

Spatial Citizenship: Creating a Curriculum for Teacher Education

Uwe SCHULZE¹, Inga GRYL² and Detlef KANWISCHER¹

¹Goethe-University Frankfurt / Germany · usschulze@geo.uni-frankfurt.de

²Chemnitz University of Technology / Germany

This contribution was double-blind reviewed as full paper.

Abstract

The Curriculum for Spatial Citizenship Education serves as a guiding foundation for creating local curriculum approaches of Spatial Citizenship (SC) teacher education and training across the European Higher Educational Area (EHEA). Thus, it addresses all stakeholders related to that special field of teaching and learning at secondary school as well as higher education, and for in-service teacher training. This paper outlines the development process of the Spatial Citizenship Curriculum within the progress of the Comenius project Spatial Citizenship (SPACIT). Giving an example of implementation, this paper also introduces a framework of a blended-learning in-service teacher training course.

1 Introduction: Supporting Education for Spatial Citizenship with Teacher Education

The rise of digital geo-media (GM) such as digital maps, GPS-based mobile devices, digital globes, and Geographic Information Systems, combined with the opportunities of the Web 2.0 constantly changes our everyday lives. Producing and consuming these manifold spatial representations of the world influences people's spatial perceptions, actions, and daily routines. We live in a geospatial society, in which GM increasingly becomes the key for social affiliation within communities on different scales. Therefore, the competent use of GM turns out to be a basic cultural technique, providing the tools and methods for location based information processing, communication in- and outside online communities, and social networks. Besides others, this competence must strongly support the empowerment of people to use GM for participation in individual and collective democratic decision making processes as emancipated spatial citizens.

The SC approach (GRYL & JEKEL 2012) focuses on the role of such a 'spatial citizen' and its appropriation of the spatial domain of social life. Concisely, SC is about being able to navigate everyday life with respect to the physical world, the meanings attached to it (that is to say the production of meaning and spaces), and to the power relations involved in this production process, and with GM as well as Web 2.0 applications as central instruments, thus, enabling new forms of collaboration and negotiation of meaning. Therefore, SC education is concerned with the individuals' knowledge, skills, and abilities, as well as attitudes "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 [he] encounters on a daily basis” (GRYL & JEKEL 2012, 8). SC links GM competence and the mature appropriation of space to the citizenship education domain, and hence, to a number of key concepts such as reflection, reflexivity, communication, participation and negotiation.

Paving the way for education for SC requires enabling the teachers as multipliers of their students’ competence development to teach such competences. The subsequent reinterpretation of learning with geo-information (GI) in secondary school has transformative potential due to the embedment of pupils with everyday geo-medial practices. In order to use this potential within innovative current teaching and learning, in-service teacher training must be the first objective. Learning environments must be created beyond uniform and input-driven learning processes, but must aim at self-directed learning, based on a constructivist understanding of learning processes and paying attention to the teachers’ individual background and needs.

Consequently, a Spatial Citizenship Competence Model for teacher training has been developed (GRYL et al. 2013), which is based on theoretical research, and includes various forms of interdisciplinary input from theoretical and empirical findings in general, as well as other competence models and catalogues in particular. This model works as the fundament for the formulation of SC learning outcomes for teacher training. As a further step, a SC curriculum needs to be formulated that provides the binding foundation for the development of specific SC learning programmes, e.g. for teacher education and training at university, or for in-service-teacher-training.

Against this background, this paper aims to introduce such a curriculum for in-service teacher training, based on the Spatial Citizenship Competence Model and learning outcomes, which is adaptable to various forms of training courses such as online, face-to-face, and blended learning. Therefore, within the second section of the paper, fundamental thoughts on curriculum development, including assessment, will be summarized. The formulation of learning outcomes against the framework of the EHEA is illustrated in section three. Subsequently, the scope and content of the Spatial Citizenship Curriculum is presented, and an example of curriculum implementation in terms of a SC in-service teacher training course is outlined. Finally, the last section of this paper gives an outlook on the further composition of that course and further work in progress.

2 Pedagogical Aspects of Spatial Citizenship Curriculum Development

Competence modelling and curriculum development are related to each other. On the basis of the identification of necessary knowledge, skills, and abilities arranged in the SC competence structure model (cf. SCHULZE et al. 2013b), learning outcomes have to be formulated to achieve the goals of SC education in accordance with appropriate learning activities.

For the SC curriculum development, we refer to the definition of ‘curriculum’ and its related terms as defined from the European perspective of education by CEDEFOP (2010). In this context a curriculum is “*a normative document (or a collection of documents) setting the framework for planning learning experiences. Depending on the country, the type of education and training, and the institution, curricula may define, among other, learning out-*

comes, objectives, contents, place and duration of learning, teaching and assessment methods to a greater or to a lesser extent” (CEDEFOP 2010, 20).

2.1 Curriculum organization

According to UNWIN et al. (2012) and PAINHO & CURVELO (2012), processes of systematization and organizing curriculum contents include major questions about the scope and depth, the integration, as well as the sequence and continuity of learning content. While “scope refers to the knowledge about a given concept or skill introduced at each stage of the learning process” (i.e. content related), sequence “refers to the order in which concepts are introduced” (i.e. progression) (UNWIN et al. 2012, 81). For curriculum organization, setting the scope and sequence of curricula content appears as most important since these two aspects are fundamental for the structuring of the learning process and its intended results. At last, there are three opportunities which help to classify different approaches of curriculum organization (cf. PAINHO & CURVELO 2012, 100):

- 1) **Linear pathway:** Probably one of the most common approaches of curriculum organization can be found within a step-wise structuring of learning content and tasks (cf. UNWIN et al. 2012). This is true, for example, for input orientated study courses, study programs or school curricula in general, as well as for lectures, textbooks or study materials which all follow a chapter-wise construction and an intended linear progression of creating knowledge and skills. Here, the curriculum consists of single topics, units and/or modules of learning content and tasks which are integrated within a discrete entity of knowledge, e.g. topic A includes all units from 1 to 7.
- 2) **Multipath curriculum:** Theoretically, like the ‘linear approach’, a multipath curriculum also consists of single units and topics and/or modules which are grouped according to different aspects of the certain domain. However, there is no ‘fixed’ or uniform learning process, which means that knowledge and skills are acquired in order to achieve particular outcomes. In fact, ‘multiple pathways’ across the curriculum could be also linear in time, from week to week, semester to semester. But they are more flexible for the demand-orientated use of the curriculum framework and for an individual configuration of learning content as well.
- 3) **Spiral curriculum:** The concept of the ‘spiral curriculum’ by Jerome Bruner is founded on “constructivist theories and on the idea, that behaviors, learning processes and acquired competences are the result of a progressive construction of the subject in its interaction with the environment”, i.e. learning through the repeated use as well as experience of a concept (PAINHO & CURVELO 2012, 101). The main characteristic of this model is that the learner’s activities are integrated within a spiral of introduction and repetition of (new) basic ideas, concepts, and subjects over the whole period of learning, to deepen the understanding and application of knowledge and skills, and finally reach an increased level of learning outcomes.

The creation of learning environments for SC teacher education should allow for multiple pathways for achieving SC competence and learning outcomes respectively. Above all, this results from the idea that the Spatial Citizenship Curriculum generally supports a demand-orientated use and flexible configuration of learning content. This in turn means that scope and sequence are based on the local conditions of implementation, the individual back-

grounds of the learners, their (fore-)knowledge and individual abilities in the various fields of competence around SC.

2.2 Assessment

Besides the decision about the suitable curriculum organization, the assessment of a learner's achievement must be clarified in advance. However, the assessment furthers the learner's self-efficacy (BANDURA 1997), which is an inevitable basis for the application of competences to everyday situations. Hereby, assessment constitutes a basis for acting in society and for empowerment as designed in the SC competences. The agents of assessment are: (a) the *learners* who reflect their own learning processes; (b) the *lecturers* who provide exercises as a 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 Spatial Citizenship Curriculum.

Concerning the elements of assessment in SC education, two main approaches, formal, and informal assessment (UNESCO 2010) can be distinguished: *Formal assessment* can be included in the particular learning units as a compulsory part of course work, for example, 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 learning process. *Informal assessment* cannot formally be connected to a standardized learning environment, but remains primarily in the learners' hands and responsibility. Nevertheless, lecturers and course work in a particular SC learning environment encourage for informal assessment because reflecting one's own competence development is a keystone of maturity and a basis for lifelong learning.

Further, formal assessment can be divided into formative and summative assessment (GONZALEZ & WAGENAAR 2008). *Formative assessment* in SC 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 SC education. 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 focused on by the multipath curriculum and the SC concept in general. Instead, a portfolio kept by each learner should be the main assessment tool for SC education as it ensures consciousness and awareness about the learner's individual learning results.

3 European Framework of the Spatial Citizenship Curriculum: The Learning Outcomes Approach

From the European perspective of higher education, the development of competence-based curricula is influenced by a fundamental change from a focus solely on qualification and knowledge towards a focus on student-centred, outcome-based, lifelong learning processes (SCHULZE et al. 2013a; cf. also LONDON COMMUNIQUÉ 2007). In order to provide compara-

bility and the transferability of qualifications across the EHEA, the Spatial Citizenship Curriculum has been developed according to the principles and standards of the European educational policy framework. Specifically, according to the concept of competence from the European perspective (cf. SCHULZE et al. 2013b), this means the incorporation of the ‘learning outcomes approach’ which has emerged as a “key concept” (CEDEFOP 2010, 8) across Europe in recent years, in order to express competences as coherent statements of knowledge, skills, abilities, or attitudes which individuals have to achieve through learning processes, and which allows the learners to actively organize their learning processes by reflecting their own needs and ways of learning both by constructivist means and from a lifelong learning perspective (cf. GONZALES & WAGENAAR 2008, EUROPEAN COMMISSION 2008, CEDEFOP 2009, CEDEFOP 2010, EUROPEAN UNION 2011).

3.1 Definition of ‘learning outcomes’

Beside different understandings of the term ‘learning outcome’ (cf. CEDEFOP 2010), for SC curriculum development learning outcomes are defined *as statements of what a learner knows, understands and is able to do on completion of a learning process*. Generally, according to CEDEFOP (2009, 50ff), learning outcomes can be distinguished on the basis of their particular role or function for describing goals of learning processes. Out of a number of six different types of learning outcomes (cf. CEDEFOP 2009), within the Spatial Citizenship Curriculum learning outcomes are used for two reasons. Firstly, as ‘tools for relating theoretical and practical learning’ they are important to refer to the application of knowledge to practice. Second, learning outcomes in SC are used in order to ‘link learners’ cognitive, skills-based and affective learning’ (CEDEFOP 2009, 56). Particularly from the perspective of teacher education and training, the latter approach appears most useful (CEDEFOP 2009) in order to link the formulation of learning outcomes to models of classifying different types of knowledge and cognitive processes, and skills as one can find, for instance, in Bloom’s Taxonomy of Educational Objectives.

For the construction of learning outcomes we will draw on a differentiation of learning *objectives* and learning *outcomes*, as described by ADAM (2004, 5 cited in CEDEFOP 2010, 24). Thereafter, “learning outcomes are concerned with the achievements of the learner rather than the intentions of the teacher (expressed in the aims of a module or course)” (ADAM 2004, 5 cited in CEDEFOP 2010, 24). Hence, learning outcomes are formulated more precise and far clearer using the learner’s language (cf. KENNEDY et al. 2006). In contrast, learning objectives uses the language of pedagogic expertise and subject disciplines “as a guide to the teaching programme that might, or might not, lead to the desired learning” (EUROPEAN UNION 2011, 14ff). Furthermore, as stated in EUROPEAN UNION (2011, 21) there is a “clear difference in the level of detail included in learning outcomes when they are applied to whole programmes of learning (when learning outcomes are broad), and modules (when learning outcomes are specific). Programme level learning outcomes are statements of what learners are expected to know and be able to do at the end of the whole programme and are therefore written in a broad overarching way that takes account of all of the learning outcomes that are associated with elements or modules within the programme.”

3.2 Formulation of learning outcomes

With the special focus on teacher training, learning outcomes for SC education needs to reflect two distinctive perspectives: The first one sees teachers themselves as ‘learners’ in the field of SC education. In contrast, the second perspective picks up the special needs of teachers ‘at their profession’ to educate students in terms of SC on the basis of appropriate approaches of teaching and learning, and creating learning environments that prepare pupils to act as ‘spatial citizens’. In order to clearly emphasize this dual function of learning outcomes for SC the following phrase has been introduced for the formulation: *At the end of the learning process the teacher should be able to create a learning environment to enable pupils to...*

The construction of learning outcomes is based on the revision of Bloom’s Taxonomy of Educational Objectives by ANDERSON & KRATHWOHL et al. (2001). Generally, the use of taxonomies of educational objectives is a common practise in order to help organise and structure learning processes and activities. In detail, such categorisations of different types of knowledge and levels of cognition are used frequently, for example, by teachers, in order to formulate intended learning outcomes since they “provide a ready-made structure and list of verbs” (KENNEDY et al. 2006, 8), which could be easily used to plan and arrange active learning processes. Thus, such a framework provides a useful tool for curriculum development in order to link educational objectives with methods of instruction, the assessment of the learning progress, and the achieved results. The Revised Taxonomy of Educational Objectives contains descriptions and examples of both the *knowledge dimension* and *cognitive process dimension* (cf. KRATHWOHL 2002, 214). This two dimensional construct integrates a hierarchy of cognitive processes of *remembering, understanding, applying, analysing, evaluating, and creating*, as well as four different dimensions of knowledge described as *factual, conceptual, procedural* and *metacognitive*.

Against this background, the formulation of SC learning outcomes represents a normative categorisation of the respective elements of knowledge, skills, and abilities identified during the competence modelling process (cf. SCHULZE et al. 2013b) in conjunction with a mapping of grades of cognitive processes. The following list provides sample formulations of SC learning outcomes:

At the end of the learning process the teacher should be able to create a learning environment to enable pupils to...

- *Identify sources of freely available public geo-information.*
- *Decide whether to accept constructions of space in GM or to promote alternatives representations.*
- *Know that 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.*
- *Apply democratic principles as basis of negotiation and construction of space.*
- *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.*

4 Scope and Content of the Spatial Citizenship Curriculum

By defining the overall goals as well as outcomes of SC education in terms of ‘SC competence’ (cf. GRYL et al. 2013), the Spatial Citizenship Curriculum acts as a binding foundation for the coherent creation of local curriculum approaches, learning programs, and materials for teacher education and training across the EHEA. Therefore, it addresses all stakeholders in the field of education and training, i.e. decision-makers, curriculum planners and developers, teachers and teacher educators, NGOs, and civil society organizations interested in education, as well as academics, researchers and professionals (SPACIT 2014), and should be applicable at a variety of places, institutions and learners across Europe, contributing to lifelong learning in the field of (spatial) citizenship education. As shown in figure 1, the *outcome*-based SC curriculum serves as a starting point in order to formulate as well as to evaluate and assess specific learning goals and outcomes in certain local training environments.

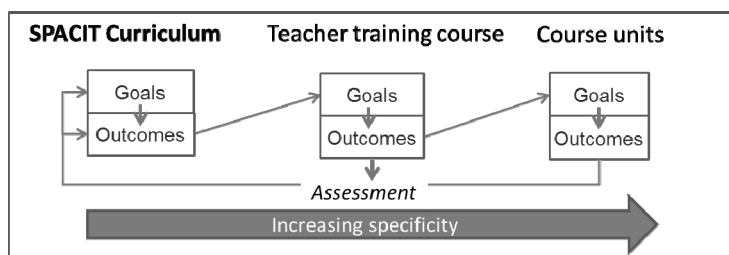


Fig. 1: Learning goals and outcomes of the Spatial Citizenship Curriculum as the foundation for the creation and assessment of certain teacher training environments (schema adapted from DIAMOND 2008, 6)

The full version of *The Curriculum for Spatial Citizenship Education* can be found attached to the Citizenship and Education section of these conference proceedings.

5 Implementing the Curriculum: The Example of SPACIT Teacher Training Course

While the previous sections of this article describe the development of the Spatial Citizenship Curriculum, this section gives an example of its implementation in an in-service teacher training course that will be developed within the framework of the SPACIT project (cf. SPACIT 2014).

Basically, the aim of the five-day Comenius training course is to raise teachers’ awareness of the impacts and challenges, as well as opportunities of using GM in society. Teachers should be empowered to integrate various GM applications into their lessons in order to induce spatial awareness, critical thinking, and reflection against the background of pupils’ everyday-life GM-based routines of communication and action. Therefore, the projected course framework (see figure 2) presents “an approach to develop the capabilities for young

people to successfully participate in the emerging geo-information society and to explore awareness, participation and communication as responsible ‘spatial citizens’” (SPACIT 2014).

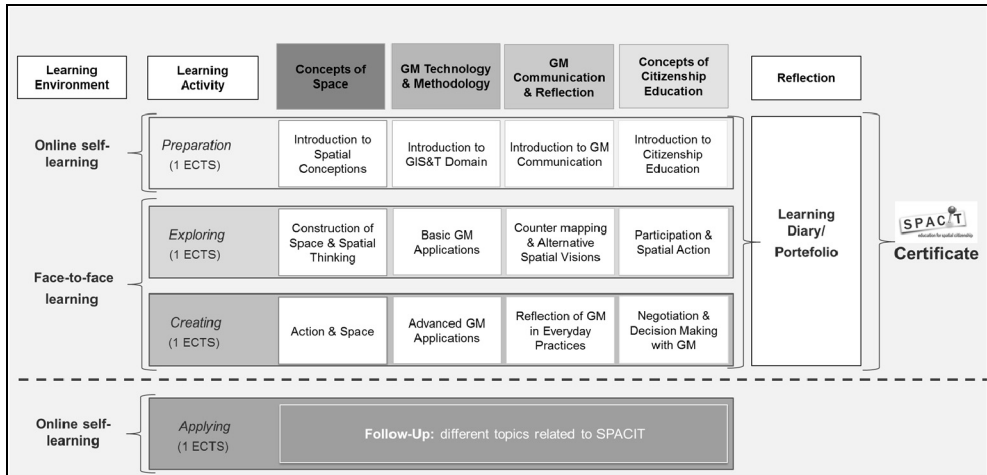


Fig. 2: Framework of the SPACIT in-service teacher training course (SPACIT 2014)

Course framework: The SPACIT in-service teacher training course will be based on the multipath curriculum approach. This is mainly due to the expected heterogeneity of (the field of) the learners, as teachers differ in their professional backgrounds, e.g. geography, informatics, citizenship education; pre-school, primary education, secondary school. Thus, the SPACIT course environment will allow for individual competence development according to the specific needs and interests of the teachers to engage in particular competence areas and domains of SC. Therefore, the learning content will be organized into four modules which are grouped to different aspects of SC competence (see table 1). Subsequently, each module is separated into three self-contained units of 6 to 7,5 hours of workload each. Depending on the individual (fore-)knowledge and competences within the particular learning fields, teachers are free to select the number of units to work through. For certification purposes, two-thirds of all units have to be completed, of which at least one unit must be assigned from each module.

Learning experience: As illustrated in figure 2, the course concept contains different modes of learning. Firstly, since SC deals with mainstream technology and is centred on the use of Geo-ICT and GM, the course setting will integrate those tools within a mixture of *self-learning* online content and *face-to-face* learning in terms of a *blended-learning* environment. Secondly, to foster competence-orientated learning in terms of achieving skills and abilities of application, the learning extent (i.e. workload) will not depend on the prepared learning content and materials, meaning that learning will not be input-driven. Instead, it takes into account the duration of a certain learning activity teachers employ for *preparation* and *exploring* the learning field, recognizing his/her individual learning needs, as well as for *creating* and *further applying* own learning materials for classroom use at his/her home institution. Finally, a third mode of learning is connected to the assessment

and certification procedure in which the teachers will *reflect* their learning experience and goals achieved with the help of a learning diary/ portfolio.

Tab. 1: Description of the modules of the SPACIT in-service teacher training course

Module	Description
Concepts of Space	The aim of this module is to provide the learner with a comprehensive engagement, with absolute and relative spatial concepts and representations. Related to the mature appropriation of space, this module focuses on the awareness of relational spatial conceptions and its consequences for societal power relations and (social) action within the physical environment. Relative concepts of space involve the social construction of spaces by the attachment of meaning to physical matter. Following the Spatial Thinking approach (NRC 2006), physical space is referred to with absolute concepts of space, tools of representation, and processes of reasoning.
Geo-media Technology and Methodology	This module aims to enable the learner for the creative and meaningful utilization of (Web 2.0-based) digital geo-media as powerful instruments of everyday social action. Therefore, related to the domain of Geographic Information Science & Technology, this module provides the technical as well as methodological knowledge and skills necessary for the mature handling of geo-spatial data in the form of GM information processing, i.e. consumption, production and prosumption of GM, analysis carried out using GM, as well as aspects of technical communication in the form of social networking.
Geo-media Communication and Reflection	The aim of this module is to introduce the learner to the opportunities and challenges of how to express, communicate, and critically interpret alternative spatial visions and constructions within (Web 2.0-based) digital geo-media (GM). On the one hand this involves the creation of own spatial representation regarding content with the help of different GM like maps, texts, photographs etc., primarily basing on the tradition of counter mapping. On the other hand this module supports reflection concerning the consumption of GM and its influence on one's own and people's everyday action. Therefore, traditional map reading skills will be adjusted in order to create awareness: (a) of the translation between social and absolute space; (b) of GM as social constructions with limited representation of the world needed to be deconstructed; and (c) of the user's needs to be reflexive towards her/his own GM consumption.
Concepts of Citizenship Education	The aim of this module is to introduce the learner to the concepts of citizenship education, essential for understanding the pivotal values for Spatial Citizenship, namely democratic principles and fundamental human rights. With special attention to the role of fluent institutions and (new media) communities, as well as power relations in society, the learner will be acquainted with the knowledge, skills, and abilities necessary for (spatial) participation and decision making in society against the background of considering societal rules as fundamentally negotiable.

5 Outlook

The next step to be done is the construction of learning environments to fill the units displayed above, appropriate to the SC curriculum and learning outcomes. As such, learning activities, both online and face-to-face, should support active and authentic learning, integrating multiple perspectives and contexts on GM through situated and cooperative learning environments, i.e. meaningful learning, problem based learning, and resource based learning. Additionally, they must take into account the potential and limitations resulting from the physical course context (e.g. available technology, suitability of the surrounding for learning outside the classroom).

The module ‘GM communication and reflection’, for instance, will help the participants to understand and analyse the GM communication processes by letting them explore various web-based GM in the unit ‘Introduction to GM communication’; the unit ‘Counter mapping and alternative spatial visions’ encourages them to map the invisible and hidden of the surrounding with simple web-mapping tools, while the unit ‘Reflection of GM in everyday practise’ will introduce and train a reflective and reflexive approach to GM within the everyday example of the ‘global thinking’-layers on Google Earth.

The production of learning environments includes the formulation of exercises and tasks, the provision of material for the learners for course work, as well as for further self-learning and the provision of assessment questions. Moreover, to increase transparency and the participants’ reflexivity on their competence development, the learning outcomes are provided additionally in a summarized ‘everyday language formulation’ to ensure accessibility.

Finally, the conduction of a pilot course will be accompanied by several modes of evaluation, including reflexivity (i.e. teacher’s reflection), collegial observation and counselling, as well as participants’ questionnaires and their open reflections. This data will provide valuable insights for the improvement and future development of SPACIT learning environments to fill the curriculum in an adequate and expedient manner. Further steps within the development of SPACIT initial-teacher education and for in-service teacher trainings are the development of a concept for complete online self-learning courses and train-the-trainer material.

Acknowledgements

Research for this contribution has been funded by the SPACIT Comenius multilateral project of the European Commission. For further information visit the project website at <http://www.spatialcitizenship.org>.

References

- ADAM, S. (2004), Using learning outcomes: a consideration of the nature, role, application and implications for European education of employing learning outcomes at the local, national and international levels. Edinburgh, Scottish Executive.
- ANDERSON, L. W., KRATHWOHL, D. R. et al. (2001), A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives (Complete edition). New York, Longman.
- BANDURA, A. (1997), Self-efficacy. The exercise of control. New York.
- CEDEFOP (EUROPEAN CENTRE FOR THE DEVELOPMENT OF VOCATIONAL TRAINING) (2009), The shift to learning outcomes. Policies and practices in Europe, Cedefop Reference series, 72 (Luxembourg: Office for Official Publications of the European Communities). www.cedefop.europa.eu/etv/Upload/Information_resources/Bookshop/525/3054_en.pdf (March 2012).
- CEDEFOP (EUROPEAN CENTRE FOR THE DEVELOPMENT OF VOCATIONAL TRAINING) (2010), Learning outcomes approaches in VET curricula: A comparative analysis of nine European countries, Research Paper No 6 (Luxembourg: Publications of the European Union). www.cedefop.europa.eu/EN/Files/5506_en.pdf (March 2012).
- DIAMOND, R. M. (2008), Designing and Assessing Courses and Curricula: a practical guide. 3rd. Edition. John Wiley & Sons.
- EUROPEAN COMMISSION (2008), The European Qualifications Framework for Lifelong Learning (EQF) (Luxembourg: Office for Official Publications of the European Communities). http://ec.europa.eu/education/pub/pdf/general/eqf/broch_en.pdf (November 2011).
- EUROPEAN UNION (2011), Using Learning Outcomes, European Qualifications Framework Series: Note 4 (Luxembourg: Publications of the European Union). Available at www.cedefop.europa.eu/en/news/19115.aspx (March 2012).
- GONZALEZ, J. & WAGENAAR, R. (Eds.) (2008), Universities' contribution to the Bologna Process. An introduction. http://www.unideusto.org/tuningeu/images/stories/Publications/ENGLISH_BROCHURE_FOR_WEBSITE.pdf (August 2011).
- GRYL, I. & JEKEL, T. (2012), Re-centering GI in secondary education: Towards a spatial citizenship approach. *Cartographica* 47 (1), 18-28.
- GRYL, I., SCHULZE, U. & KANWISCHER, D. (2013), Spatial Citizenship. The concept of competence. In: JEKEL, T., CAR, A., STROBL, J. & GRIESEBNER, G. (Eds.), *GI Forum 2013*, Berlin/Offenbach, 282-293.
- KENNEDY, D., HYLAND, A. & NORMA, R. (2006), Writing and using learning outcomes: a practical guide. In: FROMENT, E. (Eds.). *EUA Bologna handbook* Berlin: Raabe. Making Bologna work. Chapter C 3.4-1, Implementing Bologna in your institution. http://www.ehea-journal.eu/index.php?option=com_content&task=view&id=21&Itemid=148#b (June 2013).
- KRATHWOHL, D. R. (2002), A revision of Bloom's taxonomy: An overview. *Theory Into Practice*, 41 (4), 212-218.

- LONDON COMMUNIQUÉ (2007), Towards the European Higher Education Area: Responding to Challenges in a Globalised World.
www.ond.vlaanderen.be/hogeronderwijs/bologna/documents/MDC/London_Communique18May2007.pdf (March 2012).
- NRC (NATIONAL RESEARCH COUNCIL) (2006), Learning to think spatially. GIS as a support system in the K-12 curriculum. Washington, DC, National Academies Press.
- PAINHO, M. & CURVELO, P. (2012), Building dynamic, ontology-based alternative path for GIS&T curricula. In: UNWIN, D. J., FOOTE, K. E., TATE, N. J. & DiBIASE, D. (Eds.), Teaching Geographic Information Science and Technology in Higher Education. Wiley-Blackwell, 98-115.
- SCHULZE, U., KANWISCHER, D. & REUDENBACH, C. (2013a), Essential Competences for GIS Learning in Higher Education: A Synthesis of International Curricular Documents in the GIS&T Domain. *Journal of Geography in Higher Education*, 37 (2), 257-275.
<http://dx.doi.org/10.1080/03098265.2012.763162> (April 2014).
- SCHULZE, U., GRYL, I. & KANWISCHER, D. (2013b), Competence model for Spatial Citizenship Education. Spatial Citizenship (SPACIT) Comenius Project. Public report (D.2.1).
<http://www.spatialcitizenship.org/deliverables/> (April 2014).
- SPACIT (SPATIAL CITIZENSHIP) (2014), project website of the EU Comenius Project Spatial Citizenship. <http://www.spatialcitizenship.org/> (April 2014).
- UNESCO (2010), Teaching and learning for a sustainable future.
http://www.unesco.org/education/tlsf/mods/theme_d/mod24.html (November 2013)
- UNWIN, D. J., FOOTE, K. E., TATE, N. J. & DiBIASE, D. (Eds.) (2012), Teaching Geographic Information Science and Technology in Higher Education, Wiley-Blackwell, 81-95.