Learning With Games, Learning From Games

Ruben R. Puentedura, Ph.D

Some Definitions

Formal Definition of **Play** (Salen & Zimmerman)

"Play is free movement within a more rigid structure."

Vygotsky on Learning

- Zone of Proximal Development (ZPD):

  - Gap between:

    - what a learner can accomplish independently (the Zone of Current Development, ZCD)

    - what they can accomplish with assistance from a "more knowledgeable other" (MKO)

- *"…what a child can do with assistance today she will be able to do by herself tomorrow."*

- This is an iterative process:

  - The ZCD and ZPD change over time;

  - Independent practice is required to close the loop.

Vygotsky on Play and Learning

"…play creates a zone of proximal development of the child. In play a child always behaves beyond his average age, above his daily behavior; in play it is as though he were a head taller than himself."

Formal Definition of **Game** (Salen & Zimmerman)

"A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome."
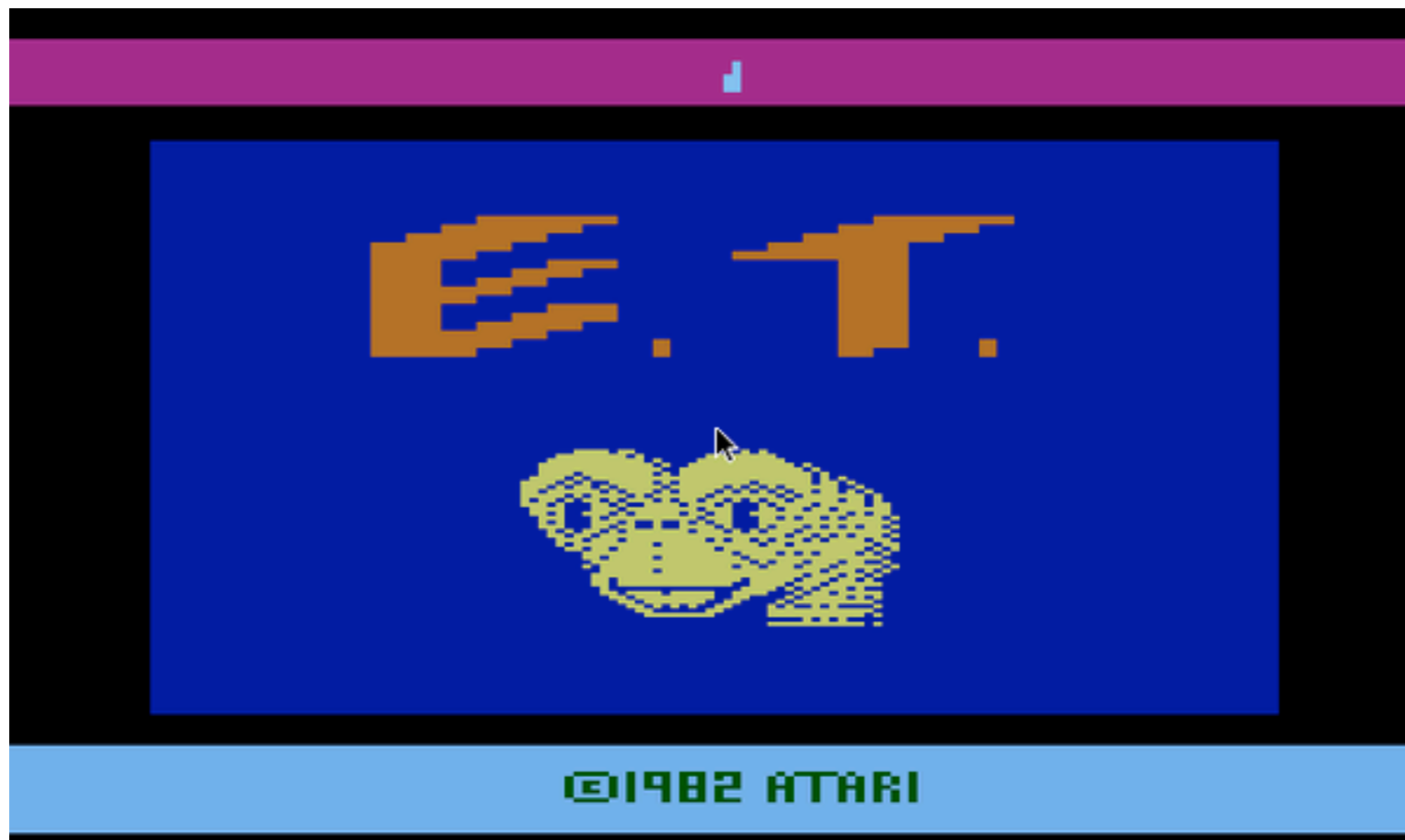
A Tale Of Two Games

One of The Best Videogames of All Time: *Pitfall!*

One of The Worst Videogames of All Time: *ET*

What Makes a Game Fun?

Games and Boredom

When Players Say…	…They Mean
The game is too easy	Game patterns are too simple
The game is too involved	Players are uninterested in the information required to detect patterns
The game is too hard	Patterns are perceived as noise
The game becomes too repetitive	New patterns are added too slowly
The game becomes too hard	New patterns are added too fast
The game runs out of options	All game patterns are exhausted

Successful Games

Include These Items…	…To Avoid
Preparation before challenges	Results due to pure chance
A sense of a game space	The perception of the game as trivial
A solid core mechanic	The game not being perceived as a game at all
A range of challenges	The game being exhausted too quickly
A range of required abilities	The game being perceived as simplistic
Skill in using the required abilities	The game being perceived as tedious

Three More Key Items for Success

You Need to Have…	…Because
Variable feedback	Players like to see greater skill result in greater rewards
A way to accommodate beginners and experts playing together	You don't want to see beginners get clobbered, and experts "bottom feed"
A definite cost for failure	Players feel cheated by "never-lose" games

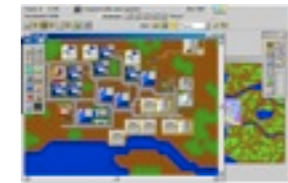# The Four Basic Groups

Narrative

IF   Graphic Adv.   Action/Adv.   RPGs   MMOGs   ARGs

Other

Board

Traditional

Puzzle

Simulation

Sims

RTS

Mil. TBS

Wid. TBS

Narrative

Other

Simulation
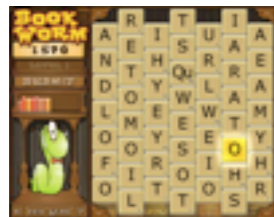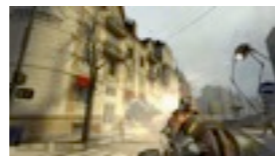
Action

Shmups   Platformers   FPS   Fighting   Sports   Vehicle   Rhythm

Action

The Educational Research

Some Facts About Game Players

- The average videogame player is 35 years old

- 40% of all videogame players are women

- 69% of heads of households play videogames

- Among teens ages 12-17:

  - 97% play videogames (99% boys, 94% girls)

  - 80% play five or more different game types; 40% eight or more

  - 76% play games as a social activity:

    - 65% play with others in the same room; 27% online

  - Same-room game play relates positively to civic outcomes

  - Game-related social interaction relates positively to civic outcomes

Effectiveness of Games in Education I (Randel, Morris, Wetzel, and Whitehill)

- Meta-study of 68 studies from 1963-1991

  - Social sciences; mathematics; language arts; logic; physics; biology

- Most effective: language arts and mathematics

  - 12 out of 14 studies showed positive results

- Next most effective: social sciences

  - 13 out of 46 showed positive results

  - 33 out of 46 were as effective as traditional methods

- Game learning overall showed better retention than traditional learning

- Students showed greater interest in topics taught via games or simulations

Effectiveness of Games in Education II (Fletcher and Tobias)

- Review of research from 1992-2005
  - 42 papers directly related to use of games in instructional settings
- Topics:
  - Transfer to Real-Life Tasks: 5 positive, 1 neutral, 1 mixed
  - Facilitating Performance, Learning, and Transfer: 4 positive
  - Transfer to Related Tasks or Domains: 8 positive, 1 neutral
  - Effects on Different Variables: 5 positive
  - Effects on Cognitive Processes: 9 positive
  - Team Characteristics of Game Players: 1 positive, 2 mixed
  - Motivational Effects: 3 positive, 2 mixed

Table 1. Learning outcomes of several games compared to lecture on same material.

Game	Topic	Audience	N (study size)	Learning outcome over lecture	Reference
Dimenxian/ Evolver	Algebra	High school	193	7.2%	(37–39)
Geography Explorer	Geography	College	273	15 to 40%	(40)
NIU Torcs	Numerical methods	College	86	2× more time spent on homework, much more detailed concept maps	(10–11)
River City	Ecology/ biology	Middle/high school	≈2000	15 to 18%, on average	(13)
Supercharged!	Electrostatics	Middle school	90	+8%	(41)
Virtual Cell	Cell biology	College	238	40%, on average	(40)

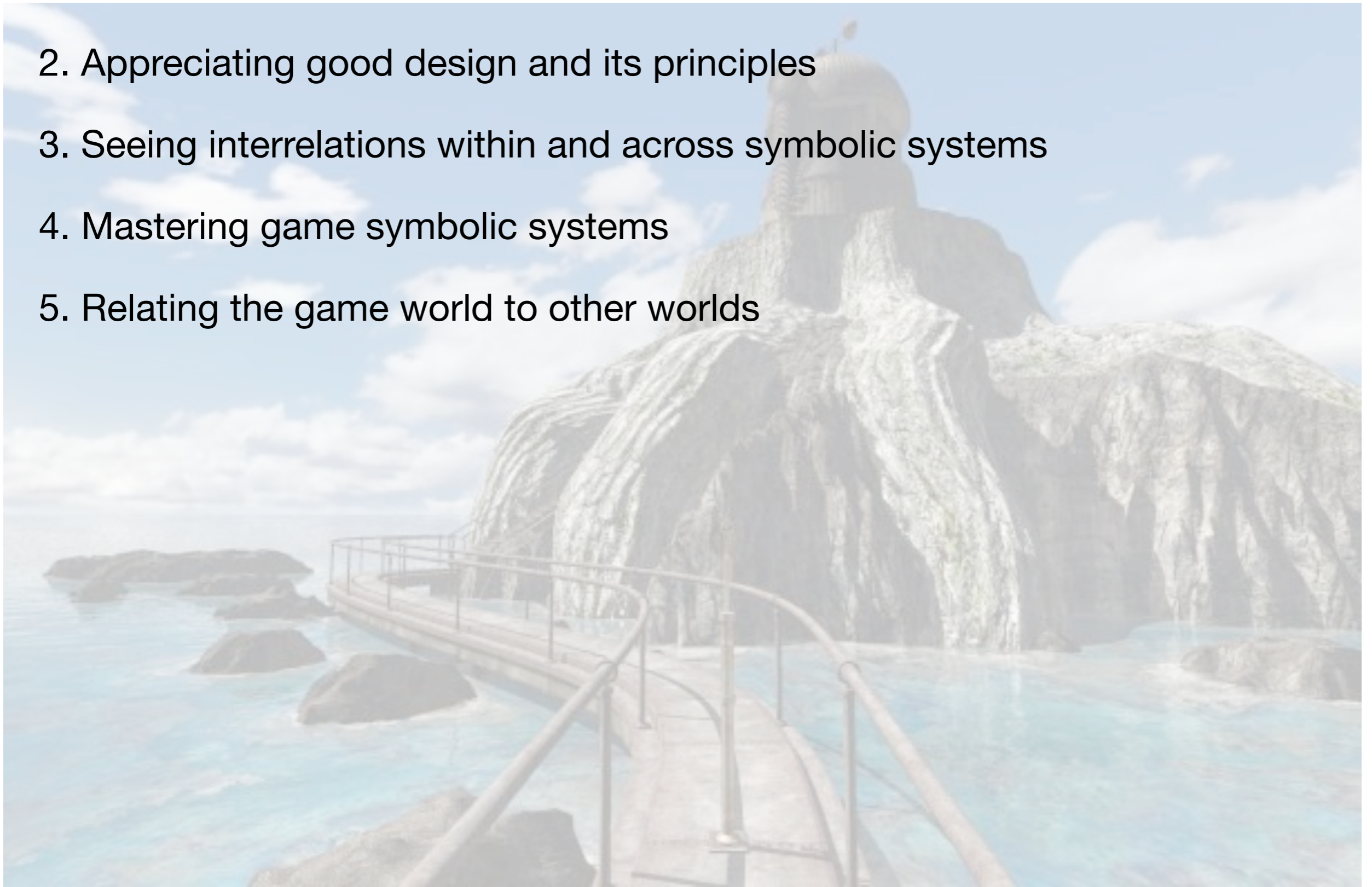# Learning from Games

Active Learning

Gamers Learn From:

1. Doing and reflecting critically

Symbolic Systems

2. Appreciating good design and its principles

3. Seeing interrelations within and across symbolic systems

4. Mastering game symbolic systems
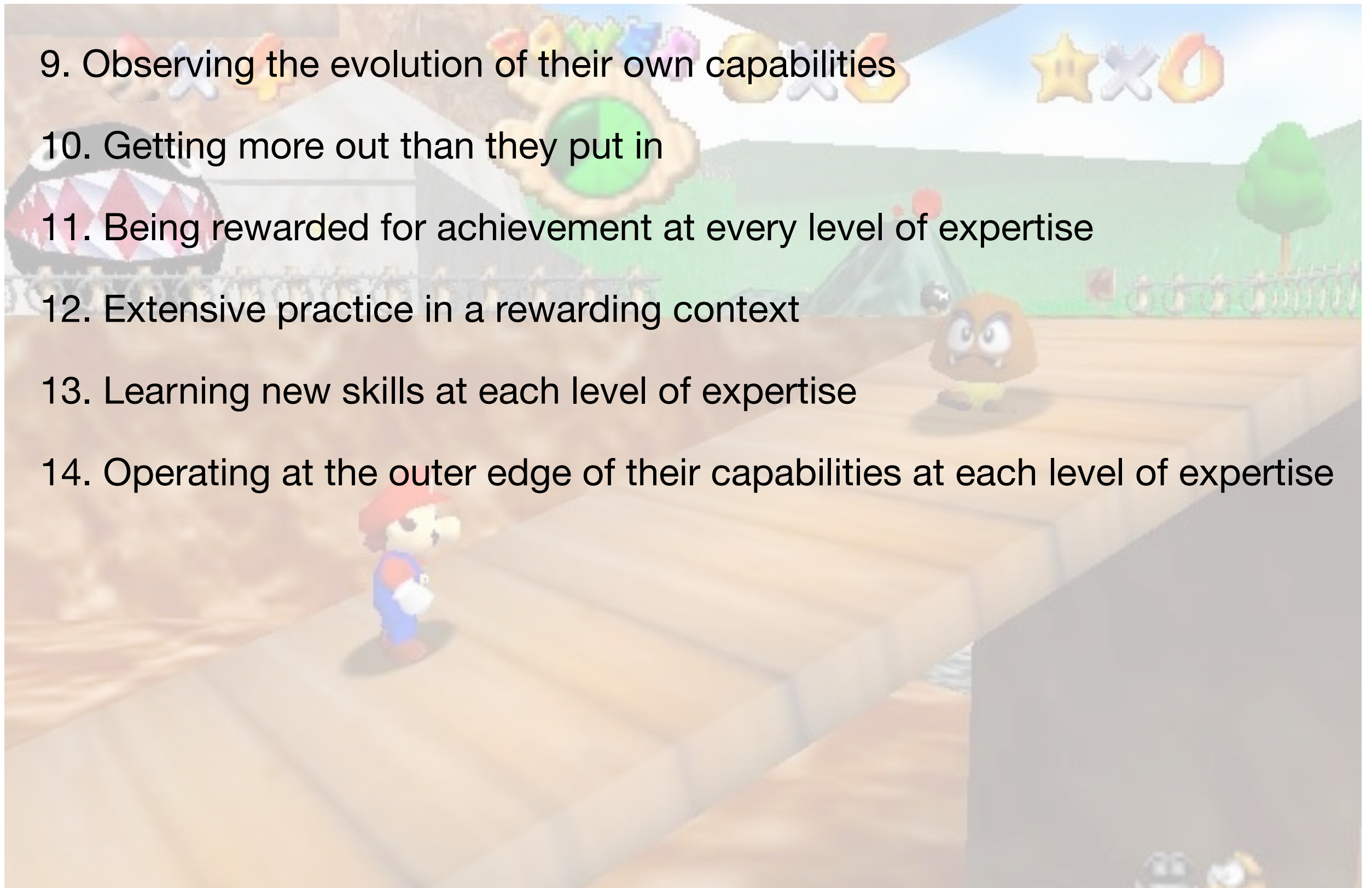
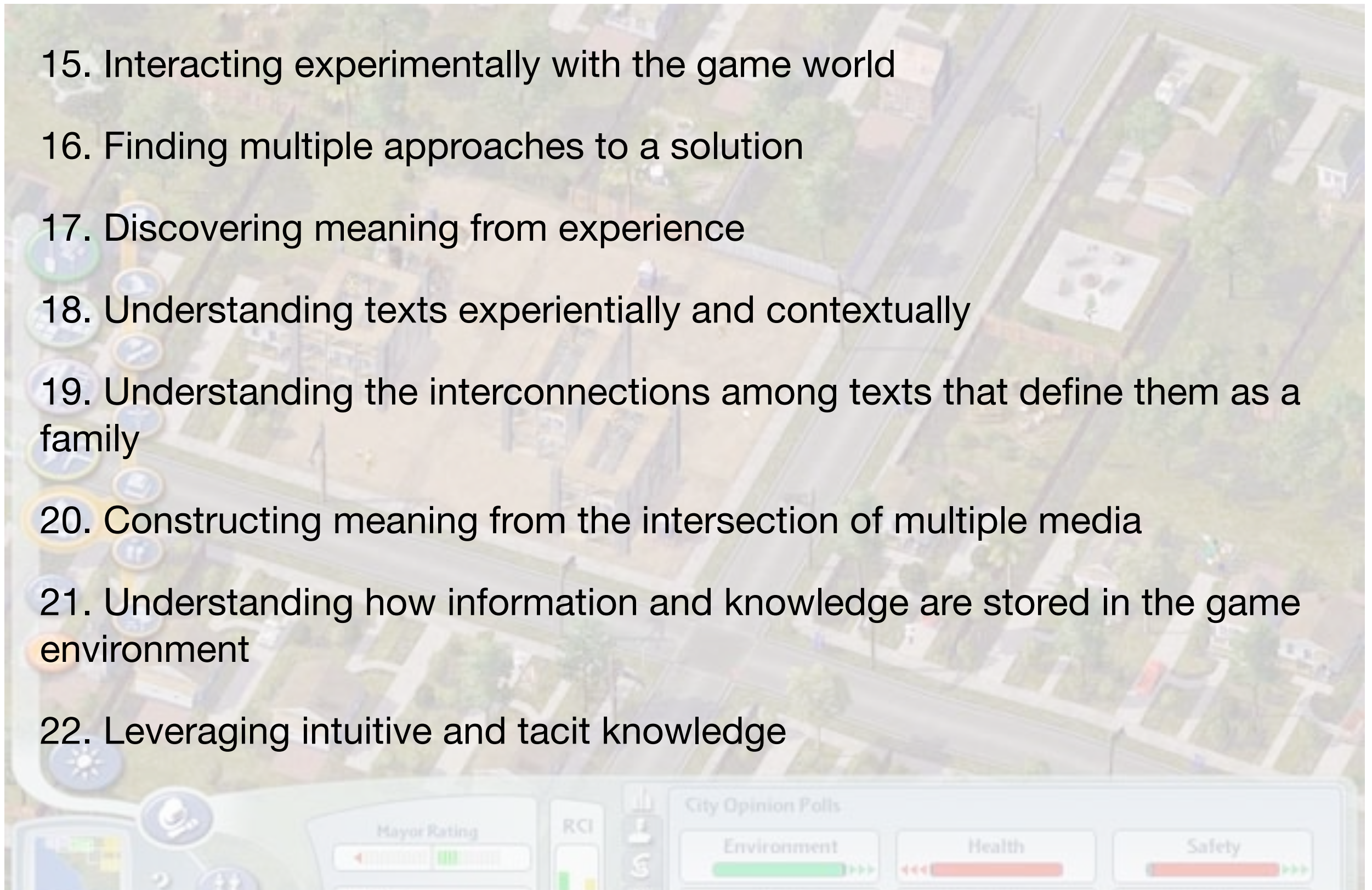5. Relating the game world to other worlds

Worlds and Identities

6. Taking risks in a space with reduced consequences

7. Committing to participating in a compelling virtual world
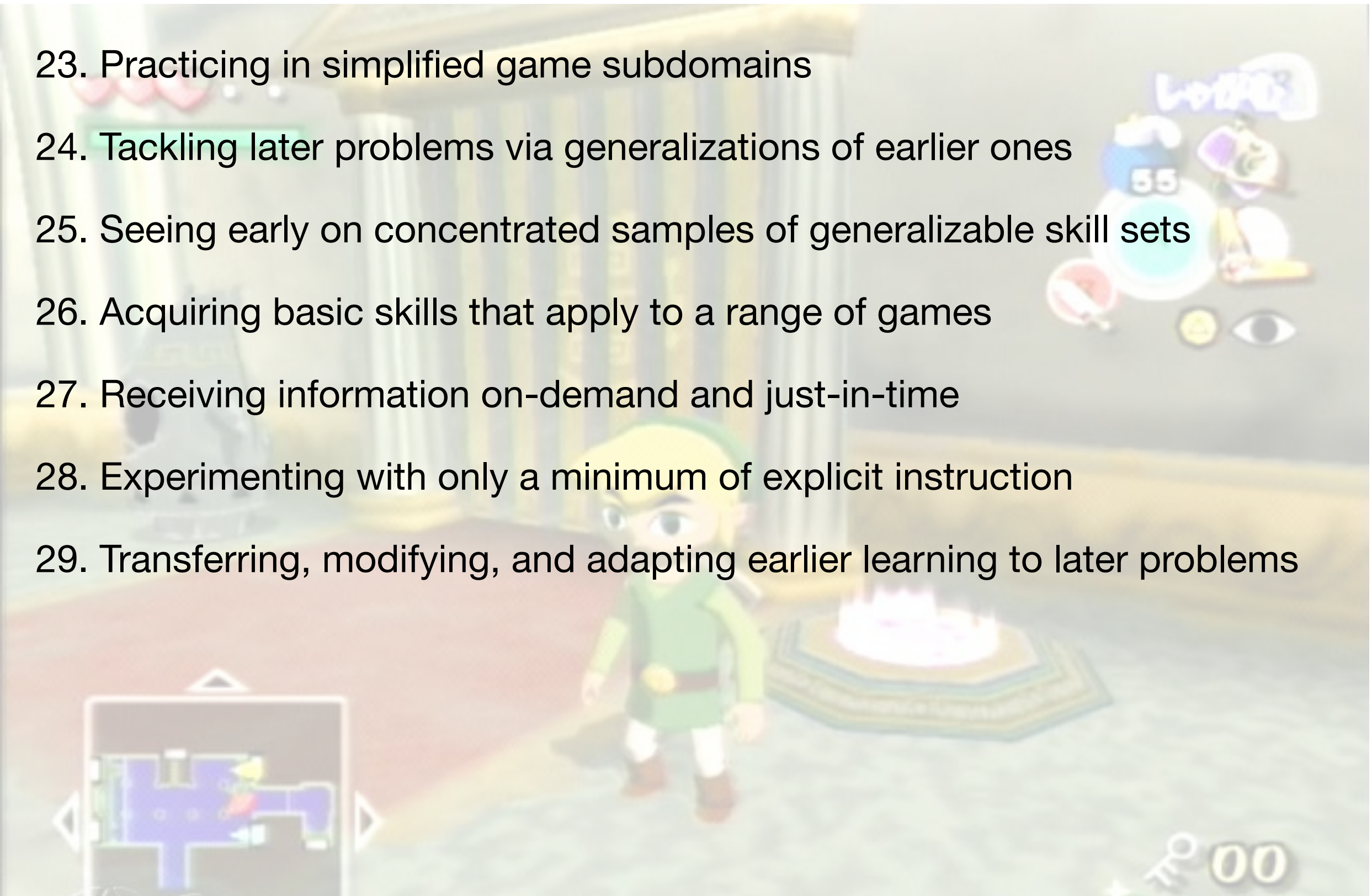
8. Assuming multiple identities in and across worlds
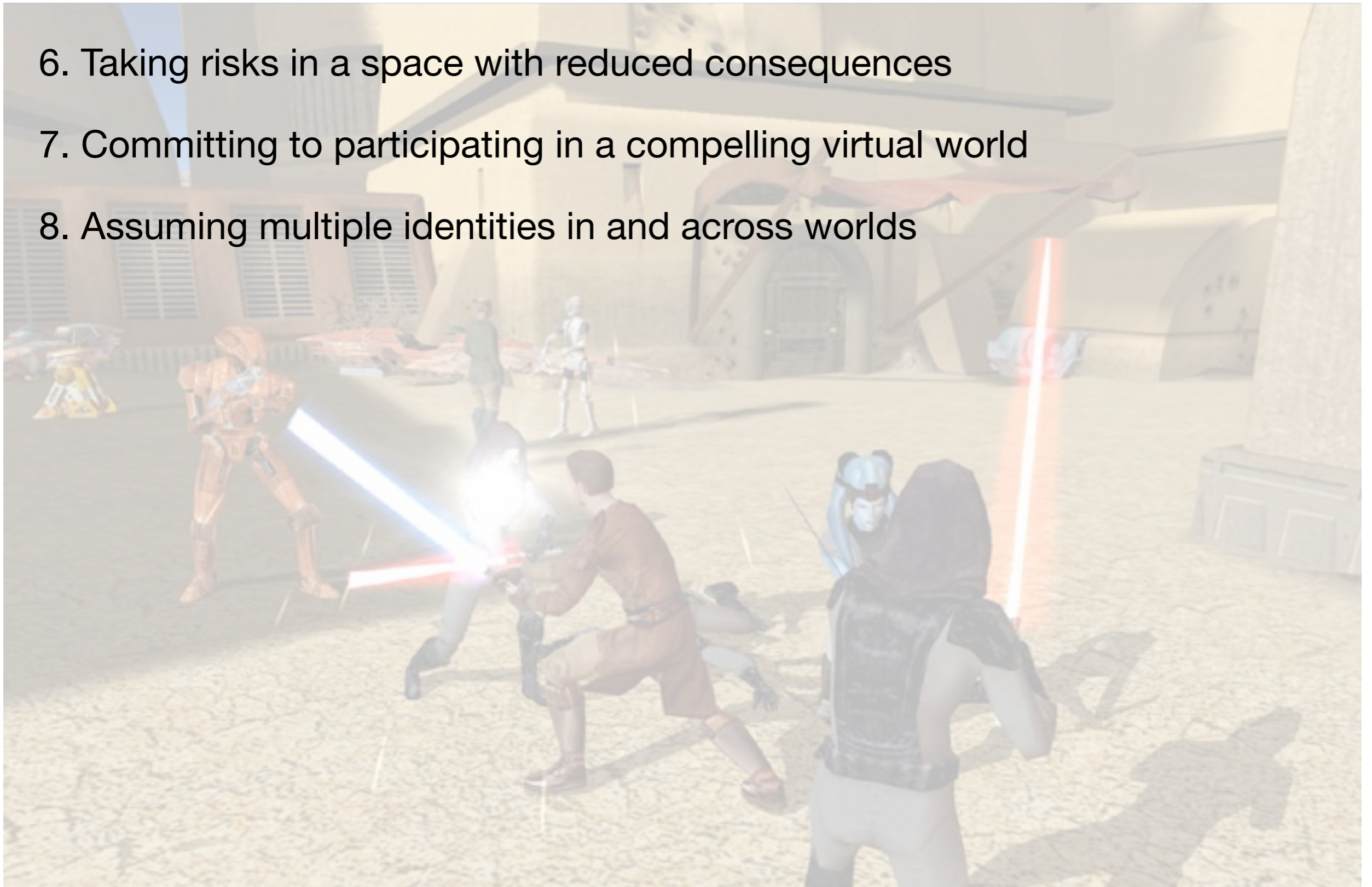
Development of Capabilities

9. Observing the evolution of their own capabilities

10. Getting more out than they put in

11. Being rewarded for achievement at every level of expertise

12. Extensive practice in a rewarding context

13. Learning new skills at each level of expertise

14. Operating at the outer edge of their capabilities at each level of expertise

Experiential Learning

15. Interacting experimentally with the game world

16. Finding multiple approaches to a solution

17. Discovering meaning from experience

18. Understanding texts experientially and contextually

19. Understanding the interconnections among texts that define them as a family

20. Constructing meaning from the intersection of multiple media

21. Understanding how information and knowledge are stored in the game environment

22. Leveraging intuitive and tacit knowledge

Developing Skills

23. Practicing in simplified game subdomains

24. Tackling later problems via generalizations of earlier ones

25. Seeing early on concentrated samples of generalizable skill sets

26. Acquiring basic skills that apply to a range of games

27. Receiving information on-demand and just-in-time

28. Experimenting with only a minimum of explicit instruction

29. Transferring, modifying, and adapting earlier learning to later problems

Cultural Models

30. Reflecting safely about their cultural models and assumptions about the world

31. Reflecting safely about their cultural models and assumptions about their learning processes

32. Reflecting safely about their cultural models and assumptions about the workings of a symbolic domain

33. Searching for knowledge in all aspects of the game, in themselves, and in their interaction with the game
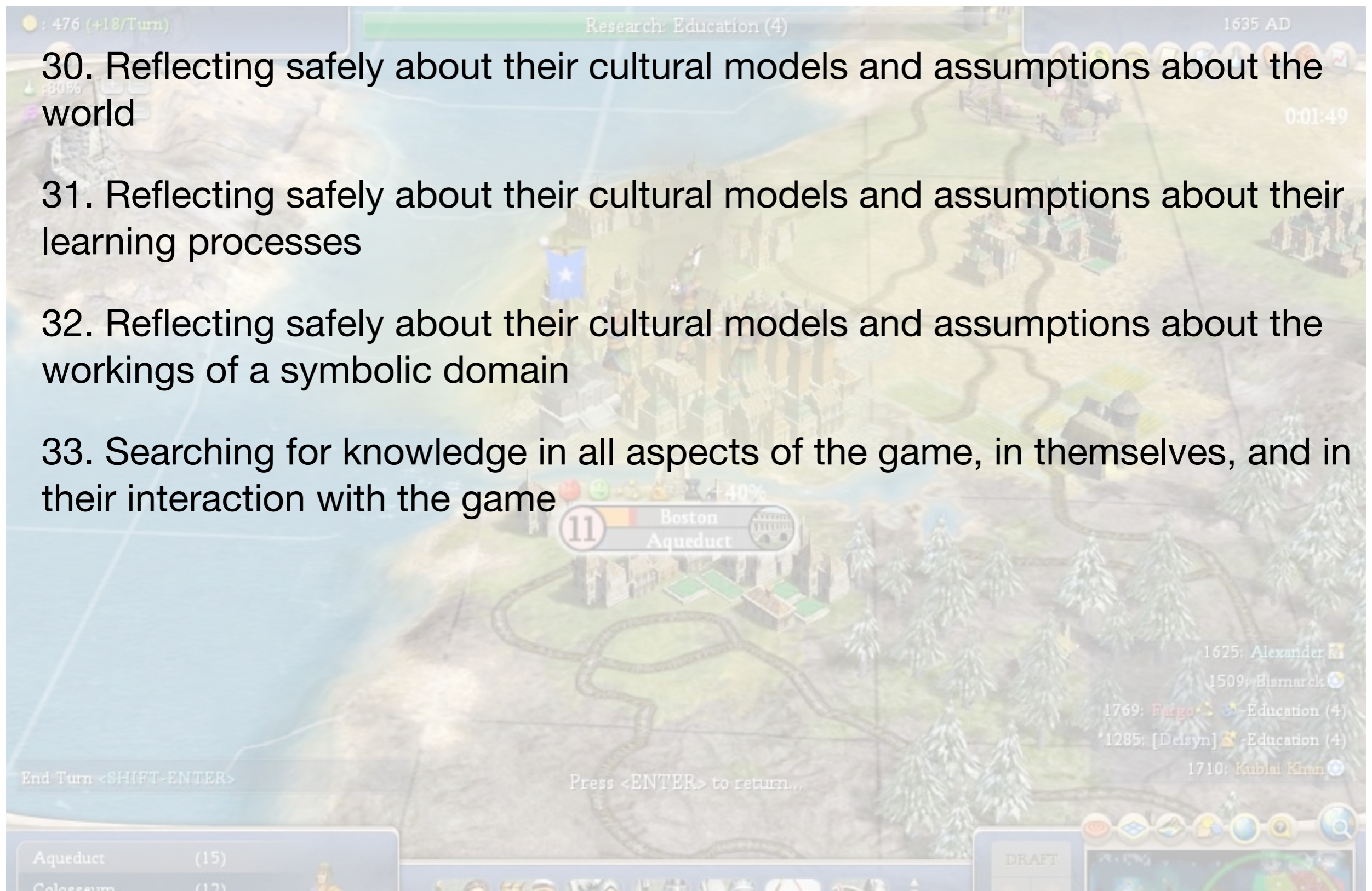
Community

34. Sharing their knowledge with other players

35. Forming a distinct community via shared interests in the gaming world

36. Teaching others and modifying the game experience

Parcelling Out The Terrain

Why are you using a game?

- Do you want to:

  - Provide domain-specific content?

  - Provide domain-specific analytic and problem-solving approaches?

  - Enhance skill transfer to related tasks or domains?

  - Enhance general skills or cognitive processes?

  - Develop specific social structures?

  - Improve participant motivation?

Particularly Interesting Categories

- Interactive Fiction
  - Narrative structure analysis
- Role-playing Games
  - Dramatic structures, narrative building support, derived media creation
- MMOGs
  - Narrative building support, derived media creation, Social Sciences research
- ARGs
  - Narrative building support, media literacy
- Sims
  - Systems modeling, statistical analysis, research methodologies
- Real-Time Strategy Games
  - Modeling, decision optimization
- Turn-based World Strategy Games
  - Historical assumptions and causality analysis
- Twitch and Rhythm Games
  - Dexterity skills, spatial perception

Interactive Fiction

Role-playing Games

MMOGs

ARGs

Sims

Real-Time Strategy Games

Turn-based Strategy Games

Twitch and Rhythm Games
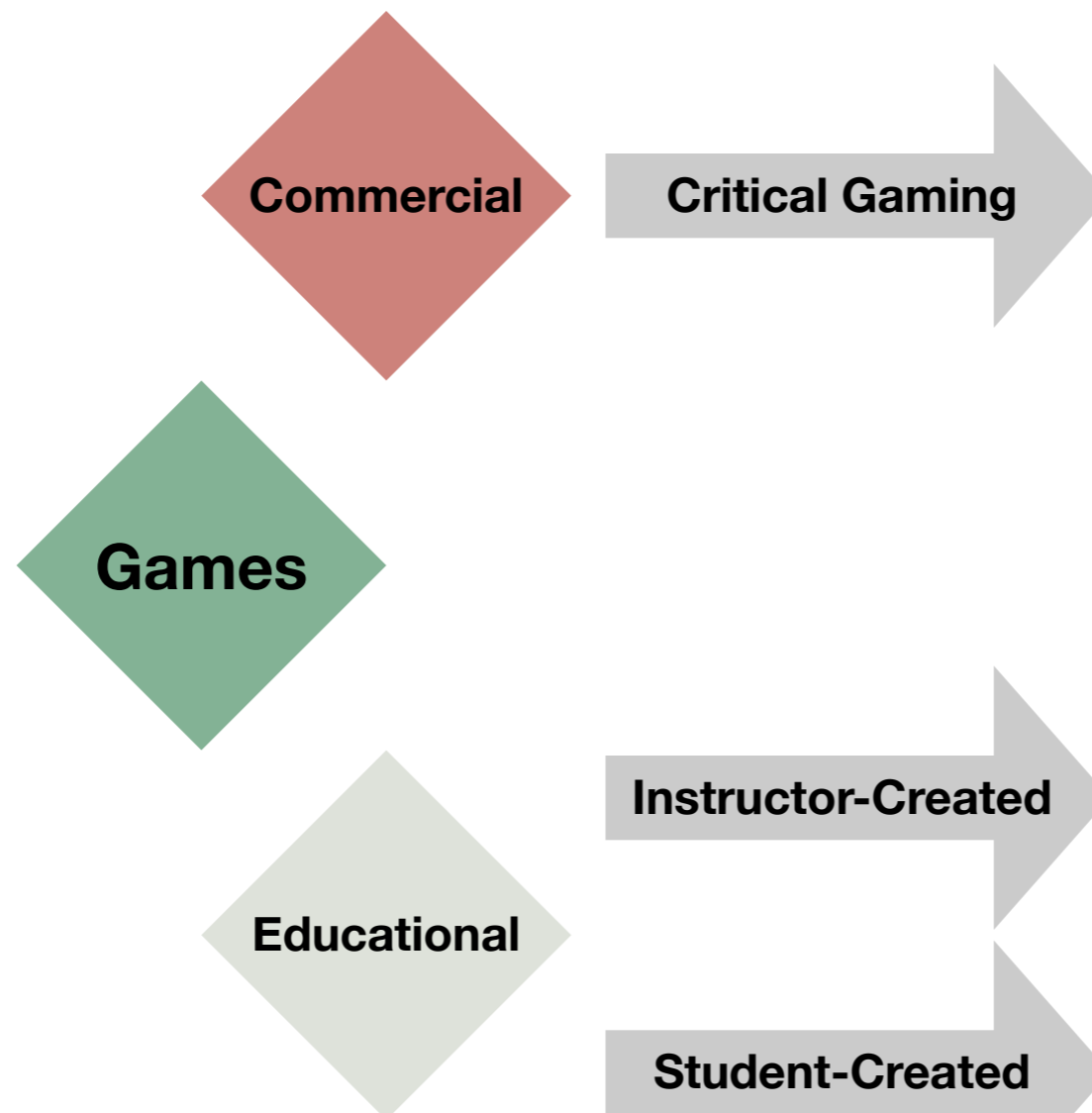
Games

Commercial → **Critical Gaming**

- Provide domain-specific analytic and problem-solving approaches
- Enhance skill transfer to related tasks or domains
- Enhance general skills or cognitive processes

Educational

Instructor-Created

- Provide domain-specific content
- Provide domain-specific analytic and problem-solving approaches
- Enhance skill transfer to related tasks or domains
- Enhance general skills or cognitive processes
- Develop specific social structures
- Improve participant motivation

Student-Created

Game and Learn – the Podcast Series

Maine Department of Education > Game And Learn - Audio/Video

Game And Learn: An Introduction to Educational Gaming

Dr. Ruben Puentedura
Last Modified: Jun 30, 2010
Tracks in Audio/video: 14

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DESCRIPTION

Game And Learn: An Introduction to Educational Gaming

Videogames can provide learners with rich worlds and complex narratives that both enhance and transform their educational experience. Harnessing this potential calls for understanding the principles underlying successful games, and how to apply them in the classroom. This 14-part podcast series, created by Dr. Ruben Puentedura as part of a joint research project between MLTI and the Ewing Marion Kauffman Foundation, will provide educators the knowledge needed to successfully use educational gaming in their classroom.

Dr. Ruben Puentedura, Founder and President of Hippasus, has implemented transformative applications of information technologies for over twenty years in educational institutions, hospitals, and arts organizations. He has worked with the MLTI since 2003, and is the creator of the SAMR model for selecting, using, and evaluating technology in education, as well as research on educational gaming and digital storytelling.

Audio/video | Transcript | Slides

	Name		Time	Artist	Album	Price
1	What Is A Game?		23:07	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
2	What Is A Good Game?		21:54	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
3	A Menagerie Of Genres		31:54	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
4	Games And Learning		27:03	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
5	Games And Education		21:07	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
6	Critical Gaming		15:15	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
7	Games And Storytelling		29:00	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
8	Games And Players		30:26	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
9	Games And Assessment		25:39	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
10	The Design Perspective		26:16	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
11	Case Study: Scratch		25:50	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
12	Case Study: Inform 7		27:52	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
13	Serious Games		13:40	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE
14	TPCK, SAMR, And Games		18:51	Dr. Ruben Puentedura	Game and Learn: An Introduction to Educational Gaming	Free GET MOVIE

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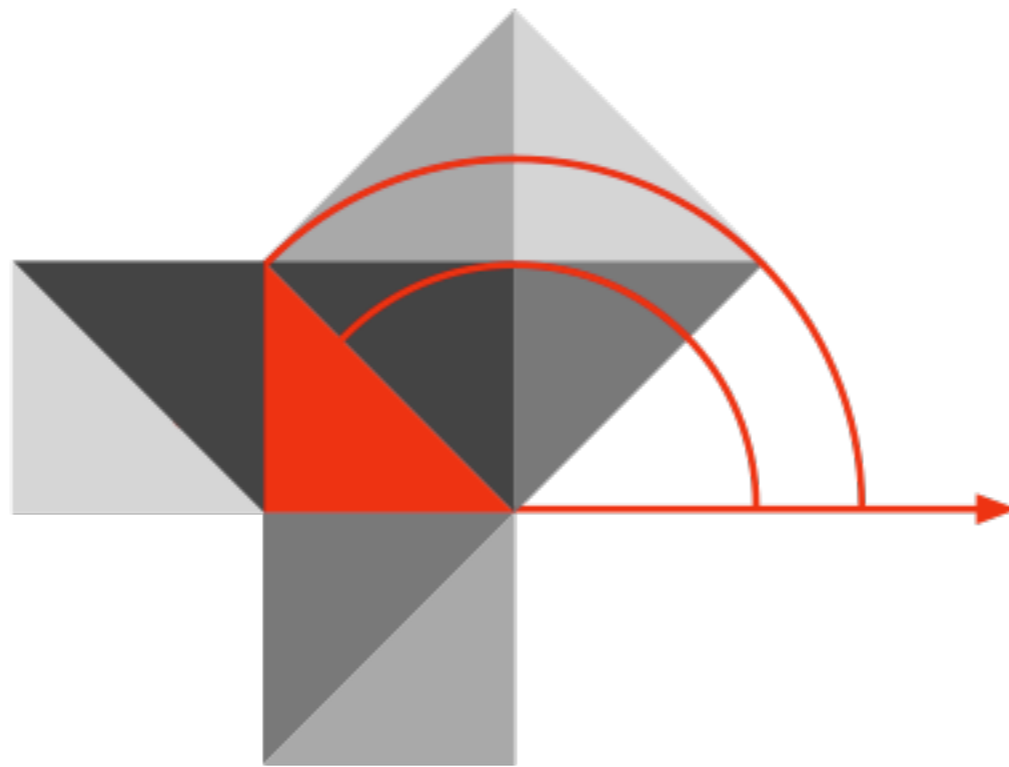
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