AN APPLICATION OF BLENDED AND COLLABORATIVE LEARNING IN SPATIAL PLANNING COURSE

Dominika Wróblewska[1], Romanika Okraszewska[1], Artur Janowski[2]

[1] Gdansk University of Technology (POLAND)
[2] University of Warmia and Mazury in Olsztyn (POLAND)

Abstract

Spatial Planning is a master course for graduate students of Environmental Engineering. The course is based on assumptions that students' future work will be connected with spatial planning, and spatial issues will have an influence on their everyday lives. To familiarize students with environmental issues in planning, the teams of students get an assignment to design an urban space, waterfront along a stream. The whole project consists of four subprojects logically linked with each other. To prepare students for public engagement in planning, collaborative learning elements have been implemented.

A variety of blended learning and collaborative learning activities have been designed. Traditional face-to-face classes involve lectures, staff consultation hours, project work, presentations and open discussions for all students enrolled for the course. E-learning components have been developed in Moodle, and they include activities such as: building an open glossary, voting on presentations and others.

Moodle platform is also used as a database of students' subprojects and presentations in read-only mode. Moreover, it allows assessing the results of student work according to defined criteria, creating databases of links to data sources, encouraging student public participation by informing them about open meetings, conferences and seminars. The students also use other open source systems such as GIS (Geographical Information Systems), WMS (Web Map Systems), institutions websites and CAD software for data visualization.

The main problems that appeared while running the course were mostly connected to collaborative team work and failure of additional activities, which were only used by a few students (the quiz was an exception). The course was evaluated anonymously by students, who gave several pieces of advice on course improvement, mainly on collaborative work.

This article presents the structure of the course and correlation between collaborative learning and blended learning and its effects. The problems that appeared during the first year of the course are discussed below. The conclusions drawn from the analysis of the course will be used as guidelines for future improvements of the Spatial Planning teaching process.

Keywords: e-learning, blended learning, collaborative learning, group project, spatial planning, Moodle.

1 E-LEARNING. GLOBAL TRENDS AND EXPERIENCES OF GDANSK UNIVERSITY OF TECHNOLOGY

The origins of e-learning date back to 1924, when professor Sidney Pressey invented the "Automatic Teacher", the first device in electronic learning. Consecutive key moments in the development of electronic media, and information and communication technologies which have affected the development of e-learning are mentioned in publications [1],[2]. With the introduction of a personal computer (1980) and the internet in the late 20th century, e-learning tools and delivery methods expanded. E-learning has been used in the education sector since the early 90s and in businesses since 2000, including the military and training sectors [1]. The extent to which e-learning assists or replaces other learning and teaching methods in the education process varies between countries, regions and universities from none to fully online distance learning.

Gdansk University of Technology is a modern university which promotes solutions and strategies that take advantage of technology development. Its current educational offer in the field of e-learning includes distance learning courses, using mostly a blended learning educational model, which has become a very popular way of teaching and learning [3]. The rules of applying distance education methods at Gdansk University of Technology are in accordance with the relevant legislation [4], [5]

ISBN: 978-84-617-0557-3

and internal procedures [6]. Important support for computer-enhanced and online teaching is provided by Moodle, the university e-learning platform. This system allows interaction between users and gives access to teaching materials and the following e-components: text files, audio, multimedia presentations, videos, mobile applications, interactive teaching modules, educational games, blogs, webcasts, instant messaging and applications enabling remote communication (synchronous or asynchronous) between the participants of the learning process. In October 2013 the teachers on the Spatial Planning Course decided to set up a course at the Moodle platform. This paper is based on a case study and focuses on an application of blended and collaborative learning for a spatial planning course supported by the Moodle platform.

2 CASE STUDY

Spatial Planning is difficult to teach, as it is based on complex legal and administrative frameworks. The challenge is to teach spatial planning issues based on real spatial data and to solve spatial problems in a collaborative way, which is the most appropriate method in a decision making process. Collaborative learning prepares students for their prospective roles as critical citizens and environmental engineers. What is more, according to T. Jekel spatial planning and learning are in fact very similar processes [7].

2.1 Goals, effects and outputs

The course in Spatial Planning is run for Master's students of Environmental Engineering. The course is worth 3 ECTS credits, and it is delivered through individual and group project work. It is mainly based on case-based learning. There are two main learning objectives of the course:

- to introduce students the set of spatial planning issues referring to environmental engineering aspects, such as water systems management and others,
- to develop skills of collaborative planning and decision making.

The expected effects of the course are:

1. gaining the knowledge of the spatial planning system and it relations to environmental engineering issues,
2. understanding urban space complexity, its structure and relation between components taking into consideration spatial order and sustainable design,
3. data managing by acquiring appropriate data form site visits and virtual trips (Google maps, Street View), form GIS and WMS systems, literature and other documents, their integration, analysis and visualization,
4. demonstrating the ability to conduct collaborative team project work in a spatial planning process.

To fulfill the course aims, the project called **The Oliva Stream Waterfront** in Gdansk was chosen. The choice of the water basin was based on the variety and complexity of the urban space along the stream, which runs through the nearby woods, suburbs, district center and ends in the Baltic Sea. The students were divided into small groups of five to six people and each group was asked to solve various problems on different parts of the stream.

The project consisted of four subprojects logically linked with each other:

1. **Subproject I - Space inventory** - identification of space conditions such as: land use, water use, hazards, building function, protected objects and areas etc. (The output was a map drawn in Auto Cad and a written report).
2. **Subproject II - SWOT** - analysis based on inventoried space conditions within subproject I, and final conclusions involved development conditions. (The output was a written report).
3. **Subproject III - Waterfront inspiration** - based on case studies known from the literature, web or individual practice. (The output was a multimedia presentation presented to the public and discussed).
4. **Subproject IV – The Olive Stream waterfront** - changes proposal - based on subprojects II and III. (The output was a poster, presented to the public and discussed).

Apart from working on the project, the students were also encouraged to take part in public discussions on spatial planning documents and other events such as conferences, meetings and seminars. All necessary announcements were posted to Moodle.

2.2 Course Structure

2.2.1 E- technology

To design, develop and deliver the course, a blended learning approach was chosen. It is a hybrid of online learning and traditional face-to-face learning, one enhances the other. A range of learning activities using online learning environments were prepared in Moodle. The participants were first-year Master's degree students and had some previous experience with blended learning. Additionally, they belonged to the digital natives generation [8]. There were no technical problems associated with operating Moodle.

During the project the students had access to all the necessary software, which they used to prepare thematic maps, posters, presentations and the final report. A few problems with software were reported by the students during the course. Spatial Planning class took place in an ordinary classroom without computer access. Fortunately, almost all the students had their own laptops. Though, internet access was not provided therefore a number of project activities were done outside of classroom. The activities involved both individual and collaborative work.

All the subprojects were prepared in Moodle. As it was important to keep the schedule and present the results in a useful way, all electronic submissions were automatically timed and dated. If students managed to submit their results on time and pass each subproject, they were exempted from taking the Final Test. It proved to be a strong motivation to keep all the deadlines.

Each subproject was assessed by the teacher and the third one was also assessed by the students, who voted on the best presentation using a Moodle feature.

2.2.2 Course components

A set of components to achieve the aims and objectives was chosen (Table 1), (Fig. 1). The traditional face-to-face approach is based on:

Lectures (30 hours) - supported with short questions and discussions about actual events.

Literature Reading - obligatory and supplementary literature. The obligatory literature mainly included regulations and directives on spatial planning to encourage students to read and analyze them.

Project (15 hours) - The Oliva Stream Waterfront divided into four subprojects.

Presentations - final outputs of the chosen subprojects.

Discussion - moderated and spontaneous discussions on group presentations for all the students enrolled for the course group.

Final written test - only for those groups who failed to submit subprojects on time or did not pass them.

The e-course in Moodle consisted of the following components:

Information Table - information about the course and events related to spatial planning such as conferences, seminars and meetings.

Database - documents such as project instructions and students' submissions. Instructions to each subproject were developed by the teachers. Further materials were developed and published by the students (presentations and other subproject outputs) and the teachers (Information Table).

Glossary - a dictionary of special terms in spatial planning collectively built by the students.

Assessment sheet - elaborated by teachers for each subproject assessing the results according to the defined criteria. All the assessment sheets were published on the website before the subprojects were submitted.

Quiz – end of module online quiz.

Voting – students voting on the Subproject III output presentations. The winners were awarded additional marks, which contributed to the final grade.

Links - a database of links to online resources, where students could gain necessary information for the projects (Gis data, WMS data and others). The database was extended to include new links suggested by the students.

Additionally, the students had the opportunity to consult their individual and group problems and outputs with the tutor. Consultation were held face to face or by e-mail.

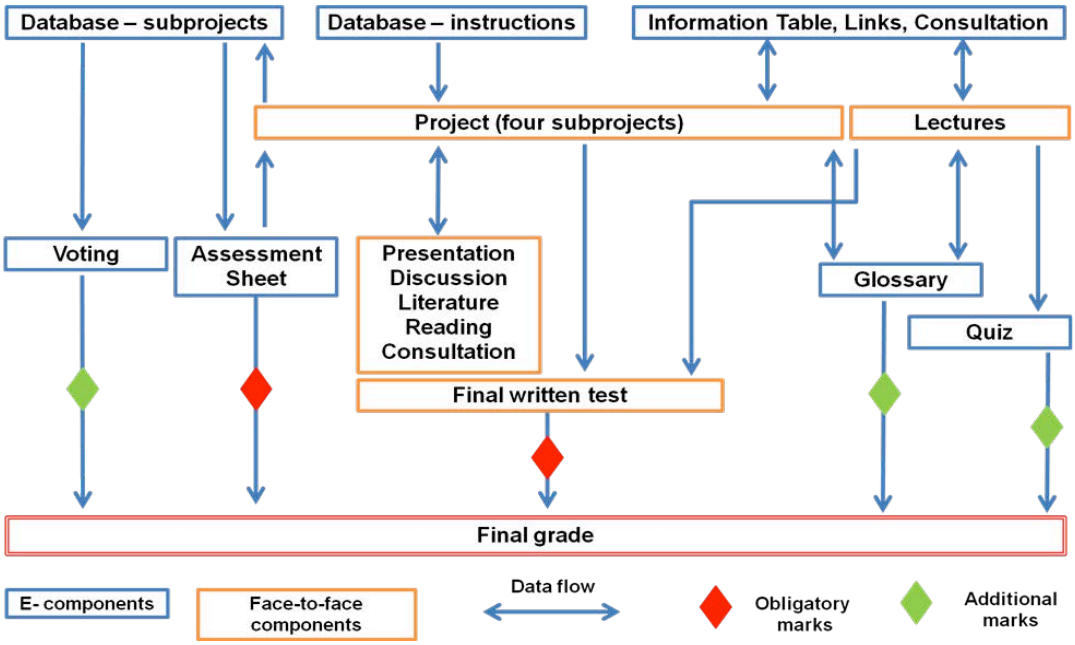

Fig. 1. Relations between course components.

Table 1. Relations between course components and learning objectives.

Learning objectives	Course elements supporting objectives		
	Traditional approach	**E-course**	**Others**
Gaining the knowledge of the spatial planning system and it relations to environmental engineering issues.	Lecture Literature Reading Project Presentations Discussion Final written test	Project Voting Glossary Quiz	Participation in external activities Consultation
Understanding urban space complexity, its structure and relation between components taking into consideration spatial order and sustainable design	Lecture Literature Reading Project Presentation Final written test Discussion	Glossary Project Voting	
Data managing by acquiring appropriate data form site visits and virtual trips (Google maps, Street View), form GIS and WMS systems, literature and other documents, their integration, analysis and visualization.	Project: Site visits Literature Reading Discussion	Project: Links Database	
Demonstrating the ability to conduct collaborative team project work in a spatial planning process.	Project Discussion	Assessment sheet Glossary	

The course consisted of many components which were not obligatory and their role was just to enrich the learning process, save time needed for searching information and to encourage students to do other activities apart from those obligatory. Some of the non-obligatory components were additionaly graded, each grade contributed to the final grade. Some tasks were not assessed to see how the students approached them, and to get know what motivated them to engage in the learning process (see table 2). The aim was to confirm the general observations that students learn "because they have an innate desire to excel, the promise of reward, the fear of punishment, the lure of advancement, social pressure, peer pressure, curiosity, a quest for understanding, the satisfaction of accomplishment, status, pride and more" [9].

Table 2. Course components and their relation to activities.

Course components	Activity				
	Group	Individual	Obligatory, assessed	Non-obligatory, assessed. Students can improve the final grade	Non-obligatory, not assessed. Chosen to support students learning process.
Lectures		x	x		
Literature Reading		x			x
Project	x		x		
Presentation	x		x		
Discussion	x				x
Final written test		x	x		
Information Table		x			x
Database	x	x			x
Glossary	x	x		x	
Assessment sheet	x	x			x
Quiz		x		x	
Voting		x		x	
Links	x	x			x
Consultation	x	x			x
External activities	x	x			x

2.3 Collaborative work

The students were divided into groups of four up to six people and it was their choice with whom they wanted to work. There was no leader or a person responsible for the organization of the project management process. To help the students, the project was broken down into smaller units – subprojects. The students got all the necessary materials and databases to start the project, but there was no written support on collaborative working. They had to solve all problems themselves, but could also consult them with the teachers. The assumption was that Master's students had some collaborative work experience. Some of the groups worked very efficiently, showing complementary skills, equal commitment, and some still needed more discipline and teacher supervision during face-to face project meetings. The support was mostly needed to achieve agreement when there were diverse viewpoints or if the activity objectives were not clear enough.

For example, subproject II SWOT was to be elaborated during classroom discussions. It was a good chance to see how different students approached it. The SWOT analysis consisted of four small analyses: strengths, weaknesses, opportunities and threads. The groups presented three different approaches to providing ideas and concepts related to future developments:

1. One or two individuals analyzed SWOT and the rest of group members accepted the result without any discussion.

2. Some students worked separately on the SWOT analysis and on completion they gathered the results to produce the final output. They did it without any negotiations or discussions, assuming that all the results were true and correct. In this case we would rather say it was cooperative than collaborative work.
3. Other students collaboratively discussed each single analysis and wrote final conclusions. These groups found more effective solutions as they generated a greater number of ideas.

The first two groups were asked to change their approach and produce more improved ideas, because only those who worked hard had consisted knowledge. The final effect was not known to all the group members, so they had no influence on it, and presented no criticism.

Subproject III was an example of collaborative work. The students were to present waterfront designs, choose criteria and assess solutions. The output was a presentation, given in public and discussed. After minor mistakes had been improved, all the presentations were submitted to the database, and voting to choose the best one started. In this case almost all visual presentations were of a very high quality, fulfilling the requirements. The chosen criteria were different, it appeared that the students could think critically and apply creative thinking to problem solving.

2.4 Course evaluation

The course evaluation was based on evaluation made by the students towards the end of the course, keeping submissions terms of the subprojects, and final marks, as well as teachers' observations during face-to-face project meetings, lectures and consultation hours. The teachers also assessed delivery strategies on the basis of the amount of students using them, the final output, and the content and information which were provided for the learners.

The evaluation made by the students indicated that they enjoyed the course, most of them became aware of spatial problems touching them as citizens or engineers. The course weakness was collaborative work which was indicated especially by the group members who were not eager to get involved in the subprojects. All the deadlines for the subprojects were reached, because the students wanted to be excused from writing the final test. This occurred to be the most important motivation factor for the students to finish all on time, and gain positive marks for each subproject. There was no student who failed the course. Some students who undertook additionally assessed but non-obligatory activities improved their overall performance and achieved excellent grades.

Some of the designed activities did not arouse the students' interest, and did not bring the expected results. The main problems that appeared while running the course were mostly related to the failure of the additional, non-obligatory activities, which were done only by a few students and were not strictly connected with the project.

Assessment sheets – they were presented to the students so that they could get familiar with them before submitting the final output. It occurred that in most cases the sheets required small modifications as the activities, approaches, ideas or solutions were quite innovative, which was not taken into account. Thus, in the future, all assessment sheets will be enriched by the possibility of assessing the students' approach, and they will give teachers the chance to evaluate the group approach to problem solving. This can result in hybrid assessment linking computer and teacher evaluation. The assessment sheets also indicated that some of the subproject components were extremely difficult to the students. That is why the issues of space composition will be excluded from the sheet and not assessed any more.

Quiz - the main problem was no access to a computer laboratory. The students were to undertake this activity at home at suitable time within three days. It was difficult to assess if the Quiz was done by each student on their own or not. In the future the quiz questions database will be rebuilt and enriched to include a wide range of questions.

Voting – this activity's aim was to make the students familiar with as many presentations as possible so that they could gain inspiration and knowledge for their future work. It occurred that the students looked through the presentations, but did not vote on them, even though the authors of the best presentation were awarded with additional grades. It probably resulted from the fact that there were too many presentations of a high quality to chosen from. In the future presentations will only be put in the database.

Glossary - this activity was added by the teachers in order to encourage the students to share information, search for definitions in appropriate legal documents and give critical feedback. To check

their motivation, the students did not know that they had a chance to be additionally graded. So the activity was only done by a few percent of the students. During the next course the glossary will be developed as it is a good component for open discussions. To encourage and motivate the students to work on it, they will be informed about additional grades for this activity at the beginning of the course.

It was found out that from the several course components (see table 2) only those which were of significant support for managing obligatory activities were chosen (database, links, assessment sheet, consultation). Other activities were not chosen or only a few students tried them (glossary, literature reading).

Taking into account problems related to collaborative work, the analysis of subproject II shows that the students could not successfully organize their work and solve the tasks. The students' evaluation notes indicate that in most cases their work would be more successful if they had a leader, and if they knew what to do with a group member who is not eager to work efficiently. One solution is to provide students with standards for collaborative work. Also if there is a leader, they can solve problems with organizing the decision making process, elaboration of outputs, etc. Apart from what is mentioned above, it is still important to have teacher supervision in the case of group negotiations, planning and management.

3 SUMMING UP

The use of technology in the teaching process is the fact. It results from the adjustment of the educational offer to the expectations of a new generation called Millennial [10], digital natives [11] or a net generation [12]. Searching for a way to improve the teaching of a difficult subject such as Spatial Planning, we turned to blended learning. The students' statements in the evaluation notes indicate that they were satisfied with learning in the Moodle environment, which confirms the assumptions about the expectations of the new generation. From the tutors' point of view, the use of Moodle has the following advantages:

- deliver higher quantity and richer educational materials without limits related to printing,
- providing additional materials outside of regular schedule,
- partial asynchronous assessment of knowledge,
- faster evaluation by using assessment sheets,
- communication channel [13].

However, there are also weaknesses and limitations associated with:

- the necessity of teachers learning how to use new tools, technologies and programs,
- the different perception of digital materials and paper materials,
- the lack of teachers' experience in motivating students in a virtual environment,
- the technical limitations of the system, e.g. lack of access to a computer laboratory.

The effectiveness of the blended learning process determines the relative proportions of traditional and e-components. As far as the course is concerned, the right balance was found.

The idea of group projects is promoted by both the Ministry of Education and the university authorities. Collaboration is inherent in the planning process. Therefore, the group project method was chosen to be the most appropriate. Collaborative skills are useful in professional life. That is why, the teachers' intention was to create an adequate environment for practicing collaborative learning both in a traditional class and on Moodle. In the classroom, the project groups received a task and then they presented solutions to the teacher or other group members. Some of the topics were discussed in class. The teacher had an influence on group work, which ranged from collaboration through cooperation to individual work.

The glossary was meant to activate students to exchange ideas and definitions. Only a few students took advantage of this tool. Besides the reasons mentioned above, the students probably preferred informal rather than formal channels such as social media, where they had to focus on appropriate language and bibliography.

Summarizing our experience we conclude that:

- the choice of the blended learning model was the right one, which was confirmed by the students and the teachers in the evaluation forms,
- collaborative group work always proceeded according to the established rules, but the case study shows that the process of collaboration can be unique for each group and can result in a number of difficulties,
- collaborative group work, if not monitored by the teachers, varied from collaboration, to cooperation or to individual work,
- additional opportunities of collaborative learning in the Moodle environment, proposed by the teachers, did not meet with interest.

The recommendations based on the case study are as follows:

- further use of Moodle as a platform for of blended learning,
- improvement of teachers' skills in the use of Moodle tools supporting collaborative work,
- improvement of the existing blended learning components by adding new collaborative work and removing the voting activity,
- development of a group project guide or providing links to such guides,
- organization of courses for teachers on negotiation and motivation techniques,
- implementation of the flipped learning method to motivate students to learn collaboratively.

REFERENCES

[1] Nichelson, P. (2007). A history of e-learning. Echoes of the pioneers, Computers and Education. E-Learning. From Theory to Practice, pp.1-11, Springer Netherlands.

[2] Koschmann, T. (1996). Paradigm shifts and instructional technology. In T. Koschmann (Ed.), CSCL: Theory and practice of an emerging paradigm (pp. 1–23). Mahwah, NJ: Lawrence Erlbaum.

[3] Chróścielewski, J., Kotarska-Lewandowska, B., Okraszewska, R. (2011), Komputerowe wspomaganie w nauczaniu geometrii wykreślnej, Nowoczesne technologie w dydaktyce, pp. 84-92,Wydawnictwo Politechniki Świętokrzyskiej.

[4] Act of 27 July 2005 Law on Higher Education, Journal of Laws of 2012, pos. 572, as amended. Amended.

[5] Regulation of the Minister of Science and Higher Education on the conditions that must be met in order for classes in college can be carried out using methods and techniques of distance education, Journal of Laws of 2007 No. 188, item. 1347, as amended. Amended

[6] Order of the Rector of Gdansk University of Technology No. 24/2013 of 10 September 2013.

[7] Jekel, T. (2007), What you all want is GIS2.0. Collaborative GI based learning environments: spatial planning and education. In: Car, A., Griesebner G., Strobl, J. (Ed.), GI-Crossroads@GI-Forum. Heidelberg, pp. 84-89.

[8] Prensky, M. (2002). The motivation of gameplay: The real twenty-first century learning revolution, On the Horizon, Vol. 10 Iss: 1, pp. 5-11.

[9] Cross, J. (2004). An informal history of eLearning, On the Horizon, Vol. 12 Iss: 3, pp.103-110.

[10] Howe, N., Strauss W. (1992) Generations: The History of America's Future, 1584 to 2069 HarperCollins.

[11] Prensky, M. (2012). Digital natives, digital immigrants, On The Horizon MCB University Press.

[12] Tapscott, D. (2005).Growing up digital: the rise of the net generation, McGraw-Hill, New York.

[13] Mokwa-Tarnowska I. (2013) Interaction and communication in the e-learning environment. In L. Zielińska and W. Górski (Eds.), E-learning in Teaching Foreign Languages at the Tertiary Level, Foundation of the Cracow University of Economics, pp. 87-96.