

## Current aspects of geospatial education in Poland

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### Introduction

This short paper presents the common presentation of the authors opening the 2<sup>nd</sup> Polish Conference *GIS in Education* held in Łódź, on 14-15 June, 2018 which was organised by the Institute of Geoinformation of the Faculty of Geographical Science of the University of Łódź and the Institute of Geoinformation of the Faculty of Geographical and Geological Sciences of the Adam Mickiewicz University in Poznań. The previous, fruitful conference of the *GIS in education* series was held in Poznań in 2015 (Jażdżewska, 2015; Jażdżewska, Werner, Zwoliński, 2015). However, the first interdisciplinary conference, completely focused on education in this field, offered by universities, technological universities and universities of life sciences, was organised by the Polish Association for Spatial Information as early as 2009 and its results were published in the form of 13 papers (Gaździcki, 2009), being the complex review of development of geospatial education in Poland. At that time the idea of the geoinformation direction of studies was presented for the first time (Stateczny, 2009), however those issues were discussed earlier, for example by geographers (Zwoliński, 2003, 2012; Jażdżewska, 2015, 2016). The series of five conferences organised under the common subject *The forum on education and professional development of surveyors and cartographers* significantly contributed to discussions on geospatial education; those conferences were organised by the General Surveyor of Poland in the period 2012-2016 (Gotlib, 2016). Discussions, initiatives and achievements concerning geospatial education in other disciplines and professions, such as forestry and geology, were also valuable.

Geographic Information Systems, known as GIS, appeared in the sixties of the past century. The first systems of this type include the Canada Geographic Information System, which allowed for recording data on natural resources basing on maps (Tomlinson, 2008). In the USA the development and use of coding addresses in population records (*Dual Independent Map Encoding*) was considered as an important achievement at that time.

Despite existing, objective difficulties, Poland at that time was also among leading countries in the field of automated gathering, processing and distribution of spatial data, in particular geodetic and cartographic data. Due to political and economic reasons (embargo), it was necessary not only to develop an appropriate methodology and software for spatial data, but

also specialised equipment for processing those data, as well as for digitising and plotting maps. 19 centres equipped with the original Polish hardware and software (GEO1, GEO2 and GEO20 computers, KART plotting machines and tools for digitising maps), specially designed and produced for those purposes were successfully operating as early as in the beginning of the seventies of the past century (Gaździcki, 1975). Those successes also contributed to development of export of geodetic and cartographic services and they were awarded with high prizes (The Master of Polish Technology Reward, 1973, The State Reward, 1978).

Therefore, more than half century has passed since the above, pioneering developments. It was the time of dynamic GIS development, the development stimulated and directed by the staggering progress of information and communication technologies (Rickles, 2017). That development took place in many countries, covering different, economic, natural, administrative and social fields. The concept of GIS became interdisciplinary and it started to influence the applied terminology and leading to some terminological confusion, among others in the field of education (Zwoliński, 2010).

## Terminological changes

The term *geographic information* was progressively substituted by the term *spatial information* which was not connected with any discipline or by the term *geospatial information* when the intention was to stress relations with the Earth itself or with a set of disciplines concerning the Earth. The term *spatial information*, considered as an interdisciplinary term, was sanctioned by the European Union legislation and by the Polish legislation (INSPIRE directive, the act on the spatial information infrastructure) and the term *geospatial information* in the official name of the *Global Geospatial Information Management*, established by the United Nations Organisation. It was also significant that the leading international standards organisation changed its name in 2004 from the *Open GIS Consortium* to the *Open Geospatial Consortium*.

Also a one-word term *geoinformation*, being a consequence of changes from geographic information systems (GISystems) to geographic information science (GIScience), proposed and justified by (1992). Scientific and didactic foundations of this name have been confirmed by numerous studies in this field, organised as directions and specialisations at universities, technical universities and universities of life sciences.

In some countries the terms *geoinformatics* and *geomatics* are used to determine the *geospatial information technology*; the first term is focused on methodology of information technology and the second one covers also methods of acquisition of *geospatial data*.

Occurring terminological changes reflect the dynamic development of the discipline of geospatial information, which takes place, in parallel, in many areas of the globe, resulting from existing conditions and needs. However, it does not mean that the acronym *GIS* which has been still commonly used, should be withdrawn in those places where it is widely known and historically founded, for example *GIS Day*, a name of the day which is dedicated to popularisation of geospatial information or in the name of a series of conferences dedicated to new achievements in that field – *GIS in education*. It is also worth to notice that this acronym is traditionally used and, therefore, it has been popularised by the Environmental Systems Research Institute (Esri), a well-known and influential software producing company.

## **Pro-developmental factors of geospatial education**

Conditions and perspectives of development of geospatial education (Chen, Wang, 2015), considered as education in the field of science and technology of geospatial information mainly depend on the possibilities of the common and simply use of spatial information for professional and personal purposes. The following, pro-developmental factors, which are highly dependent on development and operations of spatial information infrastructures should be listed:

- development of information resources and geospatial services in terms of quantitative and qualitative aspects,
- popularisation of access to information resources and geospatial services resulting from the technological progress and social-and-economic activities,
- the increased role of geospatial methodology in different scientific and technical disciplines, as well as in different professions related to the Earth's space.

As a result, the interest in the knowledge about spatial information increases together with growing needs to develop skills which are required to comprehensively use such information in the public and private areas.

## **Directions of development of geospatial education**

Particular attention should be paid to the multilevel, multi-discipline and multi-topic nature of geospatial education.

The multilevel nature should be considered as covering practically all educational levels by geospatial education, from primary and secondary schools, different vocational schools, to universities and professional high schools, including post-graduate and doctoral studies. Scopes, curricula and forms of educations should be adapted to particular levels considering forms of after-school education and in-service training sessions (Szkurłat et al., 2017).

The multidisciplinary means parallel processes of development of spatial education in different disciplines and related professions, closely adapted to specific needs of those disciplines and professions, with consideration and stressing inter- and trans-disciplinary of geographic information systems. It happens in the case of geographic sciences covering tens of different scientific disciplines and subdisciplines which are methodologically and methodically integrated by geographic information systems (Zwoliński, 2009).

Finally, the multi-topicality expresses the dynamic extension of theoretical, technological and application topics included in the scope of geospatial education (Gaździcki, 2006).

## **The role of scientists and educators in development of geospatial education**

At present scientists and educators should face the following tasks in this field:

- to increase the awareness of importance of geospatial information and spatial thinking and, consequently, of geospatial education for comprehensive development of the country,
- to create curricula at particular levels of education, with consideration of diversified requirements of different disciplines and professions, aiming at ensuring the satisfactory

educational quality and considering the current and the future chances of graduates at the labour market,

- to develop the base of methods and means which will support processes of geospatial education with the wide use of information and communication technologies (ICT/IT) as appropriate for those purposes; *The Online Geomatic Lexicon* (PASI) may be a good example in this field.

A particular educational challenge is to engage students of secondary schools, skilled in IT, in geospatial information issues. The effective use of newest information technologies and methods is the key factor influencing the development of geospatial education. It is possible only with the active participation of geoinformation scientists and practitioners. The care of development in this field may cause, that – in the longer perspective – Polish companies and research centres will not only import geoinformation technologies, but they will actively participate in their creation, both at the local and global markets.

## Conclusions

1. Geospatial education is required for the comprehensive civilisation progress of Poland and for satisfying the citizens' demands.
2. Due to the dynamic development in the field of geospatial methodology and technology and changing social and economic conditions, cooperation of parties which are responsible for the quality of education in geospatial information, in particular universities, is required.
3. The development of different forms of cooperation in the field of geospatial education, including multilateral and bilateral cooperation should be stimulated and supported at the national and international levels by common actions, exchange of experiences and personnel and distribution of means of education. This cooperation should also include regular organisation of successive conferences dedicated to current issues of geospatial education.

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### ***Abstract***

*This paper presents the common presentation of the authors opening the 2<sup>nd</sup> Polish Conference “GIS in Education” held in Łódź, on 14-15 June, 2018. In the introduction the authors referred to more than 50 years of GIS history, paying attention to its beginnings in Poland and focusing on terminological changes that mainly resulted from rapid technological development. Pro-development factors of geospatial education were successively discussed, directions of development and the role of scientists and educators were identified. In conclusions it was stated that geospatial education is essential for comprehensive civilisation progress of Poland and satisfying the needs of citizens. Therefore, it was considered, in particular, that different forms of cooperation in geospatial education, including multi-lateral and bilateral cooperation at the national and international level should be supported by organisation of common events, exchange of experiences and personnel and sharing educational resources.*

## Aktualne aspekty edukacji geoprzestrzennej w Polsce

Słowa kluczowe: edukacja geoprzestrzenna, systemy informacji geoprzestrzennej (GIS), geomatyka, geoinformatyka

### *Streszczenie*

*Niniejszy artykuł zawiera treść wspólnego wystąpienia autorów otwierającego II Ogólnopolską Konferencję „GIS w edukacji”, Łódź, 14-15 czerwca, 2018. We wstępie nawiązuje się do ponad półwiecznej historii GIS, zwracając uwagę na jej początki w Polsce i koncentrując się na zmianach terminologicznych wywołanych głównie przez dynamiczny rozwój technologiczny. Przedstawiono kolejno czynniki prorozwojowe edukacji geoprzestrzennej, zidentyfikowane kierunki rozwoju oraz rolę środowiska naukowego i dydaktycznego. We wnioskach stwierdzono, że edukacja geoprzestrzenna jest niezbędna dla wszechstronnego postępu cywilizacyjnego Polski oraz zaspokajania potrzeb jej obywateli. W związku z tym uznano w szczególności, że należy popierać różne formy współpracy w dziedzinie edukacji geoprzestrzennej, w tym współpracę multilateralną i bilateralną, w skali krajowej i międzynarodowej, przez wspólne przedsięwzięcia, wymianę doświadczeń i kadr oraz udostępnianie środków kształcenia.*

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