

University of Bamberg



Reducing locomotion-overhead in educational geogames

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Location-based games



www.foursquare.com



geograph.uk.org



www.ingress.com

Neocartographer



Locomotion





Treasure hunt geocaching game pattern



1st team: 1 - 2 - 3 - 4 - 52nd team: 3 - 5 - 1 - 4 - 23rd team: ...



Agenda

Part 1 Geogames in education

Part 2 Empirical findings on locomotion overhead

Part 3 Implications for geogame design



Part 1: Geogames in education

How to play

- Students play using a game client (thin vs. thick)
- Game-specific server

Localization

 game instance for a specific geographic environment





How to design a geogame



Design process model (Schlieder, 2014)



Narrative design of educational games

Field trip games

- Solve place-related tasks
- Move between places
- Klopfer (2008), de Freitas et al. (20012), ...
- Geogame localization
 - Teachers use their local knowledge to localize the Geogame
 - Challenge: teachers act as co-designers of the game!



Neocartogapher An urban geography game



Research questions

Player locomotion

- How much time is spent on locomotion in a geogame?
- Do players differ in their global spatial strategies?
- What spatial design decisions affect the locomotion overhead?



Local locomotion pattern Kremer, Schlieder, Feulner, Ohl (2013)



Part 2: Empirical findings

Geogame

- Fvsimulation, a geogame in biodiversity education
- "Visit every cache and solve the associated task!"
- Place design
 - k=6 places (caches)
 - Game mechanics puts no advantage to any of the 6! = 720 visit orders





Place-related tasks in the FVsimulation geogame



Place design: geogame localization

© Google Earth Map: Landsat, GeoBasis-DE/BKGc



Localization A path network: tree entry: fixed

biodiversity hotspot near Filderstadt, DE

Localization B path network: linear entry: variable

biodiversity hotspot near Eichstätt, DE



Study area, participants, procedure

Localizations

- A (tree): 64 games
- B (linear): 39 games
- Participants
 - Students aged 10-16
 - biology classes
 - small teams of 2-4
 - group decision taking



Tracks, caches and path network of localization A



Findings: locomotion-to-action ratio



Localization B

Schlileder, Wullinger. | Reducing locomotion overhead in location-based games

Localization A



Findings: path analysis for localization A

detour length	example sequence	frequency
0 = optimal	2-7-5-3-0-1	5
+2	5-7-3-0-1-2	2
+4	3-7-5-0-1-2	10
+6	1-3-7-5-2-0	43
+10	3-5-7-1-2-0	4



5-0-1-3-7-2an optimal visit order



Findings: path analysis for localization A

detour length	example sequence	frequency
0 = optimal	2-7-5-3-0-1	5
+2	5-7-3-0-1-2	2
+4	3-7-5-0-1-2	10
+6	1-3-7-5-2-0	43
+10	3-5-7-1-2-0	4



1-3-7-5-2-0a suboptimal visit order



Findings: path analysis for localization A

detour length	example sequence	frequency
0 = optimal	8-3-6-5-0-2	14
+2	0-2-5-6-3-8	3
+4	6-3-8-5-0-2	9
+5	3-6-5-0-2-8	9
+6	6-5-3-8-0-2	2
+7	6-3-5-0-2-8	1
+10	5-0-3-6-2-8	1

8-3-6-5-0-2



Part 3: Conclusions and Implications

Player locomotion

- How much time is spent on locomotion in a geogame?
- more time spent on locomotion than on educational tasks (median ≥ 50%)

- Spatial strategies
 - Do players differ in their global spatial strategies?
 - Few players choose optimal pahts; sub-optimal paths are chosen more frequently (≥ 50%)



Conclusions (1)

Spatial analysis

- What spatial design decisions affect the locomotion overhead?
- Path network affects the size of locomotion overhead



Design knowledge



Conclusions (2)

Design assistance

- previous work: focus on game balance, …
- future work: include implications of cache choices on locomotion overhead

CityPoker Game Designer	Game Instructions		F Language •
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Instruction Panel	Search	for a city	Manual search
The process of creating your own 0 gamefield is divided into six sepera each stage an introduction panel w with the nessecary information.	CityPoker e.g. E te stages. In ill provide you	Armberg	You can also search a good location on the worldmap manually.
You can switch back and forth betw different stages without having con and add required data later.	veen the upleted them	or	
Use one of the three boxes to the r	ight, to start with Enter la	titude and longitude coordinates	
creating your own CityPoker gamefield. You can either enter a city name, or give latitude and longitude coordinates for the location you want	e.g. 4	9.90331	
	r give latitude ecation you want e.g. 1	0.89360	
to play your game at. You can also search for a suitable location on the	do a manual a world map.	Go to coordinates	
You can choose from different setu	p parameters		

Schlieder, Kremer, Heinz (2016)