

Developing and Measuring Creative Thinking

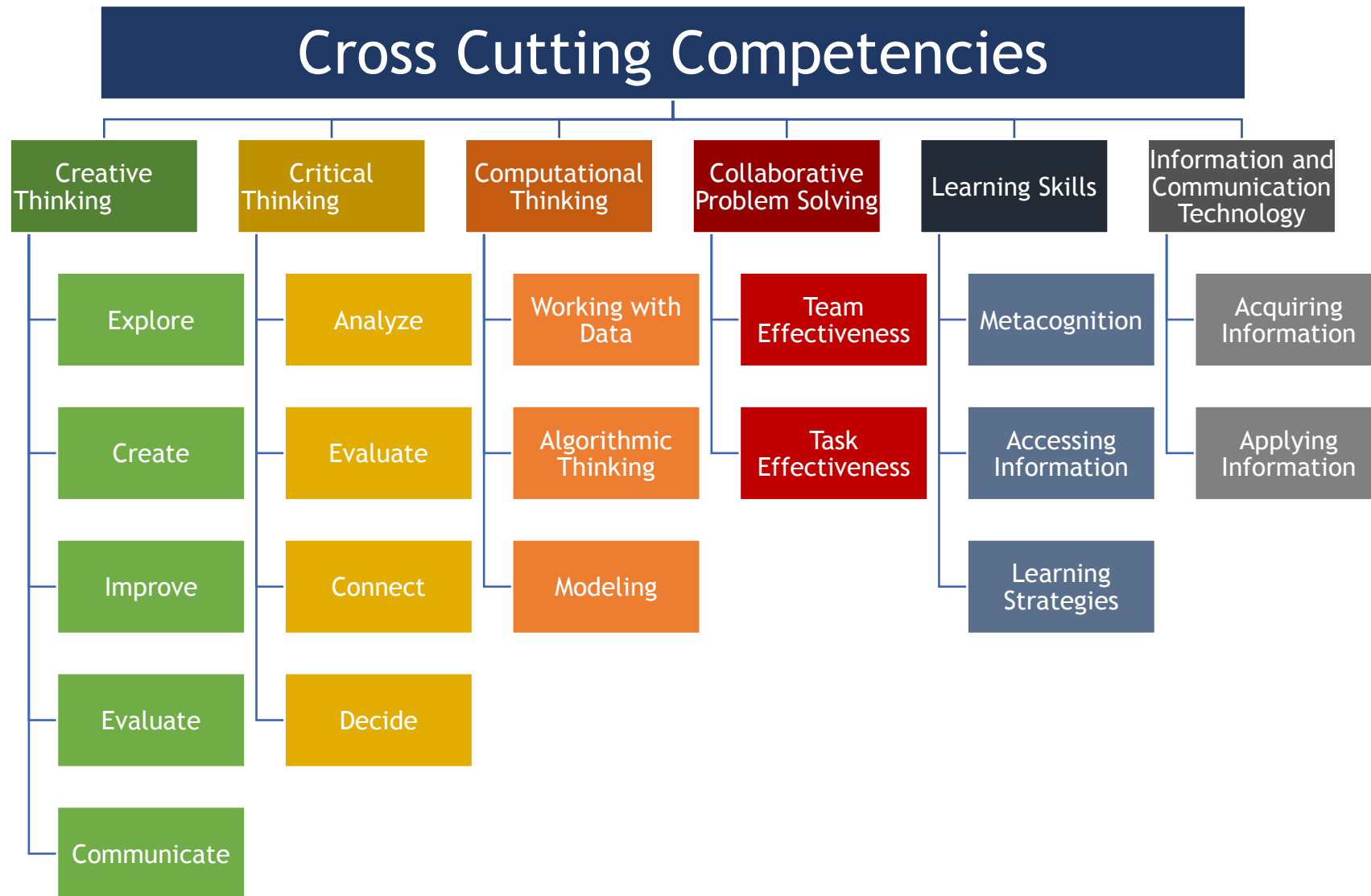
Развитие и оценка креативного мышления

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***“First-class
human, not
second-class
robots”***

-Andreas Schleicher
Director for the Directorate
of Education and Skills, OECD



Rosen, Y., Stoeffler, K., & Simmering, V. (2020). Imagine: Design for creative thinking, learning, and assessment in schools. *Journal of Intelligence*, 8(2), 16.

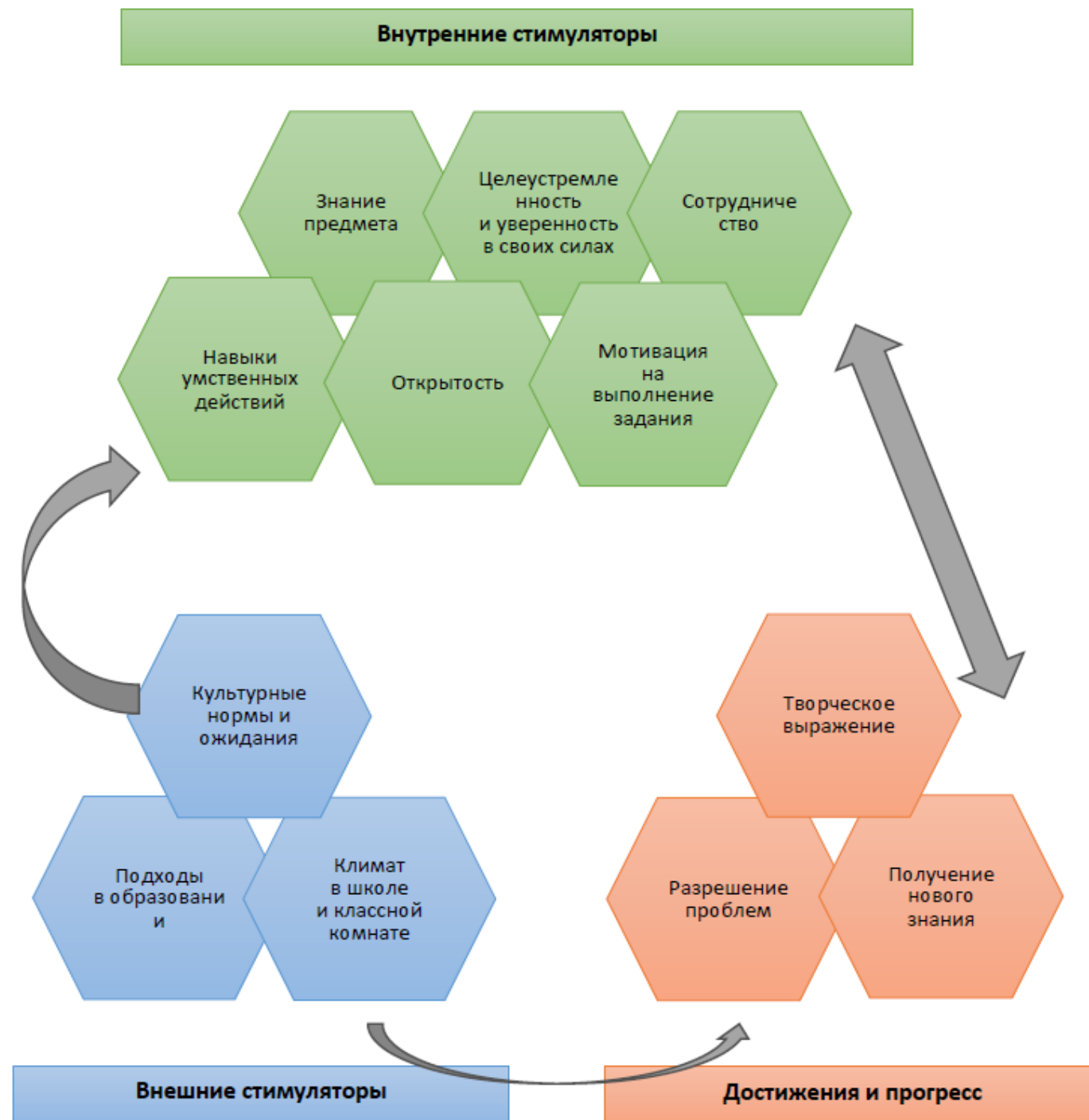
Rosen, Y., Wolf, I., & Stoeffler, K. (2019). Fostering collaborative problem solving skills in science: The Animalia project. *Computers in Human Behavior*, 104.

Rosen, Y., & Tager, M. (2014). Making student thinking visible through a concept map in computer-based assessment of critical thinking. *Journal of Educational Computing Research*, 50(2), 249-270.

PISA 2022 Creative Thinking Definition

Creative thinking is the competence to engage productively in the generation, evaluation and improvement of ideas, that can result in original and effective solutions, advances in knowledge and impactful expressions of imagination.

Креативное мышление - это компетентность продуктивно участвовать в разработке, оценке и совершенствовании идей, направленных на получение инновационных и эффективных решений, и/или нового знания, и/или эффектного выражения воображения.



Focus of the PISA 2022 Creative Thinking

- PISA 2021 focuses on the creative thinking processes that one can reasonably expect from *15-year-old students*.
- The main objective of PISA is to provide *internationally comparable* data on students' creative thinking competence that have clear implications for education policies and pedagogies.
- The range of possible assessment domains (предметная область) must necessarily be limited, in order to ensure that a *sufficient amount of data* is collected in each domain within *one-hour* creative thinking assessment.
- Assessment tasks should resemble *real activities* in which students engage, both *inside and outside of their classroom* (such as drawing, writing or problem-solving).

Креативное самовыражение

Письменное или
устное

Изобразительное
или
символическое

Получение нового знания / Решение проблем

Естественнонаучные
или математические

Социальные или
межличностные



Competency Model
Компетентностная модель

Generate Diverse Ideas

- A common indicator of student's capacity to think creatively is the number of *appropriate* and *distinctively different ideas* the student is able to generate, often termed ideational fluency.
- Students' capacities to think flexibly across domains: for example, by providing different solutions for a problem, writing different story ideas, or creating different ways to visually represent an idea.

**Social Problem Solving**

Task 1/3

Describe 3 different ideas of what people can do to save water. The ideas should be as different from each other as possible. Be specific in your descriptions.

Include only activities that everyone can do.

We recommend that you spend no longer than 5 minutes on this question.

**AN APPLICATION TO SAVE WATER****Idea 1****Idea 2****Idea 3**

Generate Diverse Ideas Across Domains

- Written expression: The student writes different captions, titles or story ideas for a given stimulus.
- Visual Expression: The student combines shapes in multiple ways to produce distinct visual products, or the student visually represents data in different ways.
- Social Problem Solving: The student finds multiple, different solutions to a social problems, which rely on different actors, instruments or methods to achieve the desired outcome.
- Scientific Problem Solving: The student develops multiple, different hypotheses or experiment ideas to investigate an observation.

Generate Creative Ideas

- Students' capacities to search for appropriate and original ideas across different domains (e.g. an original story idea, an original way to communicate an idea in visual form, or an original solution to a social or scientific problem).
- Students are asked to provide an appropriate, task-relevant response that other people might not have thought of.
- In the PISA assessment, originality is thus relative to a reference point: the responses of other students who complete the same task (i.e. statistical infrequency)

**Social Problem Solving**

Task 2/3

You and your friends have created a smartphone application that rewards users for the actions they take to save water.

You now need to find a good way to advertise the app so that people will download it. Try to think of an original idea to publicise your application.

The idea should be original in the sense that not many students would think of it.

Idea**AN APPLICATION TO SAVE WATER**

Generate Creative Ideas Across Domains

- Written expression: The student produces an original title for some artwork that is somehow related to the art.
- Visual Expression: The student produces an original poster for a school exhibition that effectively conveys the theme of the exhibition.
- Social Problem Solving: The student produces an original idea for a strategy to effectively market a product to increase awareness of the product among the target audience.
- Scientific Problem Solving: The student generates an effective and original solution to an engineering problem.

Evaluate and Improve Ideas

- Students' capacities to evaluate limitations in given ideas and find original ways to improve them.
- In order to reduce challenges of dependency across questions, students are not asked to iterate upon their own ideas but rather to change or continue given ideas or solutions.

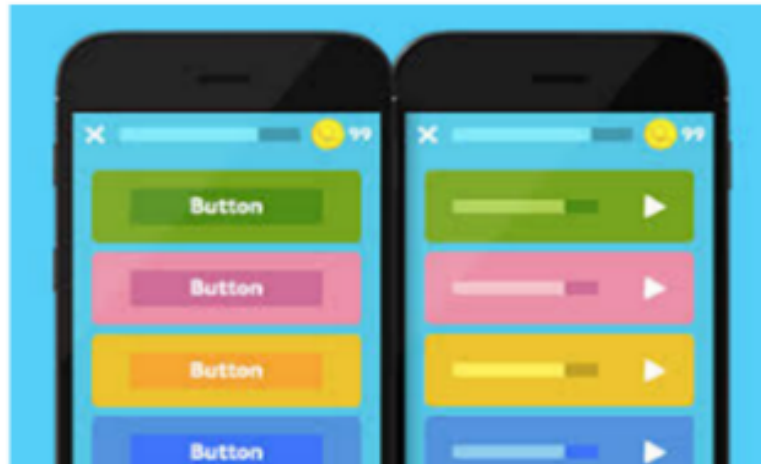
**Social Problem Solving**

Task 3/3

You are worried that after a few days, users will use the application much less frequently than at first.

Can you think of an improvement to the application that keep people using it for longer?

Describe your idea below.

Idea**AN APPLICATION TO SAVE WATER**

Evaluate and Improve Ideas Across Domains

- Written expression: The student makes an original improvement to a title for some artwork in light of new information, where the student retains elements of the given title but incorporates elements relating to the artist's inspiration in an original way.
- Visual Expression: The student makes an original improvement to a poster for an exhibition, where the student retains the images included in the given poster but makes a clearer connection to the theme of the exhibition in an original way.
- Social Problem Solving: The student makes an original improvement to a suggested solution, where the student's solution effectively builds upon the given solution in an original way.
- Scientific Problem Solving: The student makes an original improvement to a suggested experiment, where the student's response is a valid and original experiment idea and builds upon the given experiment.



Beyond PISA:
Developing Creative Thinking
Competence with Students and
Teachers



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Challenge Overview

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One of the most valuable applications of creative thinking is the ability to apply creative thinking skills, and the creative thinking process, to solve real-world problems. We have created two real-world challenges for you to apply your creative thinking skills. View the introduction video for each challenge and choose which challenge you would like to use for the following creative thinking activities.

Design: School (re)design challenge

Climate system: Rising seas challenge

Maps of Sea Level Change from NASA's MEaSUREs Project

October 1992 - November 2015

Maps of sea level change relative to a long-term mean (1992-2015), based on altimeter data from two simultaneous satellites at all times.

Computed by NASA's Sea Level MeaSUREs Project, Version JPL 1603

March 21, 1994

3-D Map of Anomalies

Global Average Sea Level

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School Re-design Overview

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School Re-design Challenge

This creative challenge is based on a true story - Lauttasaari primary school design in Helsinki, Finland.

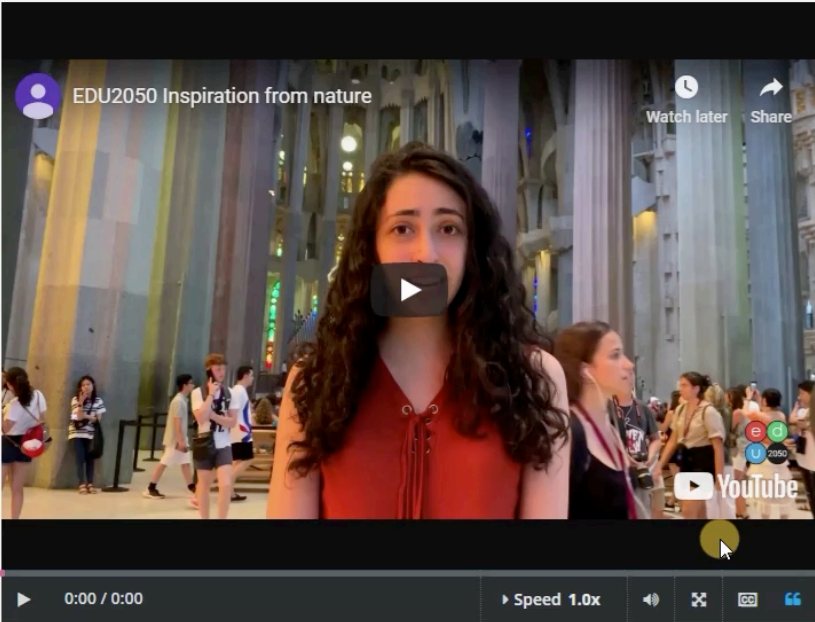
In this challenge you are a newly appointed **School Designer** of the Newtown primary school that serves 500 K-8 students. The Newtown Education Committee recently adopted a new core curriculum as a basis for school re-design:

- Architecture inspired by natural shapes
- Open and flexible learning spaces
- School as a place for group learning
- Spaces designed for project based learning

In order to enable a more extensive school re-design, the local government acquired a new building just across the street that will serve as an extension to the current school building. Your task is to come up with a creative school re-design proposal for the review and approval by the Newtown Education Committee.



Inspiration from Nature



Start of transcript. Skip to the end.

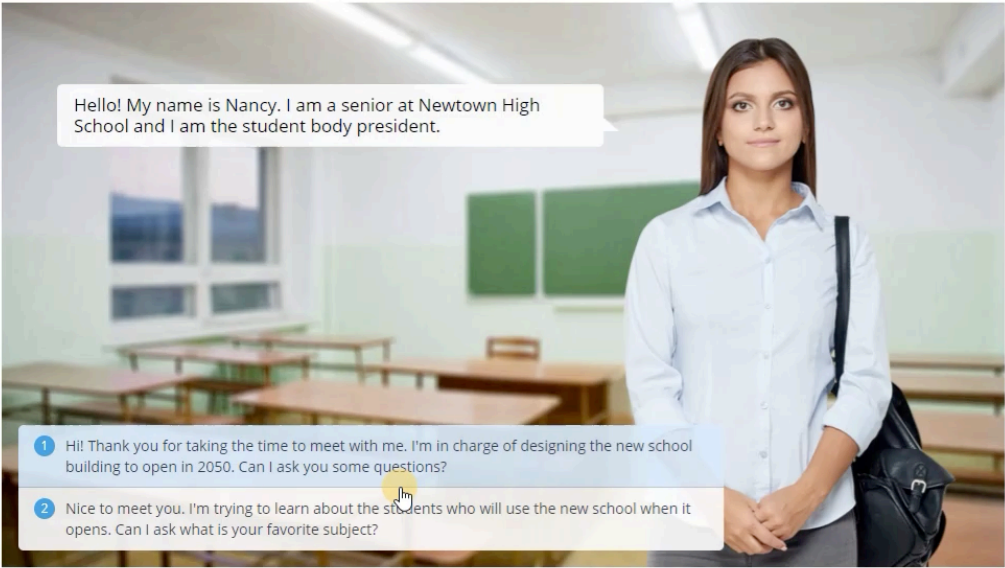
Gaudi's work is different from any other architecture.

He's famous for his inspiration from nature. Gaudi believed that nature is the richest source of inspiration and knowledge that we have. Or, in his words, nothing is invented for it is written in nature first.

Re-vision

As you know, not all schools have the same needs. We've established what elements ALL schools require. Now, let's use our evaluation skills to contextualize the elements for the project in Newtown. Start by talking with a student from the local high school to gain more information about the needs of the district.

(0/1 points) incomplete





Chris, Lead School Designer

Hello everyone!



Jamie, Architect

Late again, haha! What are you so busy working on lately?



Chris, Lead School Designer

My new design, of course! Perhaps you can help.



Jamie, Architect

Sure

Sure

Maybe

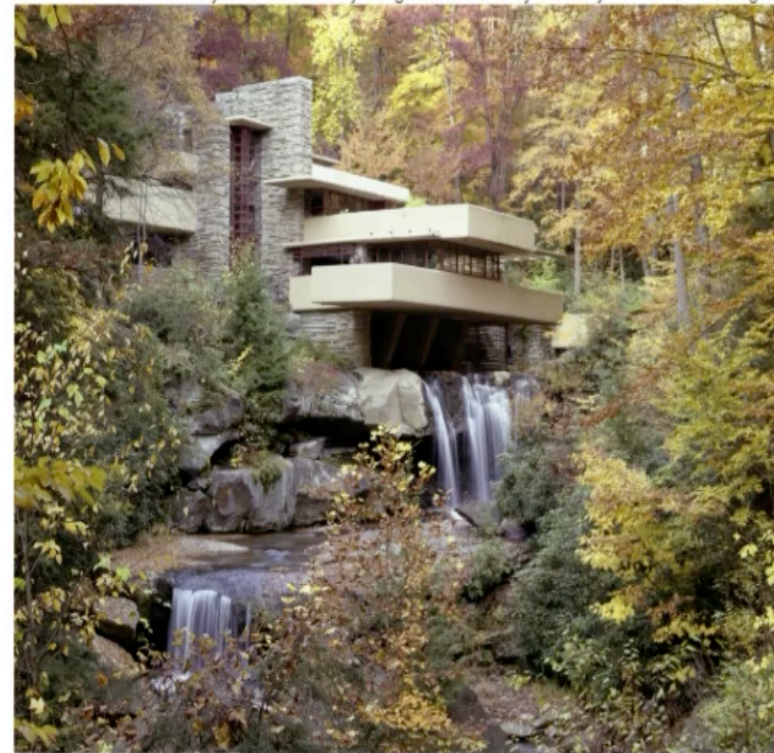
Happy to help. What is the issue?



Nature Inspired Designs

0/1 point (graded)

Let us look at a house built by architect Frank Lloyd Wright. This is certainly not a very conventional housing design!



In what ways is the design of this house inspired by nature?

SUBMIT

Reset

Nature Inspired Designs Part 2



Enrollment stats

This report shows the dynamics of the following metrics:

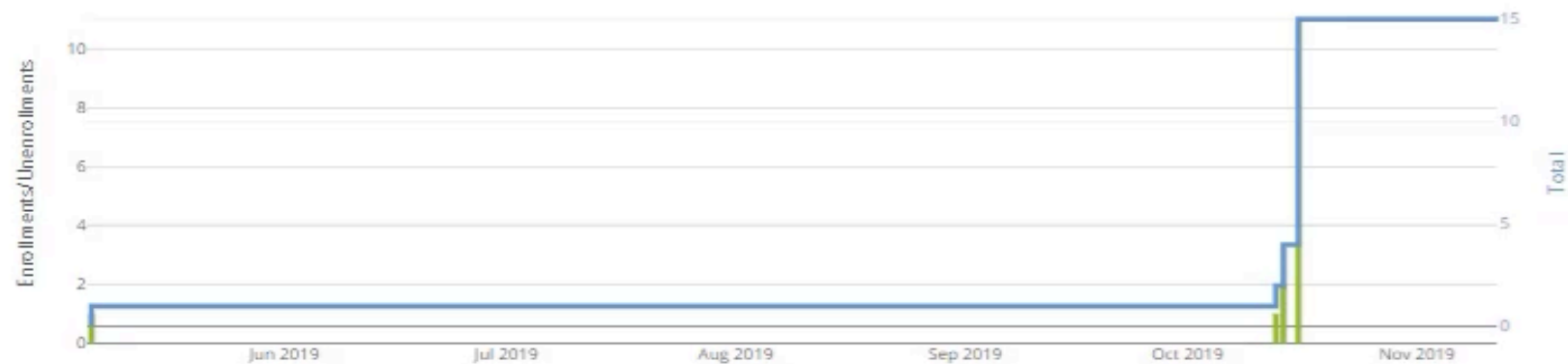
- Enrollments: Number of students that enrolled in the course
- Unenrollments: Number of students that unenrolled from the course
- Total: Total number of students that are currently passing the course

You can choose the predefined periods of time to see the dynamics (Last Week, Last 2 Weeks, Last Month) or you can choose custom time period.

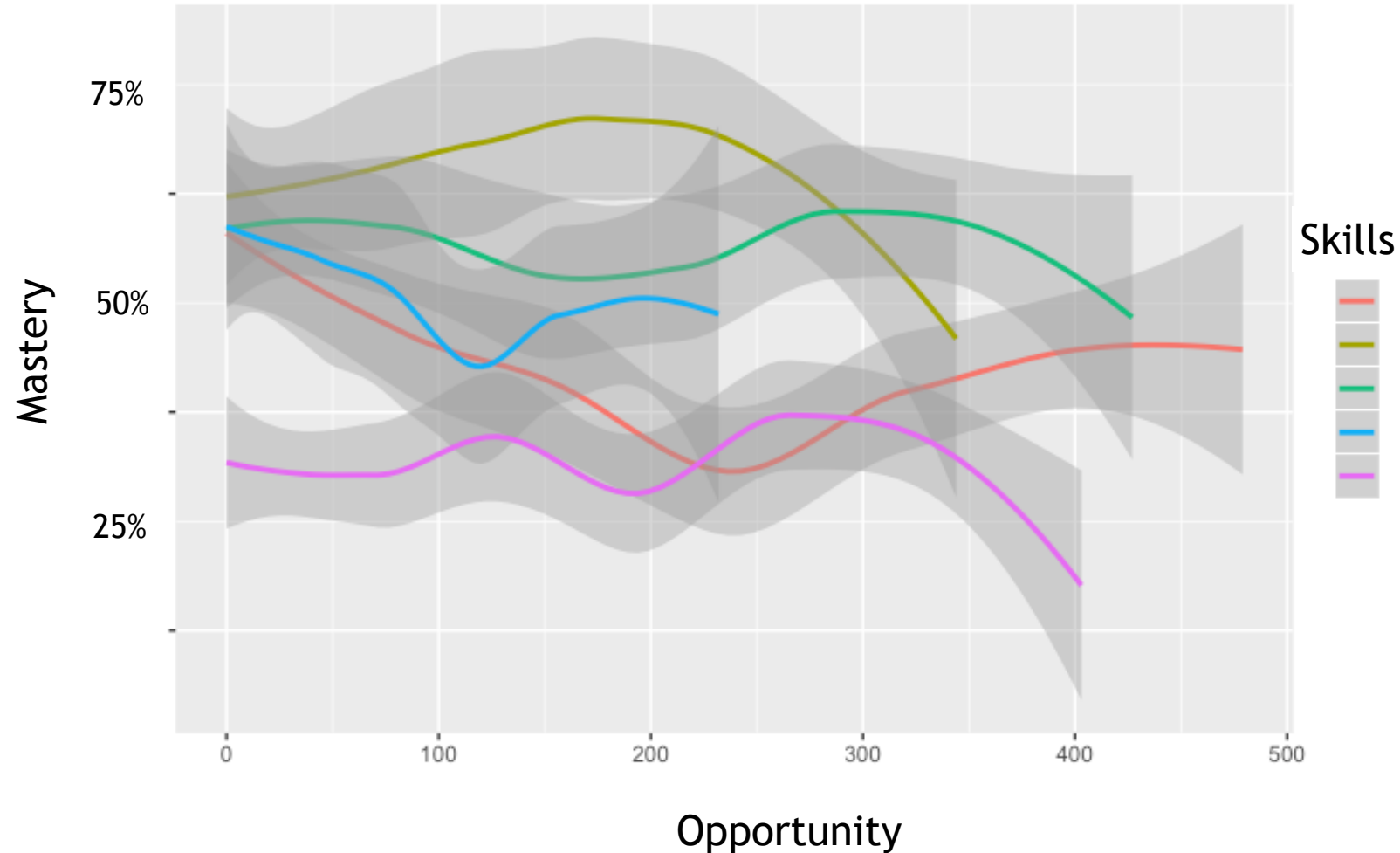
2019-05-06 - 2019-11-13

ALL ENROLLMENTS

Enrollments Unenrollments Total



Developing Competencies Over Time





THANK YOU!

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