AC 2012-4675: INTEGRATING STUDENT PROJECTS THROUGH THE USE OF SIMULATION TOOLS ACROSS LOGISTICS ENGINEERING CURRICULUM

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Integrating Student Projects Through the Use of Simulation Tools Across Logistics Engineering Curriculum

Abstract — This paper describes an innovative curriculum developed for a new Logistics Engineering degree programs at the Faculty of Engineering Management of Poznań University of Technology. The core of the program is based on a sequence of four major courses, which focus on the Product Development, Process Analysis and Optimization, Logistic Processes and Service Engineering, respectively.

Each course is built around a practical team project. With the project effort as the background, the courses introduce students to key issues in global engineering competence, such as technical and cross-cultural communication, collaboration and teamwork, organization and management, engineering ethics, critical thinking and problem solving, and integration strategies for design, manufacturing and marketing. Projects also introduce entrepreneurial components, as the teams have to develop their concepts in the context of a start-up company. One key element of all the courses is an emphasis on the use of various simulation tools. These tools may vary from physical mock-ups, through simple Excel spreadsheets to the use of industrial-strength simulation software.

The first course in the series, introduces 2nd year students to basic concepts of consumer product development. It covers the principles of design and innovation process, and also explains essential design tools, such as Quality Function Deployment and Pugh Matrices. It also reviews key manufacturing methods and systems. Students work in small teams to develop their own product ideas from initial concepts to a business plan for a start-up. The course is offered in English.

The second course, offered to 3rd year students, introduces fundamental concepts related to industrial process analysis and improvement. Students learn necessary data collection and analysis techniques (such as, for example, Value Stream Mapping) and also the basics of process simulation using a commercial software package. Student teams work with industrial sponsors and develop competing innovative ideas for process transformation and improvement. Emphasis is placed on the quality of the student work and final results. Top projects are offered to present at technical conferences, publish their results in technical journals, and also participate in project competitions.

The best projects can also be accepted as undergraduate theses (required for completion of the Stage 1 degree, equivalent to BEng) and can also be continued in the 3rd course of the sequence, focused on application of optimization techniques. This course is offered to 4th year students in the first year of their master's program. It focuses on the supply chains and logistic processes, assessment of their performance, lifecycle analysis and management. The student group project will be carried out in an industrial setting, dealing with real-life assignments.

The fourth course focused on the service engineering concepts and still in the planning phase, is intended to integrate knowledge acquired by the students in the preceding courses of the sequence.

It covers such subjects as, for example, organizational design, global issues and design and management of service operations. The final project will encourage students working in teams to develop their ideas into innovative entrepreneurial enterprises.

1. Introduction

Logistics Specialization at the Poznań University of Technology was originally launched during the 2007-08 academic year. It has a bi-level curriculum– in compliance with the European directives defined by the Bologna Process[1] . The first level (Level 1) is 7 semesters long and upon completion students receive the title of an engineer (equivalent to BEng – Bachelor of Engineering). After completing 3 more semesters (Level 2) students get a Master's of science (MSE – Master of Science in Engineering) degree. The first class of students has just completed its 10th semester (level 2) in 2012.

Graduates of this program are being prepared to become integrators of key activities within an enterprise. They take courses on the design and organization of supply chains, production, transport and distribution of goods. Logistics gains on importance in the context of global enterprises, due to the international trade. This type of knowledge is particularly useful not only in a manufacturing enterprise, but also in retail and services. Well-rounded background of the graduates opens for them opportunities in positions of leadership, management, system analysis, designers and consultants, which can focus on product design, purchasing of goods and services, production, transportation, inventory management, distribution and retail.

This paper describes the concept of conducting the subject Logistics Process Planning, on the basis of projects implemented by teams of students in the industrial environment, with the use of the latest simulation techniques. Owing to this idea, most of the students for the first time have an opportunity to get acquainted with industrial reality: they can directly observe the implementation of specific projects in companies. On the other hand, it is often the first chance for the companies to try the innovative solutions based on simulation techniques. The method of conducting the subject seems to be very attractive to both sides participating in such projects.

The paper consists of 6 chapters. Chapter 1 presents the requirements of the Polish Ministry of Science and Higher Education, which must be met by universities introducing logistics into their study schedule. The concept of the course on Logistics Process Planning conducted at two degrees in the field of logistics is discussed in Chapter 3. The core of the course, i.e. student projects, is described in detail in Chapter 4. Chapter 5 provides a list of already-implemented projects and discusses the experience gained from them. All these lead to conclusions presented in Chapter 6.

2. Ministry of Education Framework

Polish Ministry of Science and Higher Education created the basic framework for the "Logistics" track [8,9]. The framework defines qualifications of the graduates and contents of needed courses. Table 1 presents a list of major courses for Level 1. First level graduate (engineer) should know principles of modern logistics systems, fundamentals of economics, and management. He/she should have the ability to solve logistical issues using engineering methods and technologies, to design logistics systems and processes, to use computer software for logistics management. The graduate should be prepared to work in an environment of a production factory, logistics company, consulting company or administration.

No	*Content*
1	Operations and Services Management I
2	Logistics and Supply Chain Management
3	Logistics Infrastructure
4	Procurement Logistics
5	Production Logistics
6	Distribution Logistics
7	Normalization and Quality Management in Logistics
8	Transport Economics
9	Eco-Logistics
10	Process Design

TABLE 1
CONTENTS OF LOGISTICS FRAMEWORK FOR FIRST LEVEL PROGRAM

No	*Content*
1	Operations and Services Management II
2	Logistics Management
3	Cost Analysis in Logistics
4	Marketing of Logistics Services
5	Design of Logistics Systems and Processes
6	Assurances in Logistics
7	IT in Logistics
8	Project Management

TABLE 2
CONTENTS OF LOGISTICS FRAMEWORK FOR SECOND LEVEL PROGRAM

The graduates of Level 2 should have extended knowledge (in comparison to Level 1) in scope of company logistics (production, commerce, service) and other organizations forming supply chain. They should be prepared to work in positions of leadership to develop and manage logistics strategies. They should use their knowledge and abilities adhering to ethical and legal rules. They should understand the nature of competition in both local and global markets, mission and goals of company logistics, and significance of quality-based competition. They should know how to plan, organize and perform logistics processes, to introduce system solutions to improve company management and find reserves to reduce logistics costs. The graduate should develop good habits to continue their education, to develop professionally and to engage in research. Table 2 presents the list of recommended major courses for level 2.

3. Concept of Course – Logistics Processes Design

As a result of cooperative efforts between Faculty of Engineering Management in Poznań (Poland) and University of Windsor (Canada), the new concept to integrate knowledge from key courses of the Logistics Program has been developed[6]. Its main idea is to use courses Process Design from Level 1 and Design of Logistics Systems and Processes from Level 2 as main foundational courses. Process-based approach allows to think about any enterprise or a factory as structures where various processes are performed. Students form teams (companies) and carry out some projects during two levels in continuous, integral way. Student teams work together throughout the project cycle. The cycle is composed of four main courses (see Fig. 1):

1. Product/Process Integration (PPI)
2. Logistic Process Design (PPL)
3. Design of Logistics Systems and Processes (PSPL) – Process Management and Optimization
4. Service Engineering (SE)

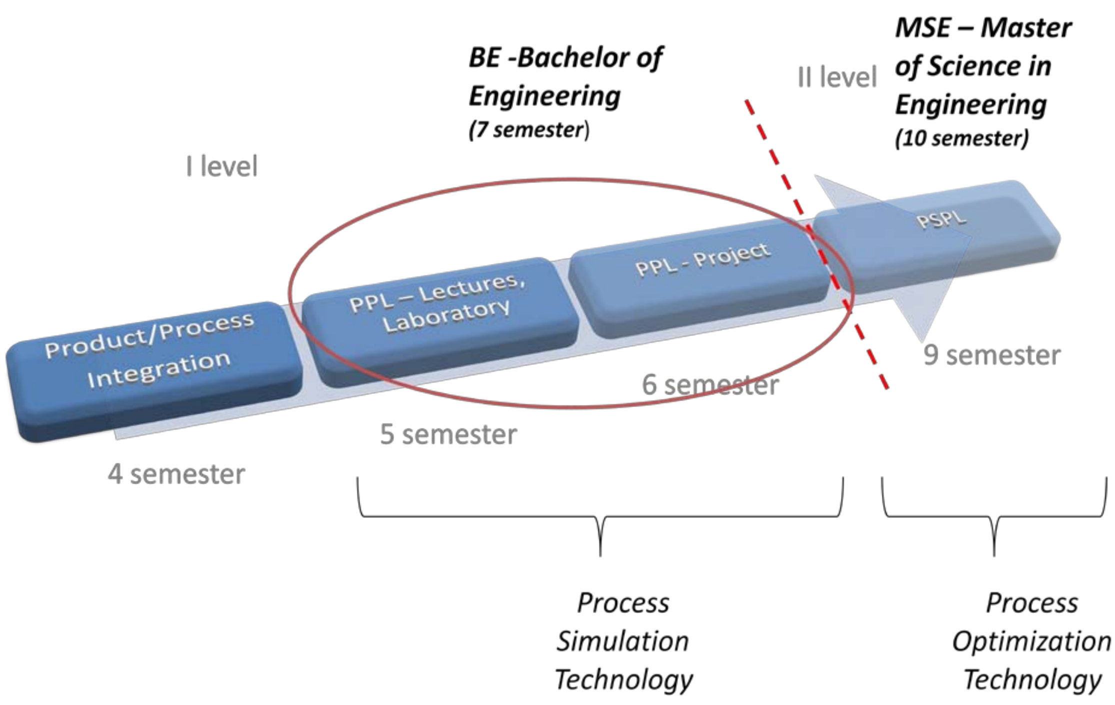

FIGURE 1
CYCLE SKELETON BASED ON PROCESS APPROACH

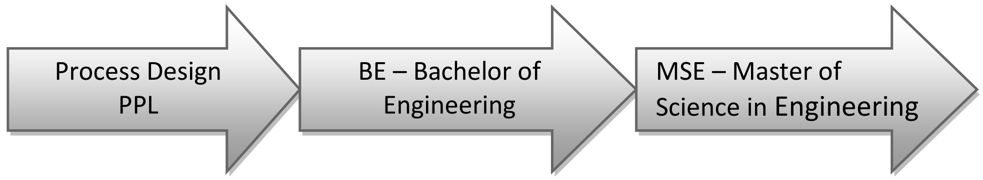

FIGURE 2
MODEL OF STUDENT WORK TRANSFORMATION

Name	*Goal*	*Outcomes*	*Semester*
PPI – Product Process Integration	To form a start-up company that produces a new innovative product that fits mass-customization market at global scale	Product Design, General Process Design Manufacturing System Design Financial Model Business Plan Main process design	Level 1 –sem. 4
PPL Process Design	Develop practical base for process design using simulation software (lectures & laboratory)	Logistics process design	Level 1 – sem. V
PPL Industrial project	Prepare project proposal for industry. Form consulting company (8 students). Project realization in industry.	Models, Proposal for industry industrial project	Level 1 – sem. VI
PSPL Process Management & Optimization	Base for process management and optimization using specialized software. Prepare project proposal for factory and Supply Chain – optimization	Proposal for factory/supply chain industrial project	Level 2
SE – Service Engineering	under development – in plan	Assess existing service; develop new service concept	Level 2

TABLE 3
PROCESS-BASED PROGRAM CURRICULUM

Stage 1 – PPI Course is introduced to provide students with general overview of product development process (see Table 3). Students form a start-up company and design a new product, develop a (rough) design of processes to manufacture this product, build a corresponding financial model and a business plan. This course is described in details in next section.

Stage 2 is divided into two semesters: during the first semester lectures cover Process Design and students are learning hands-on fundamentals of specialized software platform(s) for process modeling and simulation.

Based on the knowledge and experience gained in the PPI class, in the following semester student groups contact local companies, develop project proposals, and carry out projects according to the joint agreement. Student teams offer services to design, model or map real logistics processes.

Stage 3 (still under development) will be performed on Level 2 and will be divided into two specializations with either factory (internal) or supply chain (external) focus. In stage 4 the course on Service Engineering will be introduced.

Students are given an opportunity to expand the completed projects (Fig. 2) into Bachelor of Engineering (BEng) thesis work, which is required for graduation. Afterwards, they can continue their education towards the M.Sc., thesis-based program. Such an opportunity is offered to students who, from the very beginning, study in the same faculty and department.

4. Logistics Process Design the core of the whole course

The core of the course in Stage 2 is PPL – Logistics Process Design. Effectively, it is a two-semester course, comprising of:

- Semester 5 – 30 hours of lectures and 15 hours of labs and tutorials
- Semester 6 – 30 project classes

The stage is crucial because there is a strong connection between stages 1 and 2, in a sense that the same cohort of students, who started stage 1, continues its education at stage 2. At the second degree, i.e., at Stage 3, new students may appear (according to Bologna Process) and it must be taken into account that not all of them (or perhaps even none of them) have any background on the simulation techniques and the corresponding software. Moreover, not all students who completed Stage 2 continue their education at Stage 3.

The main goal set for students at stage 2 is to gain competence in designing and managing logistics processes. Such a goal is established by the Polish Ministry of Science and Higher Education[7], and as such, the subject is treated as mandatory.

In semester 5, students attend laboratory tutorials, where they learn to use process simulation software in a general-purpose version. It is important because students should develop the proper way of thinking and using this kind of software. Neither the kind of company students will work for nor the specific tool they will use in the future are not known at this point. The participating students, as long as they keep registered status, maintain software access both in- and outside of the classroom, as according to the software license and academic network rules. Their accounts expire at the time of their graduation from the university.

Abridged Syllabus

Week	*Lectures*
1	Introduction, Course requirements, Schedule, Idea, Previous courses presentation,
2	Functional and process orientation in management, process approach, stages of enterprise process maturity
3	Logistics processes and systems, definitions and classification, process models and standardization, model taxonomy based on criteria: organizational, chase and functional, logistics systems structures;
4	Guest lecture – IT systems as interior logistics processes supports in Volkswagen Poznań
5	Process design, definition of design, tasks design, methods of design, Proces organization rules, principles of process organization in time, cycle time, Serial, parallel and parallel-serial process organization, process design
6	Process parameters, attributes, metrics, timing, timeliness, quality, cost, productivity, efficiency, bottlenecks, process monitoring
7	Process improvement, process management, process control,
8	Guest lecture – Business Process Management with Adonis
9	Process mapping, formalisms for mapping, Visio diagrams, IDEF methodology, ASME, FMEA of process, BMPP – Building of process flow model;
10	Case study - Building Process Flow Model part 1
11	Case study - Building Process Flow Model part 2
12	Case study - Building Process Flow Model part 3
13	Process simulation – Process statics and dynamics, definitions of computer simulation, types, advantages and disadvantages,
14	Simulation models validation and verification, experiments, statistical distributions, simulation software
15	Site visit – Volkswagen Poznań

TABLE 4

SYLLABUS OUTLINE OF PPL (LOGISTICS PROCESS DESIGN) COURSE

Laboratory classes consist of two parts:

In part 1, consisting of three meetings (i.e., 6 classes), students master the basic skills necessary to create and start a simulation model as well as are being introduced to the basic probability distributions and present the results. In this part students replicate instructor's actions step by step.

Part 2 consists of 11 classes. In each laboratory group there are 10-16 students, who in pairs solve problems with use of simulation techniques. There are 12 tasks prepared for them, and therefore they do not recur within a group a students. The tasks are diverse, so that in each case different skills are needed to solve a problem. For example, in a task which requires modeling of a higher complexity process, less emphasis is placed on the presentation of results. In another task the process is quite simple, but there is a need to prepare an extensive presentation of results. Students carry out these tasks in pairs, only consulting their instructor as needed. As a result of this approach, a project team of 6-8 students is formed (i.e., a group of students who in the next semester will implement a project with industrial sponsor).

Students in such a team have already gained wide knowledge concerning simulation techniques, consisting of skills that each of them mastered by solving various tasks.

An assumption is made that students enter the course with certain initial knowledge (resulting the from the curriculum), including, for example, foundations of management, foundations of logistics, foundations of information technology, foundations of reserves management, foundations of operational management and supply chain.

However, the actual profiles of the students may vary. They are 3rd year students, i.e., semester 5 and 6, usually 21 or 22 years of age. They have no prior exposure to the industry. On the one hand, they are familiar with the way the industry operates and on the other hand, they have already gained certain skills which are considered innovative (e.g. simulation techniques). Therefore, the idea of student projects appeared so as to connect the two aspects; nowadays, in Poland industry is increasingly open to cooperation with academia. Students have already mastered the theoretical foundations of management, logistics, inventory management, operational management and supply chains: they have been using them in class and working on class projects. Most of the students have never been in a production plant. As for information technology, students' skills are limited to the use of basic applications such as MS Office and web-based applications; only few can use programs such as Visio and MS Project and hardly any student is familiar with structured programming (object-oriented programming is actually unknown to students). Under such circumstances, certain requirements need to be met both in terms of the applied simulation software and the method of conducting classes.

In semester 6, students work on projects in an industrial environment. They form teams consisting of six to eight students, select their leader and divide the work among themselves, e g., decide who is in charge of collecting data, contacting the representatives of a production plant, creating the simulation model and presenting the results. The project topics are determined by the particular circumstances; however in most cases the choice of the company and subject depends on students' decision. Students contact the selected company and organize a meeting with the participation of their academic instructor, in which the rules of the cooperation are established:

- the company is asked to prepare a list of few (usually three) suggested subjects, out of which students choose the one to be implemented;
- the subjects must take into consideration the use of simulation techniques.
- the company selects a person (industrial sponsor representative) who, on its behalf, will be responsible for implementing the project; a visit to the company is organized for all students in a team.

For example, initial list of projects from Beiersdorf Company in 2012, consisted of the following topics:

1. Pallets flow (process optimization for supply chain including production/distributor/delivery point)
2. Optimized Pallets Height (dependencies between pallet high and transport/storage)
3. Capacity planning in a warehouse - a model to support in capacity planning; to analyze current capacity or plan and translate the capacity requirements to support business on the basis of technical requirements.

Student team decided to pursue project #1.

The role of the academic instructor is to make sure that the project subject is, on the one hand, not too easy (too trivial) and, on the other, is limited ins cope, so that it can be completed on time.

Students themselves decide on the schedule, and submit it to the company for approval. Typically, the project is implemented in two steps. The first one is to collect data; it is completed when the data are validated and cleared by the company. Only after approving this step (usually in week 6 or 7) can the project be continued. Then, the team creates a simulation model and carries out simulation experiments. The projects are conducted by two academic teachers, who support each other. Nevertheless, in each project one of them takes a leading part.

5. Student Projects in Industry

Student projects are organized in companies situated in and around Poznań, which is one of the major industrial centers in Poland. Poznań is considered one of the most interesting cities for investors since it is the centre of industry, commerce, logistics and business tourism. According to data provided by investors, it is estimated that the value of cumulated foreign direct investment in the years 1990-2010 was 6.6 billon USD[2,3]. In the list of 500 largest companies in Poland published by Polityka weekly magazine in 2011, there are 34 companies settled in Poznań and PoznańDistrict. Four of them are among 20 largest companies in Poland (based on 2010 sales revenues):

- Jeronimo Martins Dystrybucja S.A. (Kostrzyn Wielkopolski) – 20,217 mln PLN
- Enea S.A. (Poznań) – 7,088 mln PLN
- Eurocash S.A. (Komorniki) – 7,792 mln PLN
- Volkswagen Poznań Sp. z o.o. (Poznan) – 7,774 mln PLN

Table 4 presents project implemented in the academic year 2009/2010.

No	Project Title	Sponsoring Company
1	Design of Procurement Logistics Process	Stomil-Poznań S.A.
2	Analysis and Redesign of Material Flow between Departments in Tyre Manufacturing Company	Stomil-Poznań S.A.
3	Optimization of Delivery Process of Metallurgic Materials	H.Cegielski – FPS Poznań
4	Optimization of Part Delivery Process to an Assembly Station	VW Poznań
5	Improvement of Stickers Supply from Store to Machine	Imperial Tobacco S.A.
6	Optimization of Human Resources Allocation in the Production of Upholstered Knitwear	Vinylpex

TABLE 5
PROJECTS PERFORMED IN 2009

The first round of projects was implemented in 2009. They were completed successfully and some organizational experience was gained then as well. Initially, the class was scheduled for semester 5 only: lectures, laboratory classes and project were running simultaneously, which turned out to be too demanding for students. As a result of that experience, the course was restructured and split into two parts:

- Semester 5 introductory lectures and laboratory classes
- Semester 6 project in industrial environment

It also turned out that the project topics need to be formulated more precisely to help clearly define project boundaries. In 2009 project ideas suggested by the companies were too general; they were defined at the managing board level and then passed on to the person in charge of a given team of students. As a result, some misunderstandings appeared and the process of developing a specific subject lasted too long and was not focused. What is more, the need for using the simulation technique was not always strongly emphasized and the companies sometimes did not take it into consideration.

The following year (2010), the need for applying the simulation techniques was explicitly stated as a main requirement. As a result, the subjects and goals were formulated properly, which also helps in managing outcome expectations. Now it shows that is one of the major issue. The implemented subject should not be too narrow, because it may turn out that its solution is trivial and does not require simulation techniques. On the other hand, it should not be too complex since the students are have to complete it within one semester. Table 5 shows the list of projects completed in the academic year 2010/2011.

No	Project Title	Sponsoring Company
1	Thorough examining the group of notebooks in the shop in SC Plaza. reparing for the Optimization of the Supply and Stocks	Komputronik (computer retailer)
2	Organization of painting raw parts coming from sub-suppliers in sets.	Solaris (bus manufacturer)
3	Simulation of supplies of material from the Supermarket on the ML4 and ML5 lines- deliveries of material with transport carts	VW Poznań
4	The organization of pipes manufacturing – one piece flow or make to stock	Solaris
5	The simulation of chosen roads of the works transport. Preparing for the optimization of the horizontal and vertical transport, improvements of the waste disposal and improving the process of supplies replenishment	Factor
6	Streamlining processes of sending both the expedition of letters and parcels at the ward of the Polish Mail with exploiting the technique of the simulation.	Poczta Polska (Polish Mail)
7	The simulation of sequence process – an example of providing front mirors in Caddy T5	VW Poznań
8	Change of a forklift truck to the tractor - works transport of empty containers - economy of the transport (road, time, cart).	Panopa
9	Simulation of the movement of aircrafts and vehicles of the ground crew ased on Busy Day Schedule at the Poznań Airport.[4]	Port Lotniczy Ławica
10	Simulation of the planned communications arrangement in *Poznań* Airport along with the system of destination car parks.	Port Lotniczy Ławica

TABLE 6
PROJECT PERFORMED IN 2010

It should be emphasized that in all of the companies, where the projects were implemented, the simulation techniques were never used before in the decision-making processes or to improve processes or solve problems.

According to the main idea of the university courses, as it is shown in Figure 2, some of the projects were successfully developed into engineers' theses – Table 6.

No	Project Title	Years
1	Optimization of Delivery Process of Metallurgic Materials	2009/2010
2	Optimization of Human Resources Allocation in the Production of Upholstered Knitwear	2009/2010
3	The simulation of sequence process – an example of providing front mirors in Caddy T5	2010/2011
4	Change of a forklift truck to the tractor - works transport of empty containers - economy of the transport (road, time, cart).	2010/2011
5	Simulation of the movement of aircrafts and vehicles of the ground crew based on Busy Day Schedule on Ławica Airport	2010/2011
6	Simulation of the planned communications arrangement in Ławica Airport along with the system of destination car parks.	2010/2011

TABLE 7
LIST OF PROJECTS TRANSFORMED INTO UNDERGRADUATE THESES

I Team - Simulation of the planned communications arrangement in Ławica Airport along with the system of destination car parks. – Airport Lawica – Poznan[6].
II Team - The simulation of sequence process – an example of providing front mirrors in Caddy T5 – VW Poznan

Activities	**I Team**	**hours**	**II Team**	**hours**
- Whole teams meetings	10m · 1.5h · 9p	135h (38%)	10m · 1h · 7p	70h (16%)
- Simulation modeling	4m · 3h · 4p 1m · 1,5h · 4p 55h · 1p	109h (32%)	10m · 2h · 2p 160h · 1p	200h (47%)
- Simulation experiments	1m · 4,5h · 7p 1m · 3h · 2p 1m · 2h · 2p	41,h (11%)	1m · 3h · 5p 2m · 2h · 3p	27h (6%)
- Data aquisition	1m · 0,5h · 7p 2m · 1h · 7p 1m · 1,5h · 3p	22h (6%)	2m · 6h · 4p 1m · 6h · 2p	60h (14%)
- Meetings with customers	1m · 1,5h · 3p 1m · 1h · 1p	5,5h (1%)	1m · 2,5h · 7p 1m · 1,5h · 2p 1m · 1,5h · 7p	31h (7%)
- Documentation	4h · 9p	36h (12%)	1m · 3h · 2p 1m · 3,5h · 5p 2m · 4h · 1p 1m · 2h · 2p 1m · 1h · 4p	39,5h (10%)
Total hours		**349h**		**427,5h**

TABLE 8
BALANCE SHEET OF STUDENT HOURS (OUTSIDE OF REGULAR CLASS TIME)

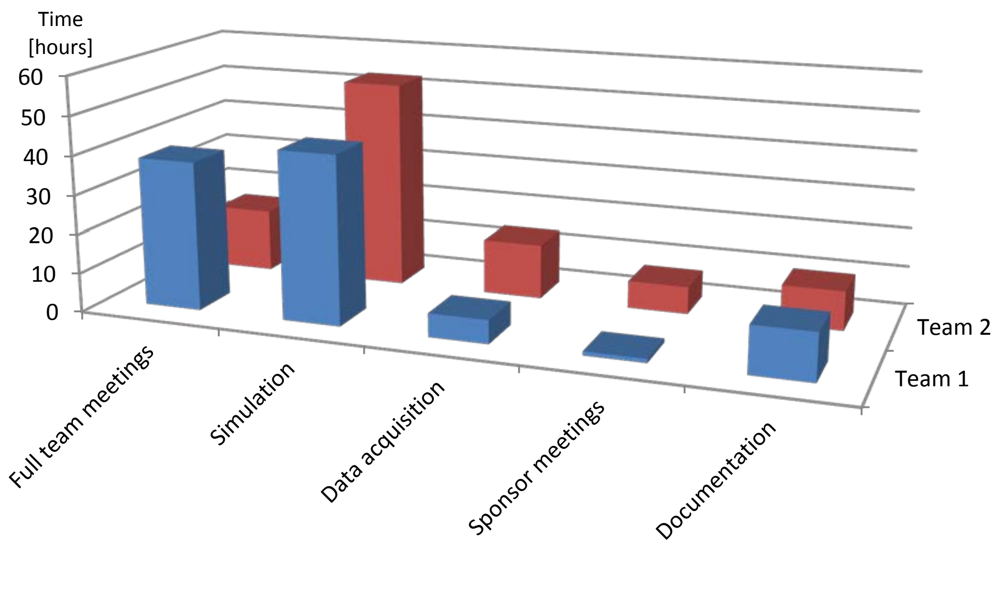

FIGURE 3

COMPARISON OF USED HOURS BETWEEN TWO BEST TEAMS IN 2011

Ahead of the course in 2011/12 academic year, students were asked to provide summary responses to the VAK[5] Learning Styles Self-Assessment Questionnaire, which allows to identify the most effective way of learning for individual student. Results of that survey are shown in Fig. 4, and Table 9 provides survey summary for the full cohort. Out of 15 teams, only three have recorded Visual style as dominant, while the remaining majority reported Kinaesthetic style preference. Also, only two teams reported relatively even distribution of learning styles.

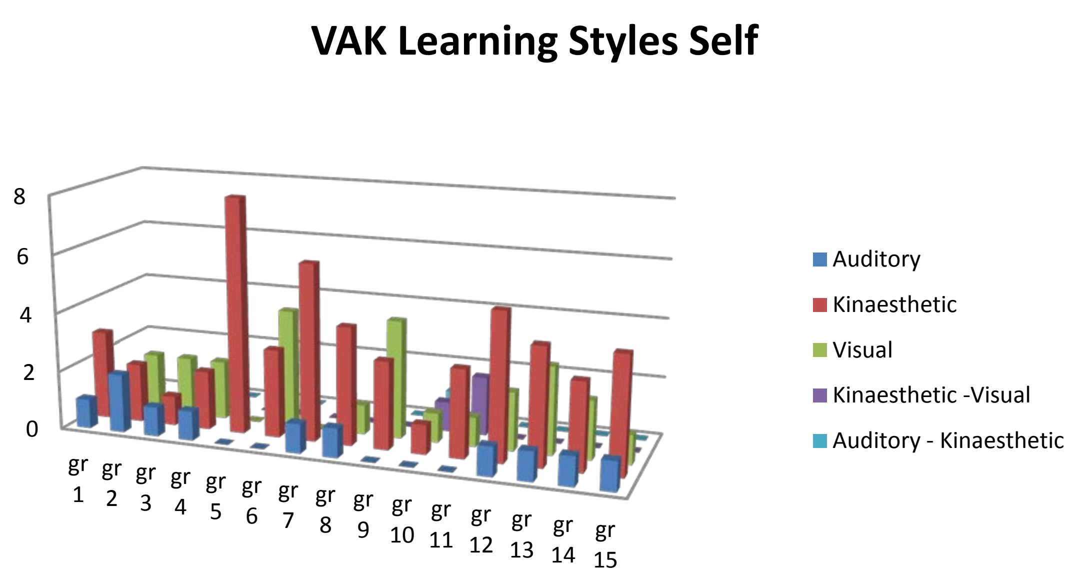

FIGURE 4

COMPARISON OF VAK LEARNING STYLES SELF BETWEEN STUDENT TEAMS IN 2012

VAK Learning Styles Self		
style	**Quantity**	**Percent**
Auditory	11	12%
Kinaesthetic	***52***	***57%***
Visual	25	27%
Kinaesthetic -Visual	2	2%
Auditory - Kinaesthetic	2	2%
Summe	92	100%

TABLE 9
SUMMARY OF VAK LEARNING STYLES SELF IN 2012 (ALL STUDENTS)

Presented results clearly indicate students' propensity for project teamwork aimed at practical, hands-on projects with industry.

6. Conclusions

The implementation of the university course presented in the article is based on two foundations: use of simulation techniques and industrial condition of project implementation. Actually, these are the most attractive features of the schedule. Due to the fact that projects are implemented in industrial conditions, students can leave the classroom and see the industry in reality. The projects are organized in a way that students must develop such skills as team-work and division and planning of labor. They are also made to solve the problem of leadership in a team as well as communication in various variants and preparation offers. Moreover, in the industrial reality, students participate in implementing projects that are actually needed by the company. Such a situation is incomparable to that in the classroom. It is supported by simulation techniques. The available simulation software is now really user-friendly. One does not have to be an IT specialist to create simulation models. In the condition of Polish industry, the techniques are barely used. That is why, companies are eager to cooperate with teams of students and they treat them as partners, which is extremely motivating to students. Obviously, it must be taken into account that these are only student projects; they have some actual restrictions owing to the limited time and resources - these are not business projects.

Due to certain situations and problems that occur while a project is implemented, students face major challenges which are never met in the traditional model of studies, such as:

- the ability to make decisions and suffer their consequences
- preparation of the individual CVs and team presentation
- establishing and maintaining contacts with customers (industrial sponsors)
- maintaining project schedule (arranging meetings), reporting meetings,
- gaining information about the actual process from people in charge of it
- communicating with people working in the industry

- identifying and defining what a problem is or not
- defining priorities
- building professional relations with the a sponsoring company

One of the elements in the program of studies is to stimulate competiveness among the teams and raising their motivation. Depending on the number of students several projects are carried out simultaneously. All project teams participate in a final competition and the award has a form of a financial prize (it depending on the sponsors) or an academic recognition prize[4], i.e., opportunity to deliver a presentation at a research conference.

After two-year experience, taking into consideration the specific nature of student projects, the academic instructors in charge of the program have specified the requirements to be met by simulation software and its providers, which are as follows:

A. Easy-to-use – user-friendliness of software in terms of creating the simulation model, visualization, preparing animations, cooperation with Excel, preparing presentations, distinguishing various competence levels of users,
B. Direct cooperation with a 3D model – students are very enthusiastic about working with 3D models,
C. User-friendliness in terms of optimization possibilities
D. Easy-to-create statistical distributions,
E. Free access to the so called viewer, which makes it possible to start simulation without changing the model and input data,
F. Elasticity, positive attitude of the software distributor towards the idea of cooperation between a university, industry and software distributor; considering students projects not as business projects, but as projects which can be an introduction to business projects.

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