Lifelong Learning Programme – Comenius Action

Teacher education

Spatial Citizenship (SPACIT) Comenius Project

D2.3 Curriculum for Spatial Citizenship Education: Curriculum plan and framework

Author(s): Uwe Schulze, Inga Gryl, Detlef Kanwischer

Due date of deliverable: 01 June 2013
Start date of project: 01 November 2011
Duration: 36 months
Revision: final version
Dissemination Level: public report

With the support of the Lifelong Learning Programme of the European Union

This project has been funded with support from the European Commission. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use, which may be made of the information contained therein

Contents

I. Preface

The Curriculum for Spatial Citizenship Education was developed within the progress of the Comenius Project *Spatial Citizenship* (SPACIT) in the scope of the Lifelong Learning Programme of the European Union. It serves as a guiding foundation for creating local curriculum approaches of SPACIT teacher education and training across the European Higher Educational Area (EHEA). Thus, it addresses all stakeholders in the field of teacher education and training at universities and for in-service teacher training, i.e. decision-makers, curriculum planners and developers, teachers and teacher educators, NGOs and civil society organizations interested in education, academics, researchers and professionals.

To provide transparency, comparability, and the transferability of qualifications to the local settings this curriculum framework was development on the principles and standards of the European educational policy framework of the Bologna Process, and, therefore, it is related to the European Credit Transfer System (ECTS). Describing the competences related to SPACIT as learning outcomes, this *outcome-based* curriculum should be applicable at a variety of places, institutions and learners across Europe contributing for lifelong learning. Furthermore, using the learning outcomes approach allows for the creation of various local approaches of SPACIT teacher training, of online or blended-learning environments related to SPACIT, and of materials for learning and teaching in the field of SPACIT, which all contributes to a common understanding of the goals of SPACIT education.

On the foundation of the Curriculum for Spatial Citizenship Education, the consortium of the *Spatial Citizenship* Project hopes to open up new perspectives and opportunities in the field of teacher education and training to face the impacts and challenges of using geo-media in society.

On behalf of the SPACIT project partners,

U. Schulze, I. Gryl & D. Kanwischer

October 2013

II. Education for Spatial Citizenship

The rise of digital geo-media such as digital maps, GPS-based mobile devices, digital globes, Geographic Information Systems (GIS), combined with the opportunities of the Web2.0 are changing our everyday lives. In particular, this is true for the production and consumption of manifold spatial representations of the world, which, in the end, influences people's spatial perceptions and actions, and daily routines. Living in the Digital Earth, geo-media increasingly becomes the key for social affiliation within communities on different scales emphasizing the place/ region/ nation/ world as a central form of spatial identification. Therefore, the competent use of digital geo-media turns out to be a basic cultural technique providing the tools and methods for location based information processing, and communication in- and outside online communities and social networks. Besides the development of twenty-first century skills, for instance, ICT-literacy, digital competence, critical thinking, and lifelong learning, education for consisting in the geo-media society must strongly support the empowerment of people to use digital geo-media for participation in individual and collective democratic decision making processes as emancipated 'spatial citizens'.

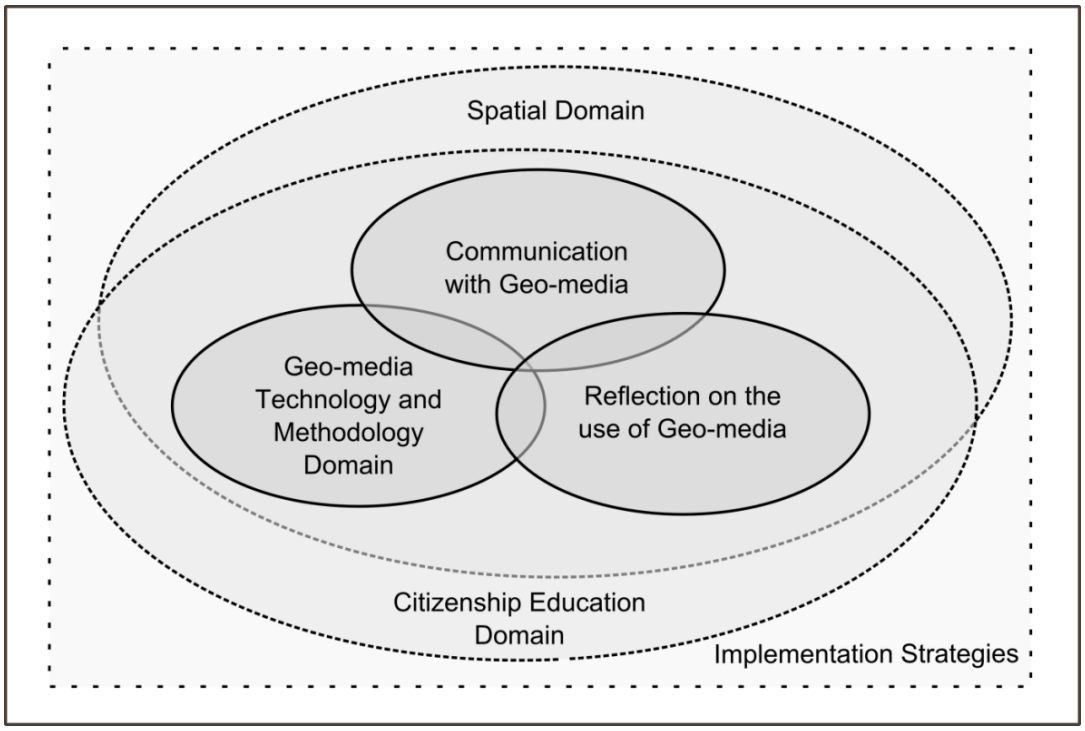
The SPACIT approach (Gryl & Jekel 2012, Gryl, Jekel & Donert 2010) focuses on the role of the 'spatial citizen' and its appropriation of the spatial domain of social life. In concrete terms, this means learning how to navigate everyday life with respect to the physical world, the meanings attached to the physical objects and environment, and the power relations involved in the production of meaning, including GIS and related instruments to naturalize meaning as well as new forms of collaboration and negotiation of meaning using web2.0 applications. Therefore, SPACIT education is concerned with the individuals' knowledge, skills and abilities as well as attitudes of the individual "to access and make sense of (geo-)information in order to participate in democratic processes and make decisions, taking into account the situations and circumstances she encounters on a daily basis" (Gryl & Jekel 2012, p.8).

SPACIT offers new opportunities for the widening of citizenship education at secondary school and contributes to its extensive acceptance as an essential dimension through which young people become informed and active citizens within society. Thus, SPACIT links digital geo-media competence and the mature appropriation of space to the citizenship education domain, and, hence, to a number of key concepts of reflection, reflexivity, communication, participation and negotiation. The recentering and subsequent reinterpretation of learning with geoinformation (GI) in secondary school has transformative potential due to the embeddedness of pupils with everyday geo-medial practices. Teachers whose goal is to educate their pupils with a SPACIT approach need to be trained to do so.

Against this background, the Curriculum for Spatial Citizenship Education provides the basis for teacher education, to make teacher competent in educating students according to the SPACIT approach and to pave the way to implement education for SPACIT in schools.

III. Competences and learning outcomes for Spatial Citizenship education

Generally, acquiring knowledge, skills, abilities and attitudes (KSA) for SPACIT means to enable students to use the various types of geo-media available to express their own spatial narratives, challenge dominant discourses, contest the dominant meanings and uses of geospatial technology and share alternative perspectives and opinions in their role as emancipated citizens. In this context, SPACIT competence can be represented as a conglomerate of six major competences dimensions.



Spatial Citizenship Competence Model

The dimensions of 'Geo-media Technology and Methodology Domain', 'Reflection on the use of Geo-media', and 'Communication with Geo-media' are at the center of the SPACIT concept (Gryl & Jekel 2012), and, thus, they are understood as core competences. With a focus on spatial representations and digital geo-media, these dimensions are related to the practical application of knowledge and skills as well as attitudes in the field of generic competences, above all instrumental competence (e.g. communication skills, information management skills, problem-solving and decision making) and interpersonal competences (e.g. social interaction, collaboration and teamwork skills). Here, the emphasis is on the reflective/ reflexive use of web2.0-based geo-media for the purpose of self-active as well as collaborative communication for sharing discursive environments.

The competence dimensions of 'Spatial Domain' and 'Citizenship Education Domain' can be understood as horizontal layers underpinning the SPACIT core dimensions overall. They are connected to theoretical aspects in respective knowledge areas and, thus, are related to subject-specific knowledge, skills and abilities.

Finally, the field of 'Implementation Strategies' of SPACIT functions as an separate but interconnected dimension necessary to integrate pedagogical and didactical approaches of teaching and learning for SPACIT from the teachers' perspective. Here, key aspects are related to the creation of reflective and reflexive learning situations combining various aspects of digital competence and geo-media use, i.e., critical engagement with geo-information and geo-spatial representations.

Basically, competence based learning approaches are closely related to the formulation of learning outcomes to describe precisely 'what a learner is expected to know, understand and be able to demonstrate after completion of learning experience' (cf. Gonzalez & Wagenaar 2008). Therefore, the formulation of learning outcomes for SPACIT education is based on the revision of Bloom's Taxonomy of Educational Objectives (1956) by Anderson and Krathwohl et al. (2001), cf. Krathwohl (2002). This framework provides a two dimensional construct that integrates a hierarchy of cognitive processes of *remembering*, *understanding*, *applying*, *analysing*, *evaluating*, and *creating* and four different knowledge dimensions of *factual*, *conceptual*, *procedural* and *metacognitive knowledge*. Using a taxonomy table allows for "an analysis of the objectives of a unit or course" and, hence, provides "an indication of the extent to which more complex kinds of knowledge and cognitive processes are involved" (Krathwohl 2002, p. 216).

Knowledge Dimension	**Cognitive Process Dimension**					
	Remember	*Understand*	*Apply*	*Analyse*	*Evaluate*	*Create*
Factual Knowledge						
Conceptual Knowledge						
Procedural Knowledge						
Metacognitive Knowledge						

Taxonomy table for analysing learning outcomes (adapted from Anderson and Krathwohl, 2001)

With the focus on teacher education learning outcomes for SPACIT education reflect two distinctive perspectives of application: The first one sees teachers themselves as 'learners' in the field of SPACIT. In this context, learning outcomes have to be understood as comprehensive statements of SPACIT education which describe broadly what a learner (i.e. the teacher) is expected to know, understand and be able to do at the end a particular SPACIT learning process. In contrast, the second perspective picks up the special needs for teachers 'at their profession' to educate students in the sense of SPACIT, on the basis of appropriate approaches of teaching and learning and creating learning environments that prepares pupils to act as 'spatial citizens'.

To clearly emphasize this dual function of learning outcomes for SPACIT education the project partner have decided to use the following phrase to introduce SPACIT learning outcomes: "*At the end of the learning process teacher should be able to create a learning environment to enable pupils to…*".

IV. Approaches of teaching and learning for Spatial Citizenship

It has been consensus among the SPACIT project partners that the creation of learning environments for SPACIT teacher education should allow for *multiple pathways* for achieving SPACIT learning outcomes. Above all, this results from the idea that the SPACIT curriculum should generally support a demand-orientated use and flexible configuration of learning content in terms of scope and sequence, related to the local conditions and opportunities of its implementation, as well as the certain backgrounds of the learners (i.e. teacher) and their particular (fore-)knowledge and individual abilities in the various fields of competence around the SPACIT approach.

Regarding to the goals of SPACIT education, i.e. enabling people to competently participate in the public negotiation of individual and collective appropriations of space through the active use of geo-media and geo-information available, teaching and learning in the field of SPACIT – for general educational purposes, but in particular for teacher training – cannot result in uniform and input-driven learning processes. On the contrary: the SPACIT consortium makes a plea for learner-centred, active and self-directed learning processes which allows for the various learners to individually construct their knowledge, skills and abilities in the field of SPACIT in order to achieve diverse outcomes on the basis of their particular needs. Since SPACIT deals with mainstream technology and is centred around the use of Geo-Information and Communication Technology (Geo-ICT), digital (geo-)media and web.2.0-based information, teaching and learning for SPACIT has to integrate those technologies for online and face-to-face learning within suitable blended learning environments. Transforming the context of face-to-face and self-directed learning into formal approaches of instruction there are number possibilities how learning for SPACIT could take place, e.g. by instructor-led classroom activities, in workshops, through coaching or mentoring (face-to-face); using web learning modules, online resource links, different media format (videos, podcast, animations etc.), workbook and additional materials (self-directed) (cf. Diamond 2008).

In this context, the pedagogical and didactical implementation strategies for teaching SPACIT should be based on a constructivist understanding of learning to foster the implementation of the theoretical subjects of SPACIT within real-world contexts and the daily routines and actions of the learners. Hence, appropriate classroom activities should support active and authentic learning, integrating multiple perspectives and contexts on digital geo-media use for communication, participation and negotiation processes in society through situated and cooperative learning environments, i.e. meaningful learning, problem based learning, resource based learning.

V. Assessment for Spatial Citizenship

In the framework of competence development and orientation at learning outcomes course credits and certificates are not merely assigned for participation, but for gaining certain specific competences. This raises the question for the assessment of a learner's achievement. Concerning SPACIT, assessment legitimizes the certification of teacher training courses, and furthermore it provides help to optimize learning processes both by the learners themselves and by their lecturers. Altogether, assessment furthers the learners' self-efficacy (Bandura 1997) which is an inevitable basis for the application of competences to everyday situations. Therewith, assessment constitutes a basis for acting in society and for empowerment as designed in the SPACIT competences.

The agents of assessment in SPACIT are: (a) the *learners*, who reflect their own learning processes; (b) the *lecturers*, who provide exercises as contribution to assessment and feedback, and instruct with formal instruments of assessment; and (c) the *course designers*, who produce the instruments of learning and assessment in congruence with the SPACIT curriculum.

Concerning the elements of assessment in SPACIT education, two main approaches, formal and informal assessment (UNESCO 2010), are implemented: *Formal assessment* is included in the particular SPACIT units as compulsory part of the course work, comprising lecturers' feedback, comparison of tasks' results with sample solutions and other participants' answers, and a portfolio that is kept by learners during the whole course. *Informal assessment* is not formally connected to the learning environment, but remains primarily in the learners' hands and responsibility. Nevertheless, lecturers and course work in SPACIT encourage for informal assessment because reflecting own competence development is a keystone of maturity and a basis for lifelong learning. The following questions to be provided within a SPACIT learning environment may be named as exemplary starting points for reflection:

- *Am I a 'spatial citizen'?*
- *With respect to the increased usability of everyday geo-media, am I able to handle geoinformation appropriately, for instance, locating my current position with the help of a (online) map or GPS-device, and transmitting the coordinates to a friend for a meeting?*
- *Is there a specific place in my neighborhood or community which I make use of in a different way as it has been planned or allowed, for instance, by public authorities?*
- *Am I able to draw a map true to scale or use digital geo-media tools to produce alternative visions, for example, of how to use undeveloped areas in my community for recreation and leisure?*
- *What opportunities do I have to participate in decision making processes, for instance on the local or regional level, using discursive online environments within social media or web-based geo-media?*
- *Am I aware that third parties like companies or public bodies can store selected personal data, allow for conclusions about my whereabouts, movements and place-based activities from the past, but also for the future?*

Further, formal assessment can be divided into formative and summative assessment (Gonzalez & Wagenaar 2008). *Formative assessment* in SPACIT teacher education and training takes

place during the learning process, *summative assessment* monitors the results of the learning process, for example, after the end of a particular course, in order to evaluate whether a learner meets the specific competences and learning outcomes related to SPACIT or not. Inspired by methods suggested in the Tuning Report (Gonzalez & Wagenaar 2008), SPACIT supports formative assessment instruments such as online self-assessment (e.g. quizzes, single- and multiple-choice), lecturer feedback and check questions, and interactive/social tasks (e.g. concept mapping). Regarding *summative assessment* SPACIT refrains from formal tests and exams as those would not meet the learners' individuality enabled with the multi-path curriculum and the SPACIT concept overall. Instead, a portfolio kept by each learner should be the main assessment tool for SPACIT education as it ensures consciousness and awareness about the own learning results. This is especially important as the teachers' competence application requires much self-initiative that can be motivated by knowing about the own strengths and progresses. Usually, a portfolio shall constantly document and accompany the learning process, including descriptions of the content of a lecture and results of tasks as well as a meta-perspective on the own competence development during the current part of the course (Reich 2012), and is therefore first of all an instrument of formative assessment. In the SPACIT learning environment a portfolio becomes additionally a tool of summative assessment by analyze it in a process of retrospective reflection, summarizing the lessons learnt and competences acquired, and by this preparing the personal development for everyday application, whereas the first steps are accompanied by the SPACIT online learning environment. The portfolio and its final reflection are therefore compulsory parts of the course and condition for certification.

VI. Fields of learning and learning outcomes for Spatial Citizenship

The structure of the SPACIT learning fields corresponds to the structure of the SPACIT competence model (Schulze et al. 2013) and, thus, there are six separate sections of learning outcomes related to SPACIT. For every part of the content, there is a description of the related competence areas and its single components to which, subsequently, particular learning outcomes are formulated. At the beginning of the each section, there is set of learning outcomes at a 'meta level' which give the rationale for each learning field in the context of the SPACIT concept, describing the overarching competences fundamental to all other sub-categories of the particular dimension.

i. Geo-media Technology and Methodology Domain

Geo-media (GM) technology and methodology targets the utilization of geo-(web2.0-)media concerning consumption, production and communication processes, while being aware of the semantic field around GM as powerful instruments of everyday social constructions. This includes technological maturity. It also refers to handling spatial data as well as to technical GI skills in the field of consumption, analysis, production, prosumption, and communication with respect to the increased usability of everyday GM. Altogether, these competences open up the factual spectrum of possibilities, create awareness of the variety of tools, and support creativity.

Meta level

Learning outcomes at the meta level summarises the overarching competences fundamental to all other sub-categories of the particular learning field.

- *Recognize and illustrate the digital earth concept and its tools*
- *Explain the conceptual foundations of the GIScience and Technology Domain (GIS&T), especially the domains of geographic information (i.e. space, time, relationships between space and time and properties) and the elements of geographic information (i.e. discrete entities, events and processes, and fields in space in time)*
- *Apply the fundamental principles of cartography and visualization related to data consideration (i.e. source materials for mapping, and data abstraction: classification, selection, and generalization), map design (i.e. map design fundamentals, symbolization, colour, typography), and map use and evaluation (e.g. reading, interpretation, analysis, evaluation of maps, impact of uncertainty)*
- *Compare and contrast the potential of different GM for expressing spatially intended ideas, opinions and visions*
- *Debate ways of maintaining and building own geo-information knowledge and skills in the sense of lifelong learning*

Geo-media information processing

This area contains the KSA necessary for the mature handling of geo-data within web2.0-based GM based on technical as well as methodological GIS&T skills concerning activities as well as processes of consumption, production and prosumption of GM, analysis carried out using GM as well as aspects of technical communication in the form of social networking.

Consumption

- *Identify sources of public geo-information, e.g. open data on (web-)GIS applications, PPGIS, geo-data browser, databases, metadata catalogues*
- *Exemplify different types of GM in daily life and in society*
- *Use different types of GM in daily life to retrieve knowledge and information*
- *Find one's place and identify a destination while read, orientate and navigate with online maps, virtual globes as well as (web-)GIS applications*
- *Handle general directional and topographic orientation, move across scales, control perspectives and swap themes*

Analysis

- *Execute basic analytical operations which are commonly applied to solve a broad range of spatial problems and to perform GIS-based spatial data analysis, i.e. attribute and spatial query operations, buffers, overlays, geometric measures like distance and lengths, direction, shape, area, and proximity*
- *Apply and organize the various GM tools' functionality appropriately to answer simple questions and fulfill single-step analytical tasks related to spatial phenomena*
- *Evaluate the result of an analytical task carried out*

Prosumption

- *Modify data selection and visualization as part of the options within collaborative GM environments*
- *Set up and change feature labels as well as markings and ratings of places or features of interest within collaborative GM environments*
- *Create comments on alternative spatial scenarios within collaborative GM environments*

Production

- *Demonstrate how to acquire, manage, and present geographic information, i.e. map drawing, handling geo-data within GI-based systems*
- *Carry out basic data capture in daily life using mobile devices (e.g. GPS- or Wi-Fi-based) or map drawing online tools*
- *Contribute one's own geo-data like GPS-recorded tracks, geo-coded photographs or draft proposal maps within collaborative GM environments*

Social networking

- *Explain the basic ideas, elements and functionalities of social networks*
- *List examples of web2.0/ geo-web-based decision-negotiation instruments*
- *Compare and contrast the options of participating within different collaborative GM environments*

- *Evaluate the benefit of sharing information within certain collaborative GM environments*
- *Demonstrate how to share and contribute (geo-)data and different media formats to others virtually as well as face-to-face*

Formulation of statements of learning outcomes are adapted from:
DiBiase, D., DeMers, M., Johnson, A. B., Kemp, K. K., Plewe, B. P &Wentz, E. A. (eds.) (2006): The Geographic Information Science and Technology Body of Knowledge (Washing ton: Association of American Geographers). First Ed.,
Donert, K. (2009): Benchmarking GIS – a Charter for European Education. In: Jekel, T., Koller, A. & Donert, K. (eds.): Learning with Geoinformation IV, p. 2-11 (Heidelberg: Wichmann).
Strobl, J. (2008): "Digital Earth Brainware". In: Geoinformatics Paves the Highway to Digital Earth (gi-reports@igf) (ed. Schiewe, J. & Michel, U.), p. 134–38. Osnabrueck: University of Osnabrueck.

ii. Reflection on the use of geo-media

This area relates to the 'consumption' aspect of handling GM and involves awareness of the influence of GM on one's own and people's everyday action in general. It focuses on the extension of classical map consumption skills: Firstly, GM as social constructions with limited representation of the world need to be deconstructed and meaning to be reflected on critically in order to extend insights and perspectives (Harley 1989). Secondly, the user needs to be reflexive towards her/his own GM consumption by being conscious of her/his own hypothesis construction (MacEachren 1992). It also includes thinking in alternatives of spatial constructions eventually being represented in GM as well.

Meta level

Learning outcomes at the meta level summarises the overarching competences fundamental to all other sub-categories of the particular learning field.

- *Discuss why to consume GM in a reflected and reflexive manner*
- *Debate the consequences of geo-information technology applications for everyday practices*
- *Illustrate why GM are representations of the multiplicity of constructed relational spaces*

Reflective consumption of geo-media

Reflective consumption of GM describes the KSA fundamental to think about the role and the impact of GM as social constructions with limited representation of the world need to be deconstructed, and meaning to be reflected on critically in order to extend one's own and others insights and perspectives.

- *Exemplify why (geo-)media are crucial to the construction of spaces through naturalisation of meanings*
- *Discuss the role of (geo-)media for the communication of construction of spaces*
- *Debate the social impacts of the construction of spaces and communication of construction of spaces through GM*
- *Compare information in GM with pre-existing knowledge and other sources and identify missing/hidden information*
- *Reveal the construction process (and political dimension) of any GM, i.e. deconstruction*
- *Decide whether to accept constructions of space in GM or to promote alternatives*
- *Construct alternative meanings/ alternative constructions of spaces while consuming GM*

Reflexive consumption of geo-media

Reflexive consumption of GM contains the KSA the user needs to be reflexive towards her/his own GM consumption by being conscious of her/his own hypothesis construction. This involves awareness of the influence of GM on one's own and people's everyday action in general and also provides the anchor point for thinking about alternatives of spatial constructions potentially being represented in GM as well.

- *Debate the importance why one has to be aware of internal and external (pre-)conditions (e.g. kind of medium, one's own interests) of the construction process of space while consuming GM*
- *Explain why GM consumption is the starting point for hypothesis construction about space*
- *Illustrate one's own hypothesis construction about space that takes place while consuming GM*
- *Understand one's own hypothesis constructions while thinking in alternative spatial constructions*
- *Illustrate that one's own hypothesis construction is related to social constructions of space*

iii. Communication with geo-media

Basing this dimension in the tradition of counter mapping (Turnbull 1998), the web2.0 reference opens up new opportunities for GM based communication processes for serving interest representation and challenging societal discourses. Competences in this field are primarily related to enable the people to express alternative spatial visions and constructions with own visualizations, to argue for and with them, and to negotiate them with others in nonlinear ways of communication.

Meta level

Learning outcomes at the meta level summarises the overarching competences fundamental to all other sub-categories of the particular learning field.

- *Recognize that GM set the stage for the appropriation of space by contextualizing communication*
- *Explain why civic practices require the traditional skills of reading, writing and speaking, but also digital literacy and competent use of the Internet, i.e. digital competence*
- *Compare and contrast ways to convincingly express constructions of meanings and alternative, non-mainstream spatial scenarios*
- *Carry out communicative functions related to the personal and public domain of life and their specific situations (e.g. locations, institutions, persons, objects, texts) on the basis of the topics (subjects of discourse) of the GM technology and methodology domain, the spatial domain, and the citizenship education domain*

Communicative activities and strategies

Strategic communication competence contains the KSA needed to carry out tasks and to perform certain activities/ actions in order to achieve or avoid successfully an intended objective within a (spatial) problem solving as well as a discourse process (e.g. spatial planning). This is understood as to organize and purposefully express and share one's own and others (alternative) spatial visions and constructions within communication processes using spatial and non-spatial visualizations as well as various media like text, pictures, and drawing etc. embedded into discursive GM environments, involving communicative activities of reception, production, interaction, and mediation.

Reception

- *Break down (i.e. listen and process) a spoken input produced by one or more speakers to receive factual information about (common everyday) spatial related topics and identifying both general messages and specific details*
- *Break down (i.e. read and process) as input written texts produced by one or more writers on a variety of spatial subjects for orientation, information and argument, and to follow instructions or procedures*
- *Deconstruct (read, interpret and question) spatial visualisations like maps, thematic overlays on GIS interfaces, compilations of various media formats on virtual globes produced by one or more authors to receive geo-spatial information about real-world objects*

Production

- *Produce an oral text which is received by an audience of one or more listeners describing and presenting a variety of spatial subjects, expanding and supporting ideas with subsidiary points and relevant examples*
- *Produce a written text which is received by a readership of one or more readers on a variety of spatial subjects, synthesising and evaluating information and arguments from a number of sources*
- *Produce own spatial narratives with the help of digital GM including a variety of spatial subjects, synthesising and evaluating geo-information from a number of sources*
- *Criticise the success (results) achieved at the end of a GM based communication process against the afore performed activities of production (i.e. planning, executing, evaluating, self-correction)*

Interaction

- *Illustrate the more interactive and dialogue-oriented digital communication process between citizen and government and public authorities*
- *Exemplify different forms of interaction like spoken interaction (e.g. casual conversation, discussions, negotiation, interviews); written interaction (e.g. correspondence by letter or email, negotiating the text of agreements or communiqués, etc. by reformulating and exchanging drafts, amendments, etc.) or face-to-face interaction*
- *Discuss why is important within interactive communication processes to exchange, check and confirm information as well as to explain why something is a problem*
- *Exemplify why it is important to highlight the personal significance of events and experiences related to spatial subjects, account for and sustain views clearly by providing relevant explanations and arguments*

- *Act and argue alternately as speaker and listener with one or more interlocutors so as to construct conjointly, through the negotiation of meaning following the co-operative principle, conversational discourse (i.e. conversation, discussion, debate, negotiation, co-planning and practical goal-oriented co-operation)*
- *Use interaction skills adequately to the involved target group in order to change spatial constructions and meanings respectively*

Mediation

- *List aspects of mediation strategies to cope with the demands of using finite resources to process information and establish equivalent meaning; i.e. planning (e.g. developing background knowledge; preparing a glossary; considering interlocutors' needs); executing (e.g. noting equivalences; bridging gaps); evaluating (e.g. checking congruence of two versions); repairing: (e.g. refining by consulting dictionaries, thesaurus; consulting experts)*
- *Discuss why it is important to act as an intermediary between interlocutors who are unable to understand each other directly (e.g. because of different languages, because of lay and expert knowledge), including spoken interpretation and written translations of spatial representations*
- *Create or participate in discussions with one or more interlocutors in a non-linear way, trying to reach compatible meanings in democratic negotiation acceptable to all participants, using web2.0 technology as an option*

Socio-linguistic competences

Socio-linguistic communication competence describes the KSA needed to appropriately communicate between representatives of different (cultural) communities or institutional groups sticking to the social conventions, norm and rules. Above all, this is connected to intercultural competence to be able to reflexively compare one's own position/ membership in a particular community with the one of members of a certain target community, and, hence, to avoid misunderstandings and conflicts.

Social norms

- *Explain why it is necessary to have knowledge of particular socio-cultural aspects of the own or foreign community or special interest groups, especially related to the field of everyday living; living conditions; interpersonal relations including relations of power and solidarity (e.g. structure of society; relations between gender, generations, public and officials); and values, beliefs and attitudes (e.g. of occupational groups, regional cultures, national identity, foreign countries and peoples, politics, arts, religion)*
- *Debate why it is important to have intercultural awareness to understand the similarities and distinctive differences (relations) between the own 'world of origin' and the 'world of the target community' (e.g. political institution, fluent web communities)*

Intercultural aspects

- *Discuss the necessity to bring the culture of origin and the foreign culture into relation with each other and overcome stereotyped relationships*
- *Use a variety of strategies for contact with those from other culture groups or communities (cultural sensitivity)*

- *Demonstrate the capacity to fulfill the role of cultural intermediary between one's own culture and the foreign culture and to deal effectively with intercultural misunderstanding and conflict situations*

Pragmatic competences

Pragmatic communication competence contains the KSA necessary for the individual to effectively perform (spatial) communicative functions in an (non-)linear interactive and discursive way, discerning the principles according to which messages are organized, structured and arranged.

Discourse competence

- *Produce coherent stretches of languages/messages including the knowledge and the capacity to control the ordering of sentences/ pieces of information in terms of topic/focus; given/new; cause/effect (invertible)*
- *Structure and manage discourse in terms of thematic organisation; coherence and cohesion; logical ordering; style and register; rhetorical effectiveness*

Functional and design competence

- *Arrange messages according to interactional and transactional schemata (pattern of social interaction such as verbal exchange patterns), for example to: form a working group and establish relations among participants; establish common knowledge of the relevant features of the current situation and arrive at a common reading; establish common agreement on goals and on the action required to meet them; agree roles in carrying out the action; recognise the final achievement of the task; evaluate the transaction, complete the transaction*

Formulation of statements of learning outcomes are adapted from:
Council of Europe (2001): Common European Framework of Reference for Languages: Learning, Teaching, Assessment. Cambridge.

iv. Spatial Domain

The spatial domain refers to relative concepts of space as main cornerstone of SPACIT. This involves the social construction of spaces by the attachment of meaning to physical matter. This physical space is referred to with absolute concepts of space. These also relate to spatial representations and the spatial thinking approach (cf. NRC 2006). Mature appropriation of space involves the awareness of relational concepts of space and its consequences for action in spaces.

Meta level

Learning outcomes at the meta level summarises the overarching competences fundamental to all other sub-categories of the particular learning field.

- *Differentiate between absolute descriptions of location as used in the geo-information domain, and relative descriptions of place and space as used in the social or political domain*
- *Describe the efficacy of GM as instruments to structure action in space by the construction of spaces*
- *Discuss why power relations leads to dominant constructions of space*

- *Explain why social rules are a consequence from production of space*
- *Illustrate the correlation between absolute and social concepts of space*

Relative concepts of space

This area contains the KSA that work as a basis to understand and apply the efficacy of GM as instruments to structure action in space by the construction of spaces. It refers to the fundamental principle of the attachment of meanings to physical matter, closely linked to the concept of the construction of spaces that bases on relative concepts of space. This competence area concludes with the concept of the appropriation of spaces that connects the constructions of spaces with societal power relations and social action and in spaces.

Meaning of space

- *Illustrate the subjective and discursive background of meanings attached to physical matter*
- *Compare and contrast the possible variety of meanings attached to physical matter*
- *Contest dominant meanings attached to space*

Construction of space

- *Discuss the naturalization of constructions of space through GM*
- *Practice the construction of spaces through the attachment of meanings*
- *Visualize spatial relations, e.g. location, distance, direction, distribution, motion, flow, and interaction through space*

Appropriation of space

- *Contrast dominant spatial constructions in order to appropriate spaces maturely by communicating alternative constructions of space*
- *Translate between social and absolute space to make use of spatial representations in everyday life's for the purpose of communication*

Absolute concept of space

This area contains the KSA basing on absolute concepts of space which are crucial for working with GM and understanding spatial relations. It links to the approach of Spatial Thinking including KSA for tools of representation as well as processes of reasoning. As further aspect of an absolute understanding of spaces this competence refers to physical matter and its non-determinist influence on spatial structures beyond the attachment of meaning.

Spatial thinking

- *Exemplify the absolute character of GM*
- *Discuss space and time as principles of ordering phenomena*
- *Recognize concepts of space like general concepts (space, space-time, place, etc.), primitives of identity (object, boundary, shape, etc.) and primitive spatial relations (location, distance, direction, distribution, motion, etc.)*
- *List internal and cognitive tools of representation e.g. figures/ground, shape, size, texture, mental maps*
- *Apply external tools of representation: geometry (i.e. point, line, polygon), graphic (drawing, map etc.), physical (3D model etc.) or linguistic (i.e. language, words)*

- *Demonstrate internal and external processes of reasoning, i.e. extracting spatial structures (object, pattern, area, route etc.), performing spatial transformations (perspective, rotation, scale, dimension etc.), drawing functional inferences (correlation, spatial dependence)*
- *Apply spatial concepts (e.g. distance, distribution) and external spatial representations (e.g. maps, charts), e.g. within planning processes*

Physical environment

- *Distinguish between matter and meaning of objects within the physical environment*
- *Discuss the non-determinist influence of matter for the construction of spaces*

Formulation of statements of learning outcomes are adapted from:
NRC (National Research Council) (2006): Learning to think spatially. GIS as a support system in the K-12-curriculum. Washington, DC
Grosser, K. (2009): Integrating conceptual frameworks from the 2006 NRC report. Available online at: Center for Spatial Studies at the University of California. TeachSpatial. http://teachspatial.org/integrating-conceptual-frameworks-2006-nrc-report (accessed July 2013)

v. Citizenship Education Domain

This dimension refers to emancipatory concepts of citizenship education and the normative background of the approach in democratic negotiation processes and human rights. It pays special attention to the role of fluent institutions and communities, to power relations in society, and participation. It links space and citizenship by implementing the term of the 'spatial citizen' (Strobl 2008).

Meta level

Learning outcomes at the meta level summarises the overarching competences fundamental to all other sub-categories of the particular learning field.

- *Exemplify that societal rules as fundamentally negotiable*
- *Discuss her/his own role as emancipated citizen, willing to advocate one's own and collective interests*
- *Rethink societal rules against the background of alternative ones*
- *Show how to challenge dominant discourses while sharing alternative perspectives and opinions in the role as emancipated citizens*
- *Express her/his own world views in the sense of democratically negotiated interests for participation through various types of GM available*
- *Apply principles of SPACIT to life world environments and spatial problems on the local, regional, national and global scale*

Concepts of citizenship

Basing on emancipatory concepts of citizenship, this competence links to pivotal values for SPACIT, namely democratic principles and fundamental human rights, as well as to the KSA necessary for participation in society against the background of considering societal rules as fundamentally negotiable. 'Concepts of citizenship' also includes KSA to act as spatial citizen basing on an understanding of the role of institutions and fluent (new media) web communities.

Values and attitudes

- *Recall democratic principles and fundamental human rights*
- *Practice democracy and human rights as fundamental principle of living together*
- *Apply democratic principles and human rights as basis of negotiation and construction of space*

Information

- *Exemplify new ways of communication and discourse production through the web2.0*
- *Apply new ways of getting information through the web2.0*
- *Debate the relation between discourses and societal rules*
- *Question dominant societal rules and discourses or accept them maturely/consciously*
- *Share alternative discourses with others, also within online environments*

Participation

- *Debate the own role as empowered citizen/ actualized citizen*
- *Discuss the importance of GM for participation in the context of the web2.0*
- *Contribute ideas and opinions in decision making processes through collaboration using digital GM*
- *Use possibilities of current digital GM to express, discuss, and negotiate ideas and opinions with others*
- *Make decisions for and against certain spatial constructions while being aware of their consequences*

Institutional/ membership

- *Contrast the characteristics of spatial versus social communities*
- *Compare and contrast the role of different stakeholders regarding the construction of space and the construction of dominant discourses*
- *Debate the importance of fluent communities (e.g. on the web) as areas of participation*
- *Question institutional rules and dominancy*
- *Illustrate the role and power of political institutions for the construction of space*
- *Navigate in fluent communities, and communicate with political institutions*

Formulation of statements of learning outcomes are adapted from:
Bennett, W. L., Wells, C., Rank, A. (2009): Young citizens and civic learning: Two paradigms of citizenship in the digital age. In: Citizenship Studies 13, no. 2, p. 105-120

vi. Implementation strategies

The following learning outcomes are formulated as overall statements of competence to support effective implementation of SPACIT education into classroom practices. Beyond already existing teaching experiences and pedagogical/ didactical competences from formal teacher education and training the given statements should actively support teachers' competence development in the fields of: (a) the creation of reflective learning situations integrating Geo-ICT and (web2.0-based) geo-media and its various resources to support digital literacy and new media competence; (b) teachers' professional growth within the different dimensions of SPACIT, especially to develop innovative technical-pedagogical approaches for active teaching and learning. Against the previous formulation of SPACIT learning outcomes the given

statements below should be read in the following manner: "*After completing the SPACIT learning program teacher should be able to…."*

Meta level

Learning outcomes at the meta level summarises the overarching competences fundamental to all other sub-categories of the particular learning field.

- *Debate the reasons for teaching SPACIT in the context of the GISociety*
- *Exemplify the SPACIT approach in order to connect and integrate its goals and concepts to the local curriculum*
- *Evaluate ways of formal as well as informal learning opportunities related to SPACIT education*
- *Evaluate her/his competences within the dimensions of SPACIT and for teaching SPACIT critically*

Creating learning environments

This competence area links to the KSA essential to plan and manage learning environments (pedagogical approach) and to design and act in classroom situations (didactical approach). While the first approach refers to a meta level of teaching SPACIT, including reflection and evaluation, the second relates to concrete and situational action as teaching professional.

Planning & Management

- *Plan and manage teaching activities and monitor students' specific progresses and general performance regarding SPACIT*
- *Create learning environments for teaching and learning SPACIT using various (geo-)media, and implementing affective, emotional and playful elements which characterise young people's interaction with GM in a real-world context*
- *Design appropriate tools for evaluation of learning SPACIT through diversified and updated forms of assessment*
- *Evaluate and select critically appropriate tools and resources to actively teach SPACIT*

Classroom activities

- *Create learning situations that allow for a critical engagement with geo-information and geo-spatial representations, i.e. triggering reflection and reflexivity by means of SPACIT*
- *Create out-of-school learning situations (i.e. field work, excursion) that are connected to spatial issues (e.g. current planning processes) and involved stakeholders (e.g. citizen, social service, politics, administration) at the neighbourhood or community-based level*
- *Design innovative and engaging learning materials integrating digital tools and various media resources related to SPACIT*
- *Personalise learning activities (i.e. methods, content, activities and dynamics) and address students' diverse learning styles and interests in the field of SPACIT, pursuing students' engagement, success and development*

Professional Growth

This learning field outlines to the need of each teacher's efforts to develop her/his own competences in the areas linked to SPACIT. Related KSA include the abilities and willingness to use digital and online learning tools to frequent related learning environments, and to reflect on her/his own competences and competence development.

- *Use regularly online learning environments and (new media) technologies as well as participate actively in local and global online communities to exchange ideas and experiences and to get insights for further developments of SPACIT*
- *Develop independent efforts to pursue continuous professional development in the field of SPACIT and keep updating the knowledge of teaching methods as well as approaches of GM/ Geo-ICT integration into classroom activities*
- *Get involved in formal and informal learning opportunities for professional development like training initiatives, workshops related to citizenship education and digital GM*
- *Be aware of the ways of maintaining and building own knowledge and skills related to the dimensions of SPACIT in the context of lifelong learning*

Formulation of statements of learning outcomes are adapted from:
Pedro, N., Matos, J.F., Pedro, A. & Abrantes, P. (2011): Teacher skills and competence development for classrooms of the future. iTEC Deliverable_4.1._Teachers_Competence. Available at http://itec.eun.org/web/guest/results (accessed March 2012).

References

Bandura, A. (1997): Self-efficacy. The exercise of control. New York.

Bennett, W. L., Wells, C., Rank, A. (2009): Young citizens and civic learning: Two paradigms of citizenship in the digital age. In: Citizenship Studies 13, no. 2, p. 105-120.

Council of Europe (2001): Common European Framework of Reference for Languages: Learning, Teaching, Assessment. Cambridge.

DiBiase, D., DeMers, M., Johnson, A. B., Kemp, K. K., Plewe, B. P &Wentz, E. A. (eds.) (2006): The Geographic Information Science and Technology Body of Knowledge (Washington: Association of American Geographers). First Ed.

Diamond, R.M. (2008): Designing and Assessing Courses and Curricula: a practical guide. 3rd. edition. John Wiley & Sons.

Donert, K. (2009): Benchmarking GIS – a Charter for European Education. In: Jekel, T., Koller, A. & Donert, K. (eds.), Learning with Geoinformation IV, p. 2-11 (Heidelberg: Wichmann).

Gonzalez, J. & R. Wagenaar (2008): Universities' contribution to the Bologna Process. Bilbao

Grosser, K. (2009): Integrating conceptual frameworks from the 2006 NRC report. Available online at: Center for Spatial Studies at the University of California. TeachSpatial. http://teachspatial.org/integrating-conceptual-frameworks-2006-nrc-report (accessed July 2013)

Gryl, I. & Jekel, T. (2012): Re-centering GI in secondary education: Towards a spatial citizenship approach. Cartographica 47 (1), p. 18-28.

Gryl, I., Jekel, T. & Donert, K. (2010), GI and Spatial Citizenship. In: Jekel, T., Koller, A., Donert, K. & Vogler, R. (Eds.), Learning with Geoinformation V – Lernen mit Geoinformation V. Berlin/Offenbach, Wichmann, 2-11.

Harley, J. B. (1989): Deconstructing the map. In: Cartographica (The International Journal for Geographic Information and Geovisualization) 1989, no. 2, p. 1-20.

Herodot Network (2009): The Benchmarking Statements for GIS in Geography Education, in: Jekel, T., Koller, A. & Donert, K. (eds.), Learning with Geoinformation IV, p. 235-240.

Lindner-Fally, M. & Zwartjes, L. (2012): Learning and Teaching with Digital Earth – Teacher Training and Education in Europe. In: Jekel, T., Car, D., Strobl, J. & Griesebner, G. (eds.) (2012): GI_Forum 2012: Geovisualistion, Society and Learning. p. 272-282

MacEachren, A. M. (1992): Visualization. In: Abler, R. F., Marcus, M. G., Olson, J. M. (eds.): Geography's inner worlds. New Brunswick, p. 99-137.

NRC (National Research Council) (2006): Learning to think spatially. GIS as a support system in the K-12-curriculum. Washington, DC.

Pedro, N., Matos, J.F., Pedro, A. & Abrantes, P. (2011): Teacher skills and competence development for classrooms of the future. iTEC Deliverable_4.1._Teachers_Competence. Available at http://itec.eun.org/web/guest/results (accessed March 2012).

Reich, K. (2012): Portfolio. Methodenpool. http://methodenpool.uni-koeln.de/portfolio/frameset_portfolio.html (accessed November 2013)

Turnbull, D. (1998): Mapping encounters and (en)countering maps: A critical examination of cartographic resistance. In: Knowledge and Society 1998, no. 11, p. 15-44.

Schulze, U., Gryl, I. & Kanwischer, D. (2013): Competence model for Spatial Citizenship education. Spatial Citizenship (SPACIT) Comenius Project . Public report (D.2.1)

Strobl, J. (2008): “Digital Earth Brainware”. In: Geoinformatics Paves the Highway to Digital Earth (gi-reports@igf) (ed. Schiewe, J. & Michel, U.), p. 134–38. Osnabrueck: University of Osnabrueck.

UNESCO (2010): Teaching and learning for a sustainable future.
http://www.unesco.org/education/tlsf/mods/theme_d/mod24.html (accessed November 2013)