Towards a Concept of "Spatially Enabled Learning"

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Abstract

Communication and information exchange is increasingly web2.0 mediated, networked and complex. The use and integration of a spatial reference to information, i.e. geomedia, has been gaining importance. As a consequence, these changes and the potential of spatial representations to contextualize learning content account for an increasing relevance of geomedia in education. Based on these devlopments a concept of Spatially Enabled Learning makes use of web-based mapping to support interaction and communication in educational contexts via social geocommunication. It links social media with individual spatial representations. The purpose is to make learners capable to be 'produsers' (producer-users) of information with a spatial reference. This is supposed to be helpful in education and everyday life with regard to spatial citizenship, i.e. reflective and participatory practice. The idea of spatially enabled learning focuses on the vision to enhance both learning and teaching processes, as well as to contribute to a more global understanding through linking learning processes with spatial representations.

This contribution discusses two main topics: a) the role of space & spatial representations in everyday life and in learning processes, and b) conceptual tools needed for that. The concept of social geocommunication mirrors the shift from stand-alone web mapping applications to collaborative web mapping applications and finally towards social web mapping applications. In this context there is a variety of recent tools that already cover the prerequisites of spatially enabled learning. This paper provides a rudimentary conceptual framework to integrate existing tools and learning.

1 Introduction and Motivation

Our societies are becoming more and more interconnected, in their living environments, economies and social interactions. According to MORIN (2001), the capability of citizens to think about this complexity of the world is a major educational issue. In such a complex framework, communication is the foundation of the functioning of society. With advances in Information & Communication Technologies (ICT), networked interaction has changed considerably (FABY & KOCH 2010). Information exchange, discussions and the way we catch up on content increasingly takes place through computer-mediated communication associated with web2.0 practices. Web2.0 applications provide interoperability and numerous innovative opportunities. Users are allowed to share, publish, interact and collaborate with each other in a participatory social media dialogue as produsers (producer and user) of user-generated content (HIEBERT 2006). Overall, the internet has gained overwhelming relevance in all areas of people's life and information exchange while direct contact is in-

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creasingly augmented through and partly even replaced by media-based communication occurring in social media. Empirical studies show the deep involvement of young people in the activities encouraged by the seemingly democratic and open nature of the media concerned (UNICEF 2010, LENHART et al. 2010, ACMA 2008). According to LIVINGSTONE (2008), this enthusiasm should be used as a relevant means to enhance learning (and teaching) in secondary education, but as REILLY (2011) and HAMPSON et al. (2011) suggest, policy responses usually act as inhibitors rather than enabling innovation in schools.

Based on the premise that the public meaning of the internet shifted from a 'virtual reality' metaphor in the late 90ies[1] to a digital mashup of our daily life,[2] that is available via mobile devices all time and *everywhere* (MEYER in print), digital communication practice and information gathering are more and more location based. As a consequence of this digital 'rebirth of place' and besides 'common' web2.0 multimedia, the production, use and integration of geomedia play a pivotal role in pluri-disciplinary, web2.0-mediated communication. Due to the appearance of applications such as digital globes (e.g. Google Earth, Virtual Earth), web mapping services (e.g. Google Maps, Bing Maps), GPS enabled mobile devices and location based services, the public's interest on and use of spatial data, geomedia and web maps – in a nutshell Geo-ICT – rapidly increased (THIELMANN et al. 2011). Location is used to integrate information and provides a focal point of communication in both science and society. Consequently, in this geospatial world everyday life and communication is increasingly geo-referenced whatever the subject matter. In addition to that, spatial data, geomedia and web maps are increasingly used as – as well as seen as – important communication platforms. Today, the use of spatial data and geographic applications on the internet is not necessarily linked to experts work, but accessible and usable by the public not disposing about spatial data, GIS or classical cartographic competencies. In sum we can say that a spatially enabled society is arising recently.

Based on the premise, that school education should provide relevant skills to participate in society, these changes in our everyday life account for an increasing relevance for geomedia in education, as well (DONERT 2010). The intrusion of new (geo)communication media requires the development of more sophisticated (geo)communication skills. Besides several approaches to integrate GI skills in geography education (see, for example, various contributions in JEKEL et al. 2010, 2011), there are no recent concepts to support communication in learning processes in general with a spatial contextualization via digital tools.

2 Spatially Enabled Learning

Spatially Enabled Learning tries to fill exactly this gap. Thus, this situation outlined above can (and should) be re-adressed by exploring spatially enabled learning and teaching processes across a number of different subjects. This aims at the integration of communication and geo-technological tools into a state-of-the-art (e-)learning framework. The availability and general use of web tools and location-based services can serve diverse subject areas.

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[1] I.e. 'a second world' or 'the cyberspace' or 'virtual reality'.

[2] I.e. the internet as a digital augmentation of our personal, subjective environment; see also the "Internet of Things" vision (TUTERS & VARNELIS 2006).

Relevant pedagogical approaches need to be identified that can be used across subject areas, from modern languages to humanities and sciences in secondary education.

Based on these assumptions, spatially enabled learning makes use of web-based spatial representations to support interaction, communication and document learning outcomes in educational contexts by connecting complex learning content to a spatial dimension. This can be achieved by contextualisation, by cartographic support of arguments in communication processes or simply as a spatialized portfolio that may be either individual or collective or both. Spatial representations should be both produced and used by all actors in the learning process through web2.0 possibilities including (Geo)ICT.

The rationale of spatially enabled learning is furthermore based on the idea that spatial representations are supposed to create a special type of "Dual Coding" (PAIVIO 1986). This can be useful for both the collective production of spatial meanings (WERLEN 2010) and the support of learning processes via spatial contextualization of learning contents. Spatial representations relate to location on the surface of the earth. They can be used for instance in digital globes and web maps, closely linked to the vision of the Digital Earth (GORE 1998). There is good reason to believe that this link between analogue codes (learning contents) and symbolic codes (spatial representations) enhances the learner's memory for complex and abstract information, as ENEMARK & RAJABIFARD (2011) in general highlight the "power of the visual over the verbal". In pedagogic psychology, visually prepared content shows a much wider memorability than verbal or textual issues (WEIDENMANN 2006) and is very fruitful for educational contexts. Beyond visualizations in general, especially geovisualization and maps show a high potential to support both subjective appropriation of space and collaborative production of meaning (HENNIG et al. 2011). Furthermore, geovisualization and maps are constituted in a special spatio-symbolic code system that seems to be independent from the produsers' cultural background and goes beyond – for example – language barriers (HALL & JONES this volume). This insight is promising for a spatially enabled learning approach, as communicating via spatial representations may bridge learning contents beyond learners' verbal skills and (dis)advantages.

Besides such empirical results and the background of the dual coding theory, we argue that spatially enabled learning is contingent with several other theories of learning, namely theories of multimedia learning (MORENO & MAYER 1999). We consider spatially enabled learning a special form of "situated learning" (LAVE & WENGER 1991) as well, including space as an additional reference system to socially situated learning environments. This may be argued by thinking of space in a constructivist version, which allows for an additional system of reference of coding in communication processes.

3 "Social Geocommunication" as the Backbone of Spatially Enabled Learning

This idea of the support of communication by subjective spatial representations derives from GEOKOM-PEP (Geovisualization and communication in participatory decision making processes) (VOGLER et al. 2010), an Austrian research project that aimed to enhance communication skills of young people in the framework of participatory planning processes. A communication platform integrating web mapping tools and social networking

services has been developed to generate 'value-added' spatial communication among pupils and teachers in a planning process making use of geovisualization. Thus, GEOKOM-PEP supported collaborative decision making in spatial planning scenarios. As a result of these communication forms, which include the possibilities to integrate information with a spatial reference, the concept of social geocommunication has been developed, linking social media with individual spatial representations (HENNIG et al. 2011). Geocommunication (in collaborative planning) so far has been characterized by the use and combination of a multitude of available multimedia and geomedia by high numbers of participants and features enabling user interaction (BRODERSEN & NIELSEN 2006). Besides producing and integrating geomedia and multimedia, social(!) geocommunication – as an online process – also requires integrating social aspects of communication such as community building and networking. This encourages a high number of users to interactively participate in communication processes via web2.0 based tools. With regard to this definition the approach of social geocommunication refers to concepts closely linked to *neogeography* and *volunteered geographic information* (GOODCHILD 2007, ELWOOD 2008). Social geocommunication consequently encourages well-structured interaction and decision making between all participants in a spatial planning scenario by the support of individually produced spatial representations, i.e. digital maps. A schematic outline of the concept of social geocommunication is summed up in Figure 1 (see below).

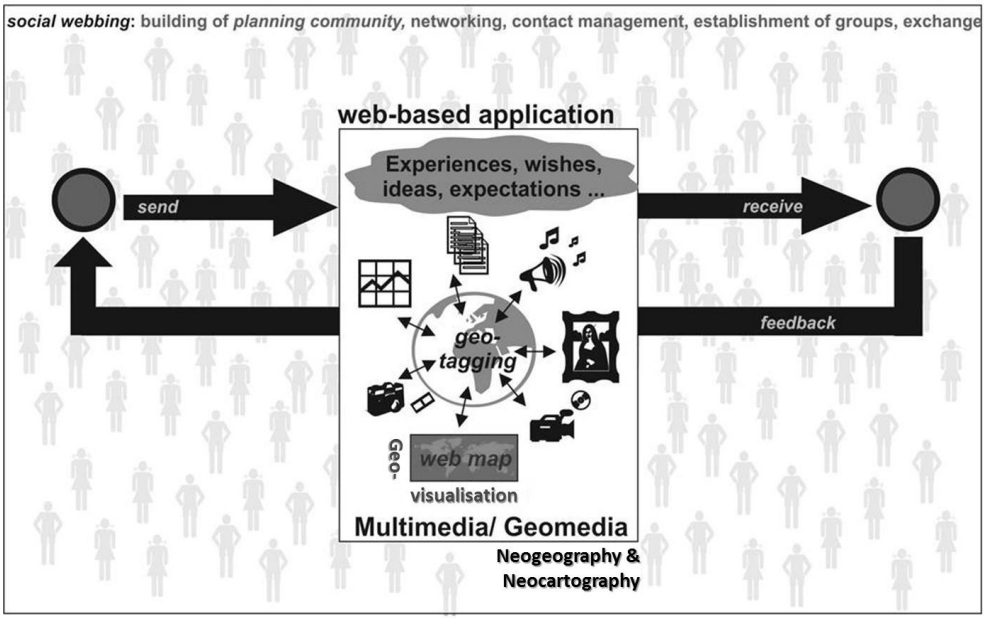

Fig. 1: The framework of Social Geocommunication (HENNIG et al. 2011)

Beyond planning scenarios, the idea of spatially enabled learning transfers this generic concept of social geocommunication to all topics and subjects in education that have spatial reference. The approach is to implement recent social geocommunication technologies to

education in order to support, contextualize and structure individual and collaborative learning processes.

In learning scenarios, the spatially-enabled web2.0-based communication processes can be described as social geocommunication, as well. In consequence, the idea of spatially enabled learning goes beyond the spatial thinking approach (NRC 2006) that is recently discussed with regard to professional skills in GIS education and focusses on spatial analysis in the framework of absolute concepts of space. Spatially enabled learning, on the contrary, uses a constructivist understanding of space (JEKEL 2008). Meaning is always attached to space via communication. In this context, spatial representations (like maps or geomedia in general) are very powerful instruments to consolidate such socially constructed spatial meanings (LEFEBVRE 1993). Meaning (in this case: the appropriation of learning content) accordingly can be highlighted and supported with a spatial contextualization via spatial representations created by learners and/or teachers.

This is supposed to be helpful in both science education and everyday life with regard to "spatial citizenship" (GRYL & JEKEL 2012). In order to incorporate spatially-enabled learning in education, new ways of teaching and learning are required and tools need to be developed to support the integration of these processes. While this idea could not be implemented in education earlier due to technical challenges and professional cartography skills needed, the development of (Geo)ICT and social geocommunication allows some promising new opportunities. A benefit for this is the wide range of web mapping tools freely available online with that are very intuitive to use. Therefore, it is not needed to develop professional cartography or even GIS skills to use spatial contextualization. These tools are also characterized through combining mapping practices with the world of social networking, a pastime enthusiastically embraced by young people today. They have the potential to be suitable for applications in learning and teaching, aiming at the integration of spatially enabled learning in secondary education through web mapping.

4 Shrinking Technical Challenges, or: "Choose your tools!"

The development (and evolvement) of the social geocommunication concept mirrors the shift from (1) stand-alone web mapping applications (web mapping; cartographic communication) to (2) collaborative web mapping applications (co-operative/ participatory web mapping; geocommunication), and finally towards (3) social web mapping applications (co-operative/ participatory web mapping; social geocommunication, see Tab.1 for a first short review). Applications grouped under these three categories are characterized by a number of different functionalities – implemented to a varying extent – to enable web mapping and communication (social networking services: constructing profile, building and maintaining social networks and relations, create groups, sharing information etc.).

Besides the few examples mentioned in Table 1, several tools of cover prerequisites of spatially enabled learning. These need to be put in a conceptual and practical framework. The problem here is no longer the availability and usability of such applications but more to discover them and reasonably put them in an educational context. This challenge needs to be adressed in the near future.

Table 1: Web mapping tools in terms of social geocommunication process development (state: February 2012)[3]

		Development over time		
		web mapping & cartographic communication	collaborative web mapping & geocommunication	collaborative web mapping & social geocommunication
exemplary tools		ArcGIS explorer online, Google Maps	Scribble Maps, UMapper, Zea Maps	TripLine, BuzzMaps, ShareMyMaps,
web mapping	viewing			
	editing			
social media services & web. 2.0 integration				

5 Conclusion

In conclusion, the idea of spatially enabled learning focuses on the vision to enhance both learning processes in different subjects addressed through spatial contextualisation of learning and teaching. This may contribute to a more global understanding through linking subject-specific learning processes and localized learning outcomes. Such an approach can (1) bridge the gap between everyday social geocommunication and collaborative learning environments in education and (2) support learning processes with a special type of dual coding beyond verbal skills or (dis)advantages. It opens the world of spatially enabled learning to pupils and teachers alike and encourages the use of spatial representations in many subject areas.

Even if this main idea seems very simple (no difficult technical prerequisites, no (pre-)professional GIS education, no complex competence modelling), we suggest that spatially enabled learning, i.e. 'just' linking learning processes and meanings with a spatial representation, has a high potential for innovative approaches in education. However, to use and implement these opportunities arising from spatially enabled web2.0-based communication in education, several topics will need to be looked at in more detail. These include:

- Which underlying concepts support spatially enabled and web2.0-based communication processes,
- Theoretic pedagogical concepts regarding spatially enabled learning need to be developed.
- Concrete pedagogies and practical pilot examples need to be created and, most notably, evaluated.
- Which software components and functions are required by spatially enabled web2.0-based communication processes?
- Which tools are available (as well as suitable) for these communication processes?

[3] Due to the rapid development of freely available mapping tools and their social media integration, this overview has no empirical evidence but "just" an illustrative relevancy to show the evolution of tools and user practices regarding "social geocommunication". But the future development in this domain reasonably is very fruitful and promising for the purposes stated in this paper.

These issues will be our next challenges towards a reasonable and well implemented concept of "Spatially Enabled Learning".

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