GIS IN HIGHER EDUCATION IN POLAND
CURRICULUMS, ISSUES, DISCUSSION

edited by Iwona Jażdżewska

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BLENDED LEARNING AS AN ALTERNATIVE TO TRADITIONAL GIS TRAINING IN HIGHER EDUCATION

NAUCZANIE ZINTEGROWANE JAKO ALTERNATYWA DLA TRADYCYJNEGO NAUCZANIA GEOINFORMACJI NA STUDIACH WYŻSZYCH

Distance Learning

Distance learning (or d-learning) has been practised for over three hundred years. Initially, teaching materials were sent by post, and this method of education was called correspondence learning. Americans are precur-

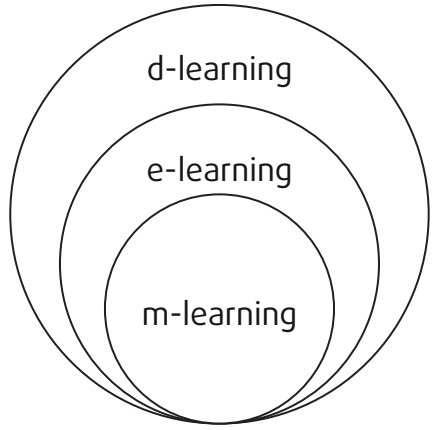

Fig. 1. The relationships between different forms of distance learning

sors of the distance learning as the first correspondence course was created by them in 1700. In Poland the distance learning began in 1776 at the Jagiellonian University, with the occupational course for craftsmen. Three years later in Warsaw a distance learning course for physicists, modelled after the Cracow school, was launched (Karauda, 2001). A characteristic feature of the distance learning is the indirect and continuous stimulation and guidance of the students' work through various media that allow to

minimise the distance. Universal access to telecommunication technologies, especially the high-speed and contextual Internet, caused the rapid development of the distance learning. Some variations of the d-learning include e-learning (electronic learning) which involves teaching through computer networks and the Internet and m-learning (mobile learning) that means learning that requires the mobile Internet access (fig.1).

Both e-learning and m-learning have a number of drawbacks, hence the search for new, cheaper and more effective teaching methods. Such methods include blended learning (or b-learning), also called hybrid, integrated or complementary learning. The blended learning combines traditional learning methods based on direct contact with the teacher with activities performed remotely using a computer. Graham et al. (2004) emphasise three characteristics of the blended learning, that involve the combination of:

1. Traditional forms of teaching (requiring direct participation of the teacher, known as the face-to-face learning) with on-line activities, primarily sing the Internet;
2. A variety of media and tools used in various learning environments;
3. Various teaching methods and approaches, regardless of the technology used.

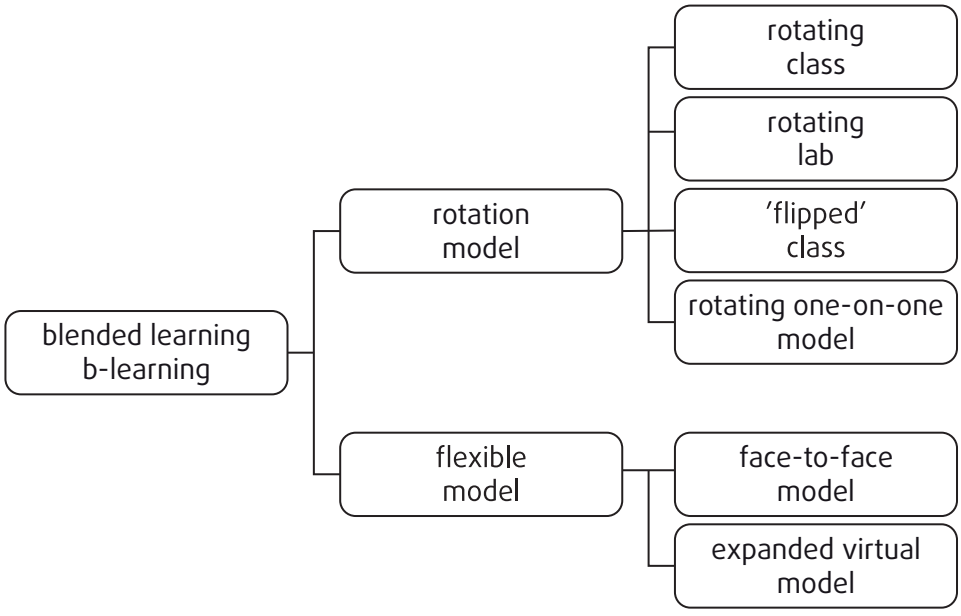

Fig. 2. Blended learning models

According to the website of the Polish Agency for Enterprise Development, the b-learning is very effective as it allows for flexible course building, that takes into account the goals, themes and specifics of the course as well as the skills and expectations of the participants (Vademecum...). Some important advantages of the b-learning include the ability to use both conventional and modern teaching methods and an opportunity for teachers and students to work together on-line. Free scheduling that fits the students' time constraints is also a big advantage. Zwirowicz-Rutkowska and Chojka (2015b) have pointed out that in times of pervasive computerisation, the Internet is often used in the distance learning as a "bank" of information resources.

For at least a decade, the b-learning has evolved from a new idea into widespread, practical and rational way of learning. In the US, the blended learning is gradually becoming the primary method used in advanced education. Amarowicz (2011) reports that in 2010 approx. 93% of American teachers used this form of education. This is because the blended learning allows for a much greater degree of personalisation of teaching, adjustment of curriculums and pace to the individual abilities of students, thus increasing students' motivation and engagement as well as their self-confidence. Research on complementary teaching shows that the b-learning not only saves time and is convenient for students but also ensures excellent academic performance supported by an increased number of course enrolments (Staker and Horn, 2012; Rouen, 2011; Korkmaz and Korkmaz, 2009).

The purpose of this chapter is to present the principles, models and tools for the blended learning, with particular emphasis on advanced education. In particular, the study shows legal aspects that for various reasons prefer this learning method.

Models of Blended Learning (b-learning)

The blended learning models most often fall into the category of rotation or flexible models, also referred to in Polish literature as interspersed models. In the rotation model, a student attends the courses (classes) conducted in the traditional manner, i.e. with the direct participation of the teacher, according to a schedule as well as courses taught in the distance learning mode. The proportions between the face-to-face and the remote modules are not preordained, and the e-learning may include lectures, exercises, laboratories, seminars, and consultations. The rotation model may be further broken down into:

Table 1. General characteristics of learning management systems (LMS). Based on: The Top 8 Free/Open Source LMSs, Published November 20th, 2013, to JP Medved; Summary of LMS and e-learning platforms www.e-learningtrends.pl

No	Name	LMS type	Mobile version	Advantages	Disadvantages	Users
1.	Moodle	Open source	yes	The most popular distance learning platform; numerous plugins to expand functionality; predefined courses; PayPal payments.	Unintuitive student interface. Difficult management of student groups.	Universities, schools, commercial companies
2.	Blackboard	The free version of commercial software	yes	The ability to login via Facebook and Gmail.	Lack of technical support, unintuitive interface. No full LMS platform functionality. User-created courses limited to 5.	Universities, public administration
3.	Sakai	Open source	yes	It integrates documents in Google Docs and Dropbox, includes Wiki-like tools.	Java-based, making functionality expansions more costly.	Universities, community
4.	Latitude Learning	Freemium	no	Available in 9 languages.	Costly expansions.	Large commercial companies

No	Name	LMS type	Mobile version	Advantages	Disadvantages	Users
5.	Dokeos	Open source	yes	Predefined quiz forms.	Difficult to adapt to specific needs. Difficult Powerpoint and OpenOffice file uploading.	Universities, schools
6.	eFront	Open source, paid version available	yes	Good technical support	Incomplete functionality, lack of integration with social media.	Universities, schools
7.	Schoology	Freemium	yes	Modern tools, works in the cloud	Incomplete functionality.	Universities, schools
8.	ILIASy	Open source	yes	High data security. A large group of active users (own conferences)	Mobile version requires the installation of plug-ins. 13 years old, with all its consequences.	Universities, schools, public administration, NATO in Europe
9.	n-educatio	Commercial	yes	Social learning module available.	No virtual classroom module nor station course management.	Universities, schools, companies, individuals
10.	CyfrowaSzkoła.pl	Commercial	yes	Social learning module available. The ability to review teaching materials. Partner settlement module.	Requires plugins, lack of blog and forums functionalities.	Universities, schools

1. The station rotation, in which students cycle through traditional lectures or seminars and e-learning activities; all conducted within the same classroom and in the presence of a teacher;
2. The lab rotation model differs from the station rotation model as the e-learning classes may take places at different locations at school;
3. The "flipped" classroom model, in which face-to-face classes are conducted at school, according to a given schedule, while e-learning classes are taken at home, after school;
4. The individual rotation model, in which the schedule may be adjusted to the needs and abilities of a student.

The flexible model usually takes the form of an individual or extended virtual model. In the individual model, a student selects an e-learning course in order to supplement a traditionally taught course. In relation to the GIS learning, these may be ESRI or SoftStat webinars or the Internet courses in sharing data over the Internet, database design, etc. The extended individual model is characterised by a predominance of e-learning courses whereas the face-to-face learning is only used to explain and expand the hardest parts of the curriculum and is often conducted as one-on-one consultation. Types of the blended learning models are presented in fig. 2.

Effective e-learning requires appropriate tools for both preparation of remote courses and management. Systems for preparation courses are called the LMCS (Learning Content Management System) and the ones for learning management – the LMS (Learning Management System). An LMS platform allows for embedding complete courses, managing students (enrolment, progress reporting, assessment, analysis of competences) as well as managing entire e-learning courses (access to training plans, access to and distribution of teaching materials). The offer of the LMS platforms is extensive and includes both commercial and open-source systems, so the choice of a solution can be hard. Several publications are available that might facilitate the decision on which LMS to choose (Szwarbach, 2012; Medved, 2013; Ramasubbu, 2015), and a lot of advice may be found in blogs and forums. First of all, the author emphasises the simplicity and ease of use, functionality, reusability of contents (of various courses), the ability to serve multiple students at once, the cost of purchase and maintenance. The basic functionality of the LMS includes the following modules:

1. Survey – tests, quizzes, surveys;
2. Chat – a tool for synchronous communication;
3. Forum – a tool for asynchronous communication;
4. Blackboard – any content designed in a LAMS editor;

5. Notebook – a student's notes;
6. Shared resources – any file (such as a spreadsheet), a link to a website or prepared and zipped website;
7. Question-answer – asking students questions;
8. Multiple choice – multiple choice questions with assigned weights;
9. "Send file" – submitting completed tasks (e.g.: text documents, presentations, spreadsheets) to the teacher.

A summary of the most popular LMS systems used in advanced education is presented in the Table 1. They include open source systems (5), proprietary systems (2) and the so-called freemium systems (2), that allow free access to a specific number of users, and one system that is a free version of proprietary software. Most of them have a mobile version, which means that they may be used smartphones or tablets. The most popular LMS platform is the Moodle (available free under the GPL licence) which is also the most widely used in Poland.

Conditions of B-learning at Universities in Poland

Formal and legal conditions In Poland, the rules for university education are governed by the law on advanced education (Journal of Laws from 2012, item 572, as amended), Article 164, Par. 3 states that "university classes may also be conducted using distance methods and techniques". The proportions between the activities carried out with the direct participation of teachers and using e-learning are defined in the Regulation of the Ministry of Science and Higher Education of 2 November 2011 amending the previous regulation on the conditions that must be met for university classes to be carried out using distance education methods and techniques (Journal of Laws from 2011 no 246, item 1470). Article 5, Paragraph 1 of the regulation provides that "the number of hours of classes during full-time and part-time studies carried out using the methods and techniques of distance education cannot be greater than 60% of the total number of hours of classes specified in curriculums for given majors and levels of education". On the other hand, Paragraph 2 of that Article adds: "Education in the acquisition of practical skills, including laboratory classes, ATVs and workshop should take place in real life, in the classroom teaching requires direct participation of teachers and students. Methods and techniques of distance learning, including virtual laboratories may only be used as support in this regard." These provisions are the most important formal and legal conditions of introduction of the blended learning, based on 40% of synchronous work with the direct participation of teachers and 60% of remote teaching using the Internet or e-learning. Additional conditions are

imposed by resolutions enforced by university authorities, course regulations, education effects and curriculums that specify in detail the method and conditions for the conduct and assessment of individual subjects. When analysing the provisions of the regulation and the rules set out by university authorities, we may conclude that the only possible teaching method that includes the distance learning during full-time and part-time studies is the blended learning, with no more than 60% of lectures, recap seminars, homework assignments and supplementary education conducted through the e-learning.

The b-learning assumes that a teacher's and student's participation has to be an organised process, and so it differs from the self-learning. As Bronk et al. (2006) noted, the distance component of the blended learning does not only include e-mailing of teaching materials but also incidental use of technical means of communication (such as e-mail, etc.) for the teacher-student contact. It also has to be institutional. Thus, one of the conditions for its introduction in advanced education is the reorganisation of the curriculums and, in particular, the establishment of mechanisms for approval of activities carried out in the distance learning mode, including the settlement of teachers' workload in the new system, etc.

The above mentioned factors make the development of the university-level e-learning in Poland effectively inhibited by legal and formal factors, which was emphasised, among others, in the opinion issued by the Association of Academic E-learning submitted to the Ministry of Administration and Digitisation in 2013 (SE@, 2013).

Methodological conditions The blended learning requires a change in teaching theoretical knowledge, including different preparation of teaching materials for subjects taught using e-learning methods. The main task of the teacher is not only to provide and require knowledge but also, maybe most importantly, to motivate the student to learn and maintain interest in the subject.

Uploading extensive collections of materials as PDF files to the platform is not a satisfactory solution. Studying such materials is tedious and reduces students' interest in the subject. Efforts should be made to activate the student through interactive forms of communication, quizzes, simulation and strategy games. Information should by hierarchical and structured. Earlier information should be repeated and retained before progress is made to further parts of material. However, instead of a set of questions relating directly to the information, problem questions, that indirectly

check the degree of material memorisation, should be used. As noted by Bronk et al. (2006), a teacher's intuition and experience are not sufficient in the b-learning. The ability to use modern means of ICT communication as well as finding new ways of preparing teaching materials is crucial.

It is also worth noting that there is a large variability regarding the scope of educational content that may be conveyed through the b-learning. Alammary et al. (2014) observed that many teachers in distance modality publish the same contents that they convey in lectures, while only a part of them prepare brand new courses tailor-made for the blended learning methods.

Students' attitude is also an important issue, especially in Poland. The blended learning assumes that the students are responsible, fair, and perform all e-learning assignments by themselves. The experience of every teacher shows us a different picture: the one, in which many students struggle with independence, promptness, proper scheduling. There are also examples of dishonesty. A solution, at least at the preliminary stage of introducing the blended learning, is to use traditional face-to-face methods in passing certain modules.

Technological conditions The blended learning requires the department and the university to invest in technical and IT infrastructure. Efficient execution of a course requires not only learning management systems (LMS) and learning content management systems (LCMS) but also the high-speed Internet connections and licences for specialised applications for both students and teachers. Electronic access to a library that would provide at least part of its resources in digital form is also necessary.

Research carried out by the Polish Open University in 2012 shows that almost three quarters of Polish students felt that state-run universities were not prepared to provide the top quality e-learning education. At the same time, almost a half of the respondents would choose this form education. The majority also predicted that in the future, the e-learning would replace traditional education. A sales manager of the e-learning solutions at Asseco Business Solutions S.A. noted that schools traditionally provided practical knowledge using the b-learning, while e-learning was used to repeat, retain and check that knowledge. He also stated that "we had gone one step backwards, retreating from total enthusiasm for the distance learning methods but, at the same time, we had made two steps

forward by taking what was best and most effective in the combination of several learning modalities"[1].

E-learning and B-learning in Teaching GIS in Advanced Education in Poland

The GIS education at the majority of Polish universities is carried out traditionally, in the form of lectures and tutorials/labs although, at least in the last decade or so, we have been seeing a growing interest in the distance learning. Two leading universities, the Jagiellonian University and Warsaw University, can boast the greatest experience in this regard. The postgraduate UNIGIS studies have been conducted by the Department of Geographical Information Systems IGiGP at the JU in the e-learning form since 2004[2]. The Department of Geography and Regional Studies of the Warsaw University has been conducting classes in the blended learning form since 2005 (Kozak et al., 2009). Remote courses in the field of geoinformation have been available at the UMCS since 2014. This is a postgraduate course for teachers, financed by the European Union under the European Social Fund. Also is teaching the GIS in technical faculties more and more dependent on modern teaching methods. The Warsaw University of Technology has been working to create a remote education platform since the early years of this century (Gawas et al., 2002) but the first remote course in geoinformation, also co-financed by the European Social Fund, was launched by the Department of Geodesy and Cartography (Białousz et al., 2009). For several years, the e-learning GIS courses, land information systems, databases and geomatics have been available at the Higher School of Technology and Economics in Jarosław. The Faculty of Geoengineering, Mining and Geology at the Wrocław University of Technology offers a facultative course in "Maps in mining" (Głowacki, 2010). For several years, the Wrocław University of Technology has been offering an e-learning GIS basics course (Blachowski, Woźniak, 2007). In 2014/2015 the b-learning Spatial Information Infrastructure classes were also launched at the Department of Geodesy, Spatial Engineering and Construction at the University of Warmia and Mazury in Olsztyn.

1 http://www.pifs.org.pl/UserFiles/BlendedLearning2%282%29.pdf
2 http://krakow.unigis.net/UIA/UNIGIS-Krakow

Planned B-learning Classes in SIP Design Methodology at the Department of Civil Engineering and Geodesy at the Military University of Technology

So far the Military University of Technology has not offered any courses in the distance learning mode to students, and thus that University has no experience in this respect. The introduction of the distance learning will therefore require changes to the regulations and the creation of the e-learning infrastructure for the university. The university authorities will support the project of modernisation of teaching methods, provided that the related interest is shown by teachers and students. Such interest seems to be shown by the Department of Civil Engineering and Geodesy. A survey conducted among freshmen of Master's studies (56 people) shows that a half of them prefer remote learning at home, during their leisure time, most often in the evening or in the morning. GIS teachers are willing to prepare teaching aids and the e-learning module using open-source tools. One of the subjects chosen for a pilot implementation of the b-learning is the SIP Design Methodology (MpS).

The MpS is the specialist subject taught for 60 hours (30 hours of lectures, including 10 hours in English, and 30 hours of project work) and 5 ECTS credits. 5 ECTS credits mean that in order to pass the subject the student has to work/learn for 150 hours, so the student has to submit unattended work that is assessed to be the equivalent to 90-hours. The course covers selected issues of the GIS/spatial system design with particular emphasis on the theoretical basis and practical skills in the development of a conceptual, logical and physical models, as well as the knowledge of language and notation used to store application schema. The unattended work hours include: preparation for the project, documentation of consecutive stages of the project and final documentation, preparation for the discussion and subject credit. All classes are carried out with direct participation of the teacher, the lecture presents the theoretical bases and examples of existing solutions, and the project has the students (in groups of 4) design a spatial information system for a chosen topic, progressing from the user's needs analysis through conceptual and logical models to test implementation.

According to the Regulation governing the conditions of the introduction of the distance learning (Journal of Laws 2011 no 246, item 1470), only a part of the lectures (exactly 60%) may be delivered through the e-learning, which amounts to 18 hours in the case of the MpS. Recaps and modules that support the project may also be organised at the university

and in the presence of the teacher, according to the curriculum. It has been decided that the course will start traditionally, at the university, with the direct teacher participation. After 10 hours of lectures, the students will study a chosen issue in the e-learning mode. Consultations and recap classes will also be delivered via the distance learning. Another session of 10 hours of lectures, the project and final credit will be delivered traditionally (fig. 3).

The following aspects will be taught through the e-learning:

1. Methodology of designing information systems – an introduction.
2. Introduction to the UML.
3. UML – class diagrams, packages. Examples of the surveying and cartographic law, and/or the INSPIRE data specifications.
4. Conceptual and application framework, applicable standards. The integration of conceptual frameworks.
5. XML and GML – introduction.
6. Spatial information system and spatial information infrastructure.

The reason for choosing this topic was the availability of numerous online courses that may be treated as good practice at least at the initial phase of creation of the e-learning module. There are plans to include willing students and PhD students in the preparation of this course. Their main task would be to assess the proposed solutions and the difficulty of the contents. Basic materials made available as interactive "lessons" in Polish will be expanded using articles and various materials in Polish and English. Modules supporting the implementation of the project as well as recap classes will be implemented at the second stage, in the subsequent year. Depending on the interest of students in the b-learning, there are plans for the e-learning SIP application and topographic database classes.

Conclusions

1. The blended-learning uses both synchronous teaching (where knowledge is transmitted and received at the same time) and asynchronous teaching (various times of knowledge transfer and receipt). The idea behind this method of education is to combine lectures, project, seminars, exercises, laboratories, consultations, tests, etc., when some of them are implemented in the distance learning mode.

2. The GIS teaching based on advanced techniques of data and information transfer is perfectly suited to distance learning. This is evidenced by numerous implementations of the e-learning courses in this field at var-

ious universities and technical universities. Many studies show that the interest in this form of education is also growing among Polish students. We should hope that the changing law that governs university-level education will make the distance classes and laboratories possible.

3. The Military University of Technology does not currently offer the distance learning courses. There are ongoing pilot programmes on such classes, and their success will determine the method and pace of introduction of the e-learning at the WAT to some extent.

References

Alammary A., Sheard J., Carbone A. 2014. Blended learning in higher education: Three different design approaches. Australasian Journal of Educational Technology, 30(4): 440–454.

Amarowicz J. 2011. http://www.edulider.pl/edukacja/co-jest-blended-learning

Białousz S., Chmiel J., Fijałkowska A., Różycki S. 2009. Nauczanie na odległość w zakresie geodezji i kartografii – przykład tworzenia uzupełniającej formy kształcenia. Archiwum Fotogrametrii, Kartografii i Teledetekcji, Vol. 21, 2010, pp. 13–20.

Blachowski J., Woźniak J., 2007. Model kształcenia stacjonarnego i ustawicznego w zakresie systemów geoinformacyjnych na Politechnice Wrocławskiej. Roczniki Geomatyki, Vol. V., Issue 3, pp. 7–18.

Bronk A., Maciołek R., Mischke J.M, Nowak A., Stanisławska A.K., Stencel P., Urbaniec J., Wodecki A., Zieliński W. 2006. Jeśli blended learning na uniwersytecie, to jaki? Dyskusje o... E-mentor, no. 1 (13) / 2006.

Fuks P.: http://www.pifs.org.pl/UserFiles/BlendedLearning2%282%29.pdf

Galwas B., Nowak J., Nowak S., Pajer M., Witoński P. 2002. Edukacja w Internecie. Ośrodek Kształcenia na Odległość Politechniki Warszawskiej, www.okno.pw.edu.pl

Głowacki T. 2010. Geodezja przez Internet. Prace Naukowe Instytutu Górnictwa Politechniki Wrocławskiej, vol. 131, no. 38, pp. 58–66.

Graham Ch. R., 2004. Blended Learning Systems: definition, current trends, and future directions. In: Bonk C. J. & Graham C. R. (Eds.). (in press), Handbook of blended learning: Global Perspectives, local designs. San Francisco, CA: Pfeiffer Publishing.

http://www.edunews.pl/nowoczesna-edukacja/e-learning/2720-edukacja-hybrydowa-czyli-blended-learning-1

Karauda K. 2001. Historia w perspektywie edukacji zdalnej (distance learning'u – DL). Kultura i Historia, nr 1/2001.

Korkmaz i Korkmaz, 2009. The impast of blended learning model on student attitudes towards geography course and their critical thinking dispositions and levels. The Turkish Online Journal of Education Technology-TOJET, vol. 8 (4), pp. 51–63.

Korzan D., 2006. Ewolucja kształcenia zdalnego, http://www.korzan.republika.pl/pdf/zdalne.pdf
Kozak J., Werner P., Zwoliński Z. 2009. Kształcenie w zakresie geoinformatyki na kierunku geografia. Roczniki Geomatyki, Vol. 7, issue 3(33), pp. 58–73.
Medved J.P. 2013. The Top 8 Free/Open Source LMSs. http://blog.capterra.com/top-8-freeopen-source-lmss/
Ramasubbu S. 2015. The Evolution of Blended Learning. https://www.linkedin.com/pulse/evolution-blended-learning-suren-ramasubbu
Regulation of the Ministry of Science and Highter Education of November 2, 2011 amending a previous regulation on the conditions that must be met for university classes to be carried out using dinstance education methods and techniques (Journalof Laws 2011 no. 246, item 1470).
SE@, 2013: http://sea.edu.pl/pliki/SEA_MAC_opinia2013.pdf
Staker H., Horn M., B. 2012. Classifying K-12 blended learning. Innosingn Institute Inc., May 2012. http://www.christenseninstitute.org/wp-content/uploads/2013/04/Classifying-K-12-blended-learning.pdf
Szwarbach P. 2012. Na co zwracać uwagę przy wybieraniu platformy e-learningowej. Nowe trendy w e-learningu. III edycja raportu e-learning Trends, czerwiec 2012, pp. 14–15.
The Law on Higher Education (Journalof Laws of 2012, item 572, as amended.).
Vademecum szkoleniowe dla przedsiębiorców MSP – www.inwestycjawkadry.info.pl
Youen A. H. K. 2011. Exploring Teaching approaches in blended learning. Research and Practice in Technology Enhanced Learning, vol 6(1), pp. 2–23.
Zwirowicz-Rutkowska A., Chojka A. 2015a. A concept of using blended learning techniques in the course of spatial data infrastructure at the University of Warmia nad Mazury, Poland. EDULEARN15 Proceedings, 7th International Cenference on Eductaion and New Learning Technologies, 757-766, ISBN: 978-84-606-8243-1.
Zwirowicz-Rutkowska A., Chojka A. 2015b. Kształcenie w zakresie infrastruktury informacji przestrzennej: propozycje zastosowania technik blended learning. Roczniki Geomatyki, t XIII, z. 2(68): 173–185.

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DIDACTICS: geographical information systems (GIS), spatial data models, SDI, geovisualisation, GIS analysis, ISO standards in geographic information, spatial services
RESEARCH: data quality, spatial analysis, geovisualisations, data modelling

The idea for this publication was born in June 2015, during a meeting of Polish teachers involved with Geographic Information Systems. The meeting was initiated by the Department of Geoinformation, Faculty of Geographical Sciences, University of Łódź, which received a grant to organize it. The discussion and presentations from academic teachers representing various universities in Poland were very interesting and sometimes heated. It would be advisable for other educators to familiarise themselves with the aspects of GIS education among Polish geographers, foresters, surveyors and other users. The experience of Geoinformation education in Poland is still modest, so the views of people who have been involved at Polish universities with it since the 1990s should be interesting to readers.

Geographic Information Systems (GIS) – the integration of environmental and climate issues as an important factor for economic development and quality of life – an innovative second-degree studies. Akronim GIS-E-QL: GIS for environment and quality of life

Project objectives: The main aim of the project is to start-up attractive and innovative second-degree studies – geoinformation in mutual cooperation of the FGS and the FMCS, students education, improving the competence of academic teachers, conference organization, publishing, cooperation with practitioners and establishing contacts with partners from Norway. This aim is consistent with the "Analysis of the economy's demand for graduates in key field of strategy in the context of the Europe 2020" 2012 and "Strategy for development of higher education in Poland 2020", in the field of promoting innovative courses, formed collectively with practitioners, raising awareness of the environment. Joint actions of educators and practitioners, supported the by the strengthening of university's hardware, software and spatial data, will ensure a high quality project. The existing cooperation with practitioners indicate that further training is necessary and they would like to see postgraduates in their institutions. The final beneficiaries of the project will be the students and the academical teaching staff and indirectly the economy of the region. Students who graduate will be the main recipient of the project, the next will be teaching staff who will have contact with the practices and Norwegian partners with similar interests. In broad terms the project will benefit Polish and European economy and environment

Grant form the STF 567 306 PLN

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ISBN 978-83-8088-140-2

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