GI and Spatial Citizenship

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Abstract

The uses of GIS at secondary school level have been mainly thought of as a support tool to encourage spatial thinking. While this approach definitely has its benefits in arguing for a wider set of competences acquired by GI-based learning, it has frequently been linked to technical interests and instrumental knowledge as described by HABERMAS (1968). The use of Geoinformation does not appear to serve an emancipatory interest in learning.

The concept of spatial citizenship tries to address these shortcomings. Conceptually, it originates from the individual and collective appropriation of social space and supports learners to acquire competences that will enable them to more actively participate in society. Spatial citizenship adds a spatial domain to citizenship education through a mixture of absolute, cognitive and relational concepts of space.

In addition to the fields of competences mentioned in the National Research Council report (2006) on spatial thinking, spatial citizenship implies that further competences are required. These may be termed competences to a) deconstruct the spatial information available from various sources, b) further ones own visions of social space by c) being able to translate and communicate them with the help of GI. Recent technological developments actively promote these geo-communication skills, while also posing new questions pertaining to the interests involved in the production and dissemination of voluntary geographic information.

This contribution explores the starting points for spatial citizenship education and discusses aims and fields of competences for active spatial citizenship.

1 Spatial Citizenship – basic considerations

When defining spatial citizenship, we deliberately identify three main contributing areas of research. These areas are 1) citizenship education, 2) appropriation of space and 3) links between spatial representations, and therefore, GI and society. Out of these, we develop a set of main aims for spatial citizenship education that differs significantly from traditional approaches to both geography and citizenship education.

Citizenship education. Citizenship education is considered an essential dimension of education through which young people become informed and active citizens within their society. However, citizenship education is 'contested territory' and has been subject to debate. While there are still concepts that either emphasize the institutional setup or a place/region/nation-based form of spatial identification (DONERT 2008), we may ask for a more emancipatory approach to citizenship education. The citizen has the knowledge, skills, competences and abilities to be able to access and make sense of (geo)information in

order that he/she can participate in democratic processes and make decisions taking into account the situations and circumstances they encounter on a daily basis.

The social appropriation of space. In accordance with social geographers (PAASI 1986; WERLEN 1995) and social theorists (LEFEBVRE 1993), we postulate that the appropriation of space takes place within the framework of everyday social action. We consider two main components of the appropriation of space: Firstly, the regionalisations of the world through social action in three domains (productive-consumptive, informative and significative, and normative political, see WERLEN 1995). Here, we suggest that meaning of the physical environment is constructed in social practice, being produced and reproduced in the public domain. Secondly, appropriation denotes the process of either accepting and adhering to socially constructed meanings which have been attached to physical space, or to actively attempt a change of the meanings of physical space to suit one's intentions.

Various authors have hinted at the fact that for the construction of meanings of the physical environment, the role of various media is crucial. LEFEBVRE (1993) delves into the matter through his discussion of the representations of space; PAASI (1986) included representation prominently within his discussion of the conceptual/symbolic shape within his theory of the institutionalisation of regions. A host of case studies based on a variety of media (film, news, images and cartography) ensued, linking representation to the appropriation of space (SCHLOTTMANN & MIGGELBRINK 2009). This of course includes classical (mass) media as well as media from the interactive Web2.0/ Geo Web domain. Both theoretical as well as empirical work suggests that media in general and geomedia in particular set the stage for the appropriation of space by contextualising communication. At this point we define geomedia as any media that uses the spatial localisation of information. Thus geomedia includes all representations of space, covering a wide range of outputs, from verbal description to vizualisation. In combination with the above-mentioned dimensions of the appropriation of space, we may therefore consider media competence to be the single most important competence for an informed appropriation of space. Hence, this competence is laid down in most curricula for secondary education (JOHANNSON 2006; QCA 2007, DEMIRCI, 2009; JEKEL et al. forthcoming). However, there is no explicit mentioning of such a transdisciplinary competence with regard to geomedia in these curricula. The representations of space are usually treated as a method only, following the rather linear map communication model, which assumes the existence of an ideal map perfectly adjusted to the user. A theory based development of competences is only slowly developed (GRYL 2009) and has so far mainly been related to classical maps. This approach pursues a didactic conversion of HARLEY'S (2001/1989) "Deconstructing the map", The conception tends to be concerned with the application of the philosophical praxis of deconstruction (DERRIDA 1967) in order to identify unavoidable margins in maps, undue simplifications, and hidden information. Each map sign is analysed with regard to the rules of its construction and the hidden agenda beneath the surface. Structures of power, relating to Foucault's theory, are discovered and reveal the political dimension as characteristic of any spatial representation. Education for media competence has to qualify for such a insight in geomedia.

Spatial representation, GI and society. Several authors have discussed the effect of representations of the social world rooted in absolute, euclidian space and statistics and their role in the control of the individual, the power to shape agendas and to further specific interests (see for example GREGORY 1994, DUNCAN & LEY 1994, WOOD 1992). More

related to digital representation, there has been exhaustive debate of the role of GIS in society, we may get an uneasy feeling about working between social theory and GIS. An ongoing discussion has been in place since the early 1990's and has been widely documented (see PICKLES, 1995; SCHUURMAN 2000; 2004; WILSON & POORE, 2009). Still, the results of this discussion bear important consequences for the use of GI(S) in schools as basis for an informed use of the technology. Criticisms included but where not limited to:

- the specific world view transported by GIS (namely, being steeped in the concept of absolute space) and the consequences incurred by privileging this conceptualisation of the world. At the center of this problem are the ontologies used. We may differentiate between uses of the term ontology. In the social sciences in general and social geography in particular, ontology is referred to as the description of the essence of human being (WERLEN 1995, 23). Within the GIS community, however, ontology is used to describe "a formally defined set of objects in which all the potential relationships between the objects are also well defined" (SCHUURMAN 2004, 31). If we accept that research methodology is directly linked to the object of research, a reduction of the ontology of the social sphere to the computer science definition is not possible. As a consequence, traditional GIS contributes to a very technical sense of problem solving (JEKEL 2007) that does not qualify for emancipatory aims of learning. We may therefore assume that GIS supports the formulation of hypotheses, but does not provide solutions to more complex problems of the human sphere. This approach would then coincide with the submise of the map communication model and the rise of alternative conceptions of vizualisation.
- the inaccessibility of certain GI for ordinary citizens, making GIS elite systems, both for access as well as tool to control citizens and greatly reduce personal privacy (ARMSTRONG & RUGGLES 2005). Examples of the intrusion into the sphere of privacy have recently and publicly been discussed for products of Google in connection with Street View, but criticism digs deeper at spatial data and location services involved with geomarketing, the tracking of mobile phones or the self-fulfilling spatial assumptions of the police on criminality (BELINA 2009). However, the inaccessibility of data has been reduced with very much the same toolsets that enable surveillance. This development now allows for the development of alternative knowledge and counter-maps (CRAMPTON 2009, 96).
- the development of GIS software by the private sector, and therefore for private corporate users rather than to adress social inequalities (SCHUURMAN 2004, 24). While it is still true that GIS technology is mainly produced by the private sector, it should be noted that the same private sector has developed the current GeoWeb applications that include Geocommunities and reasonable possibilities to produce alternative presentations of the world (FISCHER 2009).

This debate has sparked a widespread overhaul, both in terms of use of GIS in Public Participation GIS (PPGIS), as a tool for empowerment and to produce counter-maps, as well as the recent technological developments in the field of interactive Geo-Web environments (CRAMPTON 2009). However, neither the insights on the role of geomedia in the appropriation of space, nor the critical GIS debate has really reached the attention of secondary education. We do think that these contributions are situated at the center of an emancipatory approach to an education for active spatial citizenship and the role of GI within that concept.

Consequences – Aims for spatial citizenship education. If we accept the theoretical concepts mentioned above, Spatial citizenship can be defined as the ability to critically appropriate space by democratic means. This amounts to either critically and intentionally accepting the attachment of meanings to certain tracts of land as they are collectively agreed upon or enforced by more powerful sections of society; or to actively participate in changing the meanings of a certain tract of land by linking into the relevant democratic processes. Both individual approaches carry an emancipatory understanding of learning and teaching, not taking the world for granted. They are aware of the social constructedness of space and meaning, of the intentional concealment of information and the structures of interest and power constituting the framework of society and being reproduced in its (mass) media. We suggest that given world views must be challenged in a way to enable maturity in the own construction of perspectives. Uncritical acceptance of meanings or intuitively constituted counter-meanings (tactical practices, De CERTEAU 1988) are substituted with self-directed, intentional constructions. On the other hand self-constructed world views and meanings, debated through democratic negotiation, are the necessary foundation for the capability to emancipatory action.

Spatial citizenship education thus is about learning how to navigate this world in respect to a) the physical world, b) the meanings attached to the physical objects and environment and c) the power relations involved in the production of meaning.

2 The role of GI in current education

In 2006, the volume 'Learning to think Spatially' (National Research Council 2006) argued for a strong inclusion of GIS into curricula. This argument was mainly based on the assumption that spatial thinking (in terms of absolute space) could enhance the quality of decision making in both science and everyday life. However, the book is less concerned with the social production of space, but with a specific representation of space, namely absolute space.

For several years now, GIS based learning environments have been discussed all over the world, and several publications try to establish the field on an international / global scale (MILSON, KERSKI & DEMIRCI forthcoming; JEKEL *et al.* 2006-2009). We may therefore examine if the GI-based learning proposed fits into the concept of active spatial citizenship education. To that end, a rough analysis of the contributions to the first four "Learning with GI Conference Proceedings" has been carried out by linking the proposed learning environments to specific forms of human interests and knowledge (Tab. 1). These forms of knowledge were initially classified by HABERMAS (1968) as technical, practical and emancipatory. Learning processes and knowledge oriented at technical interests produce instrumental knowledge. Within citizenship education, we may think of handling problems by finding a 'true' solution, like locating the institution (office) who can solve the problem. Practical interests are based on understanding and more complex problems without a simple and 'true' solution. However, the problem presented may be solved within a given set of norms and rules, as in the case of a classic participatory planning approach. Emancipatory interests in teaching would call for active and democratic changes to the rules of spatial planning, for example, or their reflected acceptance.

Human interests and forms of knowledge can also provide a framework for knowledge acquisition / learning and teaching (VIELHABER 1999, JEKEL 2007) and can also link to citizenship education. We expect an active spatial citizen to be competent in all three fields of human interest. How do current GI-based learning environments fare in this respect?

Tab. 1: Human interests, knowledge and GI-based learning as presented in Learning with GI I – IV (2006-2009)

Human Interest	**Knowledge**	**Examples citizenship education**	**contributions LwGI I-IV[1]**
Technical	Instrumental	Knowledge of local/regional institutions	45
Practical	Practical (understanding)	Participatory planning within set rules	17
Emancipatory	Emancipation (reflection)	Partcipatory planning with democratic change of rules, counter-mapping	9

The rough analysis of contributions to "Learning with GI" Conference Proceedings shows that geoinformation in secondary education is only rarely used for emancipatory aims, and, moreover, is strongly linked to a set of rather technical competences. If we are to establish learning with Geoinformation however, emancipatory aims have to move to the centre of education, by looking into society, participation and a stronger link to spatial communication, rather than focussing on technical competences. Recent technological developments together with greater open access to information now allow for a more participatory approach in education and for real participation with the use of GI in the appropriation of space.

3 Towards a participation based inclusion of GI in Education

As described above recent discussions on GI-based education either focussed on how to learn GIS in school or how to support spatial thinking by using GIS as a support tool. Thus, they were either based on technology or on a specific discipline. Seldom has it been rooted in the needs of everyday life.

Here we suggest a two-tiered approach that looks a) at the technical competences needed by pupils as citizens and b) into competences needed for active and critical participation in society using spatial media. Looking at Al Gore's 1998 vision of Digital Earth citizen, STROBL (2008, 134) argues for a differentiation between technological education needs for various target groups according to their everyday practice. His argument hints at three different spheres of activities when using geoinformation (Figure 1):

[1] Only contributions to secondary education have been analyzed. Classification is according the main aim of the learning environment / contribution. The scope of the publication series and therefore is explicitly European, and 2/3 of the contributions are from German language countries. Data may therefore be linked to a European discussion only.

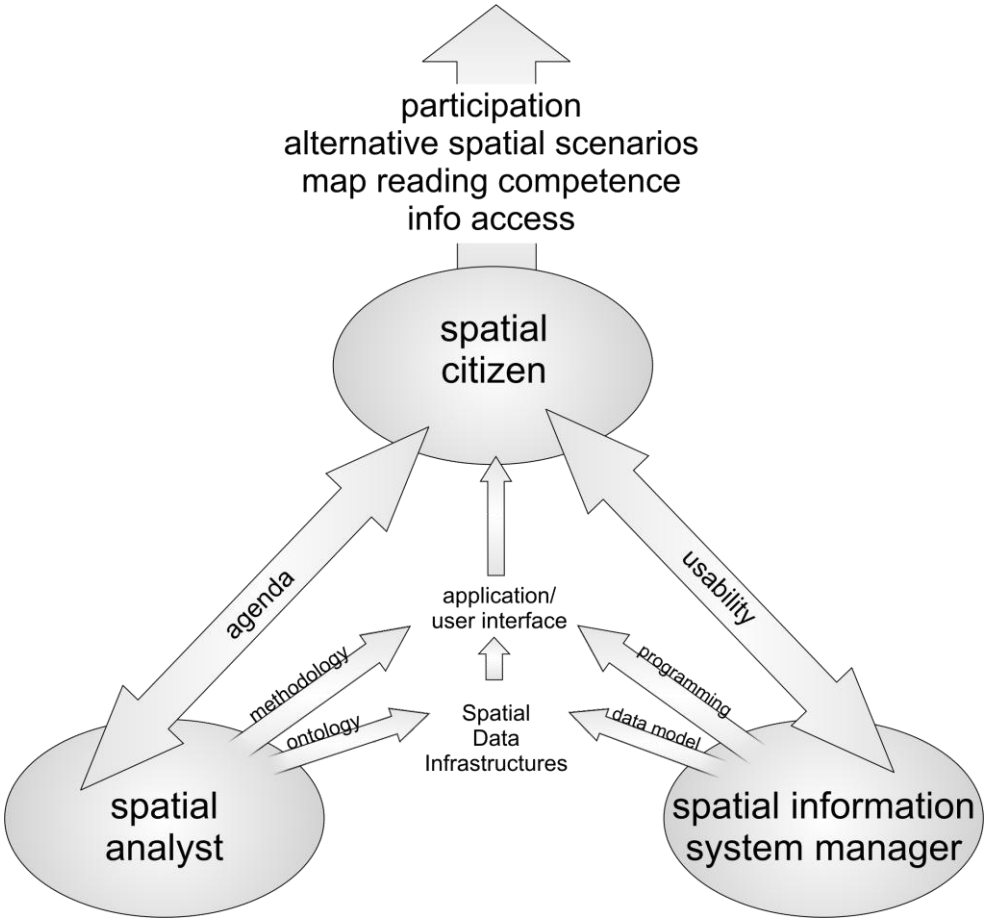

Fig. 1: Spheres of activities/roles regarding geoinformation (based on Strobl 2008)

A **Spatial Citizen** is a role that each and every citizen should accept. In order to fully participate in society a spatially literate person should be able to interprete and critically reflect on spatial representations, communicate with the aid of maps and other spatial representations, and can express location-specific opinions using geo-media. We may consider spatial communications as an integral part of **spatial citizenship** and therefore a main target for primary and secondary education.

Spatial Analysts: analysis as a process deriving information from data starts from a problem framed into a question: this can be as simple as a best route or closest facility, or much more complex as land use suitability or scenarios for climate change impact. In more complex cases it requires deep conceptual, methodological and technical understanding and therefore the domain of expert knowledge. Basic forms of spatial analysis can be undertaken in upper secondary education but they are normally observed at post-secondary education levels.

Spatial Information Systems Manager: Establishing systems and service components for geospatial infrastructures with a strong focus on IT. Again, this expert knowledge is reserved for postsecondary education in most cases.

This framework may be linked to the spheres of activity, on the citizens-to-geospatial-professionals axis, with some spatial analysis components allocated to questions citizens frequently ask in their daily lives. If we consider communication and simple spatial analysis tasks as competences of every citizen, GI-based education at secondary school level should definitely concentrate on these competences.

If we accept that this emphasis on communication is fundamental, then a more detailed perspective is needed in order to design suitable learning objectives and curricula that meet the goals of spatial citizenship. The next sections deals with these competences

Spatial Communication

Interaction between individuals and groups about places and spaces is a fundamental requirement for a democratic society, and likely goes back to the early days of humankind. Petroglyphs detailing hunting grounds, oral traditions guiding Polynesian navigators, or attempts to measure the globe and to document property all were essential in their respective societies (STROBL 2008; DOWNS and STEA 1982). Technologies may have changed, but not the general problems addressed.

The traditional acquisition of 'map reading skills' needs to be revisited and adjusted in two ways: First, the constructedness of maps asks for an additional set of competences (GRYL 2009), secondly, new didactics have to devised to take care of online maps and particularly virtual globes (STROBL and LINDNER-FALLY 2007; CRAMPTON 2009). Skills like general directional and topographic orientation, moving across scales, controlling perspectives and swapping themes can easily be acquired in a playful manner, but are essential for actively *participating* in any geospatial discourse, and therefore in society. However, the inclusion of volunteered geographic information and the ongoing Critical GIS debate asks for the fields of competences to be widened to reflect spatial representation. We therefore suggest to relate this discussion to the wider field of citizenship education.

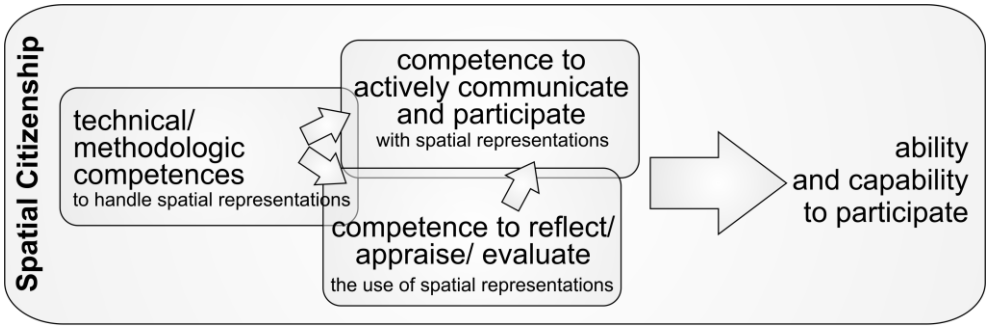

Fig. 2: Competences for spatial citizenship

Relating the argument back to the discussion of the individual and collective appropriation of space, we may identify three main fields of competence (Figure 2):

1) technical and methodological competences to deal with spatial information
2) competences to reflect/ appraise/ evaluate spatial representations as a basis to accept the 'world-as-it-is'(seen) including the social attached meanings or to decide whether to acively participate in changing current meanings
3) competences to actively engage with the spatial dimensions of society and communicate meaning using spatial information in an informed way

For these three fields of competences we would like to identify subsets of competences that can be adressed more directly in secondary educational environments.

For the 'general public' and 'citizenry' target groups and therefore benchmarks for secondary education, four levels of **technical/methodologic competences** concerning spatial information are suggested (see STROBL 2008, 136):

- 'Consumer' – map reading, orientation and navigation, finding one's place and identifying a destination.
- 'Prosumer' – ability to participate by labelling a feature, mark up ('redlining') and rate a place or feature of interest and comment on alternative spatial scenarios, like a zoning proposal.
- 'Producer' – contribute one's own data like a GPSrecorded hiking track, a geocoded photograph or a draft proposal map for a planning measures.
- 'Analyst' by competently using existing functionality to answer simple questions and fulfil single-step analytical tasks.

The technical competences however, cannot be considered the final aim of an education for active spatial citizenship. They must be considered as preconditions for participation and and a reflected appropriation of space. The skills identified so far only refer to technical knowledge. Spatial citizens who are reflective of the spatial representations they are receiving through a variety of media need additional sets of competences to critically and actively participate in society. For example, they should be able to a) appraise and evaluate, reflect and deconstruct spatial representations and b) actively use them to further their aims.

We therefore suggest a second subset set of competences which aims at the ability to **REFLECT, APPRAISE AND EVALUATE SPATIAL REPRESENTATIONS**. ACCORDING TO GRYL & KANWISCHER (forthcoming) active spatial citizens should have competences in the following fields:

- Knowledge – to know about the constructedness of geomedia
- Recognition – the ability to recognise the constructedness of specific representations
- Comparison – to compare the information of certain geomedia with external information and previous knowledge in order to detect limitations of perspectives
- Deconstruction – to identify intentionality of the use of geomedia in discourses by reflection from multiple perspectives with the help of deconstruction

In order to **actively communicate and participate** with spatial information we recommend that students should cope with the following set of competences:

- Construction – a building process of meaning which involves democratic negotiation. This includes alternative, non-mainstream spatial scenarios.

- Expression – finding a way to convincingly communicate the construction of meanings using GI
- Communication – the sharing of the ideas and meanings with the intention that communication partners adopt them
- Dialogue – to engage in, discuss, stand-up for and re-negotiate. This is an iterative non-linear process, which actively uses geomedia to further interests in democratic decision making.

4 Summary

Spatial citizenship connects the features of citizenship education with a mature appreciation of space and critical GI(S). Following this consideration, specific strategies need to be developed for working with geomedia that go beyond technical competences widely reproduced in many curricula. Rather it is necessary to enable students to deconstruct meanings of space in geomedia with respect to its subjective and discursive background and to communicate their own world views as an expression of their democratically negotiated emancipatory interests. Spatial citizenship emphasises the political qualities of geomedia in terms of its consuming as well as productive facets.

Spatial citizenship requires for a modified teacher-training. Such a training should pay attention to spatialities/different concepts of space (going beyond estalished concepts of absolute space), constructivist understanding of spatial representations, and a geomedia competence qualifying for a reflected reading and production of geomedia. In order to implement those ideas into regular education, sets of spatially transferable case studies that are thematically but not spatially explicit and relevant to the daily lives of learners have to be developed.

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