

Comp 388/488 - Introduction to Game Design and Development

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Intro - games and simulations

match game to learning goal

- Strategy, Family, Role Play, Adventure, Other...
 - *Entertainment Software Association*
- effective games and simulations for e-Learning should align features, goals...with desired instructional outcome
- Oregon Trail games appropriated by children
- Physics game counter-productive to the given physics principles
- is this inherently a bad thing?
 - *from a learning perspective - Yes*
 - *gaming perspective - No*
- transference not a bad thing...
- playtesting helps resolve many issues...
 - *shift in focus from developer and designer to players*

Intro - games and simulations

match game to learning goal

"Jeopardy-style games, a staple of games in the classroom, are likely to be best for promoting the learning of verbal information (facts, labels, and propositions) and concrete concepts. Arcade-style games..." (P.22)

Van Eck, R.N. 2006. "Digital game-based learning." Educause Review 41. PP.17-30.

Intro - games and simulations

learning and game characteristics - guidance

- simulations and games that offer structure and sound learning support
- instructional explanations
- consideration and reflection on instructional content
- manage complexity
- offer instructional support

Intro - games and simulations

learning and game characteristics - explanations

- provide explanatory feedback instead of corrective only feedback
- try to provide brief instructional explanations between breaks in a simulation
- explanations, feedback available throughout games
 - *may be explicit guidance and examples*
 - *or subtle in its usage and intent*
- there to help the player learn about the game
 - *its gameplay, mechanics, goals...*
- guidance or nudging there to help reinforce game concepts
- when using a game or simulation lacking explanations or hints
 - *players and learners alike try to achieve the goals of the game*
 - *and learn at the same time*
 - *both activities may lead to mental overload*
- normally the game, and not the learning, that takes precedence
 - *may use this concept in our designs as well*
 - *design increasingly complex and challenging tests within a game*
- also need to be careful to encourage and help a user to reach this point
- we may consider this a way of progressing from
 - *easy to learn to difficult to master*
 - *a simple hook for the game itself*

Intro - games and simulations

consideration and reflection

- achieving game goals or mastery of a simulation may preclude reflection
- reflection needed to abstract lessons and learning from a game or simulation

"The experiential nature of an educational simulation is very compelling - users often become very active and engaged in a simulation, similar to the experience of playing a video game. However, the intense and demanding interactivity of many simulations may not provide adequate time for the user to carefully reflect on the principles being modeled by the simulation"

Rieber, L.P., Tzeng, S.C., and Tribble, K. 2004. "Discovery learning, representation, and explanation within a computer-based simulation: Finding the right mix." Learning and Instruction 14. PP.307-323.

Intro - games and simulations

complexity in games

- ways to manage mental load in games
 - *manage complexity of the simulation or goal of the game*
 - *optimise the complexity of the interface*
 - *provide instructional support such as memory aids or activity guidance*
- general concept of progression within most games
 - *from text-based games to platformers, role-playing, racing simulators...*
 - *each provides the gamer with an opportunity to learn and progress*
- management of mental overload becomes a part of the game
 - *player learns, adapts, and improves within a game*
 - *game may progress without causing mental overload to the player*
- mental overload will simply cause the player
 - *to restart the game (or abandon in some cases)*
 - *learn and adapt*
 - *then oncemore try to progress*

Intro - games and simulations

managing complexity (goal progression)

- start with a relatively easy task or goal
- move gradually to more complex environments
- consider options to allow a player to manage their level of complexity
- consider learner, and gamer, experience levels
- dynamically adapt game complexity based on accuracy of responses

Intro - games and simulations

managing complexity - training wheels

- "training wheels" principle for software simulations
 - *Carroll, J.M. 2000. "Making use: Scenario-based design of human-computer interactions." MIT Press.*
- learners and players alike work with a simulation where only some of the functionality is enabled
- full interface may be visible
 - *only relevant elements of it work*
 - *players can't go too astray during early trials and tests*
- as more tasks are learnt and acquired
 - *functionality constraints are gradually released*
 - *until the player is working with a highly functional system*
- as the player gains experience, greater functionality is added

Intro - games and simulations

managing complexity - faded worked examples

- another option is to use faded worked examples
 - *might begin with a complete demonstration of the task*
 - *then, players view a demonstration of the first few steps of the task*
 - *and, finish it on their own*
- the player assumes more and more task responsibility
 - *until they are doing it on their own*
 - *all options become available...*
- a game or simulation may incorporate such a fading strategy
 - *a player can observe a successful game segment or level,*
 - *view accompanying explanatory commentary...*
- for example, use of a computer generated agent
 - *may demonstrate how to play the game or interact with the simulation*
 - *then, the agent completes some of the steps, assigning others to the player*
 - *players assume greater control*
 - *until they're able to complete all steps or actions alone*

Intro - games and simulations

managing complexity - control of pace

- pacing of game or simulation
 - Mayer, R.E., and Jackson, J. 2005. "The case for coherence in scientific explanations: Quantitative details can hurt qualitative understanding." *Journal of Experimental Psychology: Applied* 11. PP. 13-18.
- control of pace within a game or simulation
 - *also important to the potential outcomes*
- fast-paced games are likely to lead to greater overload
 - *fewer opportunities for reflection*
- may sound counter-intuitive for general game design...
 - *but it manifests itself in many different concepts*
- by pace, we may refer to different concepts, e.g.
 - *rate of introduction of gameplay concepts*
 - *such as options, difficulty of tasks, rewards...*
 - *the perceived actual pace of a game*
 - *often defined by game genre, player expectations, story...*
- consider how different games handle pace
 - *varying impacts on general gameplay*
 - *rate of adoption of a given title*
 - *longevity of gaming...*
- how we manipulate and use pace in our games
 - *may affect a player's rate of learning*
 - *their enjoyment of the game*

Intro - games and simulations

learning to play a game - part I

- provision of instruction in using and playing a game
- game or simulation requires cognitive effort
 - *to master the mechanics of the environment*
 - *not always available for learning goals or outcomes*
- we know this happens...
 - *may need to modify game and its general play*
 - *helps maintain a balance between learning and enjoying the game*
- one explicit option that often helps
 - *try to free such mental resources for learning the instructional goals*
 - *free by explicitly teaching how a game or simulation works*
- focus of this suggestion is on the mechanics of the interface
 - *not necessarily the detailed strategic decisions required by the game itself*
- computer generated agent can start the game or simulation
 - *e.g. a tour or example*
 - *how goals are achieved by manipulation of various interface elements*
- could actually be as simple as
 - *summarising keyboard controls for movement*
 - *or navigation elements of the interface*

Intro - games and simulations

learning to play a game - part 2

- also consider providing memory support
- many problem solving or strategy games
 - *take place over a period of time*
 - *participant accumulates data*
 - *participant may draw required conclusions from experience*
- records can also help learners
 - *help derive conclusions based on tests, experiments, or examples*
- might also consider including process guidance
- as a player progresses through the game
 - *actions may be recorded so they can view their progress*
 - *view upon completion of a game or segment*

Intro - games and simulations

learning to play a game - part 3

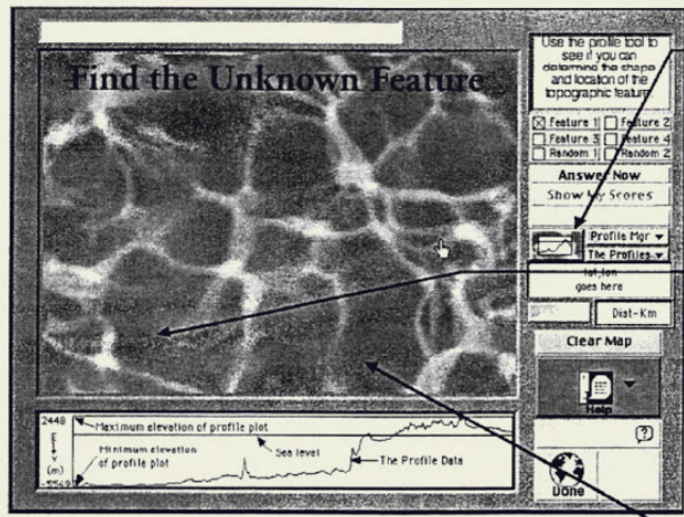
"students need support in how to interact with geology simulations, particularly support in building and using spatial representations" P.181.

Mayer, R.E., Mautone, P., and Prothero, W. 2002. "Pictorial aids for learning by doing in a multimedia geology simulation game." Journal of Educational Psychology 94. PP.171-185.

- another option is visualisation support
- *The Profile Game*
 - *players collect data from a planet whose surface is obscured by clouds*
 - *players draw a line and the computer shows a profile line*
 - *line indicates how far above and below sea level the surface is at a given point*
 - *by drawing many lines players learn*
 - *whether a section contains a mountain, trough, island...*
 - *players were provided with various aids*
 - *strategy aids in text*
 - *visual aids diagramming various features,*
 - *or no aids*
- the best game result
 - *players with the visual aids produced the best game performance*

Image - The Profile Game

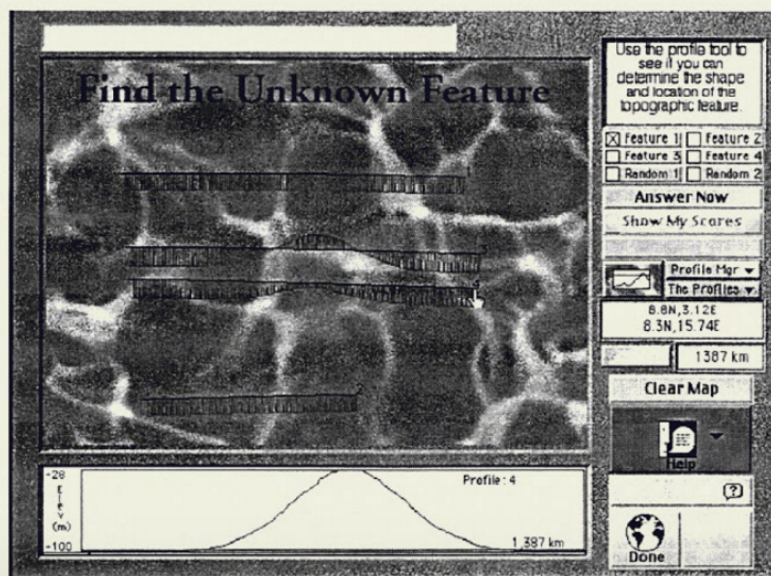
To Draw a Profile Plot Line



The screenshot shows the 'Find the Unknown Feature' game interface. The main map area displays a topographic map with a river and surrounding terrain. A cursor is positioned on the map. The right sidebar contains a 'Profile Manager' section with a 'Profile Mgr' button and a 'The Profiles' dropdown menu. Below this, there are buttons for 'Clear Map' and 'Help'. At the bottom of the sidebar, there is a 'Done' button. The bottom of the interface shows a profile plot area with a vertical axis labeled '2448' and 'Sea level', and a horizontal axis labeled 'The Profile Data'. A line graph is plotted, showing a peak and a valley. The graph is labeled 'Maximum elevation of profile plot' and 'Minimum elevation of profile plot'.

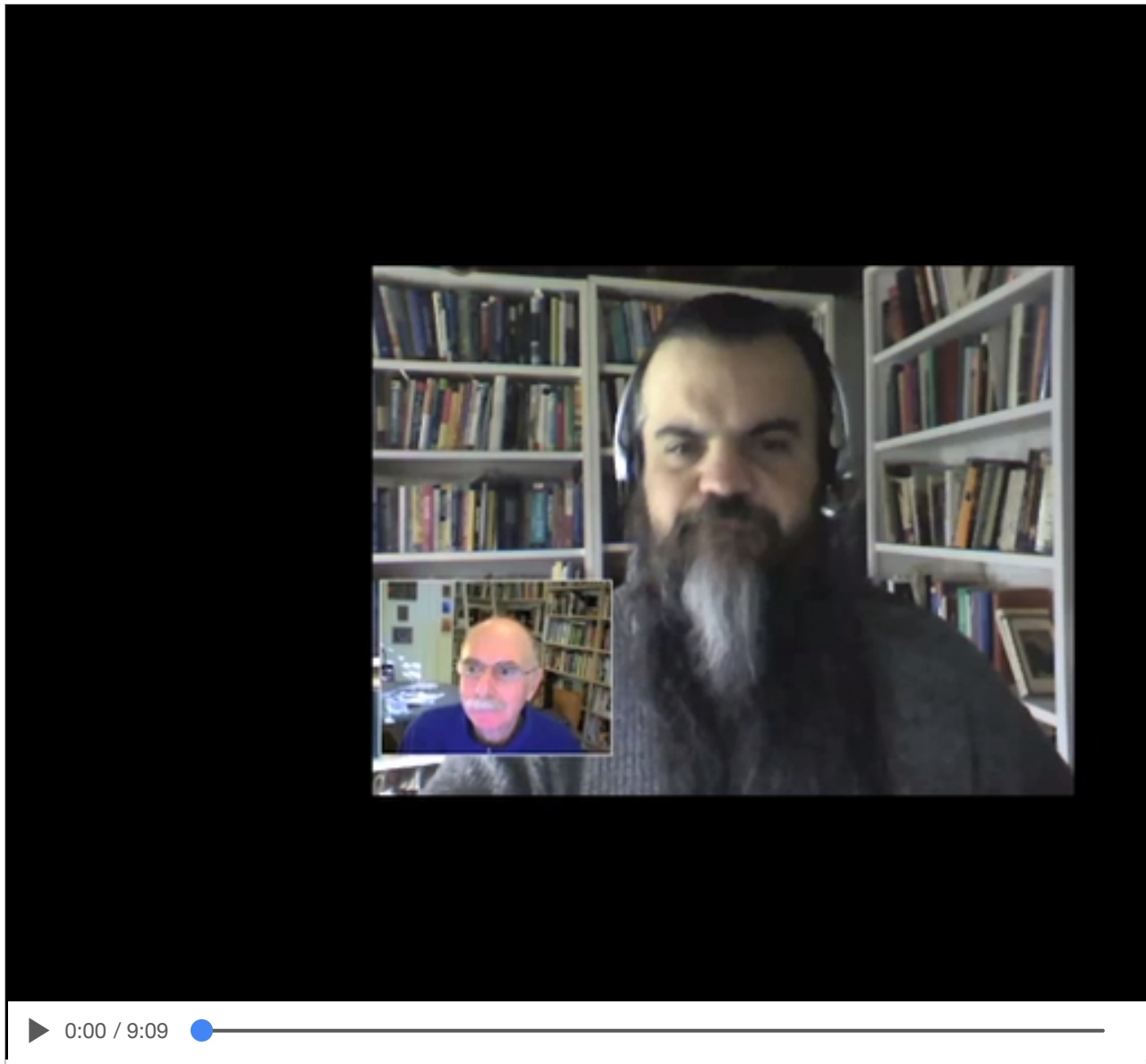
- 1) Click on the **Profile Button**
- 2) Move cursor over to a place in the map area where you want the profile plot line to begin
- 3) Click then release to establish a **Start Point**
- 4) Move cursor over to a place in the map area where you want the profile plot line to end
- 5) Click then release to establish the **Stop Point**

♦ You may draw more than one profile line



The Profile Game

Video - Bryan Alexander



- Bryan Alexander - Preparing Teachers and Students to Succeed in an Open-Ended Future
- gaming section starts at 2:50 for about 20 seconds...
- then example game usage from 4:37 to 6:20 minutes

Game examples - President Elect &c.

- Microsoft's Space Simulator - 1994
- President Elect - 1988 Editions
- SimEarth - 1990
- SimLife - 1992

Games and design

changing attitudes

- game design and development over the last decade or so...
 - *preconceptions, attitudes...morphed and updated*
- long held belief in design, game design...
 - *a good or great designer is neither made nor taught...*
 - *no longer commonly accepted...thank goodness!*
- proliferation of game design courses
 - *greater exposure to practice, learning, testing in game design*
- many now learning game design itself
- game play is now an almost universal pastime
 - *children playing Minecraft...*
 - *adults enjoying retro, learning, testing games...*
- games are helping to teach, educate, encourage
 - *from general cognitive thinking to critical skills*
 - *from history to science to environmental issues*
- games are crossing boundaries
 - *helping to increase our understanding*
 - *improve our learning...*

Game fundamentals

design and gameplay

- start to design, test, and play games
- our primary role as game design and developer
 - *creating games that players want to play, again and again...*
- as designers, easy to become distracted with
 - *art, video, music...*
 - *many other components of a game*
- simply forget to perceive our game from player's perspective
- what is the hook in our game for a player?
- as game designers and developers
 - *need to maintain an awareness and focus on player's experience*
- focus on crafting and producing compelling, great gameplay
- we see our initial game concept from a player's perspective
 - *e.g. excitement, anticipation, and fun that comes from a new game*
 - *we are close to a player's point of view*
- need to ensure we adhere to patterns, practices, and concepts for design
 - *helps with ongoing design and development*
 - *helps maintain focus on player's perspective*

Game fundamentals

desire to create games

- there are certain traits common to good game designers
- a fundamental characteristic is simply a desire to
 - *craft and shape tasks, questions, and environments*
 - *into **playful** situations and scenarios*
- innate passion for play and games
 - *both formal and informal*
 - *common thread amongst gamers, designers, and developers*
- demonstrate this passion during the life of a game's development, e.g.
 - *ability to pitch or sell your game idea*
 - *sell idea to fellow designers, developers, marketers, willing testers...*
- need for ongoing testing and iterative design and development

Game fundamentals

playtesting intro

- general concept for playtesting is initially straightforward
 - *Playtesters are chosen to play your game*
 - *then answers questions*
 - *describe their experience with the game*
 - *generally provide feedback about the game itself*
- we monitor testers playing the game to see
 - *what does and does not work*
 - *what they like, dislike...*
- great benefits of playtesting include
 - *feedback (as expected)*
 - *reminds us to see the game through the eyes of a player...*
 - *able to observe*
 - *particular concepts, objects, or patterns*
- readily observe and monitor focus of each player...
 - *where do they focus within the game screen*
 - *which components do they touch*
 - *how do they navigate a particular task or challenge*
 - *where do they get stuck or delayed*
- observe, record, and note anything of interest
 - *forms our record of the playtest session*
 - *a record of each playtester*

Game fundamentals

designers and playtesting

- playtesting may sound tedious in some respects
 - *a designer/developer may also try to gamify this regular tasks*
- playtesters can become the guides
 - *to a particular task, challenge, and level within our game*
- playtesters may highlight and demonstrate
 - *strengths and weaknesses within designs, mechanics, and gameplay*
- some designers/developers may restrict use of playtesting
 - *restrict to end of production*
 - *any avoid using playtesting at all...*
- perception of such designers/developers clouded or influenced by
 - *a tight production schedule*
 - *lack of funds and resources*
 - *or a sense of anxiety with feedback itself...*
 - *opinion and reaction of playtesters to game*
 - *perhaps dislike gameplay, design, &c.*
 - *fear of major revisions and updates*
- such a mindset is counterproductive for game design and development
- nature of games inherently discourages
 - *individual, one way communication of concepts, thoughts, and ideas*

Game fundamentals

playtesting scenarios & sessions

- we conceive and organise a playtesting session
 - *effectively inviting players to simply come and play our games*
- regardless of a game's current state
 - *we're listening to what they say about their gaming experience*
 - *an invaluable opportunity to gauge a game's successes and failures*
- use this session both directly and indirectly
 - *gauge player reactions as they interact with our game*
 - *carefully discern if silence is indicative of*
 - *focus, boredom, or perhaps a combination of both...*
- learn to associate types of feedback with the game itself
 - *use such patterns to help grow and develop our games*
- feedback is a crucial aspect of the iterative process for our games
 - *each game will transform and grow as a result*
- playtesting also reflects
 - *a flexible approach and consideration of guidelines, design rules, patterns...*
- designing a game needs to be a fluid process
 - *evolves and grows over many cycles of a game's development*

Video - Sony's Usability Testing

Touring SOE's Usability Lab



Touring SOE's Usability Lab

Game fundamentals

Design inspiration

- draw inspiration from the world around us
 - *e.g. photographers see the world in a different light...*
- designers also perceive the world differently
 - *acts as inspiration for new designs, concepts...*
- perception may include
 - *interesting colours and shapes*
 - *patterns of behaviour and attitude*
 - *cultural examples in general...*
- need to open ourselves up to a broad awareness of the world around us
 - *not just inspiration from games and example gameplay*
- games are all around us, in varying shapes and sizes, e.g.
 - *a parent trying to encourage a child to eat their greens*
 - *a cyclist racing to beat their previous best time*
 - ...

Design Inspiration - make a note

- start keeping a record of inspirational items, e.g.
 - *any notes, images, snippets &c. that you find interesting each day, week...*
- inspirational ideas might include different examples of, e.g.
 - *typography, logos, billboards, colour designs and usage, adverts, fashion...*
 - *any art, graphic design &c. that catches your eye*
- anything may serve as a useful influence for design...
- notes &c. very useful for future reference during design, development process
- help explain design choices and decisions as you progress through a game project...

Game fundamentals

Patterns and systems

- many disparate examples of games and gameplay
- may start to discern patterns and rules to games
 - *underlying systems start to emerge*
- implementing systems and patterns, e.g.
 - *how a player may interact with a particular component*
 - *how the mechanics of a particular level or space may work*
- gain experience and inspiration from the broader world
 - *useful to examine the underlying rules of systems*
 - *both regular or occasional use*
- can we modify, skew, or adapt such systems to create a sense of play?
- need to ensure we do not miss the opportunities presented by the world
- may find inspiration
 - *for a new or modified game mechanic, concept, or graphical design...*

Video - Pixar animation

The magic ingredient that brings Pixar movies to life | D...



Ted Presentation - The Magic Ingredient...
~ 3:30 to 6:17 mins.

References

- Carroll, J.M. *Making use: Scenario-based design of human-computer interactions*. MIT Press. 2000.
- Mayer, R.E., and Jackson, J. *The case for coherence in scientific explanations: Quantitative details can hurt qualitative understanding*. *Journal of Experimental Psychology: Applied* 11. 2005. PP. 13-18.
- Moreno, R., and Mayer, R.E. *Role of guidance, reflection, and interactivity in an agent-based multimedia game*. *Journal of Educational Psychology* 97. 2005. PP. 117-128.
- Rieber, L.P., Tzeng, S.C., and Tribble, K. *Discovery learning, representation, and explanation within a computer-based simulation: Finding the right mix*. *Learning and Instruction* 14. 2004. PP.307-323.