



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

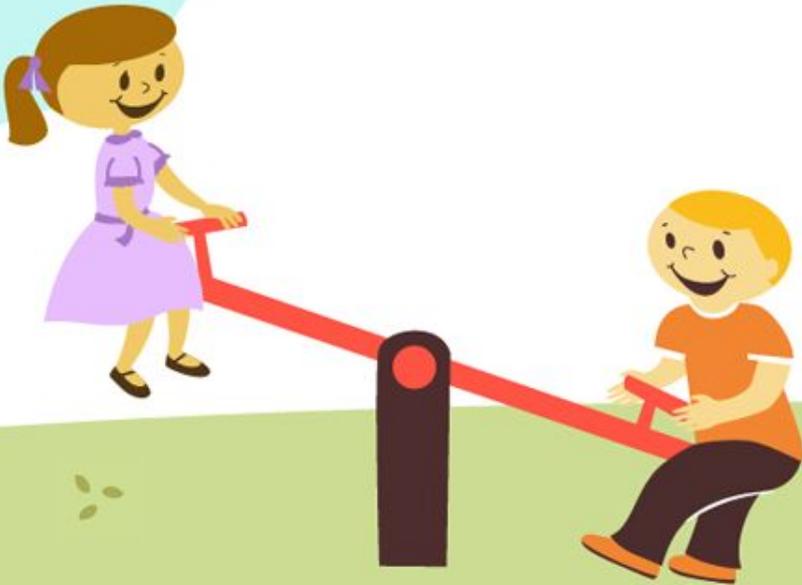


Activity 01 : Have you played a digital game?

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

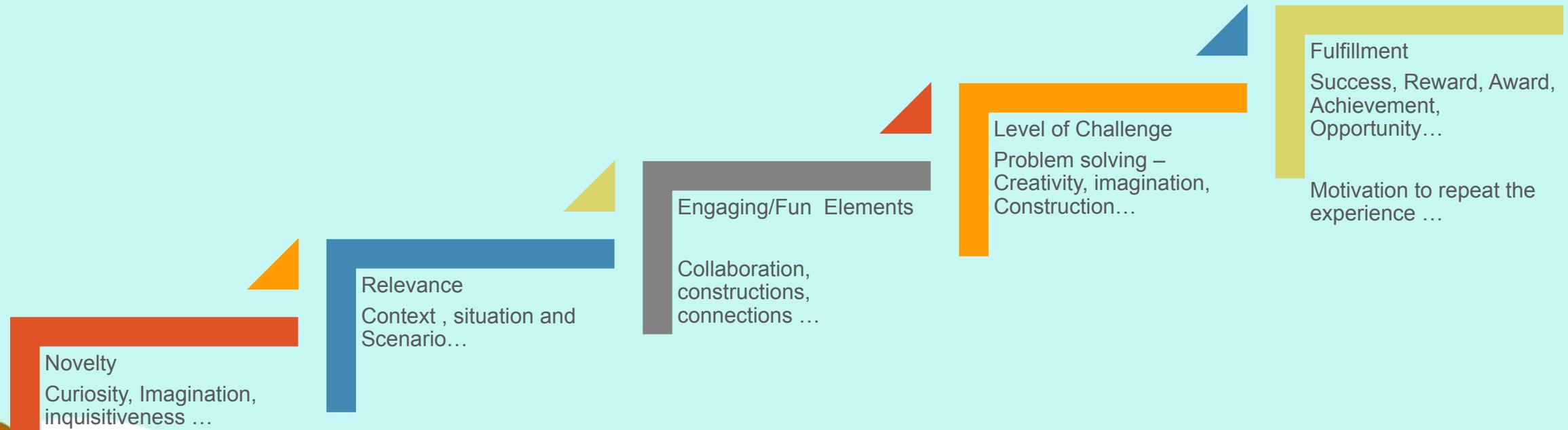


How was the game playing experience?

- 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/>



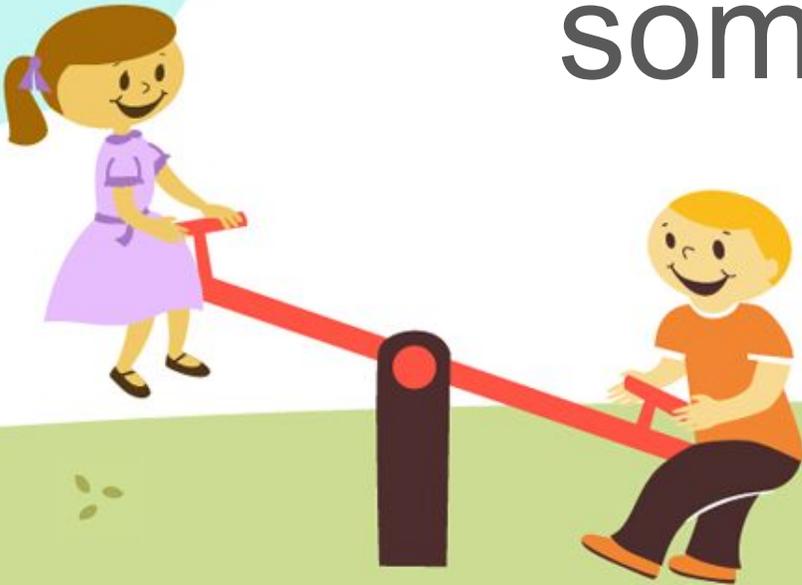
Activity 02 :

Do you recall constructing something ?

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

What did you learn when constructing?

Duration : 02 Minute



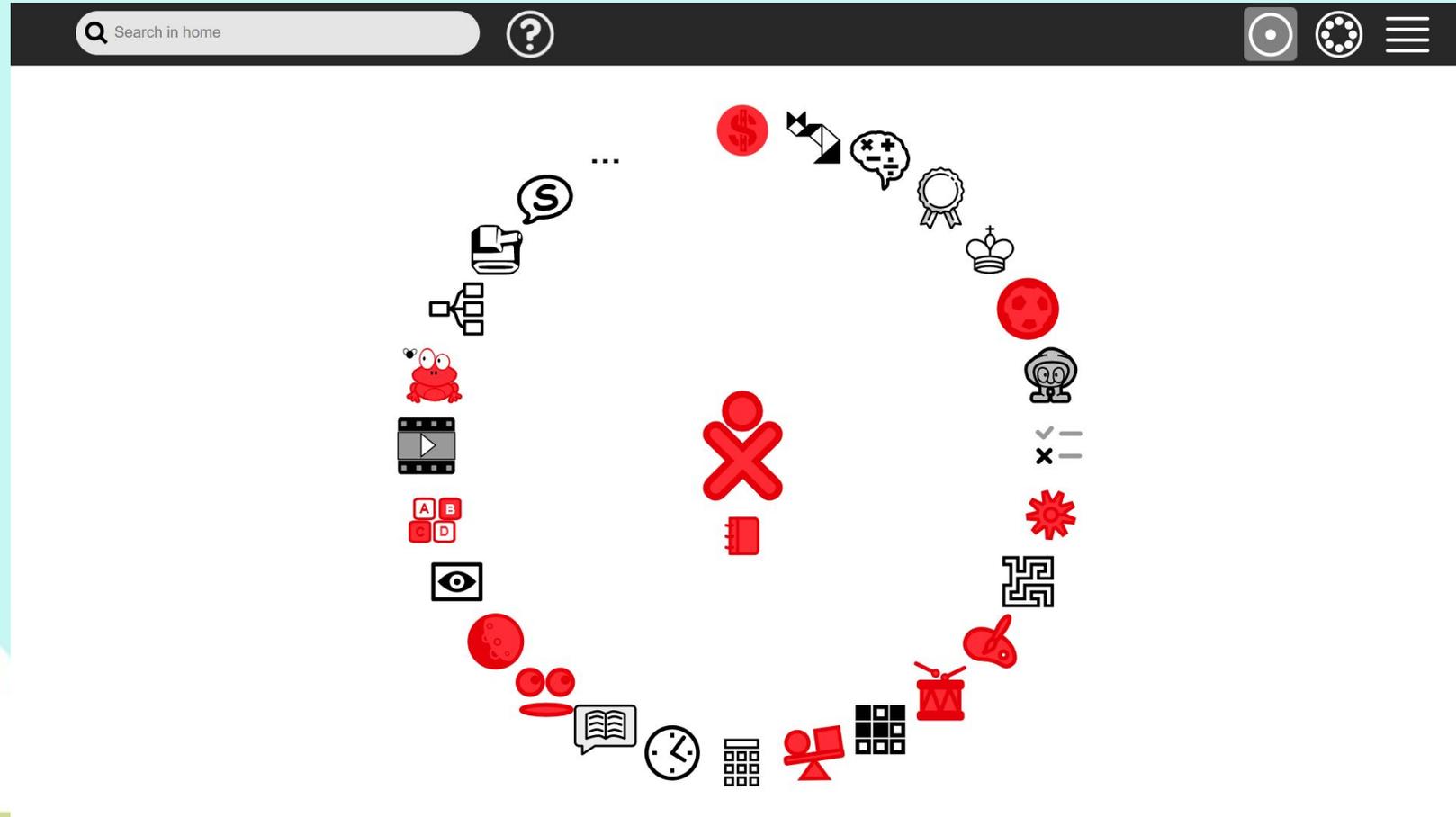
Sugarizer : Digital Learning Games – OER Level 01



The screenshot shows a web browser window with the URL `sugarizer.org/index.html#gallery`. The browser's address bar includes navigation icons (back, forward, refresh) and utility icons (share, star, zoom, full screen). Below the address bar are links for Gmail, YouTube, and Maps. The main content area features a dark background with a classroom scene. The word "sugarizer" is displayed in a large, stylized font with "sugar" in blue and "izer" in red. Below the logo, the text reads "The leading learning platform for children" followed by a descriptive paragraph: "Sugarizer is a free/libre learning platform. The Sugarizer UI use ergonomic principles from Sugar platform, developed for the One Laptop per Child project. Sugarizer is used every day by thousands of users around the world." At the bottom of the page, there are three orange buttons labeled "TRY NOW", "INSTALL", and "SOURCE CODE". In the top right corner, there is a language selector set to "English" and a US flag icon.



Sugarizer : Digital Learning Games – OER Level 01



Learning with Digital Resources : Secondary Levels : Example CLix

The screenshot shows the CLIX E-library homepage. The URL is clixoer.tiss.edu/home/e-library. The page features a navigation menu with subjects like English, Math, Science, and Digital Literacy. A sidebar on the left lists modules and handbooks. The main content area displays two featured resources: 'i2C' (Digital Literacy, 0, 9) and 'Communicative English: Level 1' (English, 8, 9).

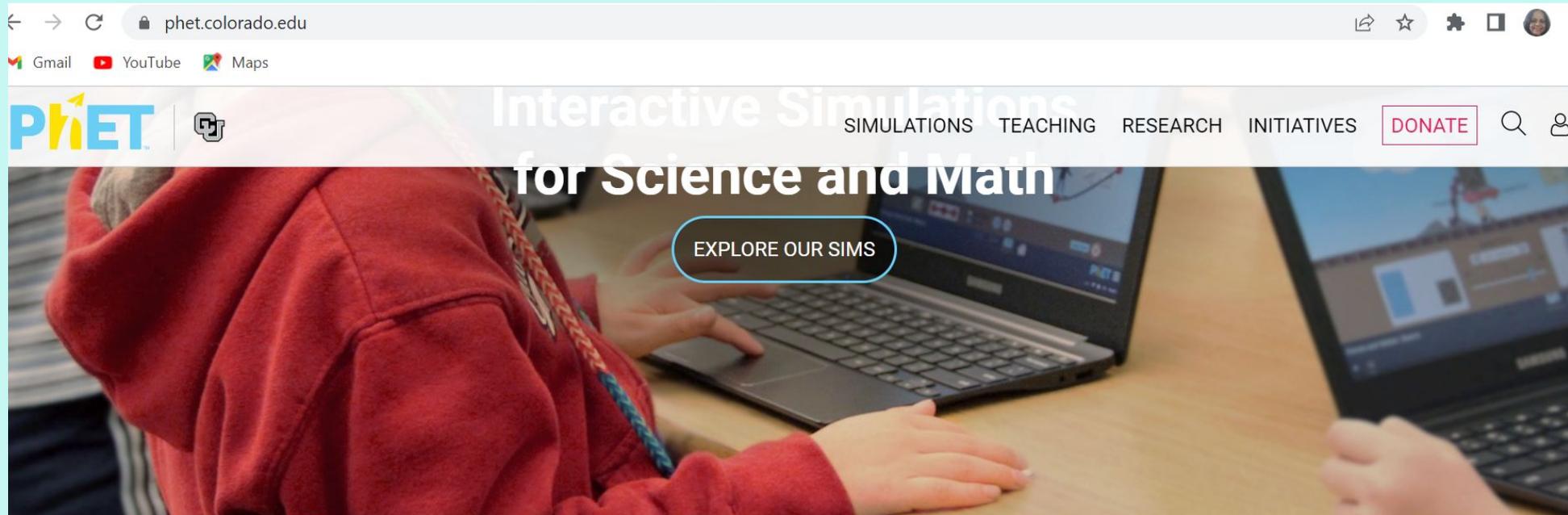
This screenshot shows an interactive activity. A character named Jamuni is at a lemonade stand. The text says: "Jamuni decides to add some ice cubes from Tray 1 to her glass of lemonade so it becomes both full and cold!" Below this, instructions read: "Drag and drop ice cubes from Tray 1 to Jamuni's glass till the lemonade comes up to the brim. Click Submit to check your answer." The visual shows a tray of ice cubes labeled 'Tray1' and a glass of lemonade. A label at the bottom indicates "Ice cubes 2cm³ each".

This screenshot shows a math activity titled "Help Jamuni distribute 3 cakes fairly among 4 children." The interface includes a "Cutting Tool" to divide a cake into smaller pieces, a "Sharing Done" button, and a question: "What is the share of each child?" The user is instructed to "Enter your answer in the form of a whole number or fraction and click Sharing Done to check your answer."

This screenshot shows the CLIX E-library homepage with a grid of digital resources. The URL is clixplatform.tiss.edu/software/Tools/food_sharing_tool/en/Lesson1/Lesson1_Activity1_final/. The grid includes: 'Food Sharing Tool_english' (Proportional, Mathematics), 'Motions of the Moon - Animation_english' (Tool, Astronomy), 'Open Story Tool' (Tool, Storymaking), 'Atom Factory' (Tool, Atomic Structure), and 'Molecule Factory' (Tool, atomic structure, science).

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

Higher Learning : Science Simulations



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

NEW!

Density

NEW!

Circuit Construction Kit: AC

NEW!

NEW!

PROTOTYPE

NEW!

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

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

Higher Learning : Science Simulations

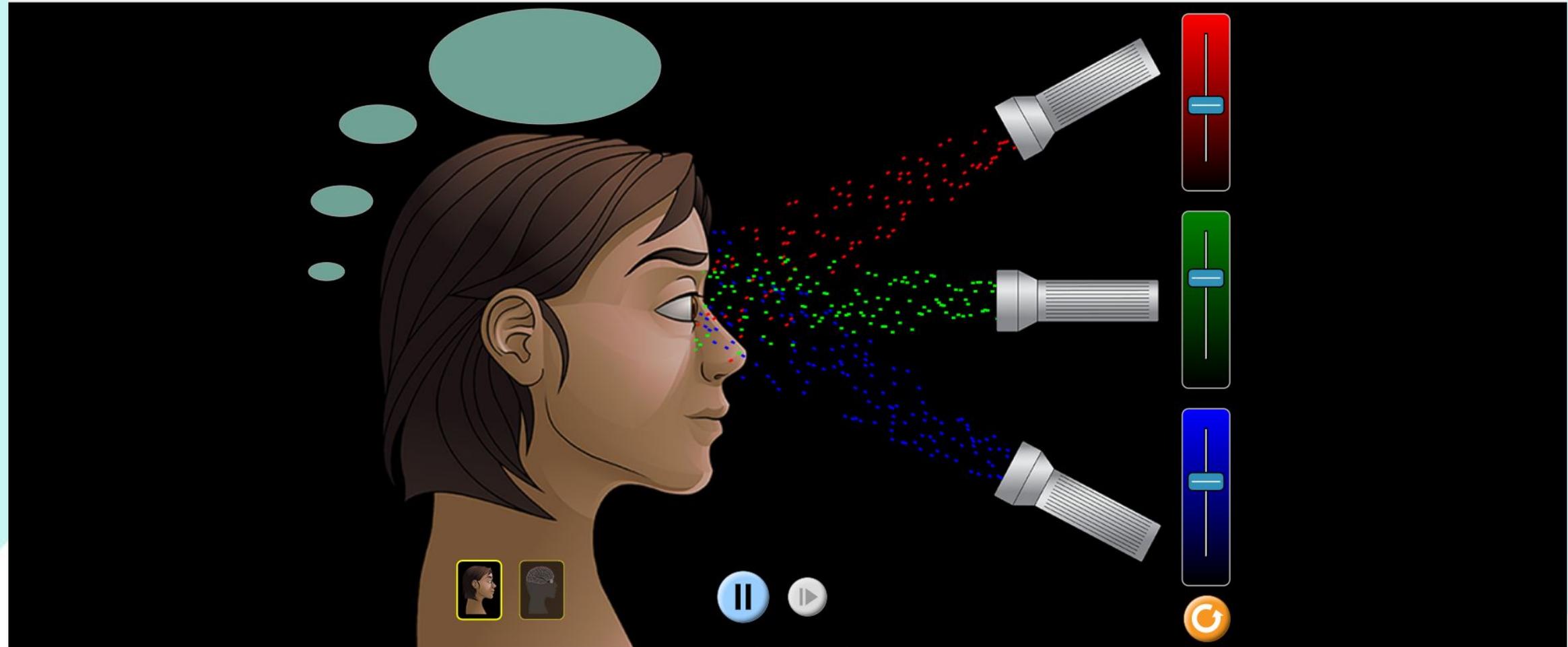
The simulation interface includes the following elements:

- Spring Strength 1:** A slider ranging from Small to Large, currently set to approximately 3/5.
- Spring Strength 2:** A slider ranging from Small to Large, currently set to approximately 2/5.
- Spring 1:** A purple spring labeled '1' with a grey mass of 250 g attached.
- Spring 2:** A purple spring labeled '2' with a red mass of unknown weight attached.
- Mass Bank:** A collection of masses on the left, including a 250 g mass, a 100 g mass, and a 50 g mass. On the right, there are two unknown masses (blue and green).
- Ruler:** A vertical ruler on the right side, marked from 0 to 90 cm.
- Legend:** A box on the top right with three options: Unstretched Length (dashed blue line), Resting Position (dashed green line), and Movable Line (dashed red line).
- Controls:** A play/pause button, a speed selector (Normal/Slow), and a refresh 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 Home

PHET

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

Higher Learning : Science Simulations

The screenshot shows the PhET 'Build a Molecule' simulation in a web browser. The browser's address bar displays the URL phet.colorado.edu/en/simulations/build-a-molecule. The page header includes the PhET logo, the University of Colorado Boulder logo, and navigation links for SIMULATIONS, TEACHING, RESEARCH, INITIATIVES, and a DONATE button. The simulation interface features a central workspace with a play button and a trash can icon. Below the workspace is a palette with three containers labeled Carbon, Oxygen, and Nitrogen. To the right, a 'Your Molecules' panel lists 'Collection 1' with items: H₂O (water), O₂ (molecular oxygen), H₂ (molecular hydrogen), CO₂ (carbon dioxide), and N₂ (molecular nitrogen). The main workspace shows a 'carbon monoxide' molecule (one red oxygen atom and one grey carbon atom) and a 'molecular nitrogen' molecule (two blue nitrogen atoms) being assembled. The bottom of the simulation has a control bar with 'Build a Molecule' text, a home icon, and buttons for 'Single', 'Multiple', and 'Playground' modes.

Build a Molecule



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

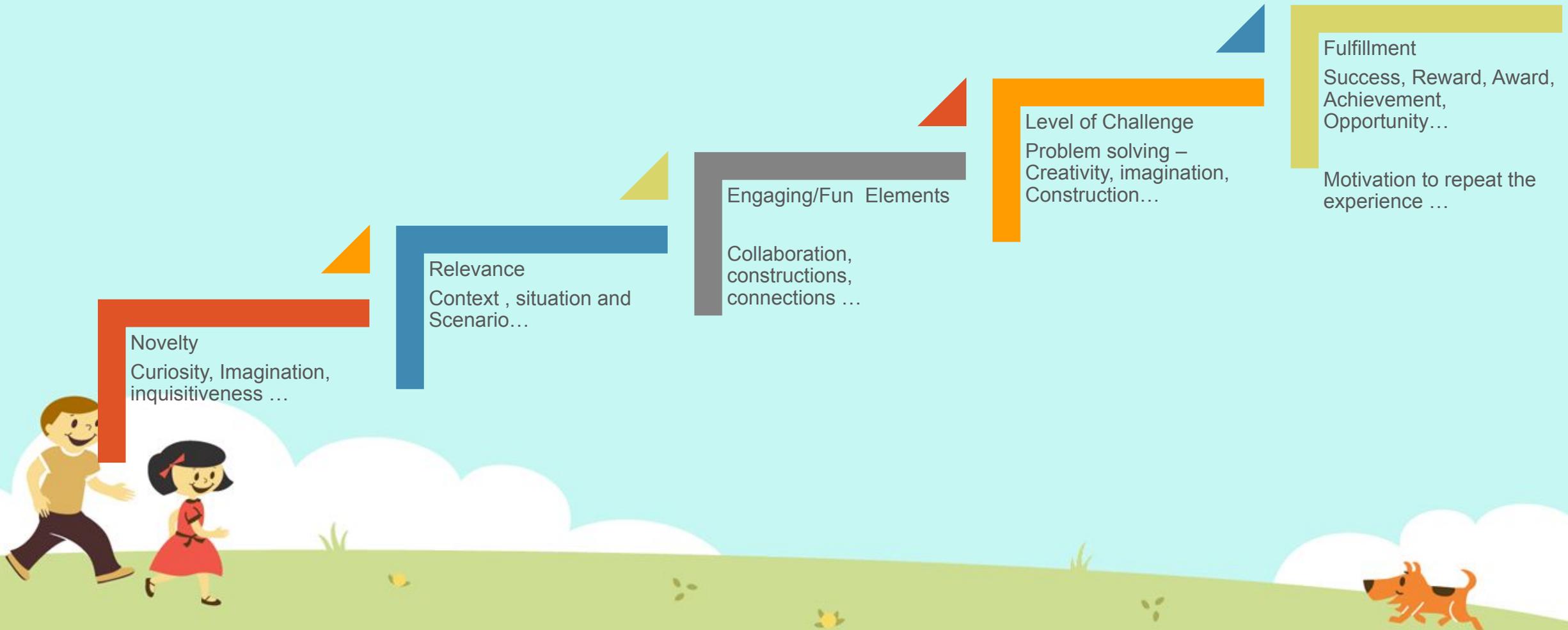


Criteria for selecting game for learning

- ❑ 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:



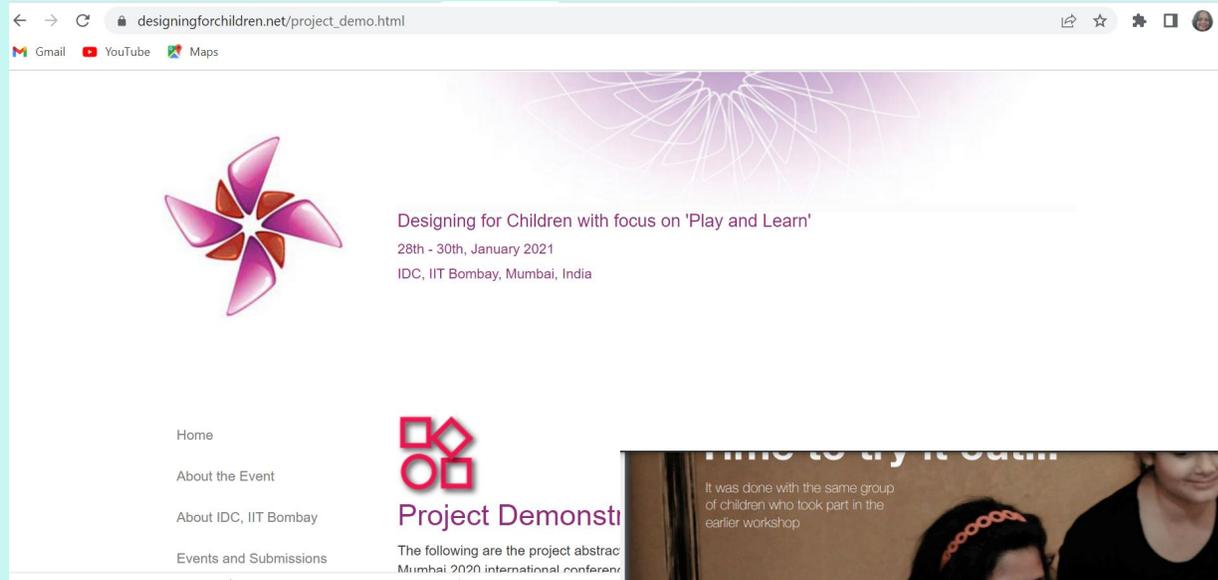
Summary

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



An infographic with a red background and white text, detailing the benefits and components of the LUMA program. The top section is titled "WHY LUMA?" and lists eight benefits, each accompanied by an icon. The bottom section is titled "THE COMPONENTS" and is partially visible.

- Ready-to-use, straight out of the box** (Icon: person at a desk)
- Limits screen time and improves cognition** (Icon: laptop with warning sign)
- Academically linked, conceptual tool** (Icon: chalkboard with lightbulb)
- High level of engagement and interactivity** (Icon: hands raised)
- Multiple Intelligence and all-round development** (Icon: puzzle pieces)
- Easy mentoring and improved bonding** (Icon: family)
- Systematic and organised self-paced learning** (Icon: calendar)
- Quick evaluations and checks for understanding** (Icon: question mark and checkmark)

THE COMPONENTS



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

Reflect and discuss.



Thank You !

