Serious games & EMERGO

sustainable development of skill-based serious games

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December 11-2012
Agenda Workshop Serious games & EMERGO

10:45 – 10:50 Welcome + getting to know each other

10:50 – 11:15 Task 1 - Evaluation of serious games

11:15 – 11:25 (Serious) games-characteristics and motives (Rob)

11:25 – 11:45 Task 2 – experiencing CSI Heerlen

11:45 - 11:55 Developing EMERGO games (Rob)

11:55 – 12:10 Skill-based EMERGO game Sexology (Aad)

12:10 – 12:15 Final discussion and round off (Rob)

Note: Slides will be available after the workshop
CELSTEC programmes

- Learning and Cognition programme
- Learning Networks programme
- Serious Games programme
- Mobile Learning programme
- PhD Programme
- Master of Science
Serious Games Programme
(Wim Westera)

1. Research tools & methods
2. Development cases
3. Education
Serious Games Programme

On going research, cases and education:

**SG development** EMERGO toolkit & methodology + EMERGO product (all)

Collaborative Scripting Games  (Hans)
StreetLearn/ARLearn (Google StreetView) (Roland, Stefaan)
Language Technologies, chatbot: Luctor (Peter – Bachelor stage)
Wiki games (Peter)
Sensors: Game-based Communication Skills  (Kiavash – PhD)
Game Learning Patterns (Sebastian – PhD)
Case: Thermenmuseum (Unity) (Wen, Wim)
Case: CHERMUG (research methods) (Peter)
GALA (Network of Excellence) (Wim, Rob)
  •  e.g. serious gaming & assessment

**SG Topic** (Wim, Rob, Roland, Peter)

Course Digital media and learning (Dutch) (Rob)

Workshop SGs  page 5
Workshop SGs with Flash (the great flu) with EMERGO
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Task 1   Evaluate an existing Serious Game

1. Enercities (www.enercities.eu)
2. First aid (http://first-aid-game.e-ucm.es)

(use Evaluation form – Serious Game & 4C – ID model as guideline)
Task 1: Evaluate an existing Serious Game

1. Enercities (www.enercities.eu)
   - Build your own sustainable city
Task 1  Evaluate an existing Serious Game

- Provide first aid
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Setting the scene

Confucius (500 bC)

“Tell me and I will forget,

Show me and I may remember,

Involve me and I will understand ...“

Einstein (nd) "Games are the most elevated form of investigation"
Why Serious games?

- human species is a player by nature (childs, adults) ‘hardwired’
- immersive learning experiences (experimenting, solving problems, creativity, strategical thinking)
- safe experimentation
- connection between theory and practice
- natural feedback (within stories)
- adaptivity
- social connectivity (Self Determination Theory = SDT)
- increased motivation & perseverance: - player is in control (SDT)
  - meaningful/relevance (SDT)
- raised expectations (due to success of the gaming industry)
- improved learning? (limited support from RCT-research)
- digital natives? (all ages, both genders)
Number of papers providing empirical evidence for each learning and behavioural outcome

Connolly, Boyle, Hainey, & Boyle (2012)

<table>
<thead>
<tr>
<th>Outcomes of playing games</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective and motivational outcomes</td>
<td>18</td>
</tr>
<tr>
<td>Knowledge acquisition/content understanding</td>
<td>17</td>
</tr>
<tr>
<td>Perceptual and cognitive skills</td>
<td>13</td>
</tr>
<tr>
<td>Behaviour change</td>
<td>8</td>
</tr>
<tr>
<td>Physiological outcomes</td>
<td>6</td>
</tr>
<tr>
<td>Social/soft skill outcomes</td>
<td>4</td>
</tr>
<tr>
<td>Motor skills</td>
<td>4</td>
</tr>
<tr>
<td>Grand Total (out of 7,392 papers)</td>
<td>70</td>
</tr>
</tbody>
</table>
(Serious) games: characteristics

“a game is a system in which players engage in an abstract challenge, defined by rules, interactivity and feedback, that results in a quantifiable outcome often eliciting an emotional reaction” (Koster, 2005; Kapp, 2012)

- system
- players (= learners in game-based learning)
- abstract challenge
- rules
- interactivity
- feedback
- quantifiable outcome (goal-learning objective)
- emotional reaction
Serious games: purposes and considerations

“a serious game is a game with another purpose than pure entertainment”

Purposes
- learning
- behaviour change (e.g., health, energy consumption)
- explore future scenario’s
- business processes (‘gamification of business’)  
- marketing

Considerations
- balance play-learn-meaning (realism) for effectiveness & efficiency
- competition between learners?
- learning objectives (which?) & assessment (how?)
- costs & expertise & technology (design, development, exploitation)
Genres of Serious games for learning (Alldrich, 2005)

1. virtual worlds – role playing/social network games (World of Warcraft)
2. branching stories [strategy/adventure] (SharkWorld, FirstAid, Emergo games)
3. simulations/spreadsheets (Enercity, SimCity, Great Flu, Darfur is Dying)
4. virtual labs and virtual products (Flight Simulator)
5. COTS (Commercial Of The Self) (Monopoly, Wheel of Fortune)
6. cross genre (mix of genres 1 up till 5)

Genre-suitability for Learning Objectives

Knowledge – Insight: 2, 4, 5
Skills: 1, 2, 3, 4 → skill-based Serious Games (SGs)
Attitudes: 1
Skill-based Serious games: characteristics

Experiencing emotions and reasoning in Authentic tasks

Active and interactive participation

Develop conceptual understanding (practicing: models-simulations)

Ability to perform scientific inquiry

Develop understanding about inquiry (reflection + natural feedback)

Solving authentic problems

All about: Authenticity - suspension of disbelief - motivation
Authentic tasks

= realistic problem situations, where learners participate as actor and constantly are being confronted with the consequences of their actions when applying knowledge and skills in finding solutions.
Discussion - ?questions?
Simulations/courseware at the Open University

- Wasmeer (NW), 1986
- Arrondissement Zomerweelde (RW), 1996
- Paradise Parks (MW), 1994
- Metale beslasting in het werk (PSY), 1997
- Psychodiagnostiek (PSY), 2002
EMERGO games - examples

- Waddenzee – Environmental sciences - 2006
- The Scheldt - Water management – Skills Labs -2009
- Sexology – under development
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Task 2 - Experience EMERGO demonstrator CSI Heerlen

http://emergo.ou.nl/emergo/community/demonstrators.htm (CSI engels)

CSI Heerlen illustrates template “logic reasoning and truth detection”
  • single-user
  • unexpected events
  • time constraints
  • score (compared to other players)

Demo of CSI
Don’t take this too serious!
(it is not about learning, but about playing)
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Problems in training programs like Water Management

Premise: Acquiring complex skills requires intensive learner support

1. Teacher-bandwidth problem → delay, skill gaps

2. Constraints (locations, time, # actors) → “less rich” learning affordances

3. Current solutions (field trips or practicals) → not sustainable training

So: suboptimal training

Solution: high-quality and sustainable skill-based SGs for Water Management

To achieve goal: Improve study success and quality of training
Problems in training programs like Sexology

Premise: Acquiring complex skills requires intensive learner support

1. *Ethical constraints for safe experimentation in real situations*

2. Teacher-bandwidth problem → delay, skill gaps

3. Constraints (# clients, time) → “less rich” learning affordances

4. Current solutions (internships) → not sustainable training

So: suboptimal training

Solution: high-quality and sustainable skill-based SGs for Sexology

To achieve goal: Improve study success and quality of training.
Solution

Skill-based SGs [& professionalisation] (EMERGO)

- Method for developing Skill-based SGs (cases) (key characteristic: **authentic tasks**)
- Components for data entry detailed scenario (development)
  - Player for testing (development) and delivery
  - Components for serious games delivery (delivery)

Solution = EMERGO-game
Evaluation of skill-based SGs Water Management

Conclusion:

*Skill-based SGs with EMERGO* can tackle the *teacher-bandwidth problem*

1. Better learning results and more satisfied learners

2. Reduction of teacher support time and less overhead

3. Flexible – reusable – and easy to maintain

   • case library: separation tasks and sources → in different case structures/flow
   • case templates (e.g., negotiation, truth gathering, market place)

However:

Comparison skill-based SG with existing training can be challenging
Requirements for skill-based SGs - recommendations

- Decisionmakers see SGs as a solution for training-problems (obvious)
- Teachers who want to use skill-based SGs (obvious)
- (preferably) rough material/resources as a start for SG content
- EMERGO method, -toolkit and player (free available)
- Professionalisation authors/teachers with EMERGO(Website, workshops)
- Technical infrastructure EMERGO (data entry + player)
- Multidisciplinary team (content, pedagogy, audiovisual, technical)
- (preferably) involve learners during SG development (and testing)
- Money (20k€ to 500 k€)

OR: give us your SG content—we create YOUR EMERGO game
EMERGO methodology & toolkit

Case development

Data entry initialisation
- START
- Case management: make case
- Components initialisation

Data entry development
- Case scenario
- Case idea
- Case delivery
- Case evaluation

Data entry 'the brain'
- Design: characters/roles
- Design: locations
- Design: Empack
- Design: Tasks
- Design: Object states

Data entry 'the flesh'
- Design: Sources
- Design: e-messages
- Design: Announcements
- Design: Conversations
- Design: Library
- Design: Selections
- Design: Tests

Design
- Student-Portal
- Staff-Portal
- GoogleMap

Case management
- check case
- RUN

Case run management
Serious games: HOW – design guidelines (Shute & Ke, 2012)

Interactive problem solving (ongoing interaction player-game)
Specific goals & rules → help players’ focus on what to do and when
Adaptive challenges (hover at the boundary of student’s ability)
[zone of proximal development & flow (Vygotsky, 1978;Csikszentmihalyi, 1990)]
Control for the player (allow or encourage players’ influence)
Ongoing feedback (timely information about performance)
Uncertainty (evokes suspense and player engagement)
Sensory stimuli (storyline and graphics/sounds to excite senses)
[professional graphics/sounds are NOT required]
Case idea

Waddenzee ('running example')

Q26: What unforeseen circumstances are incorporated?
A26: Unforeseen circumstances still have to be worked out, but can for instance be that an expert has ran out of time for consultation, that parameters used in a prior report now seem to have become outdated, political change, new report, etcetera.
Case framework

First step Design - uses case idea (analysis)

- Collection of standard phrases with tools/sources chronologically
- Input for ingredients scenario (step 2 Design)
Case framework: multi-role flowchart

student
- discuss case
  - Discuss additional information
  - Combine steps

chair
- State problem
  - Formulate causal explanation
  - Differential diagnosis
  - Discuss more certain diagnosis

Activity
Ingredients scenario

Step 2 of Design - uses framework scenario

For each activity - more detailed description of tools/sources
example: interview questions NPC

→ Input for detail scenario (step 3 of Design)

waarin de begeleider de student informeert over de instelling en de medewerkers

- begeleider vertelt iets over ViBOA
- begeleider vertelt iets over de verschillende kantoorgenoten van stagiaire (wie zijn dat allemaal?) maar geeft aan dat de student deze zelf maar aan moeten spreken als hij meer te weten wil komen over hun rol.
- begeleider vertelt student dat naast verplichte activiteiten er een reeks facultatieve activiteiten zijn. Het uitvoeren van deze facultatieve activiteiten levert de student bonuspunten op, die op het eind verzilverd worden. (Bijvoorbeeld in de toetscasus hoeft de student met meer dan ..... bonuspunten bepaalde dingen niet te doen, die studenten met minder bonuspunten wel moeten doen).
- begeleider vertelt dat begeleiding en beoordeling niet in één hand liggen. Een docent van de onderwijsinstelling waar de student op zit, is belast met de beoordeling van de stage
Detail scenario

Step 3 of Design – uses ingredients scenario
More details for Ingredients - example: complete answers to questions
Graphical representation case flow
→ Input for data-entry(EMERGO-toolkit) & production multimedia assets

[G: Ron ziek thuis] Waarin stagegeleider vertelt dat Ron ziek thuis is en de begeleiding weer over neemt

[Als student bij stagegeleider komt en in de afbeelding klikt, vertelt deze het volgende]

<Bestandsnaam; MSJ001.12>
[Sprektekst stagegeleider]

Voor ons betekent dit ik weer de rol van begeleider op me zal nemen. Dat is op zich niet zo’n probleem, alleen ben ik natuurlijk niet zo thuis in het onderwerp als Ron. Ron heeft me gezegd dat hij wel zo goed en zo kwaad als het gaat, wil doorwerken en heeft me gevraagd of ik hem jouw uitwerking van de Waddenzee wil opsturen. Hij heeft toegezegd dat hij een reactie zal geven op je stuk. Maar ik heb geen idee wanneer hij dat doet.

[aansluitend: Als de student een gesprek heeft gehad met Van Dieren]
<Bestandsnaam; MSJ001.13>
[Sprektekst stagegeleider]
Overigens, heeft het gesprek met Wouter van Dieren nog nieuwe inzichten opgeleverd? Of anders gezegd, zou – als je dit gesprek eerder gevoerd had – dat gevolgen gehad hebben voor het stuk dat nu bij Ron ligt? Als dat zo is, zou je kunnen overwegen om hem dit te mailen zodat hij daar nog kennis van kan nemen. Dat hoeft niet hoor, maar het mag natuurlijk wel.

[aansluitend: Als student geen gesprek heeft gehad met Van Dieren]
<Bestandsnaam; MSJ001.14>
[Sprektekst stagegeleider]
Overigens, ik vind het wel jammer dat je niet van de gelegenheid gebruik gemaakt hebt om met Wouter van Dieren te praten. Die had je als direct betrokkene heel interessante dingen kunnen vertellen. Ik vind echt dat je hiermee een kans gemis! hebt. Maar goed, het is nu eenmaal niet meer terug te draaien ........
EMERGO: data entry

EMERGO: player
Characteristics EMERGO games – method/toolkit
(black options for Games, grey options can be provided by CELSTEC)

- Web based production and distribution – proven technology
- Data entry
- Webplayer
- Individual and easy to use by authors-teachers (after training)
- Preview option on content + testing
- Scripting: customised learning environment, progress based
- Scripting: learner support, unexpected events
- Multiple characters (case roles)
- Monitoring learners’ progress (self, by teachers)
- Easy integration with existing LMS
- Supports Windows Media and Flash video
- Extendible with components (e.g.: multi-role, GoogleMaps, Mobile & GPS [R&D], sensors [R&D])
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Demo EMERGO example skill-based SG Sexology

under development
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EMERGO benefits

Can improve teacher bandwidth (monitoring and virtual learner guidance)
Web-based distribution and production - proven technology
Can reduce production and exploitation costs (increased reusability)
Gaming elements, active learning
Collaboration at a distance
Can improve learning
Games without Frills (Games zonder Franje)
Fast and easy to develop by CELSTEC (subject matter by client = YOU!)
(generic) Method for skill-based SG design & development
(generic) extendible Toolkit, (specific) templates (Open Source)
Varied portfolio with clients from: HE/DE, vocational education & training
Conclusion
EMERGO games: How?

• You deliver the content, we can take care for the rest, but…..
• together with you via a controlled and efficient process to create YOUR EMERGO game!
Discussion - ?questions?
Thank you for your attention ...

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EMERGO: 
www.emergo.cc    OR    http://portal.ou.nl/web/leren/emergo

GALA: 
www.galanoe.eu
References


