



International Perspectives on Geography and Earth Science Teacher Education

Conference: 26./27. September 2016
Pädagogische Hochschule FHNW,
Brugg-Windisch, Switzerland
#IPGESTE

Further information:
www.gesellschaftswissenschaften-phfhnw.ch



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1 Welcome

to Switzerland. We are proud to host the #IPGESTE 2016 conference on FHNW's Brugg-Windisch campus.

The two-day conference aims at bringing together researchers, teacher educators, pre-service teacher students and in-service teachers and is supported with funds of the Swiss National Science Foundation as well as the PH-FHNW.

The conference is also supported by the Swiss Association for Geographic Education (www.vgd.ch).

The annual member meeting of VSGG (Swiss Association of Geography Teachers) will take place during the conference.

This is the program as of August 4. Updates, also e.g. for instance regarding the evening program, will be published on the conference homepage and the conference's Facebook page.

Sincerely,

the Organizing Committee



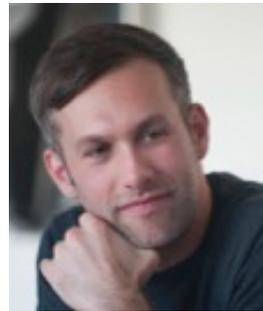
Dr. Kathrin
Viehrig

Co-Chair



Daniel
Siegenthaler

Co-Chair



Samuel Burri



Prof. Dr. Sibylle
Reinfried

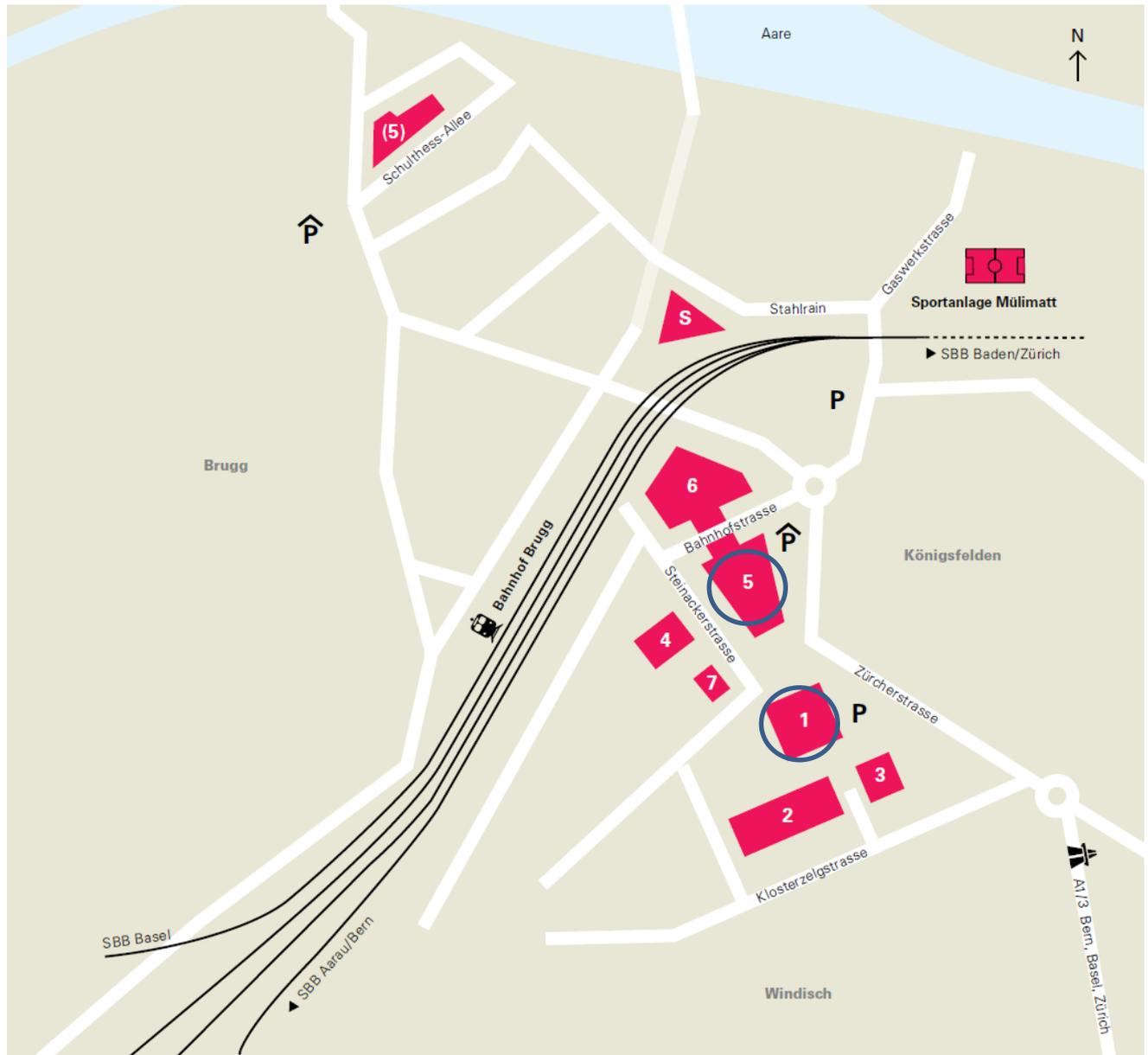
Advisory
member of the
organizing
committee

2 Venue

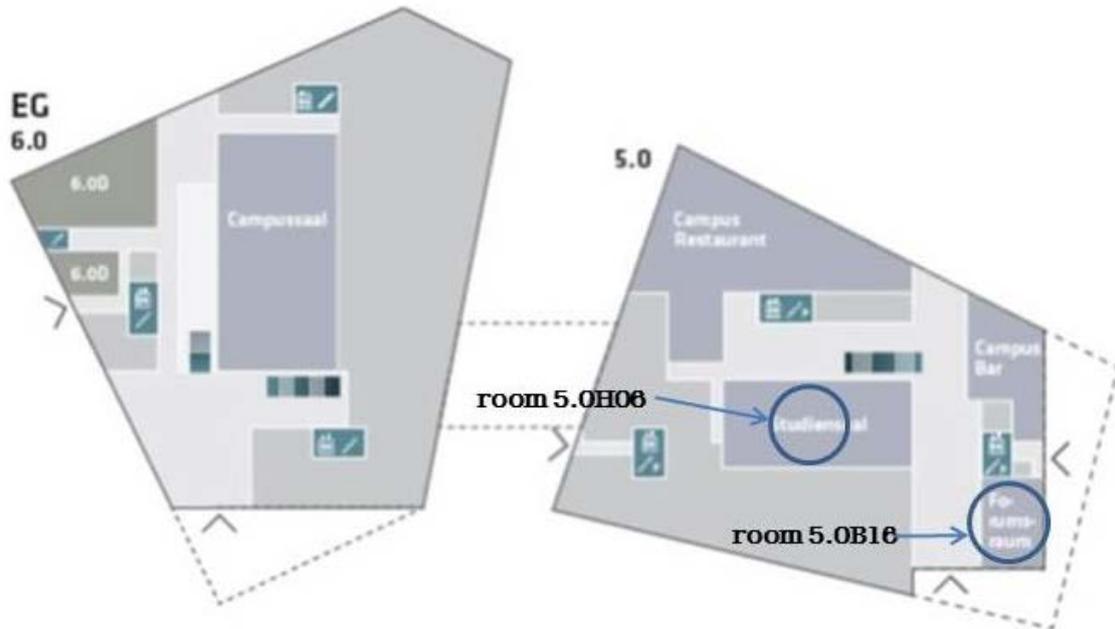
The conference will be held at the PH-FHNW on the Brugg-Windisch Campus. The conference desk will be in the hallway in building 5.

The campus is located directly at Brugg station, about 45 minutes from the Zurich Airport and about 1 hour 10 from the Basel-Freiburg-Mulhouse Airport.

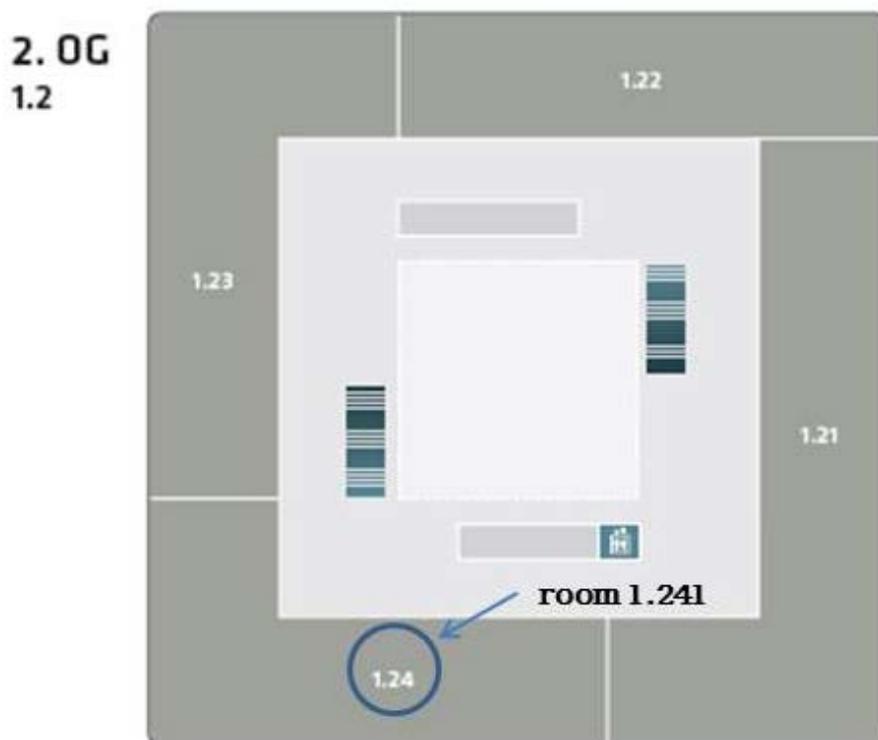
2.1 General plan of site



2.2 Floor plan: Building 5



2.3 Floor plan: Building 1



3 Conference program overview

3.1 Monday, September 26

9:00 – 9:30 am Room 5.0H06: Welcome

- Dr. Kathrin Viehrig
- Prof. Dr. Marko Demantowsky, Chair for Teaching and Learning of History and Social Studies
- Daniel Siegenthaler, Swiss Association for Geographic Education (VGD-CH)

Dr. Kathrin Viehrig (Switzerland): International perspectives on Geography and Earth Science Teacher Education – An Introduction

9:30 – 10:00 am Coffee & Tea Break

10:00 – 12:00

Room 5.0H06: Keynote session: The current situation of teacher education

Keynote 1: Prof. Dr. Sibylle Reinfried (Switzerland): Earth Science and Geography – more than just collecting rocks and knowing the countries of the world

Keynote 2: Dr. Theresa Bourke (Australia): Standards in Teacher Education – Mirage or miracle cure?

Keynote 3: Prof. Dr. Joseph Stoltman (USA): Geography's role in developing a worldview: teachers and students

12:00 – 1:30 pm Lunch

1:30 – 3:05 pm

Room 5.0H06: Session

- PD Dr. Stefanie Zecha (Germany): EarthCaching as a possibility to raise environmental awareness?
- Yvonne Behnke (Germany): Learning-Related Challenges Presented by Graphic Visualisations in Geography Textbooks
- Nina Scholten, Prof. Dr. Sandra Sprenger (Germany): The Missing Link between Competence and Performance – Introducing Noticing into Geography Teacher Education
- Prof. Dr. Sibylle Reinfried (Switzerland): „Wherever spring water is released, there must be caves” – An analysis of students' knowledge construction and reasoning about complex and abstract geoscience concepts and how they can be changed through instruction

- 3:05 – 3:35 pm Coffee & Tea Break
- 3:35 – 4:20 pm Workshops for teachers, teacher students and teacher educators
- Room 5.0B16: Marian Blankman (Netherlands): How to develop a good geography lesson
 - Room 5.0H06: Prof. Dr. Rolf Tanner (Switzerland): „Nachhaltige Entwicklung lernen – ein kompetenzorientiertes Lernmedium für die Sekundarstufe II“ (Learning sustainable development – a competence-oriented learning medium for upper secondary school)
- 4:25 – 5:10 pm Room 5.0H06: Panel discussion: How much of a geographer do you need to teach geography?
- Dr. Clare Brooks (UK)
 - Prof. Dr. Sibylle Reinfried (Switzerland)
 - Prof. Dr. Sarah Bednarz (USA)
 - Prof. Dr. Philippe Hertig (Switzerland)
- 5:10 – 5:15 pm Room 5.0H06: Closing Day 1

3.2 Tuesday, September 27

- 8:45 – 10:40 am Room 5.0H06: Keynote session: Selected challenges for teacher education
- Keynote 4: Dr. Thomas Kisser, Prof. Dr. Alexander Siegmund (Germany): In-service teachers', teacher trainers' and government stakeholders' views on competence based education
- Keynote 5: Dr. Joseph Kerski (USA): Benefits, challenges, and lessons learned in professional development for educators using GIS and other geospatial technologies
- Keynote 6: Marian Blankman (Netherlands): Content knowledge and pedagogical content knowledge of geography teachers: challenges and constraints
- 10:40 – 11:10 am Coffee & Tea Break

11:10 – 12:25 Sessions:

Room 5:0B16:

- Marco Lupatini (Switzerland): Which role does public space play in geography teaching?
- Prof. Dr. Michael Jabot (USA): The development of the Earth System Concept through authentic science research
- Dr. Olalekan Elijah Ojedokun (Nigeria): Tragedy associated with environmental commons – An application of the Skinnerian behaviour modification strategies in teacher training

Room 5.0H06: Room A:

- Gemma Collins (UK): Stuck Places – what are the threshold concepts involved in learning to teach geography?
- Prof. Dr. Eyüp Artvinli (Turkey): Impacts of in-service training on the practices of geography teachers in Turkey
- Dr. Wendy Harte (Australia): Integrating spatial technological, pedagogical, content knowledge (TPACK) learning opportunities in a secondary geography methods course

12:25 – 2:00 pm Lunch

1:25 – 1:55 pm Hallway: Poster briefs

2:00 – 2:45 pm Workshops for teachers, teacher students and teacher educators

- Room 5.0B16: Christian Sailer (Switzerland): Developing technology enhanced field trips
- Room 5.0H06: Dr. Georg Eysel-Zahl (Germany): Erneuerbare Energie und Nachhaltigkeit in der Bildung – Ein Projektvorschlag mit Handreichung und Unterrichtsmaterial (Renewable Energy and sustainable development in education – A project proposal with teacher guide and lesson material)

- 2:50 – 3:35 pm
- Room PC 1.241: Vera Fuchsgruber, Guido Riembauer, Dr. Nils Wolf, Prof. Dr. Alexander Siegmund (Germany): Satellite Images in Geography Classes – A Web-based Learning Environment
 - Room 5.0B16: Daniel Siegenthaler (Switzerland): Geschichte des Schulfachs Geographie (History of the school subject Geography)

Poster Briefs

3:35 – 4:05 pm Coffee & Tea Break

4:05 – 4:50 pm Workshops for teachers, teacher students and teacher educators

- Room PC 1.241: Dr. Joseph Kerski: Teaching with geotechnologies: Analyzing change from a geographic perspective using web maps, including population change, natural hazards, weather and climate, collecting and mapping your own field data, and creating, sharing, and assessing story maps and other web mapping communications tools
- Room 5.0H06: Daria Hollenstein, Prof. Dr. Susanne Bleisch (Switzerland): „IVGI Noise App“: Raising awareness of noise pollution and promoting spatial technologies in secondary schools

Room 5.0B16: VSGG (Swiss Association of Geography Teachers) annual member meeting

4:55 – 5:35 pm Room 5.0H06: Closing Keynote 7: Dr. Michael Solem (USA): A research coordination network for transformative research in geography education

5:35 – 5:45 pm Room 5.0H06: Closing of the conference

4 Keynotes & Panel discussion

All keynote presentations and the panel discussion will be in room 5.0H06

4.1 Earth Science and Geography – more than just collecting rocks and knowing the countries of the world – Prof. Dr. Sibylle Reinfried (Switzerland)

Human activities are today impacting the Earth system to such an extent, that the term 'anthropocene' has been suggested to denote our current era. Although Earth-related areas of study such as Earth science and geography contribute significantly to the currently required shift to environmental problem-solving, few people are aware of what 'Earth science' and 'geography' really mean and what the differences between the two fields of study are. While both disciplines include Earth's natural processes as well as human society, Earth science focuses on the possibilities and constraints of human activities by exploring the physical processes which shape our planet, while geography addresses the human dimensions of global change by examining societies in their spatial and regional context. Both fields of study share interdisciplinary research and teaching interests, such as water resources, soils and food, climate change, use of resources and their conservation, political ecology, environmental justice, historic preservation, urbanization, natural hazards, and sustainable development. Nowadays, colleges and universities offer study programmes which aim at a comprehensive understanding of the physical and economic potentials and limitations as well as of the uses and abuses of the Earth's natural resources by combining these distinctive, yet complementary disciplines. Yet, at schools in many countries, earth science and geography are being taught separately, with different educational foci being placed in each subject. This affects educational research in both disciplines in such a way that researchers in Earth science education and geography education often pursue their studies on environmental topics of global concern or on the understanding of learning processes without referring to their sister discipline. In this presentation, I explore the concepts of Earth science and geography education, their interrelationship and their conflicts. The pros and cons of a combination of both subject areas are discussed from the point of view of educational research using examples of my own research.

4.2 Standards in Teacher Education – Mirage or miracle cure? – Dr. Theresa Bourke (Australia)

Globally, professional standards as the backbone to accreditation in Initial Teacher Education (ITE) have been heralded as the magic ingredient for

improving teacher quality. In this presentation, I question the use of professional standards in teacher education by presenting findings from a recent case study in one Australian university. Discourse analysis techniques associated with Foucauldian archaeology expose the competing and often contradictory discourses that teacher educators have to navigate in the name of enhancing quality. I ask if standards really are the miracle cure for quality improvements in ITE or is it all a mirage?

4.3 Geography's role in developing a worldview: Teachers and students – Prof. Dr. Joseph Stoltman (USA)

Does developing a worldview among students, which has long been a major objective for geography teachers, persist in the 21st century? The discipline serves as a spatial platform for teachers to introduce students to the economic, social, and political changes that affect places and regions. Those changes in spatial patterns of trade, population, and territorial claims are key to understanding the global dynamics of the twenty-first-century. However, do they complement the larger ideas of international understanding and cooperation that have been promoted by world organizations in the past and present? This paper will address the vision of geography, the societal expectations of geography, the effects on geography education's pursuit of a worldview that teachers should encourage and that students should develop.

4.4 In-service teachers', teacher trainers' and government stakeholders' views on competence based education – Dr. Thomas Kisser Germany and Prof. Dr. Alexander Siegmund (project PI, Germany)

Competence-orientation plays a meaningful role in many recent school curricula. But how are the theoretical and conceptual approaches of competence-orientation based on educational research and how are they implemented in every day school life? The presentation deals with the question how the concept of competence-orientation is interpreted by teachers and how it is implemented in schools. It focuses on the subjective concepts of competence-orientation of different stakeholders participating in the implementation of competence-orientation in the Baden-Württemberg educational system.

Textbooks play the leading role when it comes to implement new curricula. From the view of teachers, textbooks often are regarded to be the most important element to implement the curricula in school lessons, and serve as an individual curriculum of the teacher in every day school life. Therefore one part of the study focuses on how the concept of competence-orientation is implemented in geography textbooks for Gymnasium (a type of secondary school, classes 5–12, students aged 10–17, considered the 'high stream' in the traditional three-stream system) in the view of different target groups of the school system.

Initially, the individual topics and hypotheses are generated based on qualitative expert interviews with educational stakeholders at ministries, seminars for teacher education and schools.

The stakeholders at the ministry and the seminars for teacher education suggest a strong use of media other than the licensed textbooks, or a different way of making use of the provided materials and tasks within the textbooks than it is intended. However, it seems that most teachers stick to the combination of tasks and materials arranged within the textbooks.

4.5 Benefits, challenges, and lessons learned in professional development for educators using GIS and other geospatial technologies – Dr. Joseph Kerski (USA)

What are the benefits, challenges, and lessons learned in professional development for educators using GIS and other geospatial technologies? Many of the benefits of the educational use of geotechnologies, including increased engagement with community and global issues, career pathways, spatial thinking, critical thinking, citizen science, field methods, and media fluency are the same now as when these technologies first made their appearance in education 30 years ago. The geotechnologies themselves, however, have seen rapid evolution. While technical challenges remain, the chief challenges are no longer technological but rather educational and societal: curricular and data resources, educator training, and suitable connection points for spatial thinking in an increasingly crowded primary, secondary, and university curriculum. Geotechnologies in education is undergoing massive transformation with the advent of web-based GIS and mobile applications. Lessons learned in conducting over 100 educator training institutes include taking advantage of online learning environments, tailored, short, scaffolded activity sets, and building a network of educators integrating geotechnologies into their disciplinary areas. Five societal forces—geoenablement, geoawareness, geotechnologies, citizen science, and storytelling—present an incredible opportunity to the geospatial education community to significantly move adoption forward in all levels of education.

4.6 Content knowledge and pedagogical content knowledge of geography teachers: challenges and constraints – Marian Blankman (Netherlands)

This presentation discusses the challenges and constraints Dutch primary teacher educators face when developing the pedagogical content knowledge of their student teachers. It also discusses the practicality and effectiveness of a possible approach (a geography course) to meet these challenges and what student teachers themselves think that they learn by applying this approach.

4.7 A Research Coordination Network for Transformative Research in Geography Education – Dr. Michael Solem (USA)

In 2013, National Geographic's Road Map for 21st Century Geography Education project issued a landmark study and research agenda for broad-scale improvements in geography education. The National Center for Research in Geography Education (NCRGE) was established in the immediate aftermath of the Road Map Project to support the long-term implementation of this research agenda. NCRGE works to strengthen geography education research processes by creating the networks, opportunities for interdisciplinary conversations, and publicly-accessible datasets and scientific resources supporting sustainable lines of research in key areas of geography education. Through its Transformative Research grant program, NCRGE is building a research coordination network comprised of geographers, education researchers, students, and teachers. Network members are using grant funds to organize thematic research groups and plan research activities that have significant potential to foster the development of evidence-based practices, new knowledge and theory, more robust curricula, better standards and assessments, and high-quality teacher training programs. In this presentation I will highlight the goals and activities of the initial cohort of research groups funded by the NCRGE Transformative Research program. I will also provide information about procedures for joining the NCRGE research coordination network, which is open to scholars in any country.

5 Presentations

5.1 EarthCaching as a possibility to raise environmental awareness? – PD Dr. Stefanie Zecha (Germany)

Earthcaching as a special form of geocaching provides an engaging and often adventurous opportunities to learn geoscientific content in non-formal settings and to spend time in nature. Previous studies have shown that nature experience is an important factor to explain environmental consciousness. The target of this empirical study is to collect actual information about the environmental consciousness of Earthcachers. The data was collected during International EarthCaching Event in Goslar in October 2015. For the operationalization, the author used a well-tested questionnaire to measure environmental consciousness. The structure of the questionnaire is divided in environmental knowledge, mental attitude and action. The target of the study is to get to know if Earthcachers increased values in this field. Important issues:

In which scale are the EarthCachers very good?

Which independent variable can be used to explain e.g. environmental action?

The data set was analyzed with the computer programme SPSS and statistic methods. The author will present a significant selection of the various results and possible explanations.

5.2 The Missing Link between Competence and Performance – Introducing Noticing into Geography Teacher Education – Nina Scholten and Prof. Dr. Sandra Sprenger (Germany)

Teachers have a considerable impact on students` learning. Apart from teacher knowledge (PCK, CK, PK) and a certain set of beliefs and motivations, professional teachers possess situational skills when performing in the classroom. This aspect of their competence deserves closer scrutiny. With reference to mathematical teacher education this competence facet is called “Noticing” (Sherin, Jacobs & Philipp, 2011) and can be conceptualized with Blömeke`s PID model (Blömeke, Gustafsson & Shavelson, 2015). A teacher has to perceive (P) a noteworthy situation in the classroom, she has to interpret it (I) and decide (D) how to respond. The aim of the research project is to measure the subject specific Noticing of pre-service geography teachers with the help of staged video vignettes. The presentation focusses on the construction of the vignettes and provides examples.

5.3 Learning-Related Challenges Presented by Graphic Visualisations in Geography Textbooks – Yvonne Behnke (Germany)

Knowledge acquisition from graphics is a complex process that represents a cognitive challenge to many students. This cognitive challenge is multifaceted; multiple representations of information must be decoded and interpreted in the respective learning context. This paper investigates learning-related challenges posed by graphic visualisations in geography textbooks. It also examines the role that information design plays in knowledge acquisition from geography textbooks and explores why graphicacy is a crucial competency in the context of geography education.

Eye tracking as a visual method of data collection and analysis was utilised to examine the degree of visual attention students devoted to graphic visualisations while observing geography textbook spreads. In an exploratory random sampling, the eye movements of 20 students (secondary school and university students) were recorded. The objects of the research were double-page spreads of geography textbooks covering an identical topic and sampled from five separate textbooks. After the eye tracking examination, each participant completed a questionnaire. Based on the eye tracking documentation, the questionnaire, and a textbook analysis, learning-related challenges posed by graphic visualisations in textbooks will be elucidated and related to educational psychology insights and findings from information design. It can be concluded

that a coherent presentation of graphic information could be one crucial factor for successful knowledge acquisition from geography textbooks. However, the eye tracking study revealed that graphic visualisations were often inspected rather superficially by the participants.

5.4 “Wherever spring water is released, there must be caves” – An analysis of students’ knowledge construction and reasoning about complex and abstract geoscience concepts and how they can be changed through instruction – Prof. Dr. Sibylle Reinfried (Switzerland)

Laypeople’s hydrological understanding is inadequate and characterized by erroneous conceptions, although water related issues belong to the most pressing problems of the 21st century. To better understand how students’ construct hydrological knowledge and change prior, mostly intuitive conceptions an explanatory in-depth investigation based on the case study method was employed. An analysis of the learning pathways of ten 12-year old students concerning their knowledge construction and reasoning about hillslope springs was conducted. An instructional sequence embedded in a pre-post-test design provided qualitative data which was analysed using content analysis that allowed the reconstruction of the students’ knowledge evolution. The instructional sequence aimed at deep learning and included worksheets, experiments, physical spring models, phases of co-construction and one-on-one tutoring interviews. The transcripts of the students’ videotaped learning phases and the tutoring interviews, students’ annotated drawings and their answers to the questions in a questionnaire served as the database for qualitative content analysis. The results indicate that the students’ prior knowledge played a dominant role in their knowledge construction processes. Students with no spring-related or science-related pre-knowledge constructed explanations that represented the formal scientific concept used in the teaching materials. Students with elaborated, experience-based but unsuitable pre-knowledge had great difficulties to change their ideas and did not perceive essential differences between their personal explanations of springs and the educational model used in the instructional sequence. In this presentation two case studies of students’ development of their conceptual understanding are presented and discussed.

5.5 Which role does public space play in geography teaching? – Marco Lupatini (Switzerland)

If you ask people to define geography most of them would mention in their answers the concept of space. According to Hertig (2012) geography analyzes the relations between societies and space, and between societies through space. Lussault (2007) defines space as a „méga-concept intégrateur“ that includes all other spatial concepts. A specific spatial concept important for geography

teaching that contributes to the formation of future responsible members of the society is public space. Controversial issues on public space, or reflections on that concept give pupils interesting instruments for their adult life as citizens. During my presentation I would like to reflect on the way teachers training, both for lower and upper grades in secondary schools, contributes to motivate future teachers to include this concept in their professional practices.

5.6 Promoting conceptual change and deep understanding in the Earth Sciences: an online approach – Dr. Rod Lane (Australia)

This paper describes the conceptual change principles used in an online module designed to improve pre-service teachers' depth and accuracy of understanding of key weather and climate processes. The online intervention was developed in response to growing concerns about the content and pedagogical content knowledge of pre-service primary teachers and secondary teachers of both Geography and Science. The module addresses both the cognitive and affective dimensions of the conceptual change process. A range of activities have been designed to elicit prior conceptions and initiate cognitive disequilibrium and constructive confusion. The module also builds metacognitive awareness through a series of reflective tasks that enable future teachers to see the inconsistencies between their existing mental models and the scientific explanations. Preliminary results from the piloting of the module are also discussed.

5.7 The development of the Earth System Concept through authentic science research – Prof. Dr. Michael Jabot (USA)

This presentation will share an integrated approach for the development of spatial and scientific reasoning in the context of global awareness. The Global Learning and Observations to Benefit the Environment (GLOBE) Program is an international science and education program that provides students worldwide with the opportunity to participate in data collection and the scientific process, and contribute meaningfully to our understanding of the Earth system and global environment. The outcome of this approach is the development of science understanding in the context of global environmental issues based on authentic scientific practices and processes. Central to this impact is the opportunity that GLOBE allows for teachers to link their local data with the data of teachers worldwide in situ. Resources that are available for the replication of this approach as well as initial impacts on candidates and students that have been exposed to this work will be shared with attendees.

5.8 Stuck Places – what are the threshold concepts involved in learning to teach geography? – Gemma Collins (UK)

The presentation will give an overview of my PhD research – An exploration of threshold concepts associated with teacher education – at the University of Birmingham, UK, which is principally done through work with geography education students.

The early stages of a literature review of the role of threshold concepts and liminality (Meyer and Land, 2003; 2005) in teacher education has been conducted. This literature review considers the ways in which trainee teachers [of geography] experience 'stuck places' (Ellsworth, 1997), and how they can be supported in making progress beyond those stuck places. The difference between 'core' and 'threshold' concepts has been examined, along with 'troublesome knowledge' in geography. Some parallels with 'geo-capabilities' (<http://geography.org.uk/projects/geo-capabilities/>) can be drawn.

Initial methods of data collection (including trainee reflection on 'stuck places' and 'lightbulb moments' of geographical learning) have been piloted, and I would like to present these, along with the early findings of this qualitative data collection. The particular focus, building previous conference presentations on this research, will be on 'progress charts' completed by trainees, and followed up by semi-structured interviews.

This work has wider implications for the design of existing and new courses of ITE, and for the ways in which we mentor and support trainee teachers. The research has been linked with my teaching this year with PGDipEd students who have been involved in the piloting of methods including the progress charts.

5.9 Tragedy associated with environmental commons – An application of the Skinnerian behaviour modification strategies in teacher training – Dr. Olalekan Elijah Ojedokun (Nigeria)

Environmental 'commons', such as the atmosphere, oceans, rivers, fish stocks, national parks, advertising, grazing land, road networks and even parking meters are under strain that create a lot of tragedies which always come on humanity without notice. If Geography, Social Studies and other Earth Science Teachers will impart knowledge, change attitude and influence people's behaviour positively towards these commons, teacher educators have to orientate their teacher trainees on the techniques of teaching that could enhance their easy learning. One of such strategies is the behaviour modification strategy propounded by B.F. Skinner in the 1950s which still has relevance till date as it is based on the values of operant conditioning whereby the undesirable behaviour are exchanged with more suitable ones and which has been successfully used to treat anxiety, obsessive-compulsive disorder (OCD), enuresis (bed-wetting), among others. The theory posits that behaviour can be

weak, excess or a deficit, hence relevant efforts could be made to increase, decrease or manage the behaviour, using the SORCK Equation and behaviour change techniques such as shaping, chaining, modelling, prompting, fading and reinforcement. This paper therefore provides socio-critical review of the theory and designs a pedagogic model that could guide teacher educators towards preparing their preservice and in-service trainees for further action that will facilitate aversion of the tragedy of the commons among the larger populace using the school as the link.

5.10 Impacts of In-Service Training on the Practices of Geography Teachers in Turkey – Prof. Dr. Eyüp Artvinli (Turkey)

The aim of this study is to analysis the effects and impacts of in-service training on practices of geography teachers in Turkey. After geography curriculum has been changed in Turkey more than ten years ago, in-service training of geography teachers has become one of the most important phase in front of geography curricula. Thus, it was researched how teachers are trained to teach geography and what are the main effects of in-service education on practices of geography teachers. In this study, the situation of in-service education of geography teachers in Turkey has been analyzed from the teachers' perspectives. Thus it has been applied a survey for geography teachers and the results has been analyzed by SPSS. It is suggested that it must be developed a new approach within the curricula by the universities and Ministry of Education according to new standards of the ministry and geography curriculum about teacher education for geography teachers.

6 Workshops

6.1 How to develop a good geography lesson – Marian Blankman (Netherlands)

This workshop starts with exploring the seven characteristics of a good geography lesson on the basis of an example. Then the participants get to work designing a geography lesson based on an everyday geographical issue. Finally, we exchange experiences with regard to the usefulness of this approach in different contexts.

6.2 Developing technology enhanced field trips – Christian Sailer (Switzerland)

Courses in many STEM programs feature learning content which is related to places in the real world. This applies especially to Geography, Earth science, Biology and History, but also the language subjects, economics and law have relations to place-related content. Teaching this content in the classroom often remains decoupled and distant from the typical working environment of the respective discipline. From research on location-based mobile learning it is well-known that teaching such content at the respective location using mobile technologies can improve the learning effect by complementing conventional didactical methods.

The OMLETH project („Ortsbezogenes Mobiles Lernen an der ETH Zürich“) has the goal to develop a generic platform for location-based mobile learning, enabling an easy use of these location-based mobile learning concepts. The created learning units by geographically areas will be accessible only in situ to students with a map-based mobile app. The learning units differ from storytelling, instructions to situated observations or game-based exploration and can be executed individually or in collaboration during learning sessions and field trips. Several courses on different age levels have been carried out so far and many important findings have already been gained.

This workshop will start with a very short field trip around the conference building to experience the capabilities of this platform using a sample lecture. The follow-up firstly shows the teacher-based configuration of this trip, provides some insights of recent studies and concludes with a discussion about benefits, challenges, and lessons learned

6.3 Satellite Images in Geography Classes – A Web-based Learning Environment – Vera Fuchsgruber, Guido Riembauer, Dr. Nils Wolf, Prof. Dr. Alexander Siegmund (Germany)

In this workshop, a new online learning environment for the application of original satellite images in schools is presented. The platform features ten learning modules covering grades 5-13. Each module deals with an up-to-date geographic question connected to the German curricula and presents information in an interactive way. The overall didactical approach focuses on problem-based learning. For an easy application in class the modules can be completed in 90min. Each student receives a printable certificate after successful module completion. The participants of the workshop can explore an exemplary learning module including a web-based remote sensing software for students (BLIF) which is implemented in the learning environment.

6.4 „IVGI Noise App“: Raising awareness of noise pollution and promoting spatial technologies in secondary schools – Daria Hollenstein und Prof. Dr. Susanne Bleisch (Switzerland)

Noise pollution is a widespread environmental problem, particularly in urban areas. Noise can be a nuisance and extended exposure to environmental noise can have serious adverse effects on human health. Members of the Institute of Geomatics Engineering (IVGI) at the University of Applied Sciences and Arts Northwestern Switzerland (FHNW) have developed the “IVGI Noise App” (<http://www.see-you.ch/decibel>), an application to map and view noise level data. The web application is available for use in environmental education. The aim is to raise awareness of noise pollution and its consequences among secondary school students while fostering their interest in spatial technologies by highlighting the role and potential of GIS in locating and assessing environmental problems and helping to find solutions. In the proposed workshop, the “IVGI Noise App” and its use in secondary school education will be introduced. Workshop participants will then use the app to conduct a short noise survey around the conference location.

6.5 Teaching with geotechnologies: Analyzing change from a geographic perspective using web maps, including population change, natural hazards, weather and climate, collecting and mapping your own field data, and creating, sharing, and assessing story maps and other web mapping communications tools – Dr. Joseph Kerski (USA)

Join Joseph Kerski as we explore a variety of human and natural-caused changes from the local to global level using web mapping and field collection tools, including population change, earthquakes and storm-related hazards, and weather and climate extremes and patterns. These web mapping tools can be used on any device, employ Software as a Service technology, and are able to be modified and shared. They are able to incorporate real-time data and can be examined in 2D and 3D. In this workshop, we will symbolize and classify data, use spatial analysis, include field-collected citizen science data, and build web maps and multimedia web mapping applications including story maps.

6.6 Geschichte des Schulfachs Geographie (History of the school subject Geography) – Daniel Siegenthaler (Switzerland)

Im Workshop werden Ziele und Inhalte des Schulfachs Geographie auf der Sekundarstufe II im deutschschweizerischen Raum thematisiert. Gegenstand des Workshops werden ausgewählte Quellen aus der Zeit seit dem 2. Weltkrieg sein (z.B. Lehrpläne, Protokolle des Vereins Schweizer Geographielehrerinnen und -lehrer). Ziele des Workshops sind einerseits Forschungsmethoden,

andererseits Einblicke in die Geschichte und Entwicklung des Schulfachs Geographie.

6.7 Nachhaltige Entwicklung lernen – ein kompetenzorientiertes Lernmedium für die Sekundarstufe II (Learning sustainable development – a competence-oriented learning medium for upper secondary school) – Prof. Dr. Rolf Tanner (Switzerland)

Seit der Lancierung der globalen Agenda 2030 für nachhaltige Entwicklung (NE) der Vereinten Nationen mit der Setzung von globalen Zielen für nachhaltige Entwicklung (Sustainable Development Goals, SDG) hat der entsprechende Bildungsdiskurs (Bildung für Nachhaltige Entwicklung, BNE) eine neue Dynamik erhalten. Die Sekundarstufe II und insbesondere das Gymnasium ist davon aber bisher wenig berührt worden. Das gemeinsame Projekt der PHBern und des Centre for Development and Environment (CDE) der Universität Bern zielt darauf ab, für die Sekundarstufe II ein kompetenzorientiertes Lernmedium für NE mit einem geografiedidaktischen Fokus zu entwickeln, um eine entsprechende Lücke im Angebot für den gymnasialen Unterricht zu schliessen. Das Lernmedium wird die neuen Entwicklungsziele aufnehmen und mit einem praktikablen Nachhaltigkeitsmodell in Kombination mit Übungsaufgaben, aufgearbeitet nach einem angepassten Lehr-Lernmodell, den Schülerinnen und Schülern einen aktiven Zugang zu NE ermöglichen. Die zugrundeliegenden Kompetenzen werden durch das Lernmedium bei den Lernenden aktiv gestärkt. Ein Teil des Lernmediums soll eine interaktive Lernplattform bilden, die verschiedene Lernaktivitäten ermöglicht. Das Lernmaterial, aufgebaut auf Daten des CDE aus vier Kontinenten (diverse GIS Daten, Monitoringdaten, verfügbare Online-Tools, verschiedene Kartenmaterialien und thematische Atlanten) macht aufschlussreiche Informationen zu ganz unterschiedlichen Räumen und Themenkreise mit Bezug zu NE zugänglich, eingebettet in den neuen Maturitätslehrplan. Die Kombination mit Daten aus der Schweiz ermöglicht den Lernenden durch das Lernmedium den Transfer zu ihrer eigenen Lebenswelt herzustellen.

6.8 Erneuerbare Energie und Nachhaltigkeit in der Bildung – Ein Projektvorschlag mit Handreichung und Unterrichtsmaterial (Renewable Energy and sustainable development in education – A project proposal with teacher guide and lesson material) – Dr. Georg Eysel-Zahl (Germany)

Das Bildungsprojekt „Zukunft gestalten – mit Kindern erneuerbare Energie entdecken“ der gemeinnützigen und unabhängigen VRD Stiftung für Erneuerbare Energien wurde in Kooperation mit der Pädagogischen Hochschule Heidelberg entwickelt. Es ist speziell für Lehrkräfte weiterführender Schulen – hauptsächlich Sekundarstufe I – konzipiert, die das Thema (erneuerbare)

Energie, Klimaschutz und Nachhaltigkeit erlebnisorientiert umsetzen möchten. Im Workshop wird die VRD Stiftung, der gesellschaftliche Kontext des Themas – die Energiewende – sowie das abwechslungsreich gestaltete Unterrichtsmaterial vorgestellt. Dieses besteht aus einer Lehrerhandreichung, umfangreichen Arbeits-/ Lösungsblättern sowie 21 Holzboxen mit Lernspielen und Experimenten zum Thema (erneuerbare) Energie und nachhaltige Entwicklung. Dieses Material steht im Workshop aufgebaut zum Testen zur Verfügung. Aufgrund des modularen Aufbaus sind die Materialien zeitlich flexibel einsetzbar: Als Unterrichtseinheit bis zu einem ganzen Schuljahr (zwei- bis vierstündig), Projektwoche oder AG. Geeignet sind die Materialien für Schulfächer wie Erdkunde, Physik, Biologie, Chemie sowie vor allem auch im Fächerverbund, aber auch in Zusammenarbeit mit Ethik und Religion. Exkursions- und Literaturvorschläge runden das Programm ab. SuS der Sekundarstufe I setzen sich, im Klassenverband oder in Gruppen aufgeteilt, aktiv mit den Unterrichtsmaterialien zum Thema erneuerbare Energie (Sonne, Wind, Wasser, Biomasse), Klimaschutz (Treibhauseffekt, Kohlenstoffkreislauf) und Nachhaltigkeit (Grundsätze nachhaltiger Mobilität, Schul-Kita-Patenschaften; Lernen durch Lehren) auseinander. Die einzelnen Unterrichtsmodule schließen mit einem Patenbesuch der SuS in einer benachbarten Kita oder Grundschule ab. Dabei übernehmen die SuS die Rolle der Lehrkraft und geben ihr erworbenes Wissen spielerisch und altersgerecht an Vorschul- oder Grundschulkindern weiter. Neben der inhaltlichen Themenvermittlung wird damit auch soziale Kompetenz vermittelt, es entstehen Vertrauen und dauerhafte Bildungspartnerschaften zwischen den Einrichtungen. Bildungsübergänge werden erleichtert.