



Paper Presentation Abstracts – alphabetical order by presenter

E2017-P13 Nina Challenges for Modernization of Higher Geographical Education in
 Alekseeva Russia

There are 54 universities offering bachelor programs in Geography in Russia and 31 universities which deliver post-graduate programs. The results of teacher's and student's surveys show the need of modernization of higher geographical education in Russia. Currently the new version of standard curriculum is under elaboration with the aim of adjusting education to the labor market needs. Teachers' community is ready to deliver competencies to the students which are linked to the professional requirements. At the same time there is serious concern about the insufficient representation of Geography in the emerging system of professional standards in Russia and in the National Classification of Occupations based on ISCO-08. The introduction of teaching module in the training of geographers is under debate. There is the urgent need to establish employers' associations in the field of Geography which can promote the wider niche in the labour market for the graduates from Russian universities.

E2017-P9 Teresa New technologies in the service of citizenship for the enjoyment of
 Amodio the cultural heritage

The research starts from the conceptual paradigm in which new technologies are changing, and in some ways by strengthening the use of cultural heritage. This approach is most effective when the cultural offerings are based on the realization of maps and geographical studies in addition to presenting the cultural heritage, we can collocate and the goods themselves within the contexts of belonging. It is also stated that the use of cultural heritage should not just be aimed at an audience of tourists but can contemplate how users also and primarily individuals and communities for a wide and conscious growth.

More precisely, the idea is that every place of the community, is a dynamic and active, evolving system: far from crystallize as anchored to the past space, the promotion of cultural heritage it implements the full potential, integrating them into the everyday life of citizens since the exercise of knowledge and the appropriate use of technology can make a significant contribution to improving the quality of life.

On this basis is presented the experience Salerno initiative in particular which is a systematic project dedicated to the extraordinary cultural heritage of the city and had the goal of knowledge, protection and enhancement, in which the multiple knowledge of the University have found a natural location since turned to the service of citizenship.

Salerno in particular embodies many initiatives scattered inside the Old Town: a photo exhibition dedicated to the 'signs' precious that dot the urban space, an interactive thematic maps and some multimedia installations, as well as a video and some App that will accompany the visitor to the rediscovery of the heritage and the size of the historical center, are the pins which make up a new idea to fruition of the cultural heritage of Salerno.

All these initiatives were possible because supported by adequate knowledge base, from a



scientific commitment without which there can be no valid form of protection and enhancement. Working for the knowledge of the cultural heritage of Salerno means committing to return to the public share a significant system of monuments, tradition and memory; each element of the historic center - museums, archaeological remains, the shape of the blocks and courtyards, the trend of the streets, the architecture of the palaces and churches - are telling the stratification of lives and cultures from which flows the form of current city, one in which every day we work and of which we are entitled to the knowledge ".

E2017-P5 Eyüp Artvinli Developing Map Literacy of First Year University Students

Co-author: Z. Melis Demir.

This study has two aims: To evaluate and define map literacy level of students' in the first year of classroom education program. And the second aim is try to develop different types of students during 4 weeks in the course of Geography 2 hours per week. It was used a ready map literacy scale published by Koc and Demir (2014) in order to define the level of map literacy of students. Then it was organized 4 weeks activities in order to develop of different types of map skills on students. Normally it should have spent only 2 weeks to develop map skills of students according to schedule of Geography course. But we extended it in order to develop map literacy of students. Main tools were GIS lessons and map of isohips. At the end of four weeks, interviews and survey were used to determine whether map skills developed after taking the class. Surveys were conducted in a pre-test, post-test fashion at the beginning and the end of the 4 weeks class. The students were found to deepen their map literacy after taking the class.

Keywords: Map Skills, Map Literacy, GIS Using, Geography Education

E2017-P12 Eyüp Artvinli Where we are in Recycling Education? An Overview of Geography Curriculum and Textbooks in Turkey

Recycling plays a key role in the developed western countries, which, when compared with Turkey, is a very large potential and brings economic value added, as well as helping to solve environmental problems. As a matter of fact, in Turkey it has been started to be considered in recent years and a "National Recycling Strategy Document and Action Plan for 2014-2017" was prepared by the Ministry of Science, Industry and Technology for the first time in Turkey. Educationally, the action plan also included a plan to raise awareness of citizens, especially children, on recycling. Within this scope, it is anticipated to establish, increase and support project-like activities that students can actively participate in recycling. The recycling rates in Turkey, both in the general sense and also in different sectors, are extremely low, far behind the European Union average. Recycling is becoming easier, cheaper and more robust by the society at an early age, and the way it is handled in the education system and its place is gaining importance. However, considering the literature, it is seen that this issue is not adequately discussed in the context of geography education.

The aim of this study is to investigate the perspective and perspective of the geography curriculum and textbooks in Turkey which has become a very important problem for Turkey and which has extremely low recycling rates comparing with western countries. For this purpose, the current secondary school geography program and the drafted geography program have been examined by document analysis method. In addition to this, current geography textbooks were also analyzed



with the method of content analysis. According to the results of the document analysis, there is only one standard in the 11th class and one item in the 12th class in the current program which deals directly with the recycling. Moreover there was no emphasis on the purpose of the curriculum that directly reflected the recycling. There is a need for recycling education in Turkey to be reconsidered with more effective ways and tools and in all dimensions from the current situation. This approach can help to raise awareness and higher levels of awareness that will save the future in recycling, which has become a major economic and environmental problem in Turkey.

Keywords: Recycling, geography curriculum, geography education, environmental problems, environmental education, Turkey

E2017-P2 Dóra Bálint iGeo – talented students' place in a changing world

Geographical excellence requires a wide range of skills above lexical knowledge mainly practical use of information linked to space. International Geography Olympiad (iGeo) is an annually held competition among the best secondary school students aged between 16 and 19. Young participants are selected through national competitions thereafter they meet in a host city every August to test their geographical skills in classrooms and also in the field. The prestige of the Olympiad is growing, more and more countries send a team, leading to 46 participants by 2016. In this study, I focus on this worldwide competition in three different levels. First, we concentrate on the national competitions where the four-member teams are selected. My research aim is to study the differences between the methods of selection and preparation in each country and find answers why they perform better or poorer in iGeo. In the second part, I analyse the structure of the Olympiad itself regarding the main trends of topics and tasks, which try to measure students' knowledge with a background of different national education systems. Finally, we examine the future path of talented students with follow-up questionnaires to provide an insight not just about their career possibilities but also about the general image of Geography in the world.

Keywords: International Geography Olympiad, young geographers.

E2017-P6 Erik Characteristics of test items and scoring rubrics appealing to
Bijsterbosch meaningful learning; a case study in pre-vocational geography
education in the Netherlands

Summative assessments tend to encourage students' rote learning instead of meaningful learning. Yet, summative assessments might contribute to meaningful learning when these assessments meet certain criteria. To contribute to meaningful learning, teachers and students should be scaffolded with strategies to cope with the test items and scoring rubrics. In 2016 a small-scale case study was conducted with six geography teachers in pre-vocational education to examine which characteristics the test items and accompanying scoring rubrics should have to contribute to meaningful learning and which strategies to scaffold both teachers and students are feasible and practical. Results showed that teachers were most positive about pre-structured test items and the principle to test 'what a student knows' instead of 'if the students knows or can do a predetermined thing'. Both teachers and students were also positive about the application of a flow chart to scaffold students in answering these test items.



E2017-P8 Marian Blankman Geography in primary teacher education

Co-authors: Dr Marian Blankman, Inholland University of Applied Sciences, Dr Susan Pike, DCU Institute of Education, Dublin

Geography Education is a component in Initial Teacher Education across Europe. The time and staffing allocations of Geography Education in Primary Teacher Education courses appears to vary significantly across and within countries. The content of GTiTE appears to have some common traits across countries in terms of content and methodologies; but again varies between and within countries.

Despite these differences the issues of Geography Primary Teacher Education are often common across Europe. In many countries, geography is a marginalised subject in schools and makes up only a very small part of ITE courses at primary level. This is reflected in Geography in Teacher Education courses, where the subject can be marginalised and underfunded. However, from students' perspectives Geography Education is generally valued as an important part of children's primary education.

This session will outline issues, research and innovations in Geography Teacher Education in Primary ITE courses, including:

- Marian will present the main results of recent research on an approach to develop the PCK for the subject geography
- Susan will review the range of issues in geography teacher education and some future directions for research in geography teacher education.
- Susan and Marion will use their thoughts above as a starting point for a discussion on opportunities for further research and cooperation in the international community of geography-teacher educators.

Key Words: Initial Teacher Education, Primary Geography, Pedagogical Content Knowledge.

E2017-P1 Nina Brendel Using Tablets and web 2.0 tools to foster geographical thinking

Geographical education today has to respond to new challenges for learners, such as thinking in systems, reflective thinking and a profound digital literacy. Mobile devices and web 2.0 tools can support the acquisition of these skills. To assist students to develop these competencies, however, student teachers have to acquire adequate skills first.

Therefore, we present a digital learning concept of pre-service geography teachers that is used at the University of Münster, Germany: Firstly, we present how mobile devices (e.g. tablets) and web 2.0 tools are integrated in the study program. Secondly, we discuss the gains for geographic teacher education by presenting results from two studies: The first study illustrates how weblogs can be used in Higher Education to foster reflective thinking, the second aims at triggering systems thinking of geography student teachers. Eventually, we address potentials and challenges of implementing mobile devices and web 2.0 tool in geographical Higher Education.



E2017-P11 Nina Brendel How to diagnose and individually trigger student reflection on geography

Although reflective thinking is a key element of geographical education, there is little research on if or how deeply (high school) students reflect on geographical issues. Grounded on the work of Dewey and Schön, the study presented here aimed at developing a multi-stage model of reflective thinking that enables researchers and teachers to diagnose the extent of student reflection on geography. Based on the geography units (4 to 8 weeks) of four high school classes in Germany, this qualitative, exploratory study analyses the extent of reflective thinking observed in those four geography classes and determines factors that influence student reflection. Moreover, we present triggers that proved useful in order to individually foster student reflection on geography.

E2017-P13 Kelly Butler Achieving a Future 3 curriculum

My paper examines lessons which I planned as an attempt to deliver a Future 3 curriculum. I want to ensure my students are taught powerful geographic knowledge. But wanting is not necessarily doing. In the United Kingdom, the new specifications are rigorous and notably content heavy. New pressures on the elusive 'Grade 9' are mounting and doubt of achievement is rife.

How can a department manage the pressures of these changes with the desire to deliver powerful knowledge? This study is focused on the practice of my geography department within an independent school in the United Kingdom. Three instances are assessed using teaching practice from two different geography teachers. There is presence of Future 3, however, limitations of teaching time provide the largest hurdle. This paper reflects on the success of delivering powerful knowledge within the time constraints of the curriculum.

E2017-P4 Lee Cahaner Segregated communities in Israel and the openness to general studies and geographical education - Case study of the ultra-Orthodox community in Israel

The segregation of population is a main axis in the research of urban geography, which focuses on the spatial and functional relations between settlements. In Israel this phenomenon has a unique expression in the spatial processes related to the ultra-Orthodox population. This population holds a set of interactions both internally as well as with the non-Orthodox surrounding population based on historical and contemporary motives and belief that its strength depends on homogeneousness and separation.

The aim of the research is to understand the series of social influences of the spatial location of the ultra-Orthodox community in a mixed city (secular and ultra-Orthodox) or in a segregated city (entirely ultra-Orthodox), and the openness to general studies in general, and geographical studies in particular. How does the shared space affect the possibility of physical and academic interaction between the segregated community and the surrounding population? And in addition, the question is explored of how a segregated space is liable to obstruct this interaction, and what are the implications of this seclusion for the set of connections with the State and the general population in spatial, economic and social contexts.



USA: International Society for Technology in Education.

Remmen, K. B. (2004). Reconsidering recommendations for educational fieldwork in earth science: Exploring students' learning activities during preparation, in the field and follow-up work.

(Doktorgradsavhandling), Det matematisk-naturvitenskapelige fakultet, Universitetet i Oslo: Oslo.

Stainfield, J., Fisher, P., Ford, B., & Solem, M., (2000). International Virtual field trip: A new direction? *Journal of geography in higher Education*, 24(2), 255-262.

E2017-P3 Krisztina Geoinformatics in education during lessons
 Dékány

The central theme in public education is how to motivate students, what tools helps to get a better, faster learning the lessons even in class or at home. Geoinformatics had already been implemented in other countries' educational systems, which could be used in Hungary as well. Geoinformatics in education has started slowly, but there are very good results. International organizations were given many opportunities to develop projects engaging spatial analysis capabilities of information technology to help the students. These companies provides data and software for teachers, in some places training and textbooks too, which I think is a prerequisite for proper application. That's why many countries have also incorporated basic GIS application into the national curriculum.

In Hungary, due to the transformation the National Curriculum, decreased the possibilities to implement geoinformatics in the teaching process. Nevertheless, in September of 2014 I started a GIS study group at II. Rákóczi Ferenc High School with a few but enthusiastic students. With them I try find some useful ways to introduce GIS applications in public education.

E2017-P3 Fran Using GIS to improve geographic knowledge among secondary school
 Domazetović teachers and students

Co-authors: Fran Domazetović, Darija Borić, Ante Šiljeg, Nina Lončar, Jurica Botić.

GIS has found a place in various school curricula worldwide, thanks to its didactical advantages and interdisciplinary approach. At the same time, national GIS curriculum still does not exist in the Republic of Croatia, thereby the implementation of GIS in the educational system is in the initial phase of development.

There are several reasons that make introduction of GIS in the educational system difficult and slow – therefore in this paper, some of the most common aggravating factors for efficient GIS implementation in Croatian educational system will be specified. Teachers who are insufficiently informed about its possibilities represent a serious barrier to a more intensive and thorough implementation of it. Furthermore, limited normative flexibility of educational regulations, as well as curriculum obsolesce, which require urgent content actualization, do limit such innovativeness in the field of educational process. Therefore, the purpose of this study was to inform teachers and students in ten high schools with main features and advantages of GIS, through five students' presentations about that particular topic. Each of them is accurately prepared and explains the practical application of GIS in various fields.

After the presentation of the five students' topics, study participants had been interviewed so their attitude towards GIS implementation in schools could be determined. Results of this study indicate



that appreciable interest in GIS implementation exists, despite numerous difficulties.

Key Words: geography education, GIS, high schools, Croatia

E2017-P7 Mathias Geowindow – the interactive learning media for natural sciences
Faller

Geowindows are innovative teaching media for scientific fields. Finally, there is a test tube for physical geography... A macroscope, in which the spacious processes forming our world can be modelled and visualized in a small environment. ... also suitable for biology and other sciences. Geowindows have been developed especially for primary- and secondary education as well as universities. Geowindows are so easy to handle that learners can work with it immediately.

After a short introduction how to use a GeoWindow, we will build up a model.

In the presentation we will develop a volcano and have a look inside the construction of the Mountain. The GeoWindow will allow to have a look at the processes which take place inside the Mountain during its outburst.

E2017-P13 Duncan The future teaching of physical geography: using the 'lens' of a
Hawley curriculum of engagement.

Teaching physical geography can be a problematic venture for teachers such that their teaching becomes unbalanced from varied combinations of heavy content, light substance and misdirected emphasis. A GeoCapabilities approach with curriculum-making eschews knowledge as merely a catalogue of facts or geography as simply a vehicle for the development of generic competences. Rather, it engage teachers in deeper thinking about the powerful disciplinary knowledge of subject-specific concepts and how to draw out significant meanings that can be interpreted from physical environments. The aim is to achieve a more balanced and purposeful approach to teaching about physical environments and provide learners with a language for engaging in the political, moral and other kinds of debates that require knowledge of the physical world and how it works.

E2017-P11 Vladimir New concept of the secondary geographical education in Russia and
Gorbanyov objectives for reforming of geography science

The Congress of Russian geography teachers passed in November 2016, which adopted a new concept of secondary geographical education. Geography teachers expressed their concern of a low level of geographical knowledge of students. Similar concerns are expressed in the new Charter of the geographic education, adopted by the IGU Conference in summer of 2016. One of the main reasons for this situation – fragmentation of geography science. People, and especially students, cannot understand what the geography? Especially deep gap lies between physical and human geography.

In this regard, it is proposed that the object of study of geography to recognize the human environment under which we understand the area where natural, anthropogenic and social spheres interact and penetrate each other. If a scientist engaged in some narrow issues, but not the environment, that it will not geography, but it will economics, sociology, urban studies, oceanography, soil science, geomorphology, etc. Thus, it is proposed to narrow the field of study of geography, and also to specify this field. In this case, it becomes clear what the geography and



its prestige will rise accordingly.

E2017-P12 Jesus Granados Sanchez The Level of Thinking and Questioning of Learning Activities in Spanish Geography Textbooks

The paper presents an analysis of all learning activities that appear in the most popular Spanish geography textbooks of secondary education. The research looks at two main things: firstly, it evaluates the cognitive demand or level of thinking of each learning activity; and secondly, it distinguishes the level of questioning in each activity. This evaluative research uses the revision of the Bloom's taxonomy made by Krathwohl (2001) and also takes into account Costa's (2005) level of questioning.

The results show that most of the activities students must work on are of low cognitive demand: more than 80% of the activities ask for recalling and understand knowledge from the text. On the other hand, activities that involve evaluation and creation are marginal.

E2017-P8 Inga Gryl Conquer new spaces. Enabling children to develop a variety of spatial concepts

Co-authors: Simon Ohlenforst and Inga Gryl. During the last years, geography learning in secondary and postsecondary education shifted to a variety of spatial concepts, taking into account not only absolute, geometrical concepts but also relational that regard spaces as socially constructed. However, this idea has only partially reached primary school. In the case of German primary geography learning, a focus on absolute concepts dominates, supplemented with some ideas of spatial perception that do not cover the whole range of the concept of relational spaces (GDSU 2013). While there has been profound research on the children's abilities regarding absolute concepts of space (e.g. Hemmer et al. 2008), there is no study yet that analyses the children's ability to handle relational spaces. In order to fill this gap, and, potentially, bringing relational concepts into primary education, this contribution will present an appropriate qualitative study design, based on spatial theory (Werlen 1993; Lefebvre 1993) and insights from pedagogical psychology.

E2017-P3 Essam Hamza Investigation of image restoration techniques for removal of motion blur from remote sensing satellite imagery

This paper introduces the concept and implementation of five image restoration techniques, which can be applied for satellite images. These techniques are, Inverse Filter, Iterative Method, Wiener Filter, Regularized Deconvolution filter and Wavelet-based Image Restoration. The restoration techniques are applied on five satellite images associated with Motion blur at different variance of additive noise. The restoration techniques are performed to check the performance of each technique and its capability to restore the degraded image. The comparison studies between these techniques are introduced based on two measures Peak Signal-to-Noise Ratio (PSNR) and Root Mean Square Error (RMSE). The experimental results showed that: the Wavelet-based Image Restoration technique is the most suitable technique for satellite images, since it gives highest PSNR and smallest RMSE with respect to the other restoration techniques.



based on experiential geography (Kold, 1984). The whole course is organized around a field trip or simulation games. We have analyzed the student's cognitive representation at the beginning of the course. We also made video recordings of their teaching practices. We will demonstrate that this pedagogical approach is efficient to improve knowledge and skills of the students in geography. It is also a good way to change their representation of geography.

E2017-P10 Veit Maier Internationalization of teacher education: How do German and Dutch geography students understand spatial planning.

Co-speakers: Veit Maier, Alexandra Budke and Uwe Krause

Maier and Budke (2016) showed in their study of schoolbooks that the importance of spatial planning differs from one country to another. The aim of this presentation is to show results of an international study about geography students and their understanding of spatial planning. Dutch and German students participated in a seminar about the use of spatial planning in geography lessons and have been part of an international exchange. The geography students completed questionnaires in a pretest-posttest design.

We can use the result of the study to illustrate and interpret the different understandings of spatial planning and its implementation in school lessons. Furthermore, we can show the potential of international studies for geographical education and the potentials of international exchange seminars for teacher training.

Literature: Maier, V., & Budke, A. (2016): The Use of Planning in English and German (NRW) Geography School Textbooks. In: RIGEO, 6, No. 1: 8-31.

E2017-P8 Ramón Martínez Medina The environment in Primary Education in Spain, a curricular analysis

In the last years the appearance of numerous problems due to the modification of the environment by human being has lead to the modification of educational curricula towards environmental education. This paper analyzes how the different educational legislation since the arrival of democracy in Spain has been incorporating the study of environmental issues. Especially interesting is the last educational reform in Spain, here analyzed.

The research methodology is qualitative and consists of an analysis of the different Spanish legislative texts since 1990, as well as all the regional legislative texts currently in force.

Finally, with our study it is tried to shed some of light on the main educational approaches on this subject in the different Spanish regions, also addressing the evolution of the incorporation of new concerns such as sustainable development in the spanish curriculum.

Keywords: environment, curriculum, primary education, Spain

E2017-P2 Johanna Mäsger Standardization of centralized geography A-Levels

The subject geography is part of the centralized A-Levels in most of the federal states of Germany. A longitudinal study (2009 to 2015) analyses the degree of standardization of the written geography examinations in five selected federal states. The results of this study will be presented at three different levels of analysis: complete written tests, tasks and teaching resources. The analysis shows both great differences between, and a high grade of standardization within the



states. Some variables even demonstrate that the standardization increases at state level over time. In consideration of these results, the question of “teaching-to-the-test”-effects on teaching geography will be discussed.

E2017-P5 Éva Máté Challenges for master students – How do MSc students cope with career opportunities under their university studies? A case study from Budapest and Pécs, Hungary

Hungarian master students in sciences are facing a huge challenge, the specialities of the labour market in Hungary. Despite low unemployment, some structural and regional problems make acquirement the matching job challenging. In this paper, we show the results of a comparative research of the MSc students at the universities of Pécs and Budapest, focusing on their employment during the studies. We suspected, that the goal is to being integrated to the market just before the degree, to implement knowledge, and get a job easier later. In our research together with a group of ELTE Budapest, we tried to find out the different motivations of students in Hungary. Results are based on questionnaires and in-depth interviews, made at both universities. Question is: do students work for living or to base long-term goals?

Keywords: Hungary, higher education, master students, labour market

E2017-P4 Marine Educational functions of sustainable tourism and geographical
 Matosyan problems of development in Armenia

Co-authors Marine Matosyan and Ashot Khoetsyan

Today, rather than ever, it become evident positive tendencies in evaluation of relationship in “human-nature-society” system, which are dictated from main issues of sustainable societal development concept.

Development of sustainable tourism depends on different factors, as geographical, demographical, social-economical, geopolitical, historical, spiritual etc. Armenia, being south Caucasian country with rich recreational resources and huge potential of human resources can become worldwide important destination of tourism only in case if all existing resources and opportunities are used correctly and effectively.

Main aspect of Research Case Study Teaching for sustainable tourism development. approaches, practice and results. Students and teachers cooperated with local stakeholders, / needs analysis elements for pre-selected villages to discover the level of awareness, understanding regarding sustainable tourism and their willingness to cooperate .

By this research work the students become more skilful in their profession of geography and at the same time being closer to the mother nature.

E2017-P7 Mike The benefits of learning in the field...geography exists outside the
 McHugo classroom

The benefits of fieldwork - especially opportunities in an Islamic environment - links into global topics are introduced, but also an opportunity for Q/A . The purpose is to create discussion on how to encourage teachers to take pupils out of school as well as how to get those training teachers (e.g. On PGCE courses) to ensure that fieldwork is an integral part of these programmes: Key words



fieldwork outside the classroom, Morocco

E2017-P5 Rafael Pablo Human Geography in the media. A peculiar service-learning project
Miguel between undergraduate students of Geography and Journalism
Gonzalez

Co-Authors: Zúñiga-Antón, M; Escalona-Orcao, AIP; Marta-Lazo, CM; Nogales, AI; Bernad-Conde, MS; Ramos-Antón, R and de Miguel-González, RP.

We present a learning experience based on collaborative work between 155 students and 6 lecturers of the Geography and Journalism bachelor degrees of the University of Zaragoza (Spain). It aims to stimulate the interest of Geography students on Human Geography, helping them to better understand their roles as members of the civil society. So the experience is based on the principles of the service-learning methodology: Geography students act as experts on various topics on which Journalism students elaborate audiovisual (podcasts) and visuals (infographics) productions. The benefits of the project extend to the society as a whole by publishing the results in university digital media (radio iUnizar and platform Entremedios). Important results are obtained: Geographers improve their oral and visual communication competences, journalists discover Human Geography as a key approach to understand the present world and all the students reinforce the acquisition of significant contents and improve their teamwork skills.

E2017-P10 Rafael Pablo Methodological Approaches To Geospatial Education research: the
Miguel case of the Digital Atlas for schools
Gonzalez

Technological advances have revolutionised lecture halls and classrooms alike facilitating new ways of learning. The cloud can be very easily integrated in daily lessons and research. Active methodology improves spatial and digital competencies. In this context the School Digital Atlas (ADE) is created on the ESRI platform ArcGIS Online. It contributes to motivating students in Geography Sciences and skills, encouraging efficiency in quality open geodata management in order to improve learning results. ADE deals with the current secondary school Geography curriculum. Therefore it is transforming a descriptive character into GIS competencies so as to achieve critical and smart geospatial thinking, which are very necessary elements for the future work of 21st century citizens. Paper will develop diverse research methodologies after implementing ADE and empirical experimentation in middle and high schools as a best-practice experience to obtain results to improve geography education.

E2017-P6 Dragana Possibilities for the application of programmed instruction in the
Milošević eight grade of the second cycle of education in accordance with
standards

The subject of the work is to determine the possibilities of application of programmed instruction in the teaching of geography in the case of the eighth grade students of the second cycle of education. On the basis of an experimental research the rationale for the use of this form of acquiring knowledge during the classes of processing new material is presented. The primary task of the research functioning is to determine the degree of benefits of programmed instruction when adopting new geographical teaching contents and what is the extent of applicability of this method of learning with the aim of improving teaching. The second task of the work is the



application of the experiment in two classes, the control and experimental, based on which it is established which vision of learning, programmed or conventional, achieves the best results in processing geographical contents in primary school.

E2017-P11 Dragana Milošević Possibilities of using Project-Based learning for the seventh grade, second cycle

The main subject of the work is to determine the possibilities of application of project learning in geography, in the case of seventh grade students another educational cycle. On the basis of experimental research is presented rationale for the use of this form of knowledge acquisition during the hours of processing new material. The primary task of the research activity is the determination of the level of project benefits of learning when adopting new geography curriculum contents and what is the applicability of this teaching forms in order to improve teaching. Another task of the work is the application of an experiment in two departments, the control and experimental, on the basis of which it was established that aspect of learning, project or conventional, the best results in the treatment of geography in elementary school.

E2017-P4 Thanh Tam Nguyen The Role of Argumentation in Geography Education in Vietnam

Co-authors: Thanh Tam Nguyen, Alexandra Budke, University of Cologne, Germany.

The process of argumentation is crucial for geography education in Vietnam, since it highly refers to educational goals implemented by the education law in 2005. However, little research has been done in terms of argumentation in geography, particularly with the goal to implement it in the Vietnamese school system.

This project uses Toulmin's work for the definition of arguments and schemes of argumentation. Furthermore, Budke's research on argumentation (2010) and how to apply it strongly to geography education is used and brought into context with the results of the study of the project. The central research question of the project is "In how far is it possible to establish a stronger didactical role of argumentation into geography education in Vietnam?". The study used in the project methodically consists of three parts. For the first part 1953 tasks and questions in Vietnamese geography school books of all grades have been analyzed. The tasks and questions have mainly been analyzed quantitatively in order to identify how many argumentative tasks were actually used in the books.

In the second part of the study 40 Vietnamese geography teachers have been interviewed in expert interviews. The goal was to identify their opinion of argumentation in geography. The third part of the study used a content analysis in order to evaluate the quality of arguments used by high school pupils in geographical context.

The results can be seen as an influential contribution when it comes to implement a stronger focus on argumentation in geography education in Vietnam. Further research would be needed in terms of how the quality of arguments of pupils in Vietnam could be improved and how teachers can integrate the important process of argumentation in more geographical contexts in lessons.

Key Words: Argumentation, Geography education, Vietnam



E2017-P8 Simon R. Conquer new spaces. Enabling children to develop a variety of spatial
 Ohlenforst concepts

Co-authors: Simon Ohlenforst and Inga Gryl.

During the last years, geography learning in secondary and postsecondary education shifted to a variety of spatial concepts, taking into account not only absolute, geometrical concepts but also relational that regard spaces as socially constructed. However, this idea has only partially reached primary school. In the case of German primary geography learning, a focus on absolute concepts dominates, supplemented with some ideas of spatial perception that do not cover the whole range of the concept of relational spaces (GDSU 2013). While there has been profound research on the children's abilities regarding absolute concepts of space (e.g. Hemmer et al. 2008), there is no study yet that analyses the children's ability to handle relational spaces. In order to fill this gap, and, potentially, bringing relational concepts into primary education, this contribution will present an appropriate qualitative study design, based on spatial theory (Werlen 1993; Lefebvre 1993) and insights from pedagogical psychology.

E2017-P9 Salvatore Eugenio Challenges for the GIScience in the era of the flying robot
 Pappalardo

Geographic information and geospatial technologies are massively diffused in sectors of society and productive systems. Geographical Information Systems (from GIS to WebGIS, from ParticipatoryGIS to PublicGIS) and technologies for geodata acquisition (satellite, UAV) represent a paradigmatic challenge in the re-organization of the decision-making processes, especially in many sectors of economy, public administration and no-profit. In this emerging scenarios Universities play a pivotal role by preparing a learning environment to integrate and to update suitable geo-knowledge and skills. In this framework the University of Padua launched from 2015 the first Master on "GIScience and Unmanned System for the integrated management of the territory and the natural resources" (Professional Master). This is an inter-departmental Master which involves GIScience enterprises and NGOs. By groups of 25 (2016) and 31 students (2017) it is possible to present preliminary results by the participant observation approach, framing the complexity of making GIScience and geography in Italy.

E2017-P9 Salvatore Eugenio Keeping fossil fuels underground: a multicriteria analysis
 Pappalardo towards a global atlas of the unburnable carbon

Climate changes and future scenarios represent a paramount challenge to combine development policies with environmental sustainability. This issue is crucial in all the political, economic and scientific spheres, at every geographical scale. However, to limit global warming to 2°C, the 80% of coal, 50% of gas and 30% of oil should be "unburnable". Nevertheless, a global map of fossil fuels and priority areas for bio-cultural diversity conservation are not analyzed at global level. The aims are mapping priority areas for unburnable carbon at global scale, analyzing overlaps of high bio-cultural diversity areas with oil projects. A GIS-based multi-criteria analysis was performed, integrating ecological, anthropological, and economic data in a global geodatabase. Results about the Amazon rainforest showed the 9.6% is under hydrocarbon projects. Almost the 10% of the Amazon basin is occupied by oil blocks, showing overlaps of 1% with protected areas and 1.9% with indigenous territory.



was not systematically monitored, nor supported, and today there is no official attitude of the educational policy creators in frontal implementation of those curricula in all vocational schools.

During the last two years a process of intensive changes in Croatian education began. Among others a proposition of Geography curriculum was made. Aside towards teaching and learning contents the curriculum is directed towards learning outcomes with elaboration of educational outcomes on all four levels, guidelines for teaching and learning, connections of Geography with other subjects, cross-curriculum subjects and other parts of curriculum. New challenges are how to prepare teachers for new learning contents and different approaches and above all how to organise school network in the conditions of distinct depopulation and coordinate tertiary with pre-tertiary geography education. Co-authors: Ružica Vuk, Martina Jakovčić

E2017-P12 Ana Pejdo Sustainable development from the perspective of Geography Education

Co-authors: Jadranka Brkić-Vejmelka, Nensi Segarić

For several years, many secondary vocational schools in Zadar County, especially Hospitality-touristic and catering school in Zadar are involved in different extracurricular activities. By participating in GLOBE and Eco school programmes in particular school combines professional knowledge and skills. Past projects include: energy efficiency in the school building, rural tourism development in Zadar County, school gardening of autochthonous plants, urban parks evaluation resulting in publication of guide on town parks on all six languages that are being taught in the school, etc. Mentioned activities involved around 100 pupils of different age and around 15 teachers among whom Geography teachers were also included. The aim of this paper is to point to the possibilities of geography education for sustainable development. Paper is based on results of research done in the February 2016 and January 2017.

E2017-P8 Susan Pike Geography in primary teacher education

Co-authors: Dr Marian Blankman, Inholland University of Applied Sciences, Dr Susan Pike, DCU Institute of Education, Dublin

Geography Education is a component in Initial Teacher Education across Europe. The time and staffing allocations of Geography Education in Primary Teacher Education courses appears to vary significantly across and within countries. The content of GTiTE appears to have some common traits across countries in terms of content and methodologies; but again varies between and within countries.

Despite these differences the issues of Geography Primary Teacher Education are often common across Europe. In many countries, geography is a marginalised subject in schools and makes up only a very small part of ITE courses at primary level. This is reflected in Geography in Teacher Education courses, where the subject can be marginalised and underfunded. However, from students' perspectives Geography Education is generally valued as an important part of children's primary education.

This presentation will outline issues, research and innovations in Geography Teacher Education in Primary ITE courses, including:

- Marian will present the main results of recent research on an approach to develop the PCK for



the subject geography

- Susan will review the range of issues in geography teacher education and some future directions for research in geography teacher education.
- Susan and Marion will use their thoughts above as a starting point for a discussion on opportunities for further research and cooperation in the international community of geography-teacher educators.

Key Words: Initial Teacher Education, Primary Geography, Pedagogical Content Knowledge.

E2017-P8 José Jesús How do children represent the world on their maps?
Reyes Nunez

The Barbara Petchenik Children's Map Competition is a biennial event organized by the International Cartographic Association (ICA) all over the world since 1993, whose main goal is to promote the creative representation of the world in graphic form by children. The diversity of solutions used by children to draw our world and to represent the themes of the competitions motivated the author to study and systematize the map drawings, which are characterized by the peculiar and rich imagination of children and young people. Different characteristics have been considered in the study: shape and size of continents, artistic solutions used to represent thematic data, the diversity of materials used in the map drawings, the messages of their works, etc. The research was developed using a selection of maps sent to the competitions organized in Hungary in these 23 years.

E2017-P3 Andreas From colourful views to scientific thoughts – manned and unmanned
Rienow earth observation in class rooms

Co-authors: Andreas Rienow, Bennet Krebs, Janna Mehring, Annette Ortwein, Johannes Schultz.

"Man must rise above the Earth – to the top of the atmosphere and beyond – for only thus will he fully understand the world in which he lives". The famous quote by the Greek philosopher Socrates anticipates the importance of space travels and earth observation techniques for the research of coupled human-environment systems.

There is an undoubtedly widespread use of remote sensing techniques and image processing analyses for scientific and societal purposes like weather forecasting, ecological monitoring, or disaster management. Nevertheless, the application of earth observing products in everyday school lessons is rare and narrowed to a visual supplement. Hence, the contribution presents interactive and e- and m-learning materials especially developed for the regular teaching of STEM subjects.

Besides the theoretical, technical, and didactical concept rooted in problem-based learning and moderate constructivism, digital teaching units implementing image-processing techniques in order to teach STEM curricular topics will be shown. While satellite imagery is applied to cover the broad range of topics, video footage from the International Space Station (ISS) acts as experimental field for implementing learning strategies of augmented reality and 3D-analysis. By experiencing the physical and mathematical background of remote sensing with geographical analysis, the pupils discover the implications of coupled human-environment systems.

Keywords: remote sensing, STEM education, e-learning, m-learning, augmented reality, interaction



E2017-P8 Daniela Schmeinck Coding in Primary School to Promote Spatial Orientation

Skills in spatial orientation are usually and mainly developed in geography in schools. In German Primary School this is done in Science and Social Science classes. Thereby aspects such as changes in perspective or the spatial visualization ability always represented a major challenge for teaching in primary school.

In literature, it is given as more or less evident that coding can teach learners how to solve problems and work together in creative ways. However, can coding in primary also contribute to the ability to orientate oneself in space (e.g. orientation in real spaces and reflection on spatial perceptions). Using the example of the programming language Swift, the paper discusses limits and opportunities of coding in primary school to promote spatial orientation.

E2017-P7 Ioanna Siamia Building a landscape educational program for the needs of Greek preschool and primary-school children: a methodological approach,

Co-authors: Professor, Theano S. Terkenli. Assoc. Prof. Aikaterini Klonari.

Greece is generally considered to be one of the least landscape-conscious among European countries, in need of further and more concerted landscape education, starting with the most malleable younger ages. Addressing this need, the objective of this paper is to propose a comprehensive and interdisciplinary landscape education program for kindergarten, first- and sixth-grade Greek primary school children. Building on existing theoretical and empirical knowledge and best practices from around the world, the paper presents the development of a methodological framework, responding to the particularities of our case study, while also adaptable to different geographical-historical-cultural circumstances.

Based on primary data concerning the children's landscape perceptions, experiences, feelings and behaviours, collected through pupil and teacher questionnaires and pupil drawings, the proposed educational program engages the children in experiential and interactional educational activities, encompassing all cognitive-emotional-behavioral aspects of their relationship with the landscape, while promoting and highlighting the values of teamwork and cooperation.

E2017-P1 Dmitri Sidorov Challenges and opportunities of geographical education online

This paper discusses challenges for and experiences of teaching geography courses online at an American university. In particular, field trips and study abroad tours are essential for teaching geography, urban, regional, and area studies courses. Their future, however, is in question with the rise of demand for distant education, further complicated by more rigid copyright restrictions for online video content than what is allowed in the class room. The new barriers created by recent geopolitical tensions further diminish opportunities for student to get field study abroad experiences. These challenges may also be an opportunity for finding ways of reinventing field educational experiences by not rejecting, rather utilizing the new distant education opportunities and crowdsourced multimedia tools for what seems to be a direct opposition of online education: field practices.



E2017-P9 Robert Mind the gap! Identifying issues that prevent new user groups to
 Vogler contribute to OpenStreetMap

OpenStreetMap (OSM) is known as the most successful application in the field of Volunteered Geographic Information. The fact, that it is based on crowdsourcing and therefore everybody can contribute, is one mayor argument for praising its openness. This crowd basement often leads to the common assumption, that OSM data is considered as neutral and unbiased i.e. does not show any author intentions concerning the social construction of spatial meaning. Theoretically, these assumptions are legitimate but studies show that e.g. the vast majority of OSM contributors are mid-aged male users. Accordingly, OSM data represents the worldview of a sharply delimited social group and thus cannot be neutral. To overcome this circumstance, it is necessary to identify the issues which prevent new user groups from contributing to OSM.

This presentation elucidates the above mentioned mechanisms and problems and outlines recommendations to recruit new OSM users illustrated by the example of senior citizens.

E2017-P11 Stefanie Teaching methods to foster geodiversity education in Geoparks
 Zecha

Co-presenter: Dr. Anette Regelous, GeoZentrum Nordbayern, University of Erlangen-Nürnberg

The term 'geodiversity' was used as the geological equivalent of biodiversity for the first time in 1993. Education is especially relevant in the case of geodiversity and nature conservation, because the greatest threat to geodiversity is ignorance (Gray 2004). Education at approved geodiversity sites can be supported by offering earth science topics in schools, in university or in national parks. The educators can use different methods, such as guided tours or wandering trails, in order to foster education in the field of geodiversity. In the last years the method of EarthCaching is emerging, which offers the possibility of a virtual community, a physical place and the real world.

The focus of this study is how EarthCaching can foster geodiversity education in Geoparks. A questionnaire was sent to all national Geoparks within Germany in order to find out how important they rate geodiversity and which aspects of Earth Sciences are subject matter. The main focus of the study lies on the concepts of communicating and teaching geodiversity of the individual Geoparks, with a special focus on EarthCaching.

The results show that geodiversity plays an important role in the national Geoparks and that all important areas of Earth Sciences are covered, the focus lying on geology and geomorphology. To answer this question, logged Earthcaches were also analyzed regarding to their educational content and if they function as a tool for tourism. At the end, best practice examples are presented.

E2017-P5 Maria Human Geography in the media. A peculiar service-learning project
 Zuniga- between undergraduate students of Geography and Journalism
 Anton

Co-Authors: Zúñiga-Antón, M; Escalona-Orcao, AIP; Marta-Lazo, CM; Nogales, AI; Bernad-Conde, MS; Ramos-Antón, R and de Miguel-González, RP.

We present a learning experience based on collaborative work between 155 students and 6 lecturers of the Geography and Journalism bachelor degrees of the University of Zaragoza (Spain).



It aims to stimulate the interest of Geography students on Human Geography, helping them to better understand their roles as members of the civil society. So the experience is based on the principles of the service-learning methodology: Geography students act as experts on various topics on which Journalism students elaborate audiovisual (podcasts) and visuals (infographics) productions.

The benefits of the project extend to society as a whole by publishing the results in university digital media (radio iUnizar and platform Entremedios). Important results are obtained: Geographers improve their oral and visual communication competences, journalists discover Human Geography as a key approach to understand the present world and all the students reinforce the acquisition of significant contents and improve their teamwork skills.

E2017-P10 Luc Zwartjes GI Learner: geospatial thinking in secondary education applied

GI Learner is a three years Erasmus+ KA2 strategic partnership project, aiming at integrating geospatial literacy, geospatial thinking and GIScience into schools. Although it is seen as one of the most important sectors in the economy it is seldom really taught in schools.

Bednarz & Van Der Schee made three recommendations for the successful introduction and integration of GIScience in schools. These were to:

- address key internal issues related to GIS implementation
- use a community of learners' approach and
- institutionalize GIScience into curricula.

In terms of the first two recommendations considerable progress has already been made, but the institutionalization of geo-technology and geo-media into curricula still remains a goal in almost all countries.

GI Learner aims to respond to this by the development of a GIScience learning line for secondary schools, so that integration of spatial thinking can take place. This implies translating the spatial and other competences, taking into account age and capabilities of students, into real learning objectives that will increase spatial thinking education activities and help produce the workforce we need now and for the future and geospatially literate citizens. All of this will help us to create a learning line showing the importance of geospatial smart thinking.

The GI Learner project (<http://www.gilearner.eu>) will develop teaching and learning material for this aim, as well as an evaluation on learning outcomes of the students who use these materials.



PAPER Session themes

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- P5 University Geography
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