

User Requirements Analysis for a Mobile Augmented Reality Application Supporting Geography Fieldwork

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Extended Abstract

Geography fieldwork, a geographical learning/teaching activity in real space, is essential to increase learners' understanding of the geography of a certain area (HMI 1992). At the same time, how to achieve optimal geographic understanding in the field needs to be considered, especially with the increasing use of new information and communication technologies (ICTs). Right now, one of the most promising technologies is Augmented Reality (AR), which extends perceptions of a real space with additional contextual information. In recent years, thanks to the availability of mobile devices, the application of mobile AR has a vast potential to make a difference (Specht et al. 2011), especially in situational education like geography fieldwork. However, in geography fieldwork, the current problem is that mobile AR applications have not been applied till now. Therefore, it is necessary to integrate a mobile AR application that can also provide additional visualizations to assist learning/teaching and gaining geographic understanding in geography fieldwork. Central to the development of a new and usable application is adopting the principle of a User-Centered Design (UCD) approach, the first phase of which is identifying user requirements (ISO 1999).

This research first establishes the current situation of using AR in education based on a literature review. At the same time, in a real educational human geography fieldwork executed in China, we have investigated 1) students' background and experience with the use of (cartographic) visualization tools (through a survey); 2) how both the organizers and students use current (mobile) cartographic tools in helping teaching and learning geography (through observation and interviews); 3) the difficulties of using

these tools and the expectations of an alternative visualization tool (through interviews).

The results of these investigations can be used to formulate the basic user requirements of a mobile AR application for supporting human geography fieldwork. It was found out that it is practical to make use of a mobile AR application in geography fieldwork because of the students' smartphone ownership and their cartographic education background. Both teachers and students thought that it is useful and important to use it during the execution stage of the fieldwork. Students use their mobile phones for both daily and academic purposes. In terms of using mobile cartographic tools, most of them prefer to use digital maps on mobile devices with the main purposes of checking locations of unfamiliar places, planning a route between different places, and navigating in unfamiliar areas. In this fieldwork, students used their mobile phones to mainly collect data and browse digital maps of the fieldwork area, with the purposes of completing the fieldwork tasks and assisting geographic understanding of the fieldwork area, respectively. In doing so, they experienced some difficulties, e.g. the time required and troubles in switching between different mobile applications and the data collected in the field lacking locational details. The difficulties they experienced give a picture of what aspects should be paid attention to and which difficulties should be tried to be avoided and (or) should be solved when designing a new mobile application involving AR. Both teachers and students, as users, expressed their expectations of such an alternative visualization tool for fieldwork use and indicated some basic key requirements, e.g., labeling geo-locations of all field collected data, making notes, recording voice data and field walking routes and optionally viewing various materials (maps, satellite images, etc.) of the fieldwork area. An analysis of these user requirements suggests the basic functionalities of a mobile AR tool to be used in human geography fieldwork. After having obtained these requirements from the actual users in this real human geography fieldwork, we can move forward to design a prototype of a new mobile AR application.

References

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