Developing project management teaching: evidence from a Hungarian experiment

László Berényi, Bálint Blaskovics, Nikolett Deutsch

Abstract—Project management is a core component of management education programs. However, there is a great deal of consensus on the phases of a project and on the main project management challenges, literature gives various frameworks with the different focus point. To improve the knowledge transfer during the lessons and seminars, learning materials and methods shall be adjusted to the continual changing conditions including recent business issues and the content of other courses. Project management courses were developed in the 1990s based on a Prussian approach to teaching, which has become overwhelmed over time. The paper summarizes the process and the results of an experiment for renewing the project management teaching at a Hungarian higher education institution. The evaluation of the headway is based on the results of students' feedback regularly collected by the university. Experiences confirm that a well-assorted curriculum which involves case studies, modelling, simulations, guest lectures will increase both the understandability and the entertaining nature of the education. Although the available benefits are favorable, immediate results are not to expect. Continuous attention and capability for flexible interventions are required for being able to refine the course content and the teaching methods applied.

Keywords—project management, management education, teaching methods, curricula development, case study method.

I. INTRODUCTION

CONSIDERATION of projects is an inevitable component of business operation in a competitive environment. The pursuit of generating profit and increasing market share require changes as well as improving efficiency and effectiveness of the operation. These changes can be achieved through properly implemented projects.

Cleland [1] found that running projects are clear signs of the presence of a change in an organization. Moreover, Görög [2] argues for projects being the tools for implementing the strategy, and without an effective and efficient project management, the companies competitive advantage is reduced largely. Thus, successful projects are essential for every company [3]. Aranyossy and Juhász [4] highlight that projects

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significantly contribute to enhancing value creation.

The understanding of projects has developed considerably throughout the decades (an overview see in [5]), and nowadays projects can be considered as temporary endeavors undertaken to create a unique product, service or result [3]:

- temporality means a definite start and end time of the set of tasks,
- uniqueness means a new level of performance,
- endeavor means work efforts and costs related to the tasks.

The characteristics and the limitations in time and cost of a project raise the need for special management processes and methods to apply. Görög [6] emphasizes the art of project management that means uniqueness supported by high-level technical and managerial competencies.

A project is a structural coordination tool [7] from an organizational viewpoint that allows the temporary reallocation of resources, functional levels, and organizational units. Coordination and proper regulation are important to avoid or reduce conflicts within the organization. The reason for this is that executing the project tasks eventually uses the common resources (i.e. project tasks withdraw resources of operation that may temporarily lower the efficiency). Personal conflicts can be highlighted: the same person is the member of the daily operation (with expectations of efficiency) and the project team/staff (with a different set of expectations) in parallel. The conflicts resulting from blended decision-making practice may also hinder the realization of project results.

Therefore, project management is a complex challenge covering planning, coordination, monitoring tasks. Future project managers must learn to deal with this complexity that requires the rethinking of education [8]. Considering that each project is individual and project management experiences can only be gained in practice, raison d'etre of project management seems superfluous at first sight. Of course, a theoretical description or only presenting good examples is not enough. Project management education and training shall develop project management competencies, i.e. enable the future project managers to solve the potential problems of any aspects.

II. PROBLEM FORMULATION

A. Concept of project management

However, the basic concept of project management is relatively uniform, literature dealing with project management shows a varied picture including the designations and the highlighted points. A great example is the naming of project management processes also known as phases, process groups or project lifecycle. There are two relevant standards for project management dividing these processes into five groups but with slightly different names (Table 1). Verzuh [9] defines four phases of the project lifecycle with the same content as the standards.

ISO 21500	PMBOK	Verzuh
Initiating	Initiating	Define
Planning	Planning	Plan
Implementing	Executing	Execute
Controlling	Monitoring and controlling	-
Closing	Closing	Close-out

Table 1 Project management phases (based on [3], [9], [10])

A common feature of project management literature is that those are most concerned with planning as the critical process of a project. The personal intention and interest of the authors in the field add brings color into the presentation of the knowledge and gives a comprehensive concept. Some options are as follows:

- start from the project environment and the expectations of stakeholders [9],
- corresponding with business strategy [10],
- focusing on the project manager's personal skills and leadership style [6], [12], [13], [14],
- establishing a comprehensive and documentable approach [10],
- placing project in a comprehensive system of portfolios and programs [15], [16],
- considering the organizational frames and possibilities [17],
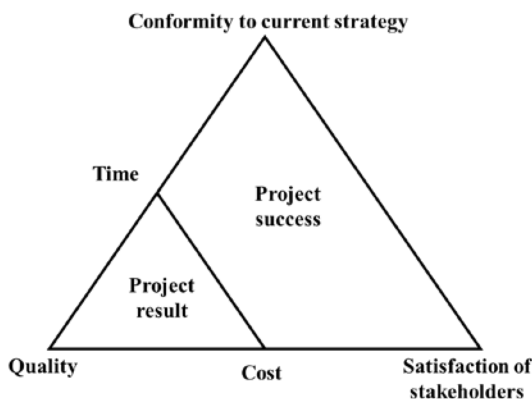

Fig. 1 Project success factors [18]

Researchers dedicated several types of research to identify the most important reasons behind the success or failure of the projects (see e.g. [5], [19], [20]) and found the main causes as follows:

- inappropriate project scope definition,
- inadequate resource allocation,
- organizational features (like lack of senior management support),
- lack of competencies of the project manager and project team.

B. Focus on curriculum

Görög [2] concluded based on the main causes and the characteristics of a project that the project manager is a key player in achieving project success and project management training have a direct impact on project success. Corporations, professional institutions, consultancies, and universities realized this, and the importance of a trained project manager and organized training or special programs to improve their knowledge (see [21]). However, the backbones of the education programs have been defined about 20 years ago, the understanding of projects and project management has changed largely during the time elapsed. IT support has evolved remarkably (highly integrated software background, the spread of ERP systems, collaboration through the internet), and new project management concepts (primarily agile approach) must be mentioned. All of these require both the redesign of training programs and the evaluation of the effectiveness of the programs. According to Wateridge [12] or Lee-Kelly and Blackman [22], the program shall be:

- holistic: it contains every given topic that is needed for being a professional project manager,
- up-to-date: the program should be relevant even for a 2010s project manager,
- easy-to-catch: those who listen to the training or programs should be satisfied with the way of knowledge transfer, and every important piece of information should be transferred to the recipient.

Since project management is an eclectic discipline, the range of competencies a project manager should possess is very broad. These competencies cover explicit (lexical) and tacit (applied) knowledge components at the same importance [23] but with industry-specific depth and content.

Researchers identified three types of knowledge elements (capabilities) of project management (see e.g. [1], [24]):

- Technical capabilities: these contain those knowledge elements, which are related to the project result. This could be the financial or the technical knowledge.
- Human capabilities: these contain those elements, which are related to the management of stakeholders.
- Project related capabilities: these contain those knowledge elements, which are related to the professional content of project management.

Cleland [1] reveals that project related capabilities have

three levels that are partly different from the previous grouping:

- knowledge: lexical knowledge,
- skill: ability to use the knowledge,
- attitude: the approach towards projects.

Cleland [1] points out that the deeps project management knowledge is the attitude, where the project manager builds up that whole process based on that view. Görög [2] identified strategy-oriented and the best practice based attitudes. Strategic orientation means that the project manager focuses on the corporate strategy and aligns the project to it; whereas project managers with a best practice based attitude use the corporate and external good experiences to manage their projects or solve the problems arisen. These can be completed with stakeholder-based attitude [5] that means that the project manager focuses on the needs and expectations of the stakeholders and motivating them to do their best. However, attitudes mainly contain tacit elements [5], [25], which give the deepest understanding of project management, training usually focus on transferring explicit knowledge or skills.

C. Teaching and training methods

Beyond the content of project management course or training, proper method and technique selection is a critical factor. There is a high variety of techniques assigned to the teaching systematized in several aspects by Petrina [26] for engineering education. However, similar techniques do not result in success by themselves. The core approach to teaching as well as the techniques and supporting tools. A teaching method is characterized by a set of principles, procedures or strategies to be implemented by teachers to achieve desired learning in students [27].

There are two classic concepts of teaching, called Prussian way of teaching and Anglo-Saxon way, usually applied in a mixed form [28]. The Prussian way emphasizes the importance of the lexical knowledge and the one-sided communication. The backbone of this teaching is the lectures and the learning from books. Due to this structure, the classic explicit knowledge element transfer is very effective. The Anglo-Saxon way emphasizes the debates and discussions and the two-sided communication. The core tools are seminars and the teacher is more like a tutor, moderator or facilitator than a classic teacher. Due to this structure, the tacit knowledge element transfer is more effective than in case of the Prussian way of teaching. Since there is less emphasis on the explicit knowledge transfer, students should acquire lexical knowledge from other sources (e.g. books or internet).

Westwood [29] formulated otherwise the core approach to teaching. One is clearly student-focused and aims a deeper conceptual understanding and change in students. The other is rather teacher-focused; it is about the effective transmission of information and skills from teacher to learner. Kirschner et al. [30] referred to these two approaches as 'minimally guided instruction' and 'explicit instruction' respectively. Among others, Adkisson and McCoy [31] call them 'progressive

methods' and 'traditional didactic teaching'.

Westwood [29] collects student-centered and direct teaching methods. Student-centered methods are about 'learning how to learn' by active involvement and motivation of the students. Methods can be discovery learning, problem-based learning, project-based learning, resource-based learning and computer-assisted learning. Direct teaching methods cover lectures, classroom mini-lectures and teacher-directed lessons.

There is an increasing interest in project method. It is generally considered a means by which students can develop independence and responsibility, and practice social and democratic modes of behavior [32]. Kilpatrick [33] determined the essence of the method as children were to acquire experience and knowledge by solving practical problems in social situations. However, at the beginning of the method's history, it was used for architectural education, it was widely spread in the 18th century. A rediscovery can be observed from the middle of the 20th century both in elementary and in higher education programs [32]. Project method is applicable to management education as it may exploit the advantages of student-oriented and self-directed forms with a professional supervision. Kováts-Németh [34] gives a categorization of techniques, which are also worth considering in higher education with a proper content:

- Techniques based on student initiatives: conversation, initiating a dispute, recall an experience report, problem statement, brainstorming, program selection, choice of creative workshops, stand-alone data collection, find new routes, visit original locations
- Techniques to collaborate: games (folk, role-playing, dramatization), puppetry, dramatic situation exercises, collecting (smells, odors, sounds), establishing a business, group design (name selection, coat of arms and flagging), competition, creation, sound map, classroom tour,
- Creative exploration, research techniques: exploring literature, interview with the communicators, making a poster, organize an exhibition, paper making, water analysis, examination and sampling, card-making, map making, map usage.

The case in our paper focuses on project management teaching in a higher education institution. Authors believe that the role of these institutions is emergent because corporations and other organizations would like to get to "ready-to-work" employees. In the light of that need, the higher education institutions shall rethink education programs and methods. It is to note, that industry and corporate-specific knowledge transfer are not achievable in most cases, expect if there is a targeted cooperation between the higher education institution and a corporation for an accredited bachelor, master or post-gradual program.

Bidabadi et al. [35] analysis effective teaching methods in higher education, offering a mixed approach (student-centered together with teacher-centered) plus educational planning and

previous readiness. They concluded that the teaching method must help the students to question their preconceptions and motivates learning by putting them in real situations. The authors also highlight that success depends on the proper selection of motivated teachers and committed management to the concept.

Paksi-Petró [36] deals with administrative management training including the learning methods, environment, and system in public administration. The suitable methods are classified as teacher-oriented, student-oriented and self-directed forms. She pointed out the primary importance of self-education but she does not dismiss conventional forms of teaching. Student-oriented methods include training, supervision, coaching, mentoring and cooperative learning, project method, cooperative learning, e-learning and blended learning.

A wider approach to the learning methods incorporates also learning environment. Ojiako et al. [37] determined two key components: transferable skills and virtual learning. Even in case of classroom training programs, IT and ICT support are expected that means more than using a project management planning software. González-Marcos et al. [38] introduce a virtual learning environment that allows active participation in a project development and offers the possibility of putting different project management skills into practice. In addition, the environment supports classroom activities, student-management, activity-monitoring, assessment and personal communication. Others deal with similar solutions either for project management teaching or teaching through managing projects (see e.g. [39, [40], [41], [42]). Results in the field denote that availability of IT support is no more a bottleneck of development, just good ideas are needed.

D. A knowledge transfer approach to teaching

Related to the topic of this paper, education and training can be clearly interpreted as knowledge transfer, i.e. transferring knowledge elements from a sender to a recipient. In case of project management, this should encompass both the tacit and explicit knowledge elements.

Sole and Wilson [43] collected methods especially for knowledge sharing:
- storytelling: telling examples for the recipients (mainly in the course of stories),
- modelling: the sender serves an example for the recipient (like a mentor),
- simulation: creating an environment where the recipient can try to solve a situation (like a computer game),
- codified resources: written forms of knowledge elements (like manuals, books),
- symbolic objects: the knowledge is manifested in a symbol (like maps, signs, prototypes).

Horváth [44] refined the model of Sole and Wilson [43], and group the different knowledge sharing methods according to the kind of knowledge elements in which they are efficient to share (Figure 2).

Fig. 2 Knowledge transfer elements [44]

Considering the nature of project management and the way of knowledge sharing, there are some conclusions to draw:
- In case of knowledge sharing, both tacit and explicit elements of project management knowledge should be transferred.
- Based on this, there is a need to apply at least one of the modeling, storytelling and simulation, and one from codified resources and symbolic methods for increasing effectiveness of teaching.
- Since tacit and explicit knowledge are both important, an ideal combination of Prussian and Anglo-Saxon ways of teaching should be applied.

In case of Prussian way of teaching, the emphasis should be on the explicit knowledge transfer, i.e. on the lectures, one-sided communication or on books, slide-shows. It can be efficient if the codified knowledge is the dominant component, as control, time planning or resource allocation. In case of Anglo-Saxon way of teaching, the emphasis should be on the tacit knowledge transfer, i.e. on seminars, bidirectional communication, guest lecturers' presentations or situation games. It can be efficient if the tacit knowledge is the dominant component including communication, motivation or project scope definition.

E. Course development goals and limitations

There is a need for the adjustment of project management course contents established in the 1990s. This is due to the remarkable changes in the interpretation of project management, project environment and especially the project stakeholder management since this period.

The paper presents a renewal concept for teaching project management based on the need above. Perception of the usefulness (i.e. satisfaction with the outcomes) by the students validate the adequacy of this development. The authors investigated whether those knowledge transfer elements identified by [25] and [44] could improve the satisfaction of

the stakeholders. They analyzed a bachelor and a master-level project management course of a state-owned Hungarian higher education institute's through the students' judgment in the recent years.

However, the authors have an intention to show general possibilities of teaching material development of project management, there are some limitations:
- the usefulness is defined based on the student's feedback, but the other stakeholders' evaluation should also bear of importance,
- the paper presents a case study of one higher education institution and two type courses,
- a comprehensive evaluation of the effectiveness and the usefulness of project management teaching is not feasible regardless the structure and the content of the other components of the program.

Despite these limitations, the authors believe that the result of the analysis is valuable due to the following reasons. There should be a starting point for the analysis, the authors did choose the student's perspective. There is a similar reason in case of the second limitation, a pilot analysis may mean the basis of a comprehensive survey. However, students' scoring can show some distortion, it allows a proper evaluation of the changes over time. Moreover, the pilot analysis may reflect the necessary development of the evaluation system as well.

The aim of the paper is limited to identifying whether the new knowledge transfer methods could increase the acceptance level by students. A hypothesis can be formulated as the new course program is considered more useful than the old one.

III. PROBLEM SOLUTION

A. Data Source

The data source of the paper is the evaluation survey of a Hungarian, state-owned higher education institution with more than 10,000 students learning a wide variety of programs and courses. The quality assurance system of the institution includes the monitoring of students' satisfaction. The institution regularly collects the opinions of the students by using an official evaluation survey. Consequences in this paper are derived from mean values of the survey results related to scores given by the students highlighting including the upgraded project management courses. Initially, both bachelor and master-level teaching methods focused on improving knowledge and skill by using the Prussian approach.

The scope of the investigation focuses on the following:
- whether the students realized the importance of the course,
- whether the students were satisfied with the teacher's work,
- whether the knowledge transfer was entertaining enough.

There are 7 bachelor level (Table 3) and 6 master level (Table 4) courses analyzed between 2011 and 2017. Tables summarize the number of participants who were learning the project management courses and highlight the pilot course with the new features and tasks, worked out by one of the authors.

	Number of students, total	Number of students, pilot course	Response rate, total	Response rate, pilot course
2011	489	57	49.59%	87.72%
2012	401	116	64.49%	93.10%
2013	526	79	92.59%	96.20%
2014	353	117	61.62%	95.73%
2015	382	197	61.52%	57.87%
2016	412	212	66.26%	68.87%
2017	327	196	57.19%	57.65%

Table 3 Sample characteristics, bachelor level (own edition)

	Number of students, total	Number of students, pilot course	Response rate, total	Response rate, pilot course
2014 - fall	55	25	71.09%	65.85%
2015 - spring	77	29	47.02%	58.62%
2015 - fall	78	49	67.95%	77.55%
2016 - spring	71	54	59.15%	70.37%
2016 - fall	72	42	72.22%	88.10%
2017 - spring	79	55	70.25%	74.54%

Table 4 Sample characteristics, master level (own edition)

B. Former practice of project management teaching

Pilot courses have been launched in 2011 at bachelor and in 2014 at master level. New elements and methods were incorporated incrementally, the concept reflected first in seminars. The initial position was as follows:
- students should prepare a presentation and an essay as a homework in small groups (3-4 students),
- 1-3 groups made their presentation in a seminar,
- both the group and the teacher evaluate, correct and upgrade the assignment.

If there was no presentation assigned to the actual lesson, students solved an additional specific case study in the field of special project management skills. Moreover, these case studies had the purpose to prepare next homework or presentation. This was typical in case of master level, with 3-5 seminars of 14 that required such a case study, depending on the number of presenting groups and the lengths of discussion. It was difficult to predict the headway, and provision tasks needed special attention.

It should be noted that this course was developed in the

middle of the 1990s, and upgraded two times in the early 2000s. However, the concept was very successful and popular, the approach was a breakthrough in its own time, it overcame in time. Results in the field of generational theory (see [45], [46]) point out that a new way of communication is necessary also in teaching if the target audience comes from the newer (Y, Z or Alpha) generations. Higher education students in 2017 are the representatives of the late Y and the Z generations. Attitudes to information (IT) and info-communication (ICT) technologies significantly determine differences between the characteristics of the generations [47] [48]. Generation Y was born in the age of computers, Generation Z was born with the Internet, and Generation Alpha members are born into a permanent online era.

C. Development progress

Development of the project management teaching at the institution has been launched in 2011. The core element of a practice-oriented teaching is providing an insight into the practice by creating case studies and by developing games or competitions (simulations). Guest lecturers were also invited to share their best practices. Teaching experience shows that 1-2 presentations are useful on bachelor level and 3-4 presentations on master level. Of course, a breakthrough requires a step by step implementation, summarized in Tables 5 and 6. There was a crucial improvement in tacit knowledge transfer, and at the same time, the hard (explicit) element transfers in both courses were made more digestible, more adequate for the late representatives of the Y generation.

Year	Improvement	Knowledge transfer
2012 spring	Sample assignments at home Guest lecturer Brief simulation	codified resources storytelling modelling simulation
2013 spring	Sample assignments in class	codified resources
2014 spring	Presentation reduced to 1 Own stories	storytelling
2015 spring	Presentation abolished Class case studies	modelling
2016 spring	Upgraded class case studies (real own projects, showing the project result to the students)	modelling
2017 spring	Except for one, case studies were changed to situational games	simulation

Table 5: Pilot course development, bachelor level (own edition)

Year	Improvement	Knowledge transfer
2014 fall	Presentation reduced to one Class assignments Guest lecturer	codified resources storytelling modelling simulation
2015 spring	Improved class assignments More guest lecturers Own stories	storytelling
2016 fall	Case studies Assignments coming from real life	modelling
2016 spring	Upgraded assignments	
2017 fall	Sophisticating the assignments	

Table 6: Pilot course development, master level (own edition)

D. Judgement on the progress – bachelor level

Survey results about the students' satisfaction with the project management courses confirm the effectiveness of the development efforts. The evaluation is presented in a 1 to 5 scale, higher values show a higher level of satisfaction about:
- understandability: the success of the knowledge transfer, conformity of the content to the learning objectives,
- teacher's work: professionalism of teaching and approach to students (by "How useful pieces of advice the teacher gave?" question from 2015 and by "How much the student learned from the teacher?" question from 2017),
- contribution: contribution to the development of the students' professionalism,
- entertainment nature: the tasks done in class were entertaining (evaluated from 2015).

Knowledge-transfer related components are summarized in Table 7 for bachelor and in Table 8 for master courses. Tables show the results of the pilot course, total sample and total sample without the pilot course.

Year	Understandability			Teacher's work		
	Pilot course	Total sample	Total without pilot	Pilot course	Total sample	Total without pilot
2011	3.98	3.41	3.32	4.24	3.67	3.56
2012	3.76	3.55	3.24	4.11	3.82	3.47
2013	4.34	3.52	2.69	4.46	3.83	2.98
2014	4.47	4.02	3.24	4.62	4.24	3.46
2015	3.93	4.04	4.19	4.2	4.07	3.9
2016	4.55	3.85	2.96	4.71	3.92	2.91
2017	4.71	4.19	3.65	4.74	4.18	3.55

Table 7: Evaluation results, bachelor level (measured on 1 to 5 scale, own edition)

Year	Contribution			Entertainment nature		
	Pilot course	Total sample	Total without pilot	Pilot course	Total sample	Total without pilot
2011	3.85	3.32	3.3	n.a.	n.a.	n.a.
2012	3.27	3.15	3.11	n.a.	n.a.	n.a.
2013	3.76	3.29	3.2	n.a.	n.a.	n.a.
2014	3.89	3.56	3.5	n.a.	n.a.	n.a.
2015	4.15	4	3.99	3.54	3.45	3.36
2016	4.37	4.07	4.02	3.96	3.54	3.38
2017	4.57	4.43	4.37	4.07	3.85	3.65

Table 8: Evaluation results, bachelor level (measured on 1 to 5 scale, own edition)

Results suggest that the new teaching elements for improving knowledge transfers contribute to the development of the course. There is a relapse in the figures in 2015 (Figure 3). The reason for this was that the newly introduced learning materials disrupted the time management of the seminars. Moreover, students did not like some of them because the prerequisite knowledge was insufficient due to a reorganization of the program. The judgment has improved again after a refinement of the learning materials based on the experiences and feedback.
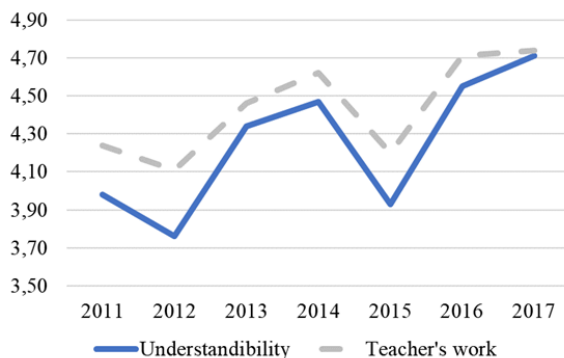

Fig. 3 Judgement on understandability and teachers' work, bachelor level (own edition)

	Understandability	Teacher's work	Contribution	Entertainment nature
Understandability	1	0.989	0.955	1
Teacher's work	0.989	1	0.902	0.989
Contribution	0.955	0.902	1	0.956
Entertainment nature	1	0.989	0.956	1

Table 9: Correlation matrix of components, bachelor level (based on SPSS output)

There are strong and significant correlations between the components of the evaluation time series (Table 9) suggesting that students' comprehensive experiences may give the basis for their judgment. Since other factors were unchanged, it can be considered as the result of the development. A T-test of the components between the pilot course results and the total results confirms the results (Table 10) in case of most components.

Component	t	d_f	Sig. (95%)
Understandability	3.622	6	0.011
Teacher's work	5.233	6	0.002
Contribution	5.179	6	0.002
Entertainment nature	3.384	2	0.077

Table 10: Paired Sample T-test results between pilot course and total without pilot, bachelor level (based on SPSS output)

E. Judgement on the progress – master level

Master level course development has been launched in 2014. Evaluation method used in this chapter is analog with the bachelor level analysis in Chapter 3.4. Tables 11 and 12 show the results of the pilot course, total sample and total sample without the pilot course.

Semester	Understandability			Teacher's work		
	Pilot course	Total sample	Total without pilot	Pilot course	Total sample	Total without pilot
2014 - fall	4	4.03	4.03	3.95	4.32	4.43
2015 - spring	4.06	3.59	3.45	4.06	3.66	3.52
2015 - fall	4.62	3.77	3.7	4.59	3.72	3.54
2016 - spring	4.55	4.24	4.09	4.66	4.04	3.85
2016 - fall	4.75	4.04	3.67	4.53	3.95	3.66
2017 - spring	4.8	4.37	4.1	4.71	4.36	4.14

Table 11: Evaluation results, bachelor level (measured on 1 to 5 scale, own edition)

Semester	Contribution			Entertainment nature		
	Pilot course	Total sample	Total without pilot	Pilot course	Total sample	Total without pilot
2014 - fall	4.27	4.3	4.37	3.35	3.54	3.65
2015 - spring	4.025	4.115	4.09	3.37	3.51	3.46
2015 - fall	4.31	4.225	4.2	3.95	3.85	3.81
2016 - spring	4.4	4.33	4.29	3.92	3.84	3.79
2016 - fall	4.51	4.23	4.11	4.06	3.58	3.39
2017 - spring	4.68	4.65	4.61	4.37	4.31	4.27

Table 12: Evaluation results, bachelor level (measured on 1 to 5 scale, own edition)

The trend in the figures is similar to bachelor experiences; ongoing adjustments of the curriculum were successful (Figure 4).
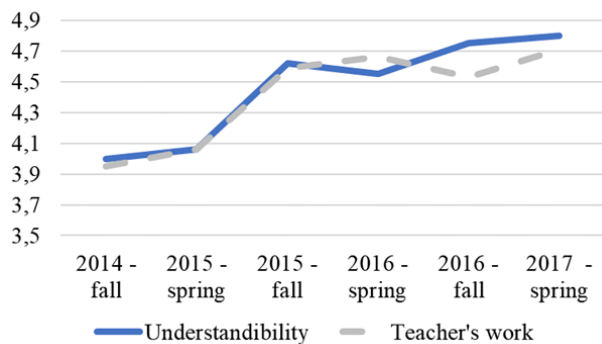

Fig. 4 Judgement on understandability and teachers' work, master level (own edition)

However, statistical analysis shows strong correlations, but the master-level values are under bachelor-level ones (Table 13). T-test does not show significant differences in most cases (Table 14) that suggest a less powerful impact of the new teaching methods.

	Under-standability	Teacher's work	Contribution	Entertainment nature
Understandability	1	0.95	0.833	0.975
Teacher's work	0.95	1	0.75	0.937
Contribution	0.833	0.75	1	0.896
Entertainment nature	0.975	0.937	0.896	1

Table 13: Correlation matrix of components, master level (based on SPSS output)

Component	t	d_f	Sig (95%)
Understandability	3.926	5	0.011
Teacher's work	2.521	5	0.053
Contribution	1.208	5	0.281
Entertainment nature	0.820	5	0.449

Table 14: Paired Sample T-test results between pilot course and total without pilot, master level (based on SPSS output)

F. Contribution to the development of professional skills

An important result of the upgraded learning materials and the 'Anglo-Saxonized' way of teaching seems to be successful. Students can understand and accept the importance of project management (especially on bachelor level), so they are more committed to deepening their knowledge. 'Anglo-Saxonized' way means combining the Prussian teaching style and attempt to generate a real-life project environment and to show real-life problems.
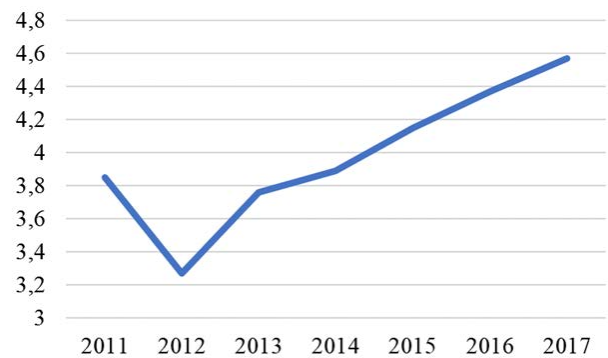

Fig. 5 Contribution to the development of professional skills, bachelor level (own edition)

As a result, both bachelor and master students increasingly believe that the course can contribute to their professional career (Figures 5 and 6).
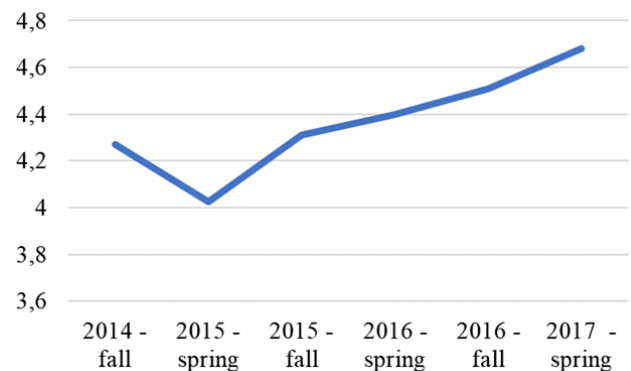

Fig. 6 Contribution to the development of professional skills, master level (own edition)

IV. CONCLUSIONS

Project management can be considered as a complex discipline. Authors dealing with the success of project management found the joint importance of technological knowledge, leadership skills and special project management competencies. Based on this complexity, the teaching of project management needs a special attention. The Prussian and the Anglo-Saxon way of teaching can describe the essential approaches, but a mixed application is not excluded. The project management courses developed in the 1990s involved mainly Prussian elements. Literature above proves that this way is less efficient in tacit knowledge transfer, however, it is necessary for a successful project manager. It seems worth to combine the Prussian and the Anglo-Saxon elements of teaching.

The pilot case presented in this paper can be considered as an experiment for adjusting the project management course to the changing requirements that can be traced back to labor market expectations and the generational changes.

Our hypothesis said that the new course program is considered more useful than the old one. Results confirm that the renewed teaching methods have a favorable impact on the students' satisfaction and effectiveness of the knowledge

transfer process. The hypothesis can be accepted.

It can be concluded that the upgrade of the learning materials was successful, especially on bachelor level. Real life examples and situational games can contribute to improving project management education.

Authors believe that effective project management teaching relies on the Prussian elements, but should try to model practical environment in order to maximize the amount of the knowledge transferred and to reduce the time needed for it. In addition, similar course development should be useful in other management courses as well. The indicators and the statistical analysis allows some further conclusions:

- Although the impact if favorable, immediate results are not to expect. Continuous attention and capability for flexible interventions are required for being able to refine the course content and the teaching methods applied.
- There is a need for a serious assessment and evaluation system that allow monitoring the headway.
- Temporary relapses should be counted on due to the above; a long-term commitment is needed for overcoming the difficulties.

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