Assessment and Education for the Future
Hong Kong, 17 November 2022

The rise of digital learning

PhET INTERACTIVE SIMULATIONS



1 billion+ simulations since 2002

C O D E 60 million students

170 million+ projects created

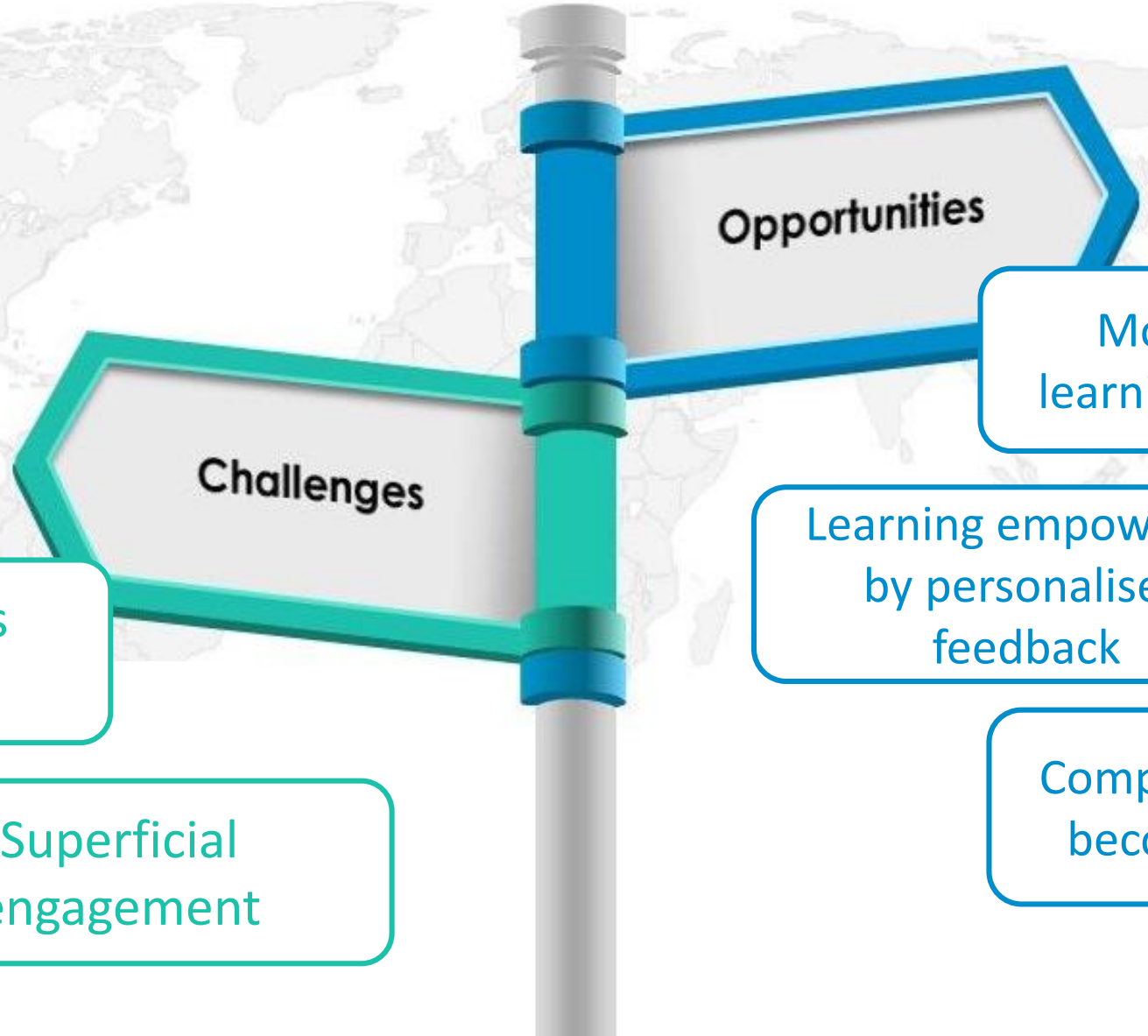
SCRATCH

Community statistics at a glance

- 88,011,954 projects shared,
- 79,292,790 users registered,
- 539,581,552 comments posted,
- 29,964,560 studios created

...and growing!

Challenges and opportunities of digital learning



More engaging learning experiences

Learning empowered by personalised feedback

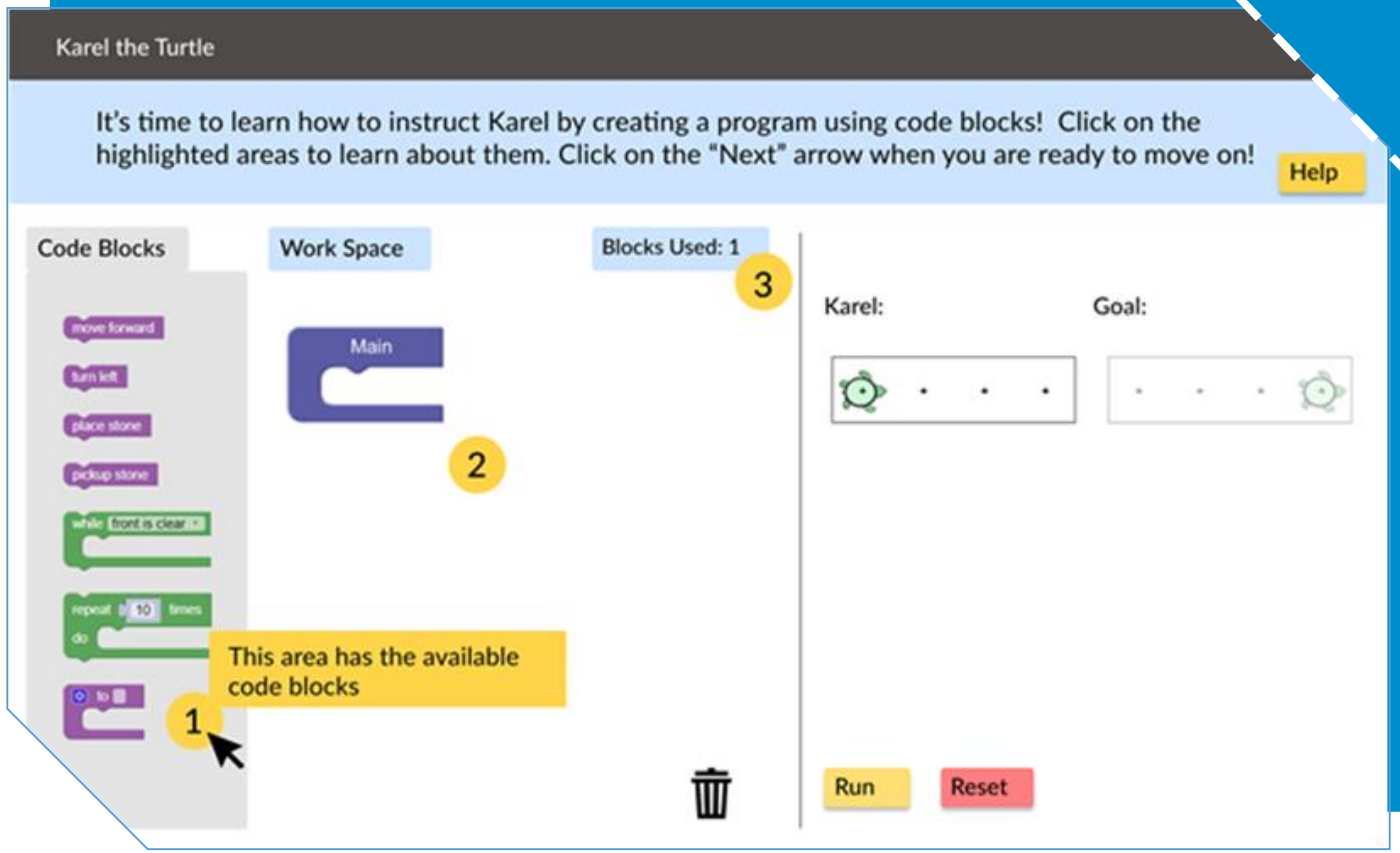
Complex phenomena become accessible

Learning is less directed

Superficial engagement

What we aim to achieve in the PISA LDW assessment

Build **realistic digital learning experiences** with:

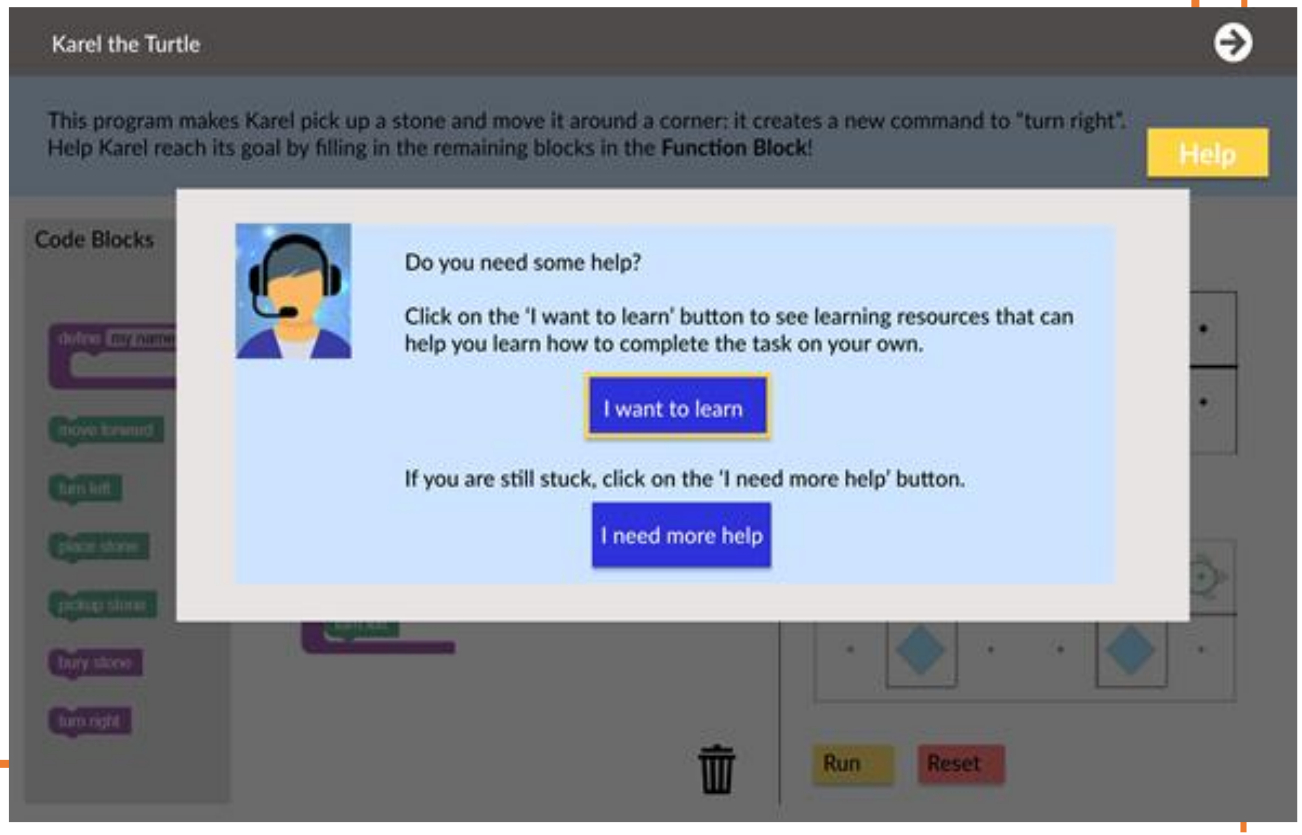


- ❑ An **engaging challenge** to solve
- ❑ **Opportunities to learn** how to do it
- ❑ **Intelligent feedback** on progress

What we aim to achieve in the PISA LDW assessment

Track students' work on the learning platform to assess:

- What **progress** students make on the learning challenge
- How well they use **learning resources** (worked examples, hints, and feedback)



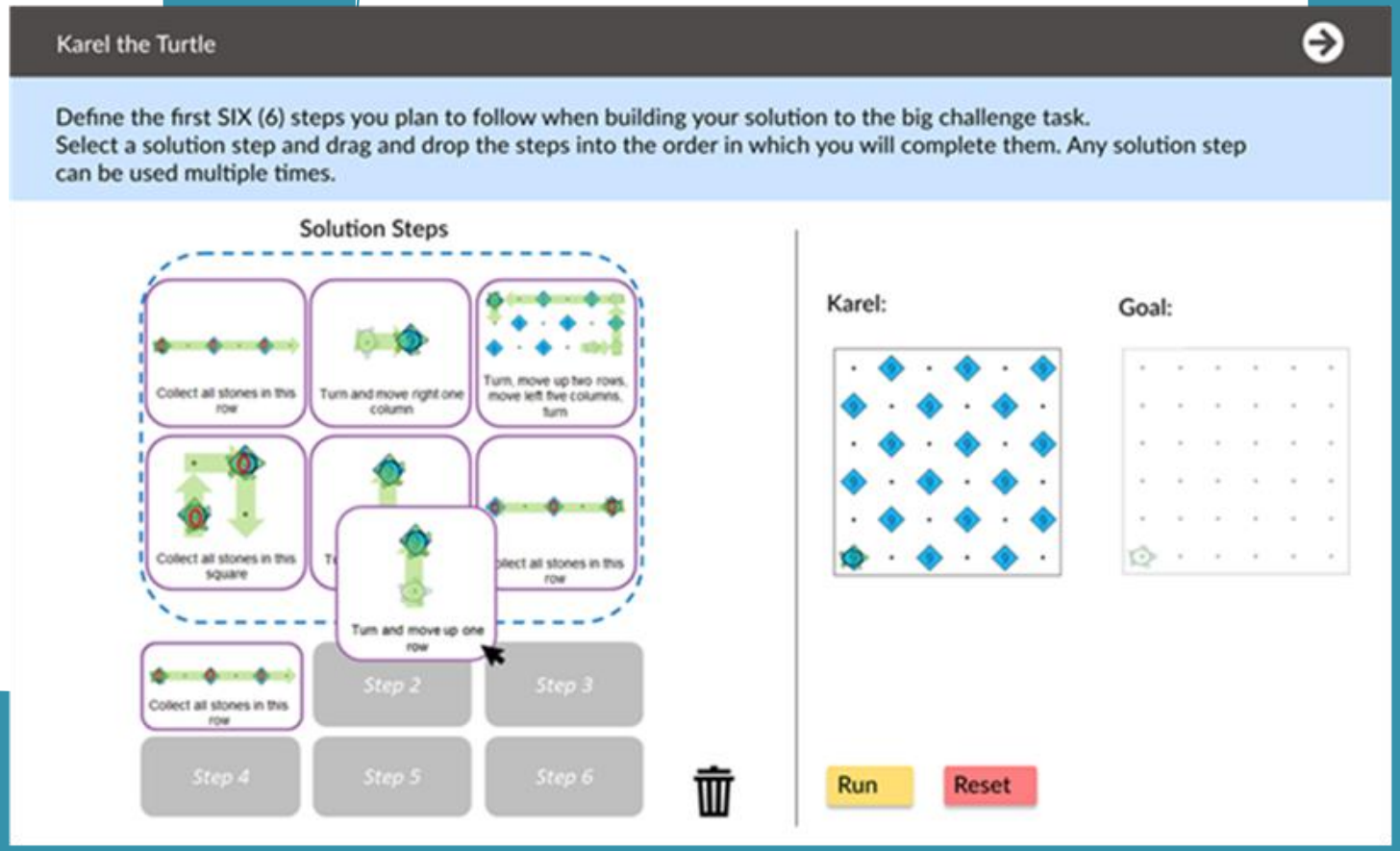
Definition of Learning in the Digital World

"The capacity to engage in an iterative process of knowledge building and problem solving using computational tools. This capacity is demonstrated by effective **self-regulated learning** while applying **computational and scientific inquiry practices**"

COMPUTATIONAL and SCIENTIFIC INQUIRY PRACTICES

- Decompose problems and recognize patterns

METACOGNITIVE MONITORING and COGNITIVE REGULATION PROCESSES



COMPUTATIONAL and SCIENTIFIC INQUIRY PRACTICES

- Decompose problems and recognize patterns
- Conduct experiments and analyse data

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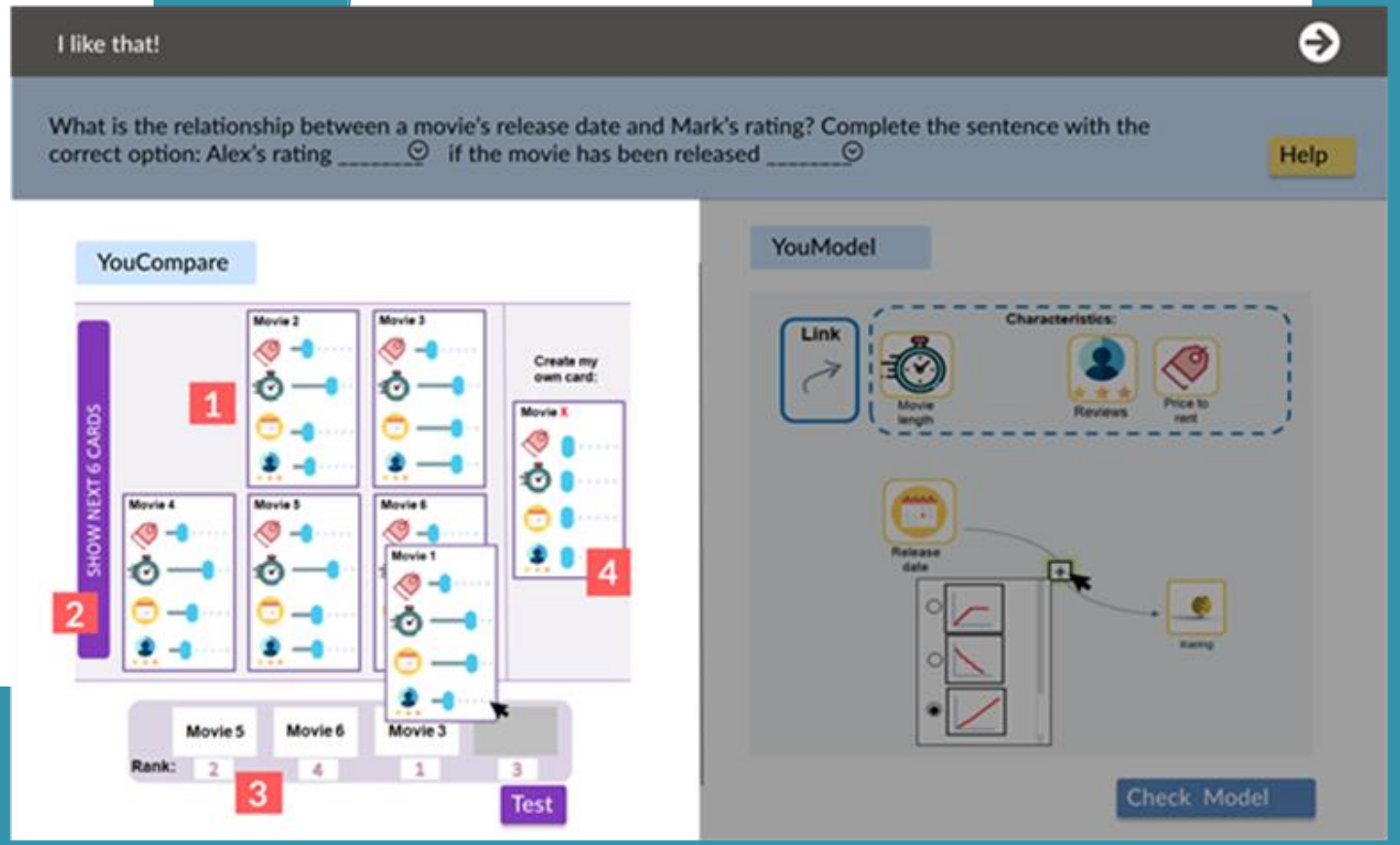

COMPUTATIONAL and SCIENTIFIC INQUIRY PRACTICES

- Decompose problems and recognize patterns
- Conduct experiments and analyse data
- Build and debug computational artefact

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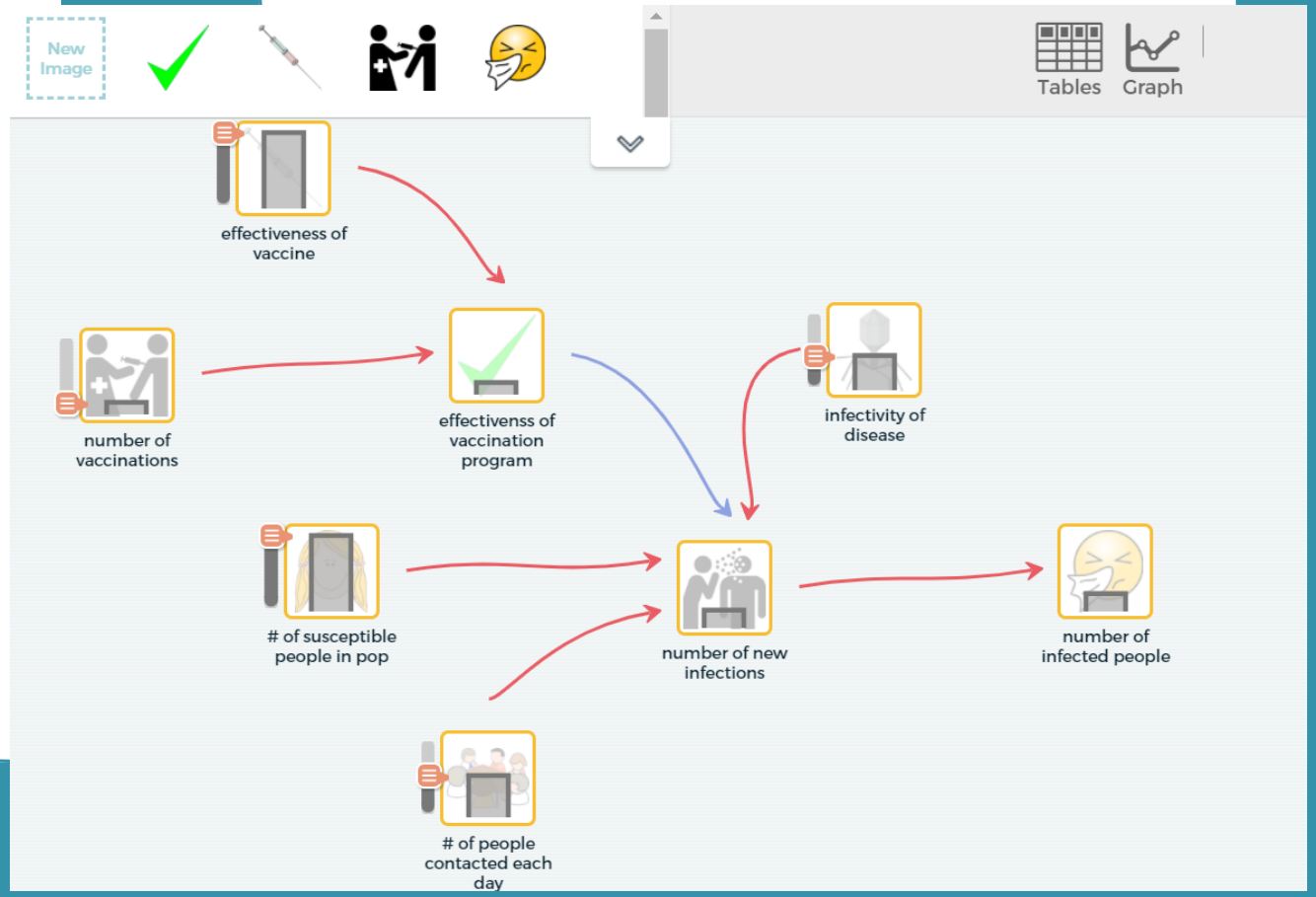

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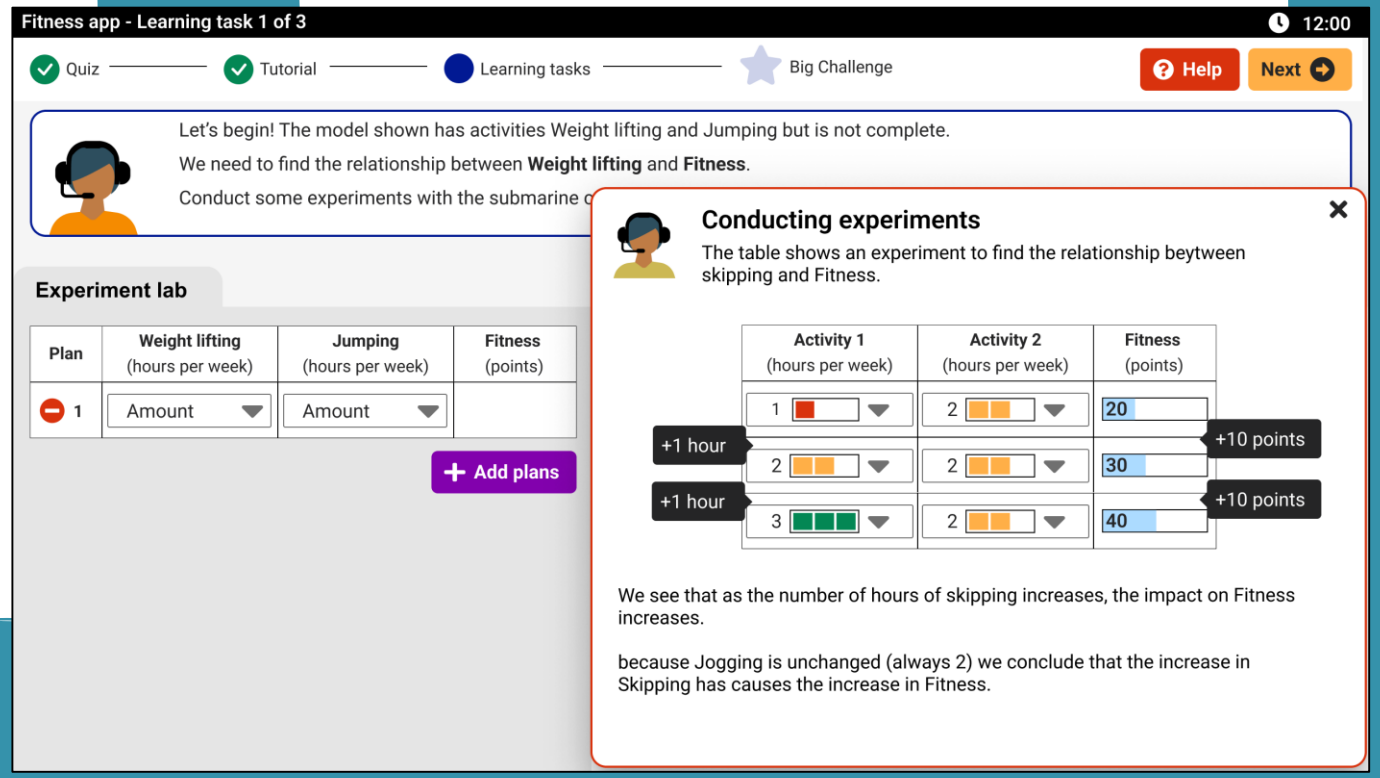
METACOGNITIVE MONITORING and COGNITIVE REGULATION PROCESSES

- Monitor progress and adapt



COMPUTATIONAL and SCIENTIFIC INQUIRY PRACTICES

- Decompose problems and recognize patterns
- Conduct experiments and analyse data

METACOGNITIVE MONITORING and COGNITIVE REGULATION PROCESSES

- Monitor progress and adapt
- Evaluate knowledge and performance

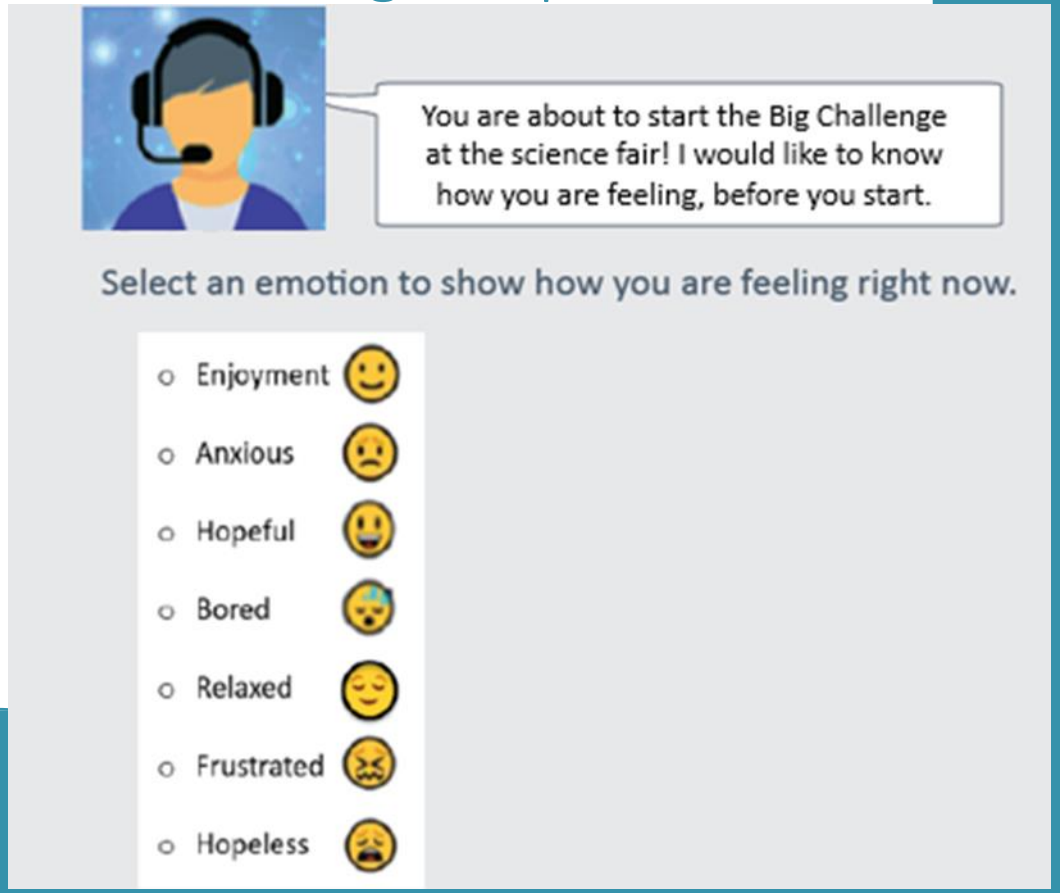
To what extent did you do the following in the Big Challenge? Complete the sentences below:

I submitted _____ (an *optimal solution/a correct, but not optimal solution/an incorrect solution/ no solution)*

I successfully used the tools and resources in the Big Challenge to help me make progress _____ **(***None of the time/Rarely/Several times/Every time)*

COMPUTATIONAL and SCIENTIFIC INQUIRY PRACTICES

- Decompose problems and recognize patterns



METACOGNITIVE MONITORING and COGNITIVE REGULATION PROCESSES

- Monitor progress and adapt
- Evaluate knowledge and performance

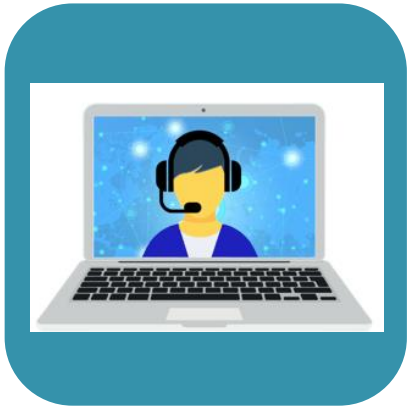
NON-COGNITIVE REGULATION PROCESSES

- Maintain task engagement
- Manage affective states

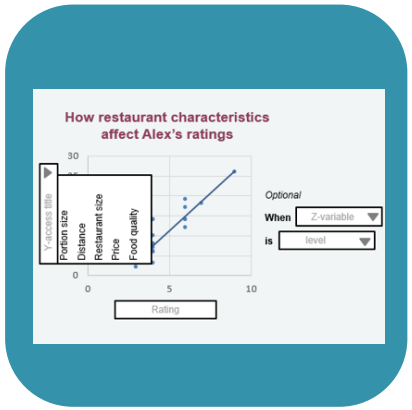
Task Sequence

30 minutes

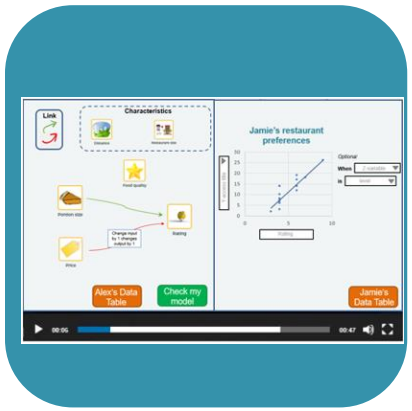
Introduction of overall learning goal



Evaluation of prior knowledge

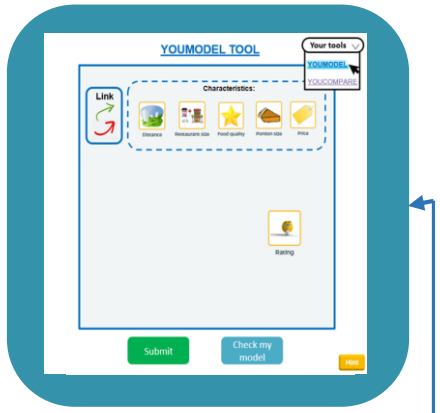


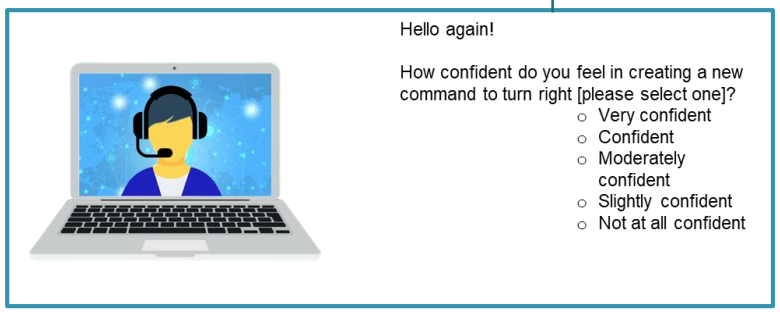
Tutorial



Learning activities

Challenge





Evidence-centered design in LDW

Evidence Rules ▷ **Unit structure, tasks, affordances & UI design** ▷ **Scoring and analysis**

What kinds of behaviour are associated to different levels of mastery of each facet of the construct?

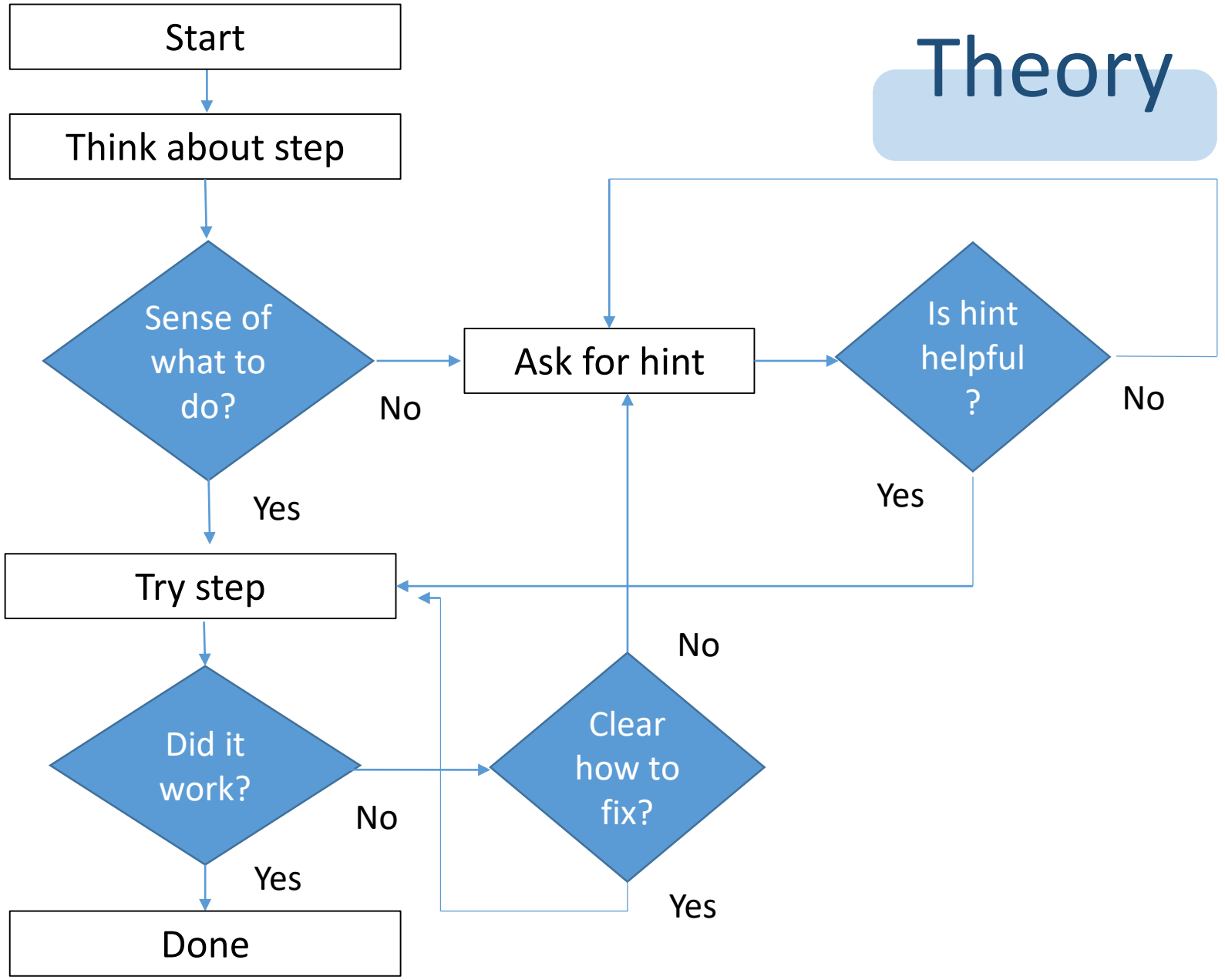
What task design and affordances do we use to elicit the desired behaviour and collect the necessary (process) data?

How do we convert observed actions into scores?

How do we aggregate data into reporting scales?

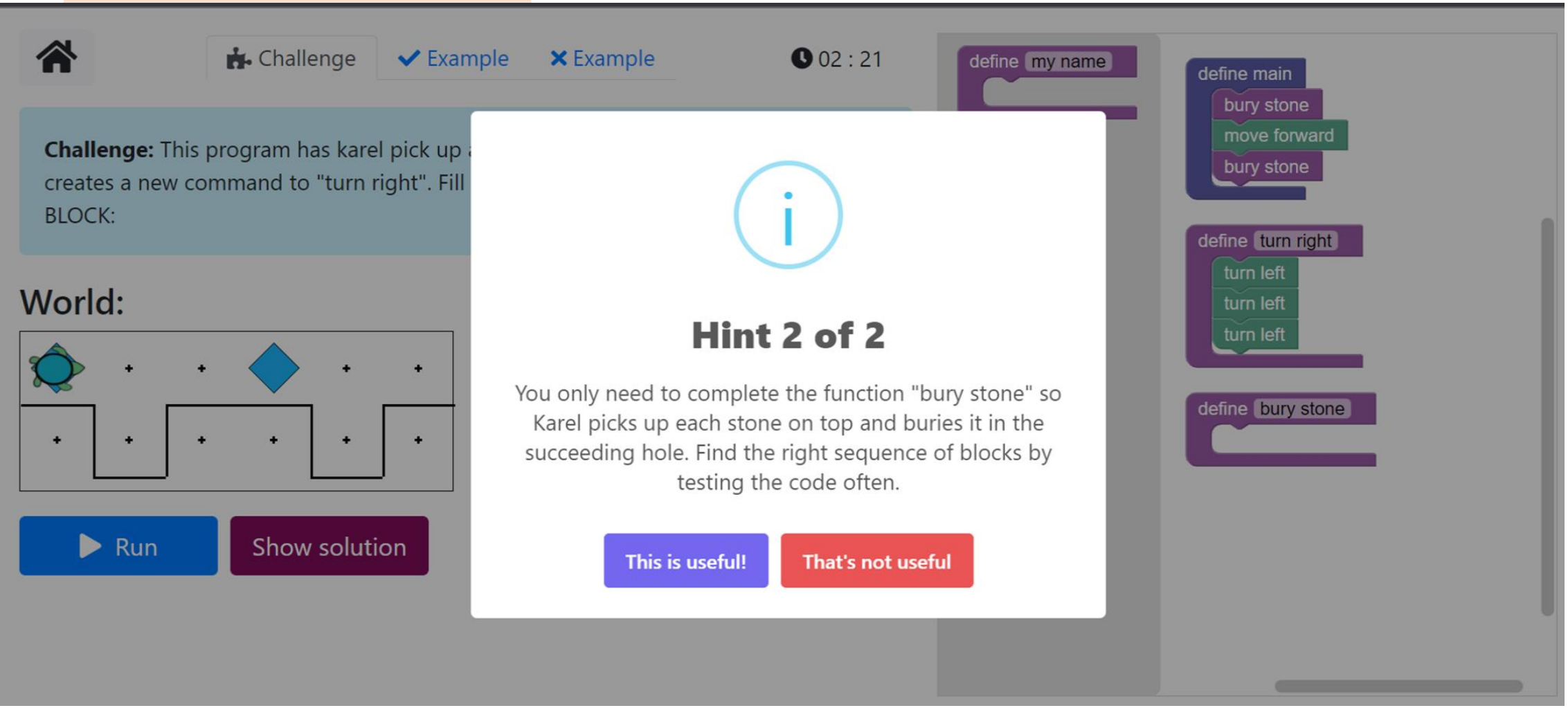
Theory

An example: Identifying effective help-seeking



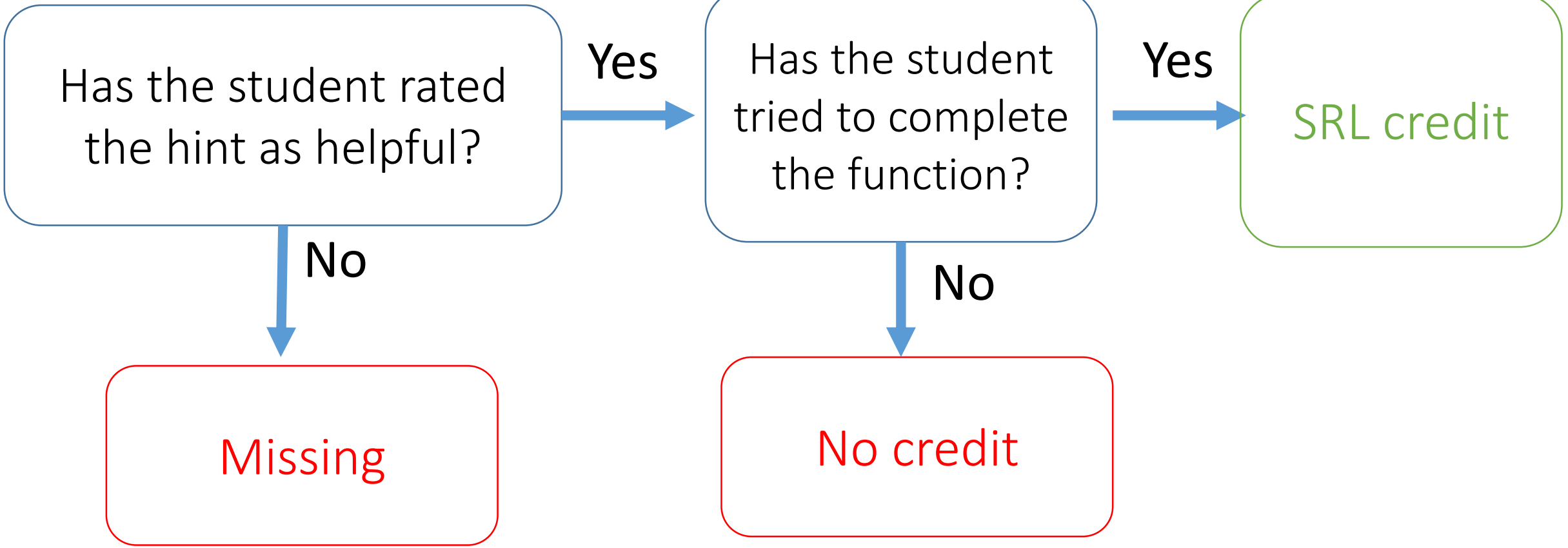
Task & UI design

An example:
Identifying effective help-seeking



An example:
Identifying effective help-seeking

Scoring rules



Multi-dimensional reporting

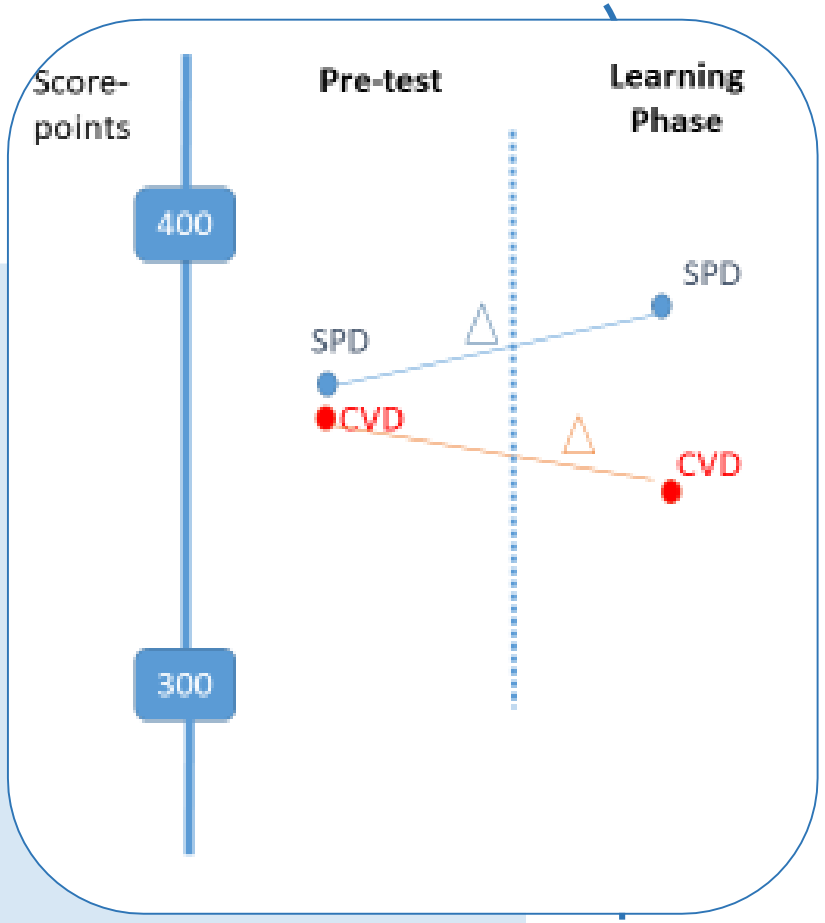
❑ Two reporting scales

- Computational & Scientific Inquiry
- Metacognitive monitoring and cognitive regulation

❑ Measure of learning gains

❑ Profiling of learners

- Level of engagement
- Affective states during learning
- Strategies and coherence in challenge tasks



Validation activities

Cognitive Laboratories

2021/22

7 countries
(AUS, BUL, CHL, COL, SPN, NOR, US)

- ❑ Small scale
- ❑ Qualitative orientation
- ❑ Used to refine the units (problem formulation and UI) in preparation for pilot studies

Eye-tracking study

2022

Germany

- ❑ Small-scale
- ❑ Qualitative orientation
- ❑ Used to refine the units, validate quality and appropriateness of SRL resources and evidence rules, and identify disengaged behaviours

Pilot Studies

2022/23

5 countries (AUS, BUL CHL, NOR, COL)
National add-on study (Germany)

- ❑ Quantitative evaluation of unit quality
- ❑ Investigate:
  - Structure and dimensionality of construct
  - Relationship between item scores and different kinds of process data

From PISA to the Classroom:

The Platform for Innovative Learning Assessment (PILA)

What is PILA?

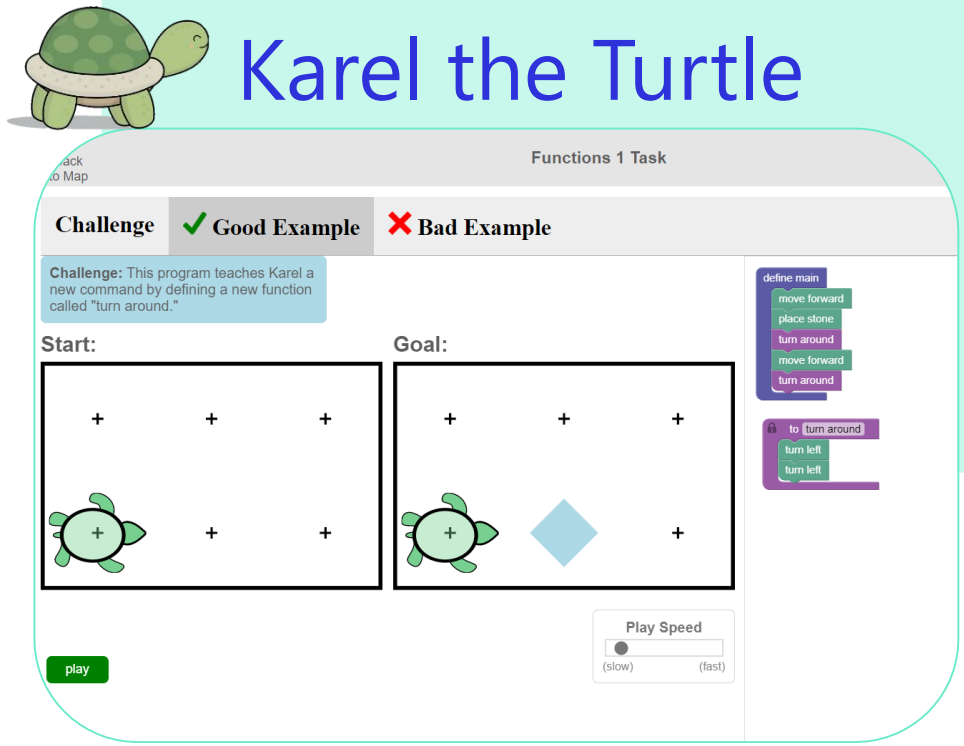
The Platform for Innovative Learning Assessments is a free digital formative tool that provides engaging tasks to support students' development of 21st Century skills

PILA is growing and improving through co-design with international group of teachers and students

PILA is and will remain open-source, to empower collaborative EdTech development and assessment research

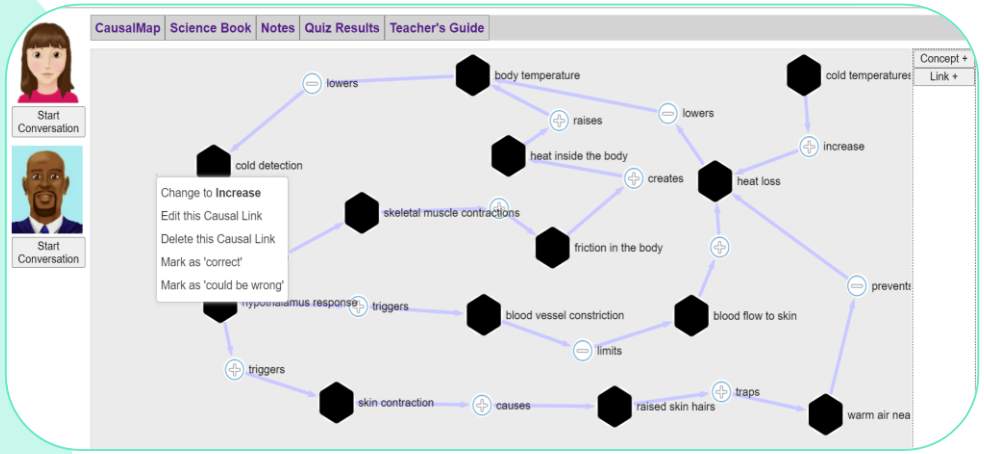
Here is a sneak-peek: Learning&Assessment applications

Karel the Turtle

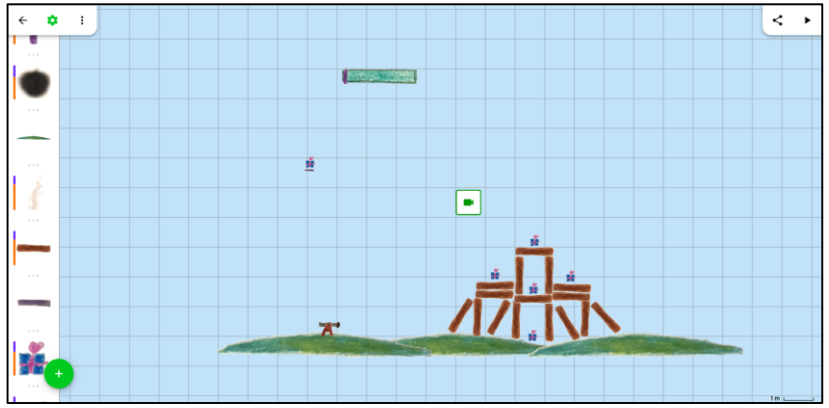


Karel the Turtle:
Help Karel navigate the world by building programs with block-based coding

Betty's Brain

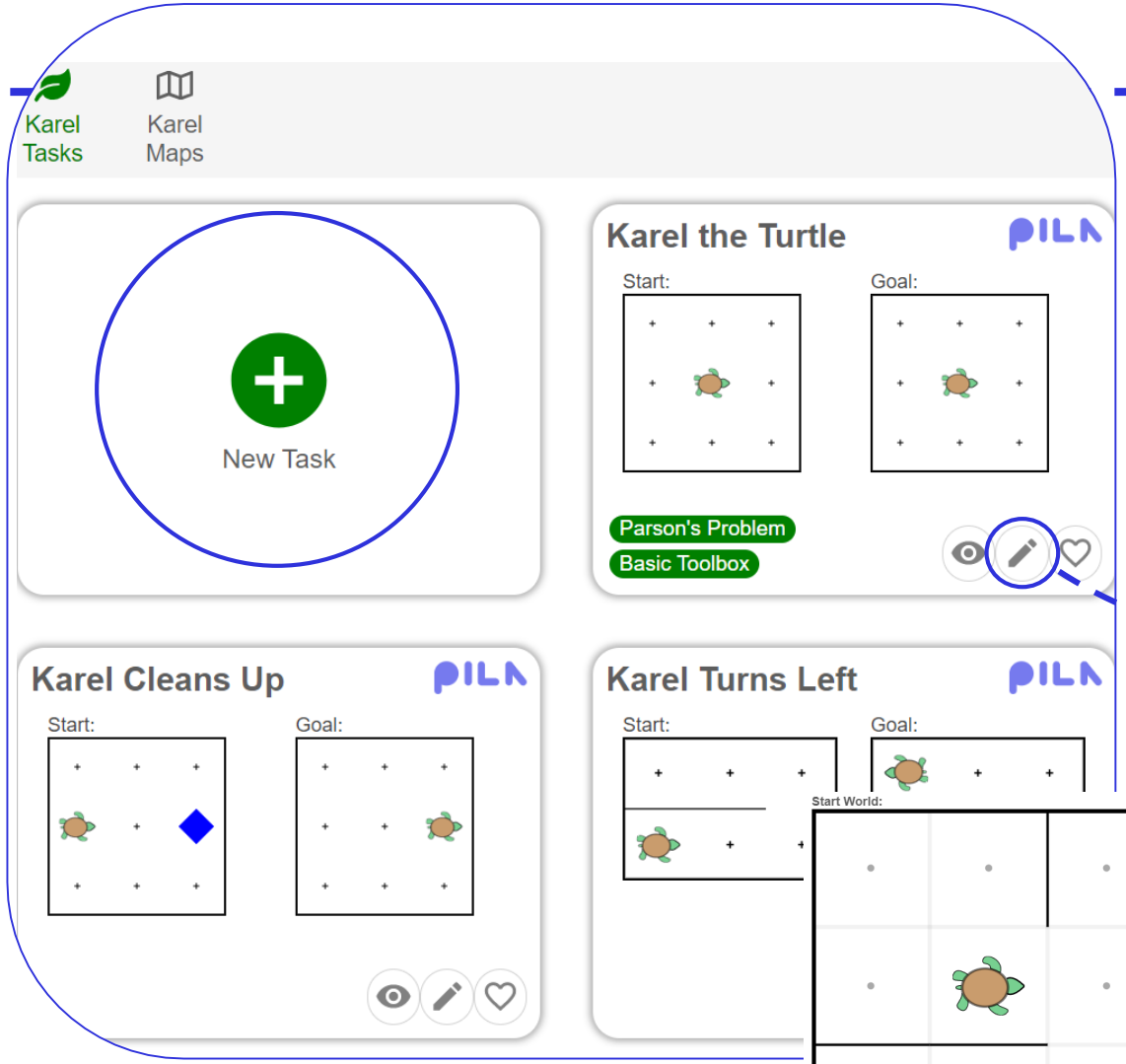


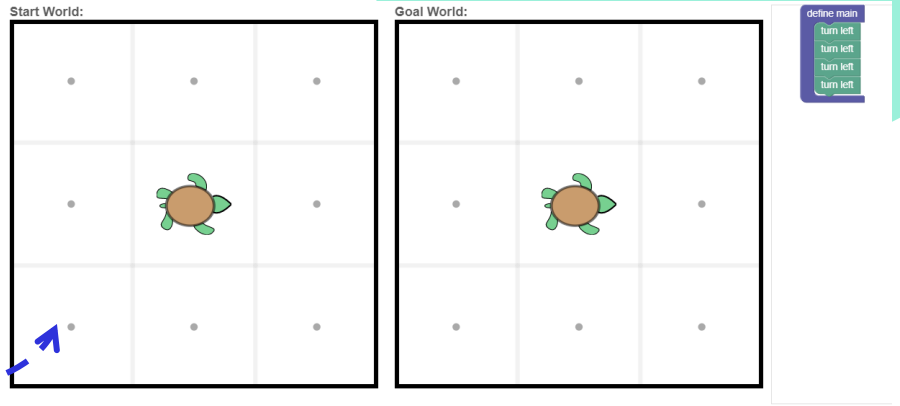
Betty's Brain
Teach Betty about complex phenomena by building a conceptual map

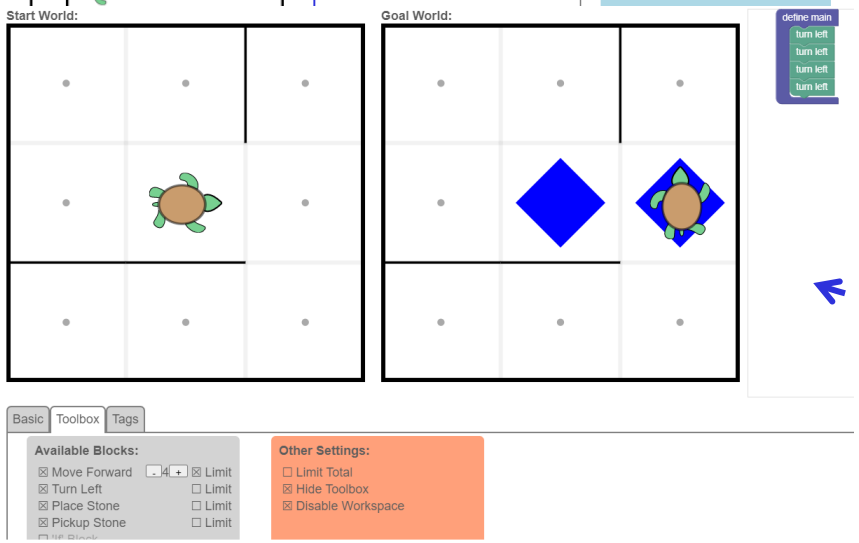


Cand.li:
Use your imagination and create your own videogames!

Here is a sneak-peek: Customization tools







Questions?

Contact us to participate

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www.oecd.org/pisa/innovation

pilaproject.org