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Learning with Games

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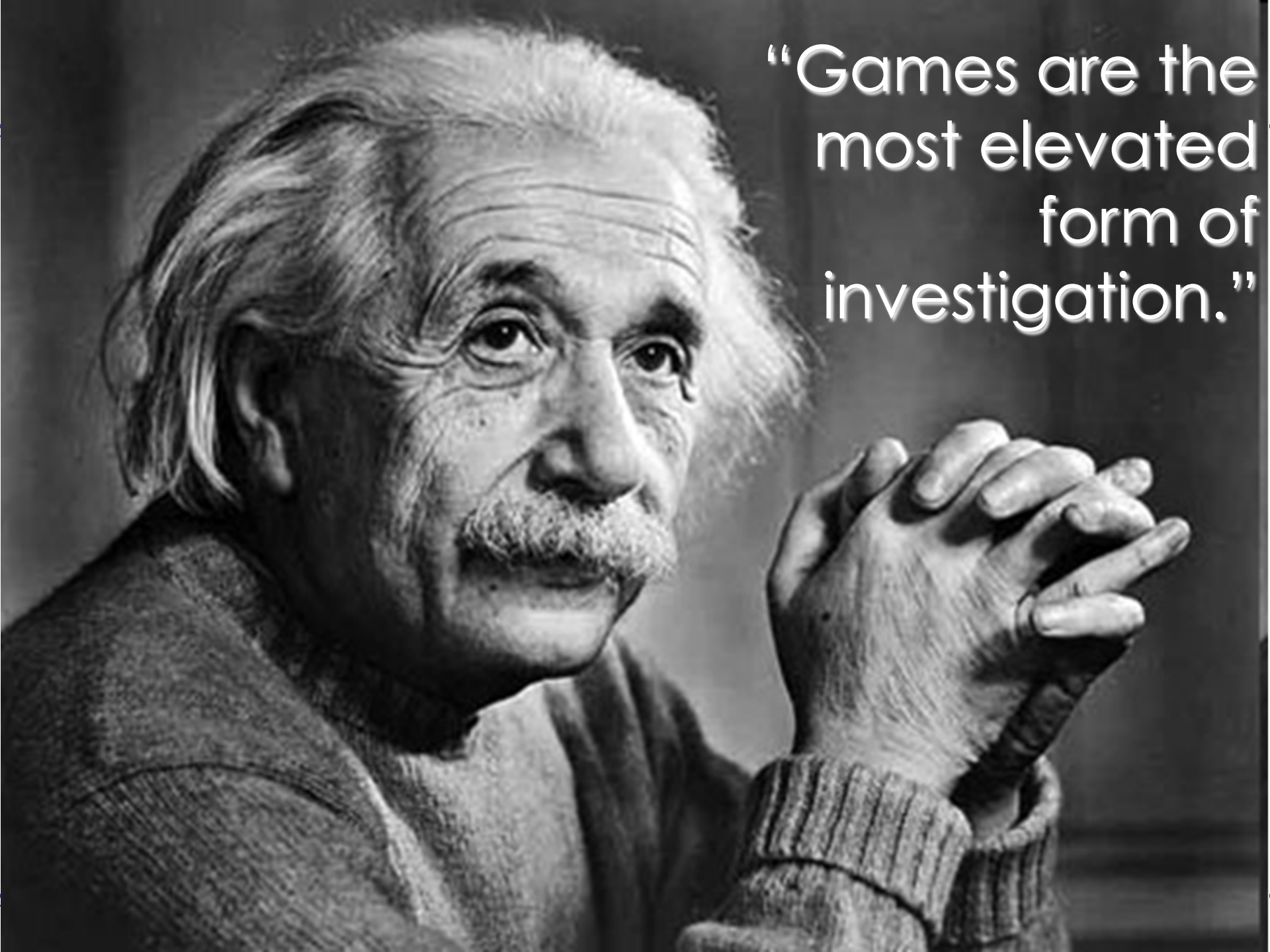
Open Discovery Space Summer school 2015
Workshop on Game Based Learning:
"Adding a game-based perspective to our educational scenarios"


"Games are the most elevated form of investigation."

Games

- … are a form of fun. That gives us enjoyment and pleasure.
- … are form of play. That gives us intense and passionate involvement.
- … have rules. That gives us structure.
- … have goals. That gives us motivation.
- … are interactive. That gives us doing.
- … are adaptive. That gives us flow.
- … have outcomes and feedback. That gives us learning.
- … have win states. That gives us ego gratification.
- … have conflict/competition/challenge/opposition. That gives us adrenaline.
- … have problem solving. That sparks our creativity.
- … have interaction. That gives us social groups.
- … have representation and story. That gives us emotion

Marc Prensky

WORLD OF WARCRAFT

WoW is a massively multiplayer online role-playing game (MMORPG) meaning other players are playing in the same game environment or world at the same time.

- ✓ Decision making (strategy & problem solving)
- ✓ Social interaction/ values/ cultures

…the educational possibilities are vast.

… teamwork, collaborative problem solving, group think, brain storming, group information quests etc

collaborative problem solving, media literacy, scientific reasoning etc.

SPORE

The player must guide a creature from the cell stage through to the Space Age.

- ✓ Dexterity/ precision/ motor skills
- ✓ Decision making (strategy & problem solving)
- ✓ Social interaction/ values/ cultures
- ✓ Ability to learn/ self assess

Spore could be used as an introduction to the concepts of biology, history, sociology.

While not scientifically, the game can be used to encourage discussion by highlighting these inaccuracies.

As decisions made at the beginning of the game can have repercussions throughout the game, students must analyse the effects of their choices.

The game can be used to motivate students to learn by allowing them to be. Students can share their creations with others as an encouragement for collaboration in group projects.

MARIO & SONIC AT THE OLYMPIC GAMES

The game includes 20 Olympic events or "mini-games". The player chooses a character to compete in the events which include gymnastics, athletics, fencing and rowing

✓Memory/ repetition/ retention

✓Dexterity/ precision/ motor skills

The game could be used in the class room to teach basic principles at primary level such as motor skills, memory and basic cognitive skills.

Wii games including Wii Sports games have been used in classrooms to integrate elements of Mathematics, Physics and Sport itself into the classroom environment. These games have been helpful in getting students interested in the subjects in question through group work and motivating them in their studies.

DANCE DANCE REVOLUTION

The game is played on a platform know as a dance pad that has four arrow panels: left, down, up, and right. These panels are pressed using the player's feet, in response to arrows that appear on the screen in front of the player. The arrows are synchronized to the general rhythm or beat of a chosen song.

- ✓Memory/ repetition/ retention
- ✓Dexterity/ precision/ motor skills
- ✓Social interaction/ values/ cultures

DDR and version of the game are used in schools throughout the United States as exercise routines and to get students active prior to learning being started.

Modified versions of the game use the dance pad to encourage typing, math, and spelling. etc., however these require purchase software.

It has been shown that these dance games place a high cognitive load on working memory. Pattern recognition and the rapid conversion to a sequence, chunking these sequences, and storing temporarily would involve the visio-spatial sketchpad component of working memory

Games such as DDR and Guitar Hero place a high cognitive load on working memory, and if exercising working memory improves this cognitive process as is the basis of brain training games, then a dance game such as DDR or *Stepmania* would surely enhance the cognitive abilities that are critical to academic achievement.

BIG BRAIN ACADEMY

This game is a funny intelligence test. Related games include the Brain Age series, the Professor Layton series and Dr. Kawashima's Brain Training series to name a few.

✓Memory/ repetition/ retention

✓Decision making (strategy & problem solving)

✓Ability to learn/ self assess

The game has a lot of inputs to be used in the classroom. It develops all aspect of cognitive thought.

The most important thing is not only to game and pass the different levels but it is the final feedback that the speaking-guide gives to the player. The guide offers a brain map in order to help the user to understand where he/she needs more work. For example at the end of each match the guide shows a user' brain map signed on the basis of the positive and negative scores collected by the user. In this way the player/players can find a stimulate improving to continue to face him/ her self – themselves.

This game can be used in the classroom as a formative and final evaluation plan for the learners.

It is similar to "Civilization" starting from the Stone Age and right through to the Space Age. In this case the game is online, multiplayer, and more complete, mostly based on player interaction and real time strategy.

It includes economic, military, city and research development, and the possibility of forming alliances and managing relationships with other alliances or players.

✓Decision making (strategy & problem solving)

✓Social interaction/ values/ cultures

The principal uses of the game would be to explore consequences of actions, practice problem solving and complex decision making, and social interaction with other players.

A range of options are possible, from using the game as a warmer activity in class, followed by discussion, or sessions on related subjects. The game is a microcosm of a society and could therefore be used as either a starting point for extension activities about different aspects or as a source for comparison with the modern world, for example.

AGE OF EMPIRES III

This game series are called real time strategy. Real time strategy game composes of "resource gathering, base building, in-game technological development and indirect control of units". In Age of Empires players needs to gather some resource to build some buildings and needs some experience points to create new soldiers.

- ✓Decision making (strategy & problem solving)
- ✓Social interaction/ values/ cultures
- ✓Ability to learn/ self assess

This game can be helpful to practice historical issues of different cultures.

Teacher can ask students to create a scenario from a real story in the history of students' country. This would be a discovery activity for a history classes.

This game promises a lot of learning outcomes on strategic thinking and decision making and can be used for "problem solving….Interesting decisions in a competitive environment, that lead to a satisfying conclusion, and making virtual combat as interesting and fun as chess."

FARMVILLE

This game creates a social environment that players create his farm and help the neighbors. There are varieties of games apart from farming where the players help each other and grow their own places or properties. Therefore it can be compared with Mafia Wars, FishVille.

✓Applying concepts/ rules

✓Decision making (strategy & problem solving)

✓Social interaction/ values/ cultures

This game has some promises about basic math. In elementary level this game can be given a motivational element.

This game has lots of features to reflect affective skills. A class can have one account to create a farm. However there should be some organization among students since just one account can use the farm at a time. Teacher can make this organization and each student can be responsible with the farm for a certain time. This will provide a feeling of responsibility and students will learn about farming by constructing a place.

THE SIMS III

Life simulator. The Sims focuses entirely on the lives of "Sims", placing the player in control of their virtual "world" and their daily activities, such as sleeping, eating, reading, and bathing.

- ✓ Applying concepts/ rules
- ✓ Decision making (strategy & problem solving)
- ✓ Social interaction/ values/ cultures
- ✓ Ability to learn/ self assess

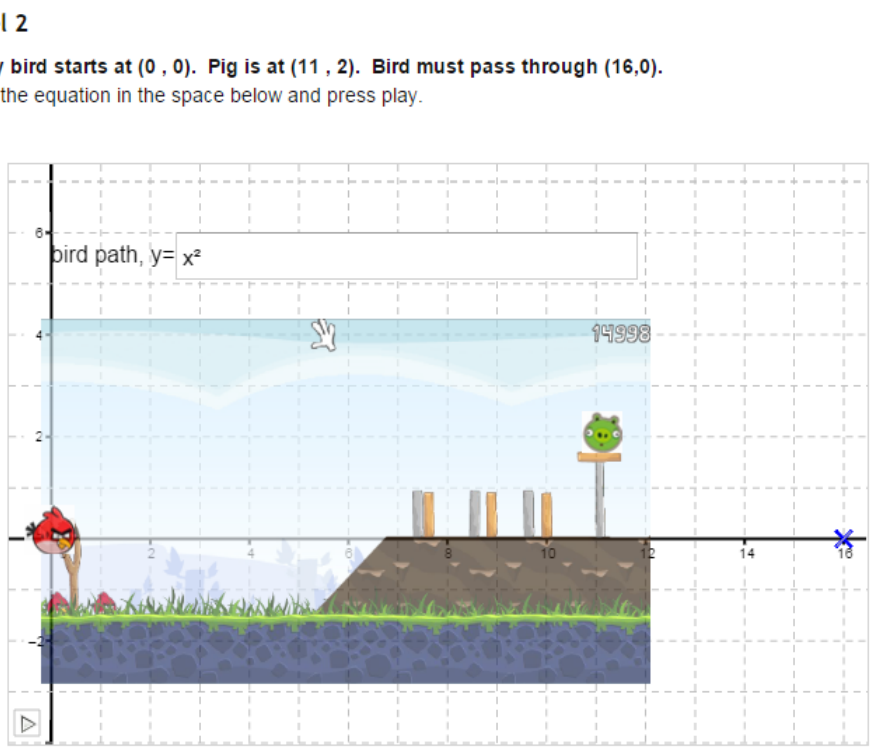
The game lends itself to discussion of social aspects, cultural issues, and can also be used as course material for other activities such as story-telling, which can be used to work on language etc. Also it can be related to students' own lives. The game allows the player to take pictures of the scenes, which can be used for developing stories. This can allow:

- ✓The use of different supports to tell the story
- ✓The use of a foreign language version of the game and tell the story in that language
- ✓The creation of stories that focus on different social topics.

ANGRY BIRDS

Angry Birds is a widely-known and played game based on physics principles. Players are able to control trajectory and force by "pulling" on a slingshot thus affecting speed, velocity, and other factors pertinent to kinematics.

Angry Birds is a great game to demonstrate physics principles since it is a game built on OSP-Open Source Physics. Students can experience many different kinematics principles while playing the game.



- ✓ Primary Math: positional math language (above, below, left, right, bottom, biggest, smallest), measurement (distance), angles, shapes
- ✓ Intermediate Math: parabolas, velocity, angels, trajectory, acceleration, quadratic formulas
- ✓ Science: simple machines (lever), mechanics, force, energy, velocity/speed
- ✓ History: history of the catapult, changes made to catapult technology throughout history, modern-day inventions that use this technology
- ✓ Music: Tie in with history, what music was popular in the middle ages when catapults were invented (give students a feel for the culture of the time).
- ✓ Art: Tie in with history, what era of art was happening during the middle ages when catapults were invented (give students a feel for the culture of the time).
- ✓ Language Arts: reflection writing, reading text for information (non-fiction books and websites)

- ✓ Make observations and measurements to identify materials based on their properties.
- ✓ Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
- ✓ Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- ✓ Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
- ✓ Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.
- ✓ Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

ROBOCODE

The game is designed to help people learn programming concepts, to program in Java, and have fun in doing so. It is very easy to start with a simple robot being written in just a few minutes. However, perfecting a robot can take many months.

Applying concepts/ rules

Decision making (strategy & problem solving)

Social interaction/ values/ cultures

Using Robocode to teach computer programming provides a highly motivating and addictive tool for students to immerse themselves in Java code, or just to learn the basics of computer programming. More advanced students can design and implement such features as statistical analysis and neural network algorithms for which they can be assessed on if needed.

✓… as an introduction to programming or to technology in general,

✓… as a design system for problem solving and strategizing

✓… as a tool to foster competitiveness or teamwork (robots can battle in teams against other teams).

Dimenxian is a first-person shooter set on an island besieged by a deadly virus. Students battle the virus in four missions that build students' basic algebra skills. The missions' primary focus is the coordinate plane. Students must use coordinates, the x-axis and y-axis, and graphing to locate and retrieve important items on the island.

•Applying concepts/ rules

•Decision making (strategy & problem solving)

This game can be integrated effectively in educational settings if organized well with the lesson plan of the course. First of all, it covers a compressive list of learning objectives aligned real educational content from the National Council of Teachers of Mathematics standards of USA. It also consists of different missions and each mission aligned with a set of learning objectives. It can be used either as a choice of supplemental math and algebra instruction (i.e. practice for the using real life data for plotting a graph) or as a tool for after-school efforts.

PowerUp focuses on energy, engineering and diversity; the objective of the game is to generate clean energy — while racing to save the planet from ecological disaster. Each area of the energy-themed worlds — water, solar and wind — has a major challenge to be solved, all with four objectives and clear measures of success.

✓Applying concepts/ rules

✓Dexterity/ precision/ motor skills

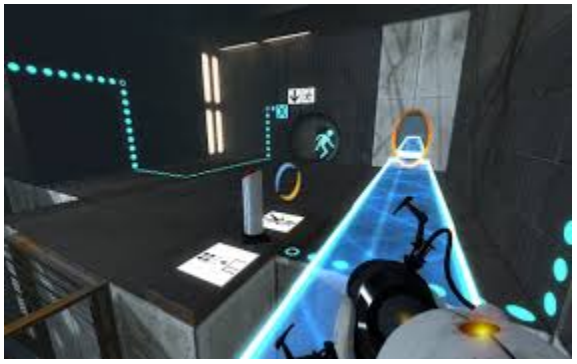
The game play is designed for classrooms. The homepage has a recommendation for planned order of the lessons. The two lessons based on the Orientation Center review concepts that are integral to the game's back story and provide students an insight into the diversity of the Engineering field.

In the three lessons based on the game's missions students will take on the role of engineers and work in groups to solve a challenge. Students will design, prototypes, tests and revise their solutions using a low-cost collection of recycled school and household materials

PORTAL 2

Portal can be compared to any modern first-person shooter. The main difference in this game is the fact, that there are no shots fired by the protagonist and the game mechanics revolve around logic and physics puzzles, instead of shooting enemies.

- ✓ Dexterity/ precision/ motor skills
- ✓ Applying concepts/ rules
- ✓ Decision making (strategy & problem solving)
- ✓ Ability to learn/ self assess



Portal 2 is well known for its single-player story mode, but this is not the centerpiece of the *Portal 2 -Education Version*. The centerpiece of this modified version is the Puzzle Maker, a level-creation tool. The *Puzzle Maker makes it so that players are no longer just solving but creating, sharing, and playing their puzzles or "test chambers." Best of all, while making test chambers is easy and provides instant gratification, creating good levels is also intellectually challenging and provides endless opportunities for creative and critical thinking.*

TERMINAL VELOCITY WITH PORTAL 2

Students build a simple experiment to compare the terminal velocity of a cube and Chell, also investigating the math behind air resistance and terminal velocity.

GLOBAL CONFLICTS: PALESTINE

The game has received great praise as an educational game as it not only teaches people about the Israeli-Palestinian conflict, but also facilitates the teaching of communication skills and other competencies of the journalism profession.

✓Decision making (strategy & problem solving)

✓Social interaction/ values/ cultures

- ✓ to learn about the lives of the people in the middle of the conflict (in an immersive environment)
- ✓ to learn about the role of the media in modern society
- ✓ used by humanitarian groups as a means of informing people about global issues
- ✓ to teach the practice of journalism, media literacy, and research skills
- ✓ to teach about gender and religious issues
- ✓ to learn about issues linked to peace and conflict studies, such as "political violence, human security, democratisation, human rights, social justice, welfare, development, and producing sustainable forms of peace."

DARFUR IS DYING

Darfur is Dying is a viral video game for change that provides a window into the experience of the 2.5 million refugees in the Darfur region of Sudan. Players must keep their refugee camp functioning in the face of possible attack by Janjaweed militias.

- ✓ Dexterity/ precision/ motor skills
- ✓ Decision making (strategy & problem solving)
- ✓ Social interaction/ values/ cultures

The game can be used to raise students' awareness about the crisis in Sudan's Darfur region. The game could be used when teaching about the situation in Africa, to let students know how difficult life is for the people there. As for the time needed for completing the game a class is totally suitable, even there should be time for an introductory discussion or wormer task and for a concluding discussion after paying the game.

MINECRAFT

a sandbox independent video game

- ✓ enables players to build constructions out of textured cubes in a 3D procedurally generated world
- ✓ exploration, resource gathering, crafting, and combat
- ✓ an open world game that has no specific goals for the player to accomplish, allowing players a large amount of freedom in choosing how to play the game
- ✓ available through player-hosted servers and enables multiple players to interact and communicate with each other on a single world. Players can run their own servers or use a hosting provider

- ✓ a school in Stockholm made Minecraft compulsory for 13-year-old students. “They learn about city planning, environmental issues, getting things done, and even how to plan for the future,”
- ✓ A teacher in Australia set up “quest missions” where students can wander through and explore ancient worlds.
- ✓ An English-language teacher in Denmark told children they could play Minecraft collectively in the classroom but with one caveat: they were allowed to communicate both orally and through text only in English.
- ✓ A science teacher in California has set up experiments in Minecraft to teach students about gravity.
- ✓ British Museum to be digitally recreated in Minecraft
- ✓ The entire country of Denmark has been recreated in Minecraft

MinecraftEdu

✓bundle of mods and dashboard features gives teachers more control

✓teachers can quickly host servers and build custom maps with integrated content as well as create and administer assignments and lessons

✓set of classroom management tools that make it easy to define player abilities and items; to freeze, mute, and teleport students; and to create specific building areas with player permissions -- allowing for different lessons or projects on one map

PATH OF TRUST

A two-player game about trust and cooperation. Two adventurers, the Guide and the Muscle, venture into an ancient labyrinth-like tomb to uncover hidden treasures. The Guide can see the tomb visualized on the screen and can provide directions, but does not have the strength to move around. The Muscle is able to run through the labyrinth, but has no memory of its layout.

ProSocialLearn

4Scribes is a story-making game. The objective of the game is to collaboratively create a story, while each player tries to steer the narrative towards their individual (secret) ending. The premise of the story can be given by a teacher, decided by the players, or generated by computational tools. The winner is decided through the players, who each anonymously vote which ending was the "best".

Fostering **creativity** in **learning** through digital **games**

c2Learn
creative learning

In Iconoscope you make icons to represent concepts given by the system.

Your goal of the game is to make your icon representative to the concept, but not too obvious so that you make the others guess - and to guess what other players' icons represent.

However, if all co-players interpret the icon correctly, the player loses points - hence the need to make an icon that is representative, but not too obvious!

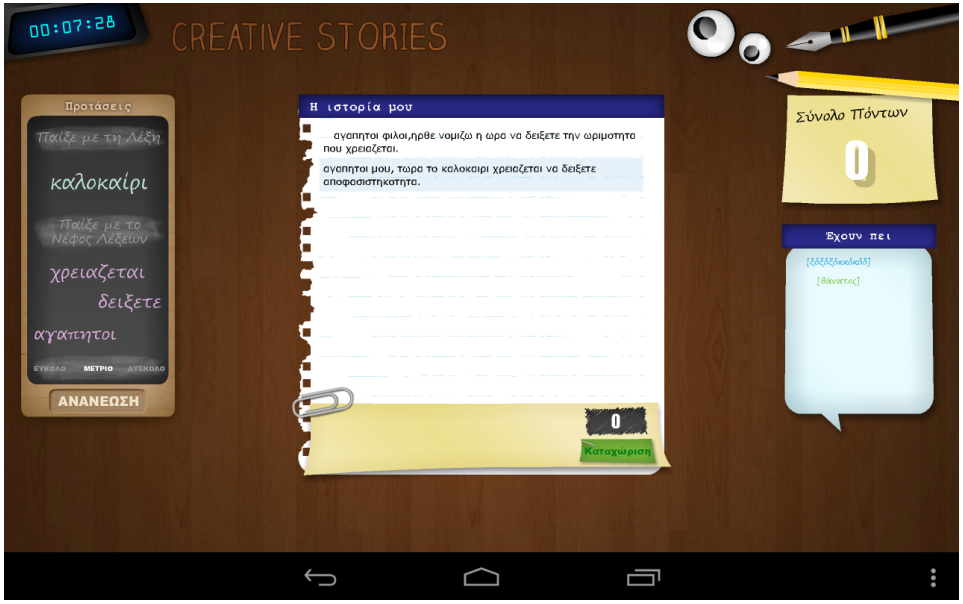
So an icon fails if:

- It communicates its intended message to everyone.
- It communicates its intended message to no one.
- It communicates its intended message to fewer people than another competing icon.

Fostering creativity in learning through digital games

Playing free collaborative writing to generate ideas for innovative scenarios of action.

"*You are the last ones still conscious and capable of action on the Earth. You have just received Invincible Invaders' ultimatum before the Attack. Write Earth's Message to Invincible Invaders* "



Fostering **creativity** in **learning** through digital **games**

C2Learn
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- Any of this sounds familiar?
- Do you play?
- Do your students play? What? Why?
- Think about an example of GBL
  - What is the pedagogic benefit?
  - How might you implement it?
    - ❑People? Organisation? Environment? Technology?
  - What questions do you have?

Thank you!

http://portal.opendiscoveryspace.eu/

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