The role of cartographic visualizations to improve spatial cognition in geography fieldwork

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Overview

- Research Motivation
- Background
- Study 1
- Study 2
- Study 3
Research Motivation

The need for studies on

- Effective cognitive gains of geography fieldwork via cartographic visualizations
- Investigating the usability of cartography visualizations in the three stages of geography fieldwork
Research Motivation

- The best geographical knowledge construction?
- In a real world: natural, social and cultural environment (Gale et al, 1990) (Fieldwork settings in geography education)
- The perception of space is dominated by visual sense (Mark and Frank, 1990)

However

- Pedagogy with cartographic visualizations is less developed (Wiegand, 2006)
- It has long been an issue - the relation between knowledge learning and scientific instruments (Madsen and Camilla, 2012)
Background - Fieldwork and Geography Fieldwork

- Learning-oriented
- Research-oriented

Preparation stage
Fieldwork stage
Follow-up stage

physical-oriented geography fieldwork
human-oriented geography fieldwork

From Kent et al., 1997
The Geography Fieldwork in this research

Human-oriented geography fieldwork

Learning-oriented

Urban

Undergraduate
Background - Spatial Cognition

- Spatial cognition is the mental representation of the environment.

**Psychology**
- Landmark knowledge, route knowledge, and survey knowledge; way-finding, distances and directions identification.

**Geography**
- How people understand the physical and human features of the environment and their relationships.

- Natural language descriptions
- Direct experience: such as walking, driving and travelling
- Visually acquired through media, such as maps and graphics.
Background - Cartographic Visualizations

- visualizing geographical reality

Maps (atlases): paper and digital
Photos, Aerial images
Videos
Virtual reality
Augmented reality

How are they currently used in geography fieldwork?
Is it possible to make a better use of the current cartographic visualisation potential?
Study 1 - Methodology

- Secondary source analysis
  - Journal papers, books, geography fieldwork instruction, textbooks, etc.
- Online survey
  - “The role of cartographic visualizations in human geography fieldwork”
  - Human geography fieldwork leaders
Study 1 - Online Survey still Open

- https://www.surveymonkey.com/s/5MW37Q9

The role of cartographic visualizations in human geography fieldwork

Thank you for your time. In case of any questions, please feel free to email me on x.wang-5@utwente.nl.

1. Your name and email address (optional)
   
   

2. Which university are you working at?
   
   

3. In this university, which department (institute) are you working at?
   
   

4. Does your department (institute) offer human geography fieldwork for undergraduate or graduate students?
   
   

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Study 1 - Study Results so far

- Use and Usability during Fieldwork stage of human geography fieldwork
- Preparation stage
- Follow-up stage
Study 1 - Study Results

- Augmented reality

Fieldwork stage

Follow-up stage

- Two cases
  - Ecosystem fieldwork
  - Cultural science fieldwork

How?

1. Personalizing the learning content based on the user’s current interests, as well as the location in the field
2. Augmenting what students observed around them with multi-sensory data: texts and voices notes, and pictures.

useful

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Study 2 - Interactive mapping in Human Geography Fieldwork

The theme: Textile industry collapse
Study 2 - Interactive mapping in Human Geography Fieldwork

Digital mapping tools (Locus mapping application) and traditional paper maps
Study 2 - Study Results - mental maps

Pre-fieldwork

Post-fieldwork
Study 2 - Study Results: Landmarks marked on the map before and after

<table>
<thead>
<tr>
<th>Feature</th>
<th>Pre-fieldwork</th>
<th>Post-fieldwork</th>
</tr>
</thead>
<tbody>
<tr>
<td>digital</td>
<td>paper</td>
<td>digital</td>
</tr>
<tr>
<td>ITC building</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Menzis building</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Prinsesse tunnel</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Schuttersveld villa</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Coach-house</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Leeu bakker shop</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Carpet right shop</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Praxis shop</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Car glass office</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>KPN</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Fit for free</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Bus stalling</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Railway line</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Hengelosestraat</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Ring road</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Parkweg</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Old textile factory wall</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>ITC’s parking lot</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Construction site</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Fortuinstraat</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Bus lane</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Schuttersveld road</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Open space (after villa)</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Total number of features</td>
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<td>9</td>
</tr>
</tbody>
</table>

TP1 = Test Person 1; ……
Study 3: Mobile Augmented Reality
Study 3- Mobile Augmented Reality

Investigate its role to improve spatial cognition in two human geography fieldwork in China and an European country

STEP 1

• Developing a ubiquitous augmented reality by adding own components and locations to an existing augmented reality mobile application

UCD (user-centred design)

STEP 2

• Investigating the usability of this mobile augmented reality tool in improving students’ spatial cognition during the human geography fieldwork
Study 2 - Case Study in China (in November, 2015)

- The human geography fieldwork in Beijing Normal University
  1. Half day in the field
  2. In Beijing, an area which was an embassy area during Qing Dynasty
  3. Main Objective
     - To understand and learn location change of embassy area in Beijing spatial pattern, and further understand and learn the change of land use through comparing several maps from dynasty of Yuan, Ming, Qing, the Republic of China and now
Study 2- Case Study in Europe
Thanks for your attention!

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