



Game Based Learning

Exploring Digital Games For Learning



Nutan Bharati

Training on Game Based Learning, 20-24 June 2022, CIET, NCERT, Delhi

Learning Outcomes : Exploring Digital Games for Learning

At the end of this session, you will be able to

- Identify elements of digital, real life games and simulations
- Discuss main theories around game based learning
- Extrapolate role of teachers in digital game based learning and OER
- Create criteria for selecting effective games for learning



How we will learn

- Stories, videos and scenarios
- Learners, collaboration and experiences
- Activities & QA

Learning Level	Games and Simulations	Areas
Early Years	Sugarizer and others	Subject agnostic
Secondary School	Connected Learning Initiative (CLIX), Google lens, maps	Science Maths Languages Social Science
Higher Learning	PHET, Play-Learn IITB and others	Science, Technology



When to use digital games during learning

- Introducing a new topic
- Explaining a difficult concept
- Assessment
- Summary
- Entire topics can be taught through games

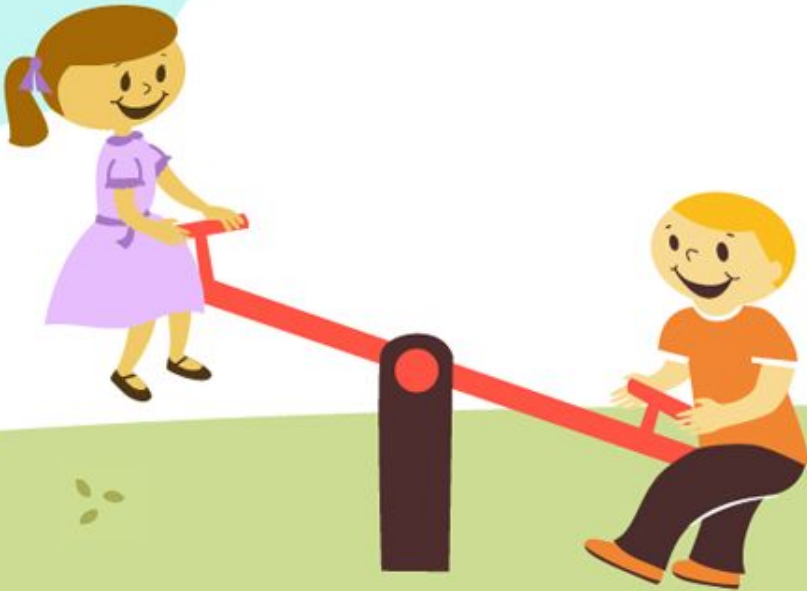


Activity 01 : Have you played a digital game?

Please share the name of the game and/or weblink in the chat box.

Look at what your colleagues have posted and test any one game from their choice. You have another one minute to share your experience on chatbox!

Duration : 02 Minute



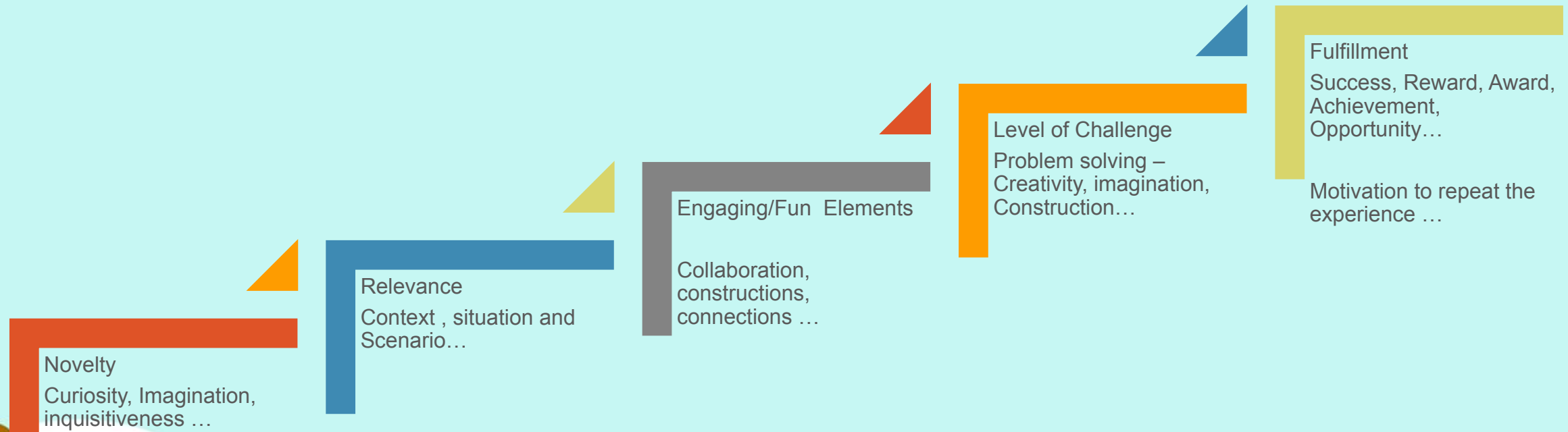
How was the game playing experience?

- Motivating?
- Engaging?
- Connecting with other learners?
- Challenging, competition stressing?
- What was your criteria for choosing a particular game?

...



Levels of Engagements in games



How are digital and real games different

- Teams engagement, Peer Learning
- Physical, mental , social growth
- Discipline
- Joy, Fun, Happiness, Break from routine
- Connecting with another world
- Problem Solving with collaboration
- Sense of achievement
- Practice and self improvement

▪ PHYSICAL GROWTH & DEVELOPMENT
▪ SOCIAL CONNECT

Personal Augmented Learning : Learning Ecosystem

With an aim to align individual learning needs to context and scenarios offered during instructions to focus on a particular concept is highlighted.

This magnifies the environment conducive to learning a specific area of difficulty or interest of an individual learner to make learning process effective.



Constructionism

Seymour Papert : Turtle Logo

A little girl, counting steps, turning left or right by degrees to exit the room...

“Papert built on Piaget's theory of constructivism with a learning theory of his own: constructionism. It proposed that **the best way to ensure that knowledge is built in the learner is through the active construction of something shareable — a poem, program, model or idea.**”



Principles of constructivism.

- Knowledge is constructed. ...
- People learn to learn, as they learn. ...
- Learning is an active process. ...
- Learning is a social activity. ...
- Learning is contextual. ...
- Knowledge is personal. ...
- Learning exists in the mind. ...
- Motivation is key to learning.



<https://el.media.mit.edu/logo-foundation/resources/onlogo/index.html>

<http://dailypapert.com/multimedia/>

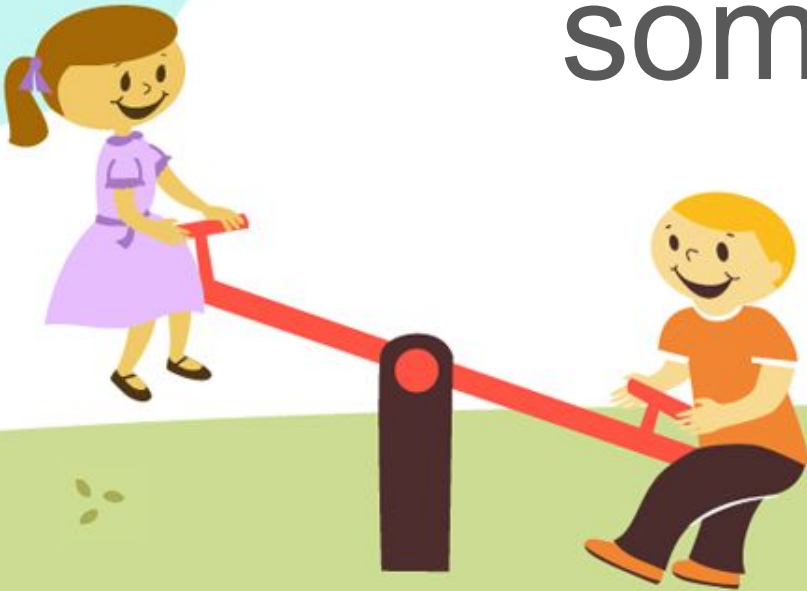


Activity 02 : Do you recall constructing something ?

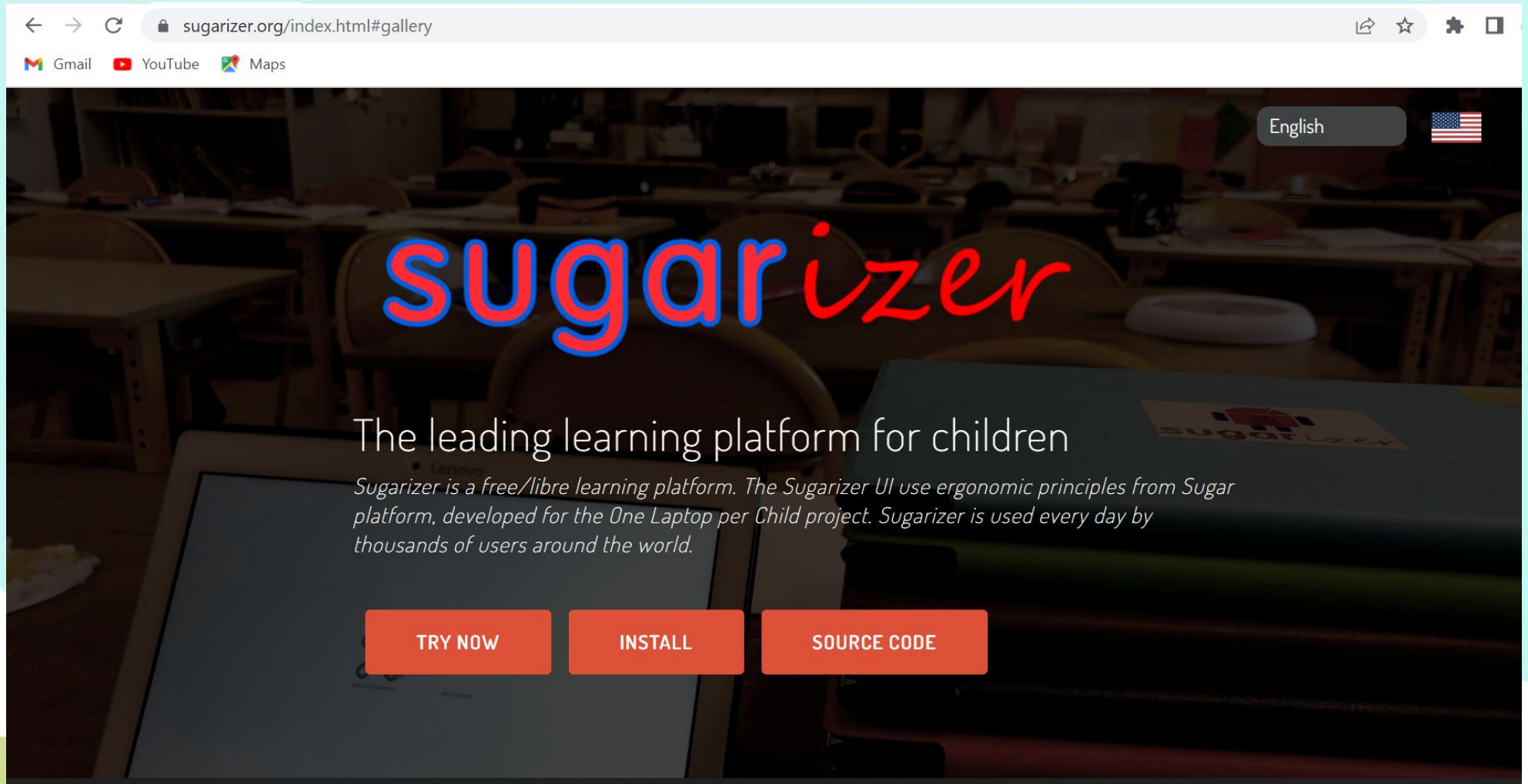
Share on chat box, what did you construct and when.

What did you learn when constructing?

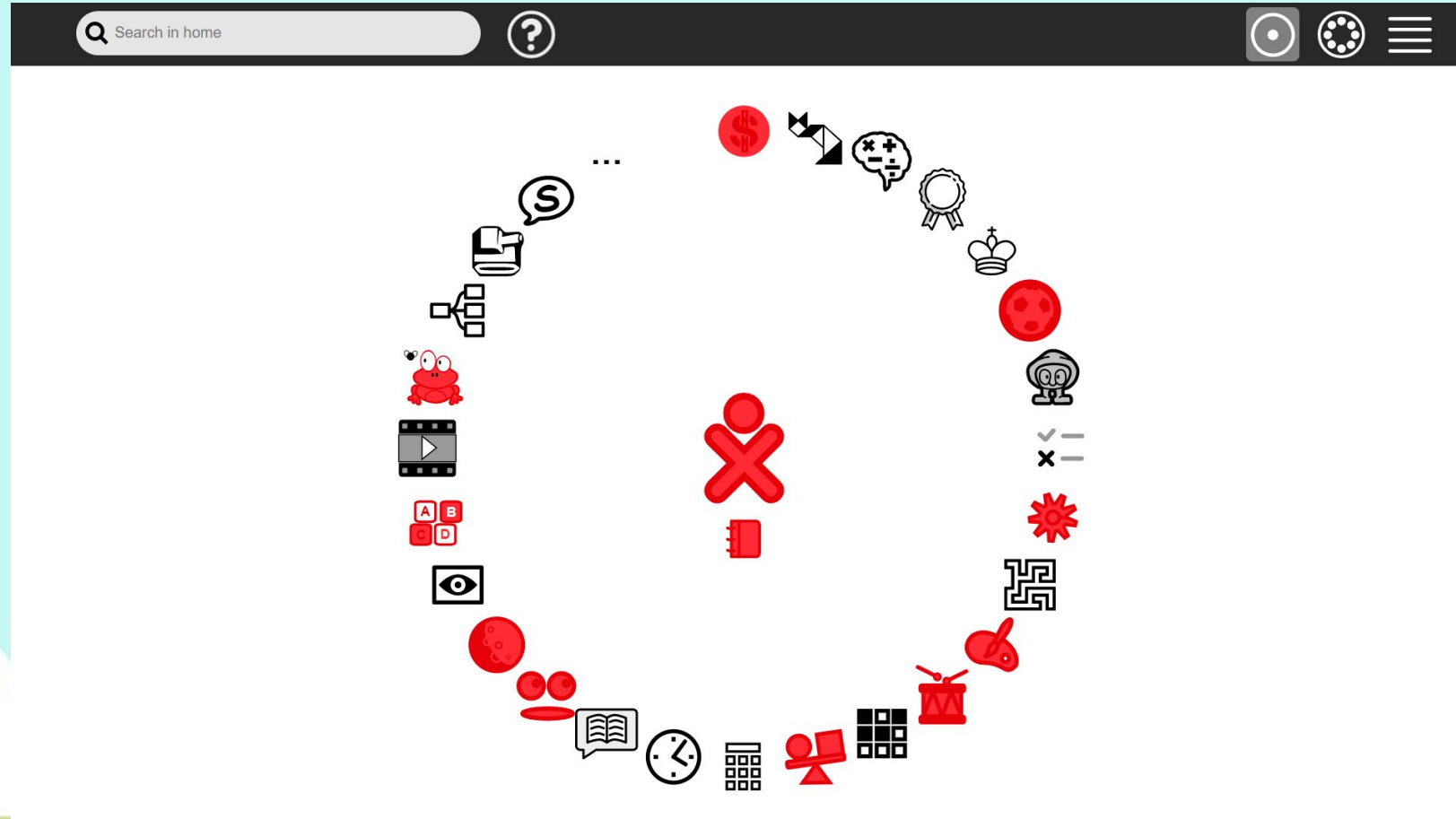
Duration : 02 Minute



Sugarizer : Digital Learning Games – OER Level 01



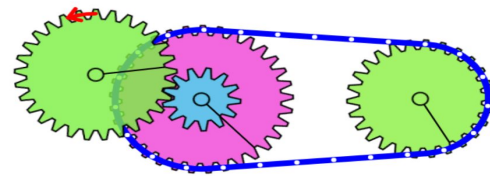
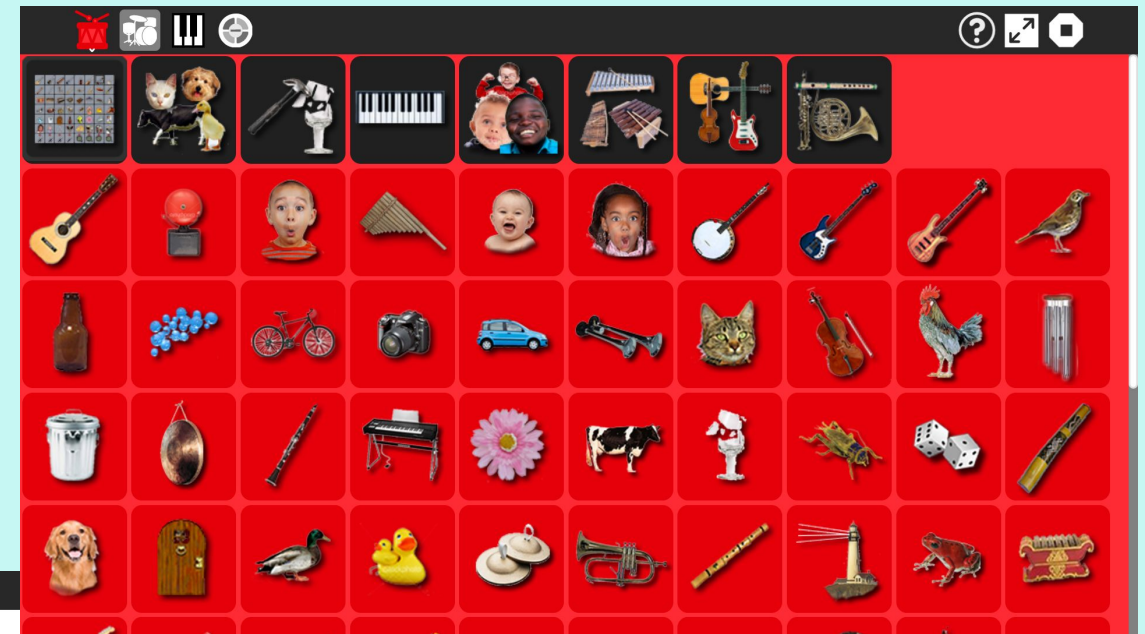
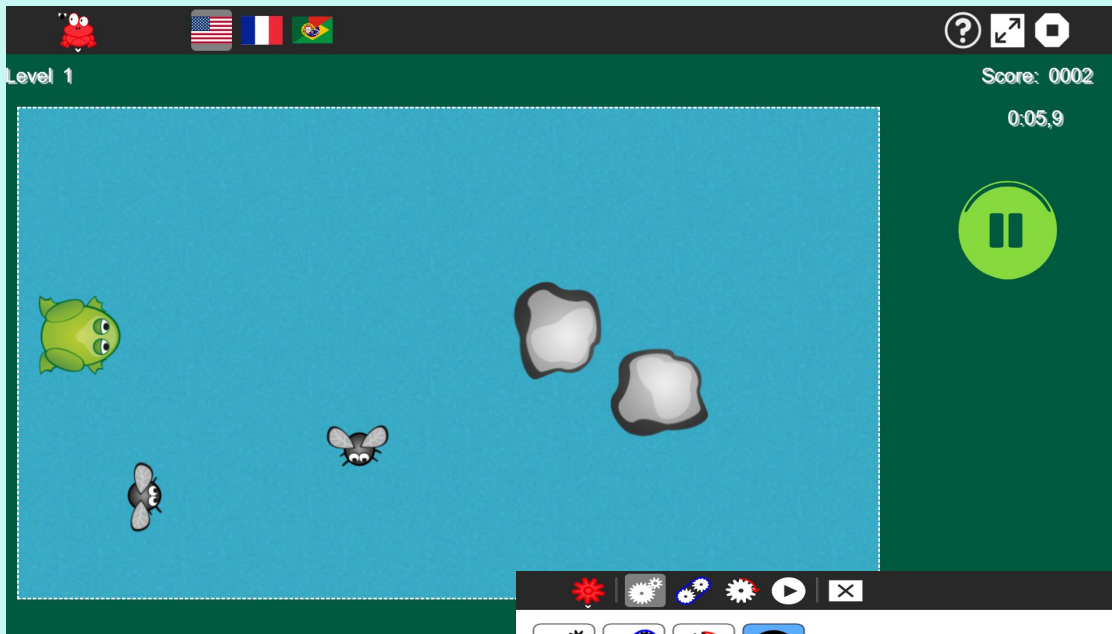
Sugarizer : Digital Learning Games – OER Level 01



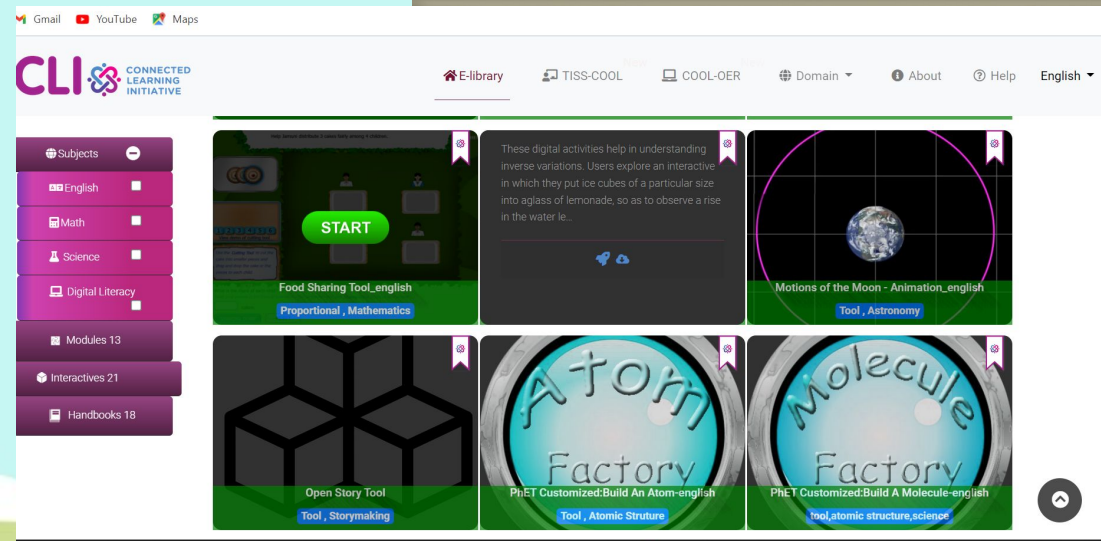
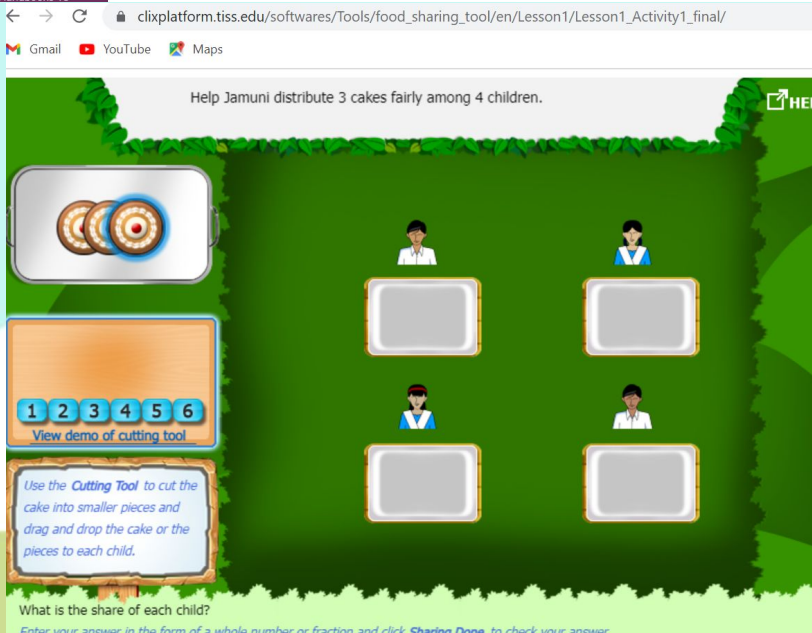
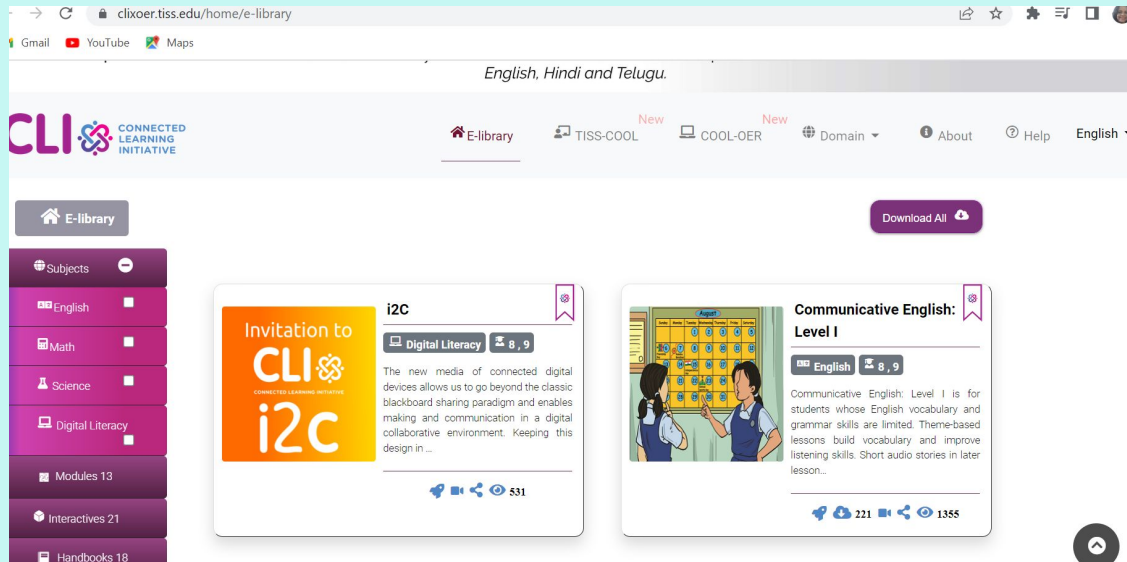
<https://sugarizer.org/>



Sugarizer : Digital Learning Games – OER Level 01

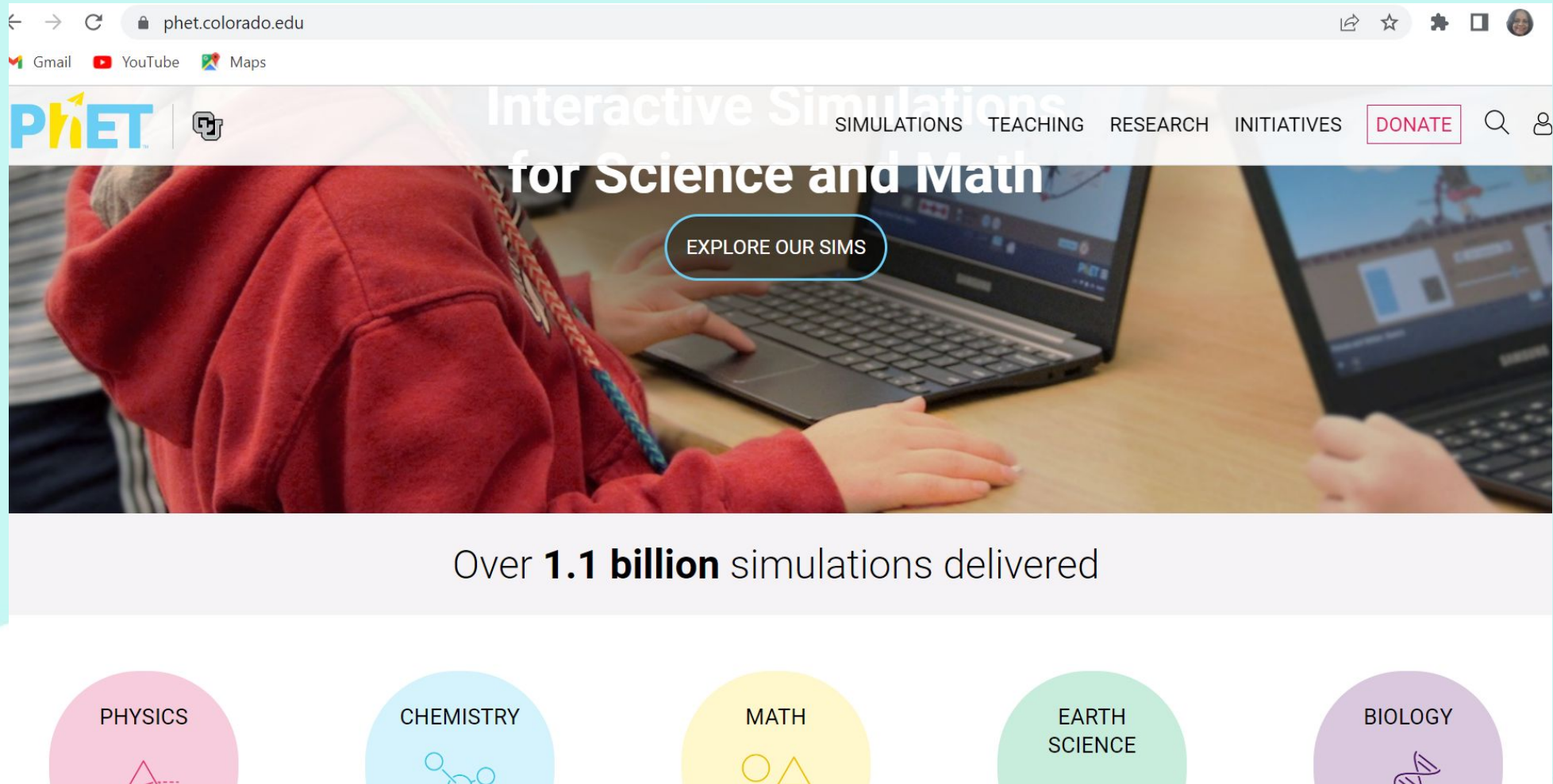


Learning with Digital Resources : Secondary Levels : Example CLIX



<https://clixoer.tiss.edu/home/e-library>

Higher Learning : Science Simulations



The screenshot shows the PhET website homepage. At the top, the browser address bar displays 'phet.colorado.edu'. Below the browser bar, there are links for 'Gmail', 'YouTube', and 'Maps'. The PhET logo is on the left, and a navigation menu on the right includes 'SIMULATIONS', 'TEACHING', 'RESEARCH', 'INITIATIVES', a 'DONATE' button, and search/user icons. The main heading reads 'Interactive Simulations for Science and Math'. Below this is a large image of a child in a red hoodie using a laptop, with an 'EXPLORE OUR SIMS' button overlaid. A light purple banner below the image states 'Over 1.1 billion simulations delivered'. At the bottom, five colored semi-circles represent different subject areas: Physics (pink), Chemistry (light blue), Math (yellow), Earth Science (teal), and Biology (purple), each with a small icon.

phet.colorado.edu

Gmail YouTube Maps

PHET

SIMULATIONS TEACHING RESEARCH INITIATIVES DONATE

Interactive Simulations for Science and Math

EXPLORE OUR SIMS

Over **1.1 billion** simulations delivered

PHYSICS

CHEMISTRY

MATH

EARTH SCIENCE

BIOLOGY

<https://phet.colorado.edu/>

Higher Learning : Science Simulations



Browse Filter

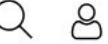
SIMULATIONS

TEACHING

RESEARCH

INITIATIVES

DONATE



SUBJECT



50 Results

Sort by: Newest



- ☒ Physics
 - ☒ Motion
 - ☒ Sound & Waves
 - ☒ Work, Energy & Power
 - ☒ Heat & Thermo
 - ☒ Quantum Phenomena
 - ☒ Light & Radiation
 - ☒ Electricity, Magnets & Circuits

- ☐ Chemistry
 - ☐ General Chemistry
 - ☐ Quantum Chemistry

- ☐ Math
 - ☐ Math Concepts
 - ☐ Math Applications

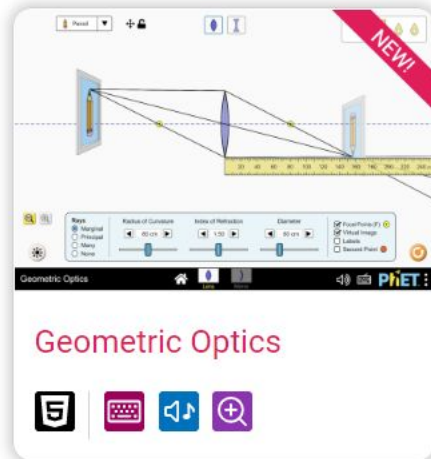
- ☐ Earth Science

- ☐ Biology

Physics

HTML5

HTML5 Prototype



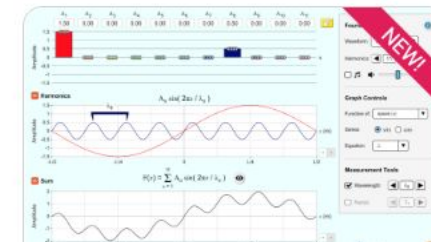
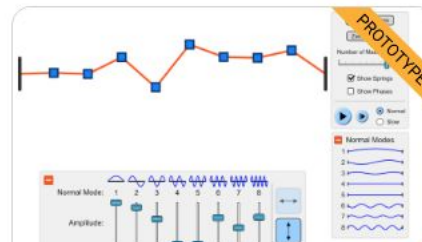
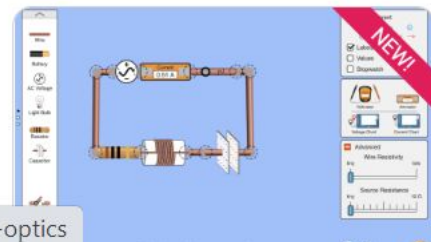
Geometric Optics



Density



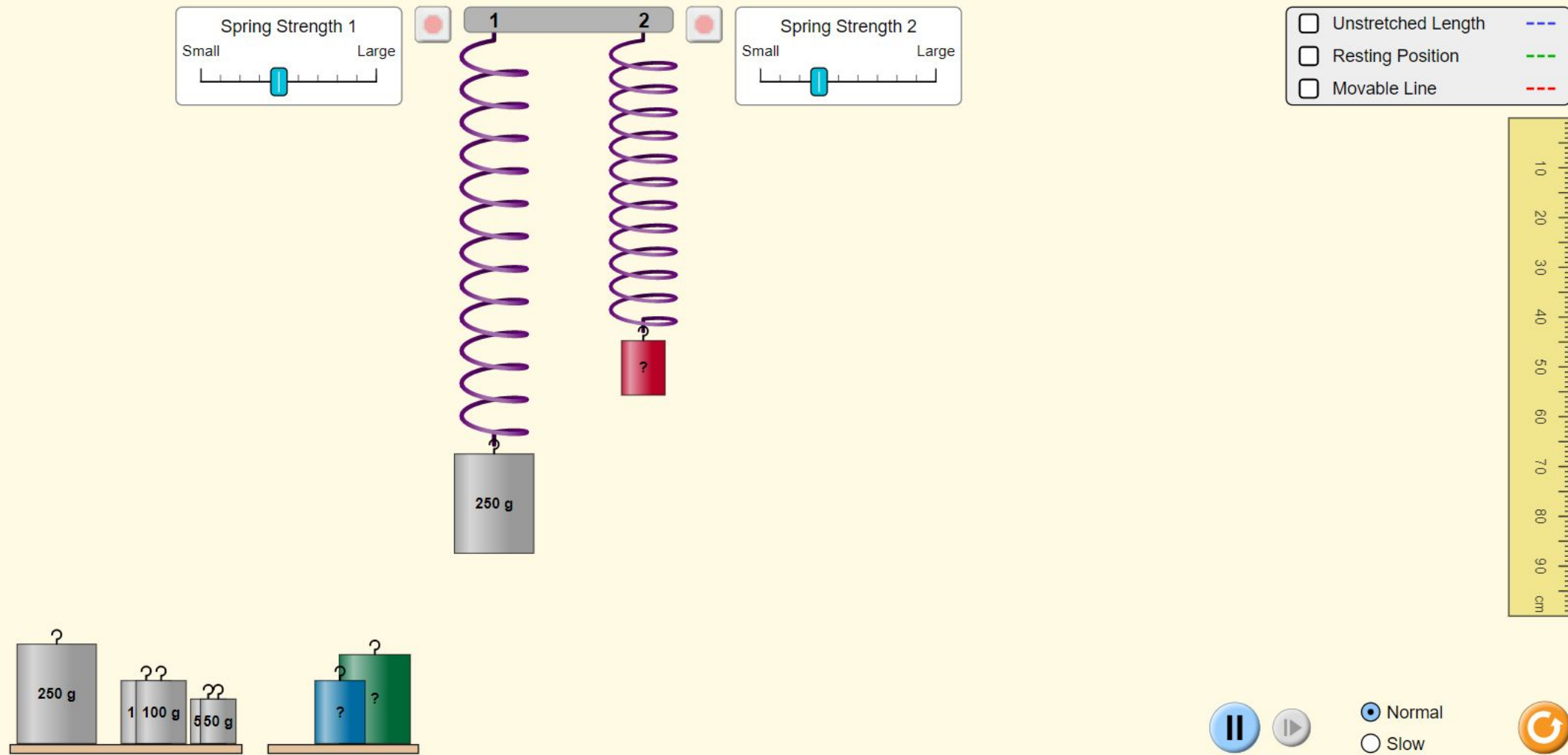
Circuit Construction Kit:
AC



<https://phet.colorado.edu/en/simulations/geometric-optics>

<https://phet.colorado.edu/>

Higher Learning : Science Simulations



The simulation interface for "Masses and Springs: Basics" features two vertical springs, labeled 1 and 2, hanging from a horizontal support. Spring 1 is on the left and has a grey mass of 250 g attached to its bottom. Spring 2 is on the right and has a red mass with a question mark attached to its bottom. Above each spring is a control box for "Spring Strength" with a slider ranging from "Small" to "Large"; both sliders are currently set to the middle. To the right of the springs is a legend with three checkboxes: "Unstretched Length" (blue dashed line), "Resting Position" (green dashed line), and "Movable Line" (red dashed line). On the far right is a vertical yellow ruler with a scale from 0 to 90 cm. At the bottom left, there are two sets of masses on a table. The first set includes a grey mass of 250 g, a grey mass of 100 g, and a grey mass of 550 g. The second set includes a blue mass and a green mass, both with question marks. At the bottom right, there are playback controls: a pause button, a play button, a speed selector with "Normal" (selected) and "Slow" options, and a reset button.



Higher Learning : Science Simulations

phet.colorado.edu/sims/html/color-vision/latest/color-vision_en.html

Gmail YouTube Maps

Color Vision

Single Bulb RGB Bulbs

PHET

Higher Learning : Science Simulations

The screenshot shows the PhET 'Build a Molecule' simulation in a web browser. The address bar displays phet.colorado.edu/en/simulations/build-a-molecule. The page header includes the PhET logo, the University of Colorado Boulder name, and navigation links for SIMULATIONS, TEACHING, RESEARCH, INITIATIVES, and a DONATE button. The simulation interface features a central workspace with molecular models: carbon monoxide (CO), molecular nitrogen (N₂), and a water molecule (H₂O). Below the workspace is a palette with Carbon, Oxygen, and Nitrogen atoms. On the right, a 'Your Molecules' panel lists 'Collection 1' with H₂O (water), O₂ (molecular oxygen), H₂ (molecular hydrogen), CO₂ (carbon dioxide), and N₂ (molecular nitrogen). The bottom of the simulation window includes a 'Build a Molecule' title, a 'Single' button, and a PhET logo.

Build a Molecule

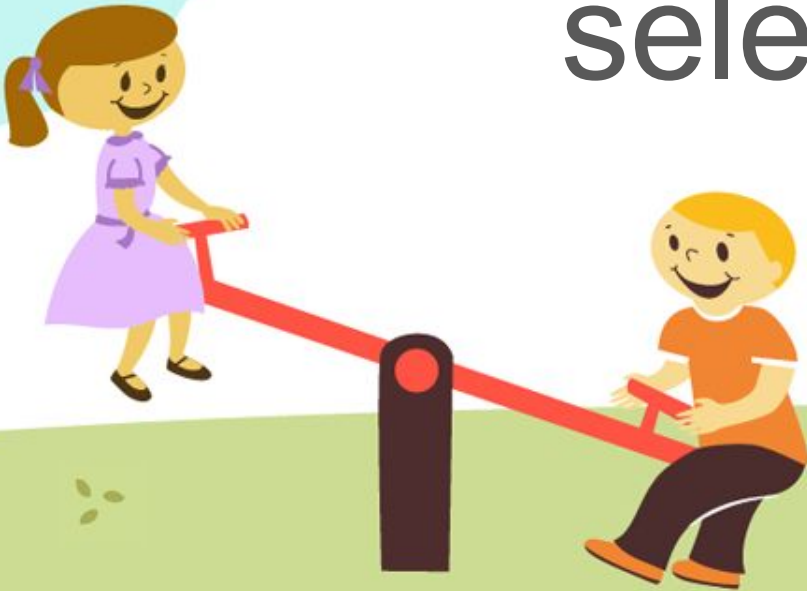


<https://phet.colorado.edu/>

Activity 03 : What is the criteria for selecting a game?

How will your criteria change if you had to use this game for teaching?

Duration : 02 Minute



Role of teachers in game based learning

- ☐ Coach
- ☐ Meta Learner
- ☐ Guide
- ☐ Researcher
- ☐ Community of Practice

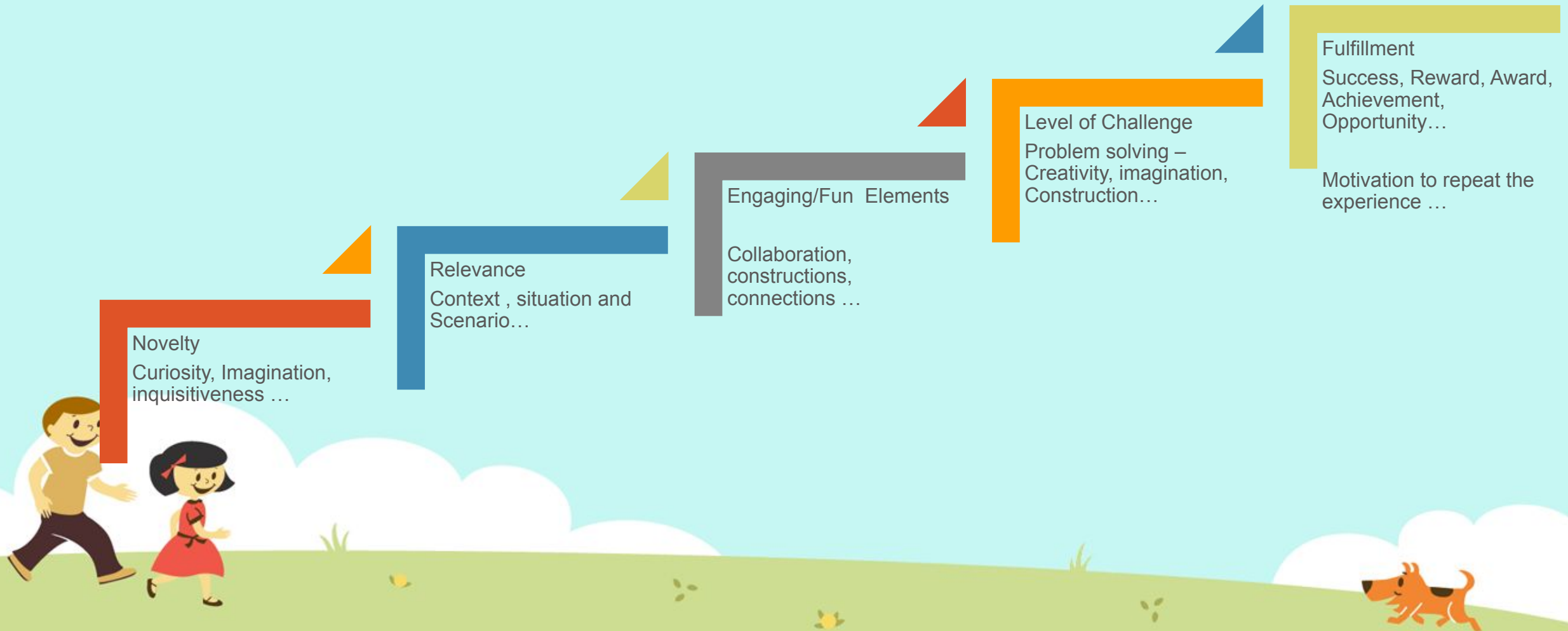


Criteria for selecting game for learning

- ☐ Practicality
- ☐ Economy
- ☐ Context
- ☐ Learning level
- ☐ Learning stage
- ☐ Learning ecosystem
- ☐ Quality of reward system



Let us add and create criteria for selecting digital games for learning:



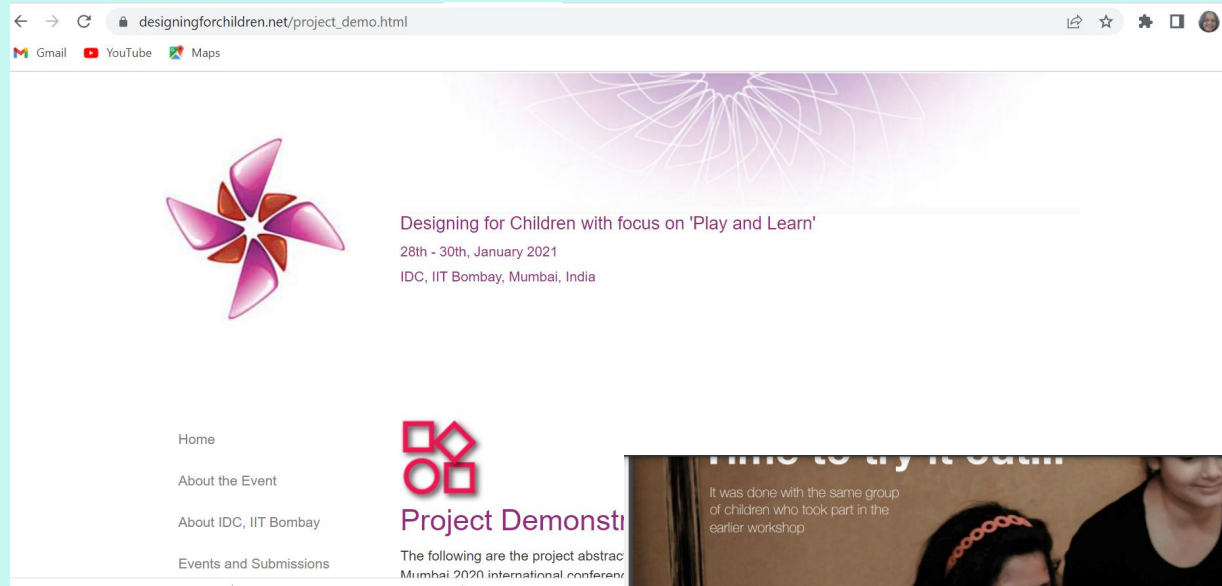
Summary

You have learned about

- ❑ Differentiation between digital, simulations and real life games
- ❑ Teacher's role in game based learning situation
- ❑ Criteria for selecting games for learning
- ❑ Theoretical basis for learning with games
- ❑ ...



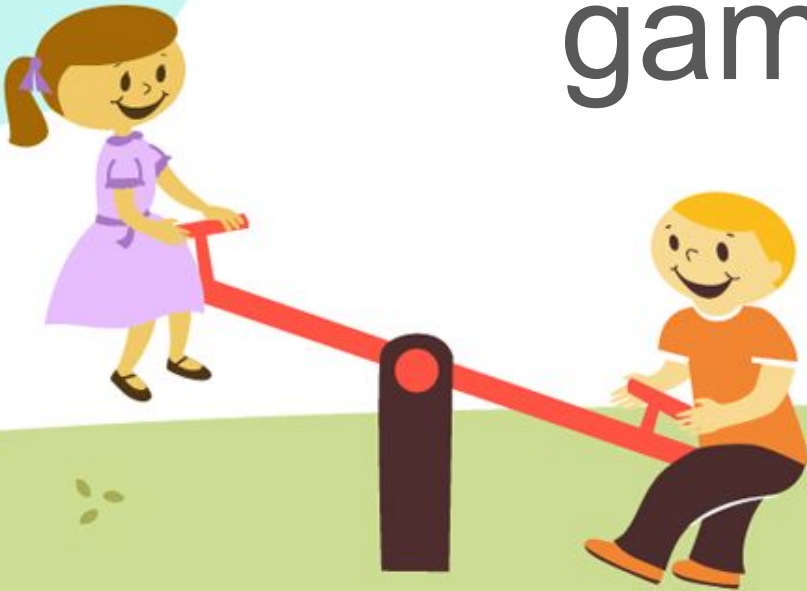
Ongoing explorations on digital games for learning: IIT Bombay



https://www.designingforchildren.net/project_demo.html

Carry home: What are the challenges of game based learning?

Reflect and discuss.



Thank You !

