

A WEB OF CHALLENGES AND OPPORTUNITIES. NEW RESEARCH AND PRAXIS IN GEOGRAPHY EDUCATION IN VIEW OF CURRENT WEB TECHNOLOGIES

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Abstract

Current web technologies have invaded people's lifeworld. With mobile devices information can be obtained independently from space and time and works as an omnipresent layer that augments people's constructions of the world permanently. Basing on implications of the current web on everyday action, this paper suggests necessary and recommended changes for geographical learning, focusing on the improvement of learning geography with the help of the web as well as on geography's contribution to enable students to a mature usage of web technologies in their everyday life when acting in spatial contexts. The result is a first draft of a potential research agenda, collecting an overview of questions to be worked on by geographical educational research for the praxis of geography learning in schools. This draft includes aspects such as enabling students to understand relational concepts of space and changing power relations in the classroom due to ubiquitous knowledge availability.

Keywords: geography education, geography, web2.0, media competence, research agenda, geoweb.

1. INTRODUCTION – WEB TECHNOLOGIES AND THEIR IMPACTS ON EVERYDAY (GEOGRAPHICAL) ACTING AND LEARNING

Technology always used to be a driving force of changes in human action. As technological sociology describes, technology enables people to certain action not possible before, and particularly even makes people acting (Flichy 2007). During the last decades enormous improvement has been achieved in the field of information technologies that help to obtain, organize, and communicate information and exercise a great influence on the everyday praxis of the individual and society as well. The web is a temporary height of this development. Started as an experiment in a scientific and engineer environment, during the last 20 years the web has changed from a static library of information to a collaborative medium of multilateral mass communication (Mika 2010).

At this, information related to geography plays a crucial role on the web, in the shape of information connected to geographical locations (geographic information, GI) and in the shape of information about the world we live in, contributing from different fields to the interdisciplinary character of geography. Two examples shall give a glimpse on nowadays massive implications the web has on the orientation in physical and socially constructed spaces and spaces of geographical knowledge and learning.

Navigating through a city with a smartphone may become a highly web-led project: Applications like Google Maps Navigation lead to the target, let's say, a café, by connecting digital maps and the user's current position identified with the smartphone's inbuilt GPS-device. The café has been selected with the help of online rating platforms like Qype. Here, other consumers have created GI that forms a layer of opinions/meanings attached to the physical place of the café. Augmented reality tools like Wikitude make these layers visible just by using GPS and image analysis in connection with the smartphone's camera. At the café, communicating the own geographical position to others with Foursquare may be rewarded with advantages like special offers at this location later on. A quick check of the list of 'friends' in a social network shows the ones, who are in the surrounding (assumed they share their location with their friends); and allows to invite them to join. Finally, a Twitter message lets the world know, what the user is doing.

In a typical geography lesson, the situation is a bit different. The students are sitting within a classroom to learn about and be prepared for the world outside. A web search request about a burning issue like the ongoing conflict in the Middle East provides maps, texts and pictures. These sources illustrate the conflict in its complexity and make it, while students put together pieces of information guided by the teacher, a bit more understandable. Not surprisingly, at one point a student identifies a piece of information contrary to that the teacher gave. This could be a point to discuss critically about the borders of knowledge in a world of increasing amounts of information, about the question of essential knowledge to find orientation in this information overload and about criteria of trust in sources in a world of multiple meanings especially in conflicts, where political interests are involved. Sadly, this episode can also lead to the teacher's decision to reduce the input on information selected by her/him in future lessons.

In western societies (and many developing countries follow using their own approaches with an even stronger focus on mobile technologies, see Kanwischer & Quennet, 2012) nearly everybody can have access to the web, if she/he wishes. The examples illustrate the great influence of the current web on the praxis of everyday decision making and learning. This raises questions, like, who provides this action-determining information, and who uses the information the users publish on the web at the same time.

This paper will not only answer these questions on a general basis, but will especially identify necessary implications for geography education basing on the efficacious characteristics of the current web. These implications target the opportunities the web brings along to improve and challenge geography learning, as well as the challenges to everyday mature action in web-influenced spaces geography education needs to prepare for.

The second paragraph illustrates some of the most influential characteristics of the web and their consequences for spatially related acting and learning. Ongoing from this, the third paragraph categorizes interesting fields of geography education research and formulates research questions by taking up the challenges for geography education. These thoughts are supplemented with first, but still incomplete findings contributing to answer these questions.

2. SELECTED CHARACTERISTICS OF THE CURRENT WEB AND THEIR CONSEQUENCES FOR GEOGRAPHY EDUCATION

2.1. Geoweb and Geomedia

The important connection between geography (education) and the web is to some extent the result of the emergence of the geoweb during the last years (Rehrl & Reich, 2010). The geoweb provides geomedia, which was made possible and driven by certain technological, social and political progress. (Following recent approaches and projects, e.g. digital-earth.eu, in the context of this paper geomedia are understood as all material and digital

representations of space.) The development of well-engineered mobile devices such as smartphones and tablets and the progress of mobile networks allow people to connect to the internet (nearly) *wherever* they are. At the same time, the web has changed from a one-way-communication tool to a collaborative, social medium, namely the web2.0, as social networks show. For bodily human beings, bound to places and things of material co-presence, there is a need to connect social life on the web with that in lifeworld and to adapt information from the web locally. All this can be provided easily, when the user's location is identified. With the lifting of the limitations to the accuracy of the signals of the US Navstar Global Positioning System (GPS) in the year 2000, GPS positioning and the production of own locational information became open to everybody (Xu, 2007). The blending of the physical being and additional information from the web leads to an abolition of the seeming border between virtual and 'real' world (Milgram et al., 1994) and a 'renaissance' of place on the web (Schroll et al., 2007).

For geography education, a wide field of localized information about the world is opened on a local and global scale on the web, accompanied by a variety of geographic visualizations and other non-pictorial media that hasn't been there before, carrying the potential of making geography more lively and more closely connected to lifeworld.

2.2. Volunteered (Geographic) Information

The changes that came with the web2.0 led to significant alteration in (mass) media communication as well: The domination of an expert caste that provides information to consumers and filters incoming contributions by gate keepers is ended, as the sociality of the web includes not only communication and interaction on a personal level but also the exchange and collaborative production of information and knowledge (Ebersbach et al., 2008). Platforms like Wikipedia illustrate how the expert status changes: Within a self-controlled community the single user can produce information, to be more concise, encyclopedia entries (formerly a classic domain of closed expert groups hired by well-known publishing houses). The new role of the producer, between consumption and production, emerges (Bruns, 2008). (At this, the term 'producer' is to be differentiated from 'prosumer', as the latter is influencing the market through mature consumption decision, but, in contrast to the producer, not by active production.) This 'lay-production' of information seems to challenge existing expert cultures: Without formal qualification, everybody can communicate to a potential large auditory. However, one has to be careful with the 'lay'-term. Web communities are not free of control and hierarchies: New web expert status has to be gained. In Wikipedia administrators control new entries, mentors offer help to greenhorn authors, and, additionally, all users can exercise (social) control over entries published. In the field of blogging everybody can open a blog, but followers must be gained by originality, topicality, quality or other criteria a wider auditory might search for. Qualifying as someone who is heard on the web, means often continuous work, as the more people participate on the web in a productive way, the more effort has to be undertaken in order to be heard within the crowd. The attention platforms and producers get, influences the potency of the information they provide. But altogether, these new forms of information production challenge the traditional idea of building trust in information by tracing it back to a single identifiable author, or a small group of authors responsible for it. Old authorities (like publishing houses) try to keep their expert status alive by joining the social web communication as well.

Concerning the educational ideal of teaching the 'right' and 'correct' things, these linkages to approved sources of trust are welcomed in many school contexts. However, as the increasing quality and actuality of collaboratively produced information (for Wikipedia, see e.g. Giles 2005) and even blogs show, these sources cannot be ignored forever by education. Especially geography education taken down from various up-to-date knowledge about the

world the web provides. Additionally, geography education can enable learners to communicate their spatial visions and interests and discuss them with others on the web, using the web's potential for democratization (Warf & Sui, 2010).

2.3. Multiperspectivity and Relational Concepts of Space

The social production of information results in the co-presence of manifold information on the web. This includes different and potentially contradictory information to one certain aspect, as each user constructs his own (naturally limited) world view on the basis of his abilities, insights, beliefs, social context, and intentions (see constructivism, Glaserfeld, 1995). The existence of differing perspectives beside each other is not a new development, but without traditional gate keepers their number is multiplied on the web. However, this has the advantage that the limitations of single perspectives become visible thanks to the opportunity of comfortable and low-cost comparison which was not provided in traditional media. Wikipedia opens pages to all viewers, where different versions of entries are discussed. Search engines display democratically information from divergent sources beside each other (as long as no censorship is implemented as to be noticed for instance in China, see Drummond, 2010).

For geography education, the complexity of problems and the constructedness of knowledge is made visible through the web. (The impact of the web on geographical education cannot be reduced to geomedial, as a lot of information on the web is about learning about and understanding the world.) Likewise, multiperspectivity requires the user's ability to decide, whether the perspective of a medium is complex enough to solve a certain problem or not. Especially interesting for a geographic context, the web can help to understand relational concepts of space. Relational concepts state that spaces are socially constructed by the attachment of meaning, the seemingly fixed connection between physical object and meaning is human-made and open to alternatives (Werlen, 1993). The co-presence of different spatial constructions for a certain area on the web (e.g. in crisis mapping, where a location can be a scene of a crime, a place of suffer or a place of heroism, see Michel & Bittner, 2012) could potentially lead to a self-evident understanding of these concepts (Schlottmann, in print).

2.4. The Flood of Information and Its Management

The amount of information available increases enormously with the web. This concerns the amount of multiperspective information to one certain aspect as well as the amount of information available in general, that is, according to some estimation, doubling every few years. Mashups, that combine information from different sources on the web under common surfaces, increase the availability additionally. An increase of information means more comfort, but a challenge to the user's organization and creation of knowledge at the same time. Completely new modes of orientation and processing are required. Reading and inquiry habits change completely to adapt to the new supply. The web3.0 is a new step to manage the flood of information. In contrast to key-word based search, the web3.0 takes into account the semantics of a word, the awareness that one word can have different meanings (e.g. space in geography and space in astronomy). Information is selected according to a certain semantic corresponding to the user's needs. Those needs are anticipated around information about the user, brought together from former search requests and additional information e.g. from social networks (see the Google universe including Google+). However, the algorithms do not respect that meaning is principally ambiguous, negotiable and fluid (Schlottmann, in print).

Regarding geography education the information provided on the web is a great source for learning (for instance digital globes in contrast to thematically reduced school atlases), but becomes overwhelming as well. New and advanced strategies to organize information as a

basis to construct geographical knowledge have to be taught. Additionally, referring to the web3.0, learners need to become more mature regarding the selection of information they are offered.

2.5. Ubiquity of Information

Being (or at least being able to be) online nearly everywhere and every time has become a matter of course due to mobile devices and networks. As the term of ‘augmented reality’ (Milgram et al., 1994) describes, a layer of information lies over everyday’s perception and praxis and potentially influences action, inseparable interwoven (especially when thinking from a constructivist background). Being online constantly extends the range of action, communication and information consumption. ‘Looking things up later’ is no option any more, information is delivered just-in-time.

For geography education information can be acquired just-in-time within the classroom. Excursions can be enriched with information provided with mobile apps – this can produce completely new constructions of space and open new perspectives.

2.6. Un-Volunteered Geographic Information

A main critique point on the visions around the web is that the number of producers is small in comparison to the number of those that are mainly consumers (TNS, 2007), despite low barriers through increased usability. However, volunteered and intended production of information is only one side of the medal. Every user produces information, mainly unconsciously, and leaves traces that are stored over long periods. Starting with trackable IP-addresses over the multiple utilization of email-addresses for different services to the usage of constant pseudonyms or real names on the web (several social networks require the latter as part of their terms and conditions), especially the new web’s strong connection to lifeworld prevents increasingly the possibility of anonymous surfing, when one wants to participate in lifeworld activities enriched or even made possible through web information and communication. Personalized search requests on the web3.0 (and at this aid while navigating through the jungle of information) require user data that is collected more or less automatically. Regarding ubiquitous computing in connection with GI, the user has to open her/his position to web services in order to get location-based information in exchange. The internet of things, connecting tools of everyday usage to the web, delivers information about the user as well (e.g. a navigation tool in a car enriched with up-to-date traffic information). Getting certain services requires a kind of, mostly not frankly addressed, openness with own data.

This kind of production of information – regarding geodata the term “un-volunteered (geographic) information” (Jekel et al., forthcoming, referring on Goodchild’s, 2007, “Citizens as sensors”) might work – is a great challenge to mature learning. It clearly addresses (spatial) privacy issues (Armstrong & Ruggles, 2005) that are challenged by visions of the end of privacy (O’Hara & Shadboult, 2008). Privacy decisions, especially regarding spatial privacy, become a serious issue, as the blending between volunteered and un-volunteered is fluent: For instance, power positions on the web – gaining an expert status, influence and attention – are mandatorily connected to a constant, trustworthy identification, as tools measuring the social web success show (Oosterveer, 2011).

2.7. Big Web Business

Seemingly harmonic enclaves of collaboration for the public’s sake and open source like Open Street Map and Wikipedia may not hide the fact that the web content is highly linked to human’s interests and especially economic purposes. For instance, although many of Google’s products are free of monetary charge for the private user, Google is the strongest

selling company: The user's charge is paid with his attention and with personal data that is used to select advertising information. In a world full of information, users are thankful for the reduction of complexity, although this reduction is directly influenced by the business relationship between companies providing services and products and internet companies. Additionally, the power of social relations is economized by using the credibility of 'friends' to influence consumption decisions.

Regarding the geography domain "geographies of consumption" (Werlen, 1993) are influenced and local action led by algorithms providing economic advantage for certain stakeholders. Creating awareness towards these linkages is a task for geography education as well.

3. A WEB OF CHALLENGES AND POSSIBILITIES – A COLLECTION OF RESEARCH QUESTIONS FOR GEOGRAPHY EDUCATION

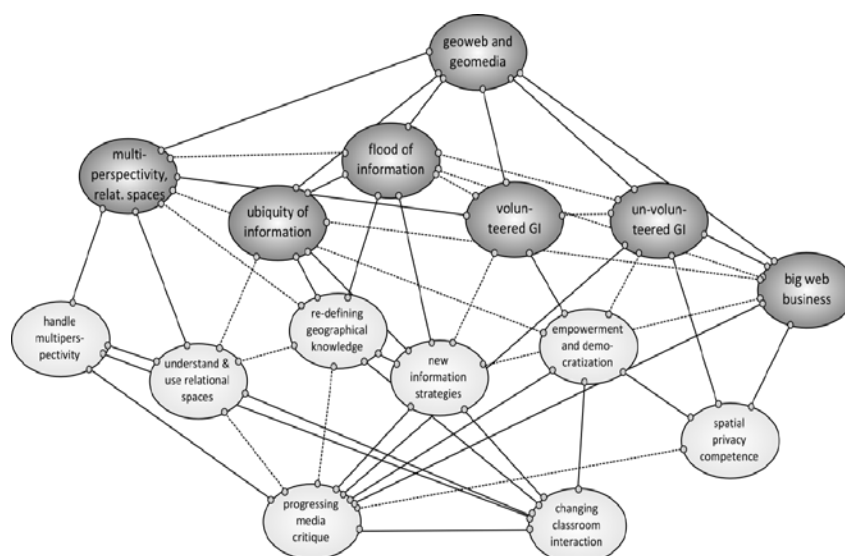


Figure 1. Selected characteristics of the web (dark grey) and deduced questions for research and praxis of geography education (light grey) and several of the potential linkages between them form themselves a web of challenges and possibilities

Following from the characteristics outlined above, different challenges to and opportunities for geographical education emerge, that are targeted to improve geography learning as well as to deliver geography education's contribution to enable the students to mature everyday acting and learning with the web (see figure 1). In the following, these challenges and opportunities are transferred in questions for geography education research, as their profound adaption requires theoretical as well as empirical and practical inquiry. The questions form a *preliminary* research agenda, a first idea for a systematization, and do *not* claim wholeness; there are just burning issues following from the current web's characteristic and related challenges. They are naturally open to supplementation. Additionally, the questions are formulated comprehensive; in concrete research situations they have to be reduced to analyzable questions, e.g. the formulation of the structure of certain competences (for concretization of the term, see Weinert, 2011), the development of methods to teach them, the identification of constraints and the formulation of methods to evaluate their practical implementation. It must be emphasized, that geography education and geography education research have already paid attention to some of the questions. However, as the current web is a young and developing artifact, this research is still limited and many aspects remain without theoretical backing or practicable solutions. Much work still needs to be done as the implementation of the web in (e.g. geography) education is either missed at all (OECD,

2008) or often remains rather conservative, not fully aware of the potential and challenges the recent development of the web and geoweb come along with (Schlottmann, in print; Gryl & Jekel, 2012; Selwyn, 2011; Schuck et al., 2010; Selwyn et al., 2008). The work already done is described in connection with the concerning question.

3.1. Handle Multiperspectivity

Multiperspectivity as a consequence from the 'lay' publishing culture on the web provides multiple insights and requires new competences regarding information consumption and knowledge construction.

- How can geography education profit from multiperspective approaches?
- How can students be enabled to handle multiperspectivity, complexity and uncertainty regarding geographical knowledge?

Conceptual and proved approaches show that geography learning can gain huge benefits from multiperspective approaches (Rhode-Jüchtern, 2011). However, first empirical studies showed that even teachers have huge problems in positively making sense of multiperspectivity and try to avoid multiple perspectives by reducing educational material on single and renowned sources, published by traditional authorities (Gryl 2012).

3.2. Understand and Use Relational Spaces

Geomedia, provided on the web, help to transfer multiperspectivity to multiple perspectives on spaces, resulting in relational concepts of space.

- How can students understand and handle relational concepts of space with the help of geomedia and geoweb tools?

Educational approaches to relational concepts of space already exist (Wardenga, 2002), but are not widely implemented yet. First studies show that students can use geoweb tools to produce alternative spatial visions, making relational concepts visible (Hennig et al., 2011). However, even leading concepts of nowadays geography education like spatial thinking do not involve relational concepts (Gryl & Jekel, 2012; see NRC, 2006).

3.3. New Information Strategies

The flood of information on the web requires new competences of selecting, processing and working with information as cross-domain capabilities with an important impact on geography as widely connected, interdisciplinary subject.

- How can students be enabled to handle the flood of information in a mature way?
- How can concepts of reading competence and methodological competences be adapted to web2.0 and 3.0 requirements?

There are already first works on reading competence on the web, for instance the PISA study on students' performance in using digital technologies (OECD, 2011), but information competence is more complex and transferable concepts for everyday learning still have to be developed.

3.4. Progressing Media Critique

The web's huge influence on everyday action, the new distribution of power on the web, the importance of social relations, and the hidden intentions and business approaches in web2.0 und web3.0 require a new media competence regarding media critique and awareness.

- How to enable students to a critical usage of (geo)media and information related to geography on the current web?

Traditional concepts of (mass) media critique do not cover the new challenges in detail (Baacke, 1997). Cross-domain approaches like Bennett et al.'s (2009) 'actualized citizen' mark first aspects of a new media competence adapted to the web.

3.5. Empowerment and Democratization

Volunteered geographic information comes up with opportunities for the user's participation in information production and communication and at this in societal decision making. However, democratization requires competences not emerging automatically from existing tools.

- How can students be enabled to actively use the web's potential for empowerment and democratization?

Democratization with the help of the web is widely discussed. First projects strengthen the civic potential of technological approaches (see Demirci et al., 2011). However, existing power relations on and outside the web outline the limits of this process and need to be taken into account (Haklay, in print). The approach of spatial citizenship tries to connect the potential of user-friendly web tools with the communication and negotiation of alternative spatial visions for mature appropriation of space (Gryl & Jekel, 2012).

3.6. Spatial Privacy Competence

In the framework of un-volunteered (geographic/locational) information and economic interests spatial privacy is an important aspect.

- How to enable students to decide maturely on their privacy issues in a given societal, institutional and technological framework?
- How and to what degree can spatial privacy be maintained while enabling participation?

A first awareness of this problem exists in geography education (Höhnle et al., in print), but still is not providing viable strategies to achieve participation while maintaining a maximum of privacy. Future concepts need to take into account the broad philosophical dimension as well and have to find alternatives beyond self-chosen exclusion.

3.7. Re-Defining Geographical Knowledge

The conveying of knowledge is mostly seen as a core point of learning at school (Moegling, 2010). However, when information can be accessed everywhere and every time due to ubiquitous computing, the question about the essence of knowledge that is needed as basis for further knowledge construction is posed.

- Which basic knowledge or what kind of knowledge enables students to construct their own knowledge using ubiquitous computing when taking into account the short half-life of knowledge? Which knowledge can be, following from this, excluded from the curriculum?

The cluelessness regarding this question is obvious, when geographical knowledge is formulated in curricula rather vaguely (see e.g. DGfG, 2007). Thanks to the ubiquity of information old canons of knowledge, especially all-round education, need to be questioned, giving space for other educational objectives. Competences can be formulated without reference to knowledge, but they are not teachable without content (Terhart, 2002). Additionally, teachers often miss orientation regarding the content knowledge to use in their lessons (Moegling, 2010).

3.8. Changing Classroom Interaction

Subsequently, as enabling students is a main point in the questions formulated above, the teacher's role as multipliers of the students' competence development is crucial.

- How can teachers be enabled to make use of the web's opportunities for geography education and to teach their students how to use the web in a mature way for everyday (spatially related) action?

This question is related to the practical implementation of web tools in education as already done in several learning environments that can be or are already transferred to geography education (e.g. Light, 2011; Freedman et al., 2010), but needs to go further as well: With schools as rather conservative, self-preserving systems, many teachers' willingness to adapt to the new opportunities and challenges is limited, as first empirical insights show (Gryl 2012), but there might be hope for prospective teachers (Yazici & Demirkaya, 2010). In fact, the current web includes wide changes in the praxis of teaching. The teachers' role changes from the supplier of knowledge to a guide and tutor within the complexity and multiperspectivity of the web. Maturity as educational aim, mostly not yet experienced in classrooms, but even more necessary in nowadays everyday living, requires for changes in persistent power relations in the classroom. In view of the students' new socialization, a starting point might be the implementation of web technologies in teachers training (Paraskevas et al., 2010), supplemented with reflection on the social implications of the web.

4. CONCLUSION

The current web provides applications that may enrich geography education significantly due to up-to-date information, variety of (geo)media, and increased complexity and vividness. Additionally, the web structures everyday action in spaces. Both trends force geography education to pay attention to the web, which is still a desideratum. Successful implementation is not possible without various educational research. This paper has provided a preliminary agenda of research questions, open to supplement and restructuring, that gives a first insight into worthwhile and burning aspects and may contribute to the creation of practicable strategies in a web of challenges and opportunities.

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