Exploring Project Management Education

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Abstract

The object of this paper is to explore the actual practice in project management education in the Netherlands and compare it to reference institutions and recent literature. A little over 40% of the Higher Education institutions in the Netherlands mentions PM education in programs and/or courses. A total of 264 courses, minors and programs in the Netherlands found. In reference institutions 33 courses and programs are found and 36 publications deal with actual teaching of project management in Higher Education. Comparing these sources finds traditional methods of teaching and testing, a roughly comparable focus on subjects and an unsupported high claim of learning level, while the number of credits assigned to project management is relatively small. There is a strong focus on planning without execution, which is critiqued as is the promoted Project Based Learning.

Keywords: Exploring, Project, Management, Education

Introduction

Project management education is not without critique (Ramazani & Jergeas, 2015). Since adaptation of the subject in Higher Education curricula, progress has been made, but challenges still remain (Söderlund & Maylor, 2012). This paper explores the current offerings of project management in Higher Education in Netherlands. Project management education in Higher Education has been the focal point of research before in Pakistan (Arain & Tipu, 2009) and in Central and East Europe (Obradovic, 2015), without elaborating on the actual practice as this paper will: an in depth look at project management education in Higher Education in the whole of Netherlands is presented. Although there are several publications on teaching project management, a syntheses has not been made. The practice of teaching at six reference institutions, the Dutch institutions, literature and the results of a workshop with 33 participants are compared on methods of teaching, testing, subjects incorporated, intended learning outcomes, credits assigned and whether added value is measured.

Project management education is defined here as education aiming to (better) prepare students for the role of project manager. Project management methods and/or skills are specifically identified as learning outcomes. It can have different forms: a specific part of the curriculum is designed for project management (like a specific course), but project management could also be one of multiple learning outcomes in a course. It could have the form of a theoretical exploration of the subject, research into specific parts or even a specific exercise aimed at a specific skill. This definition allows all these kind of forms, with one exception: it has to be more than just a claim of project management in the learning outcomes without specific attention. Simply assembling students into a group and giving them a group assignment without specific attention on project management issues is not considered to be project management education.

First the data collection is described: literature, the practice of teaching project management in the Netherlands and in reference institutions and the workshop with practitioners. Next the results are compared on several focus areas: teaching methods, testing methods, learning outcomes both in subjects as in promised level, allotted study time and whether progress is measured. Each focus area will describe the data and present a short discussion on the findings within that area. An overall discussion on results and generalization precedes the conclusions.

Literature on project management education

The subject of teaching project management has been addressed numerous times. For this paper the interest is on publications that deal with actual teaching practice in project management. Since project management is a relatively new field of study, views on project management success change over time (Jugdev & Müller, 2005) and in Higher Education

new forms of study like project based learning (PBL) have recently taken ground (Graaf & Kolmos, 2003), the focus in on relatively new publications, published after 2000.

An initial search revealed that a majority of results reported on some form of educational project and the management of these, usually reporting on the apparent success or even on challenges in the application of project management in Higher Education projects (Austin, Browne, Haas, Kenyatta, & Zulueta, 2013). The search effort was adjusted to remove most of those results. Six searches were performed using EBSCO-host in September 2016, as specified in table 1. Publications without an abstract were discounted. If the abstract suggested potential, the publication was read. If the publication fitted the criteria it was used.

Search	Search terms	Found	Double	Potential	Match
1	Abstract containing sentence 'learning project management'	19	1	9	4
2	Abstract containing sentence 'project management education'	52	1	25	12
3	Abstract containing all terms 'project', 'management' and 'education', subject restricted to higher education	42	4	2	1
4	Abstract containing all terms 'learning', 'project' and 'management', subject restricted to higher education	59	6	19	8
5	Journal name containing project management, abstract containing 'education'	45	12	5	1
6	Journal name containing project management, abstract containing 'learning'	20	6	8	2

Table 1. Literature searches performed

The searches yielded 237 publications of which the abstracts of 68 showed potential. After reading the publication, 28 remained that matched the criteria. In case several publications were based on the same and supplying the same information, the best – offering the most information – was selected. Although Alam et al. supplied two which seem to be based on the same master, the information was complementary and the research question different, so both are included (Alam, Gale, Brown, & Khan, 2010; Alam, Gale, Brown, & Kidd, 2008). The first four searches revealed 25 matches, the last two searches revealed 3 more. Eight more publications were found by going through the references of the found publications and searching for publications that referenced one or more of them, making a total of 36 publications.

From each of the publications the following information was extracted: (curriculum) context, region, teaching method, intended learning outcomes, testing method, study time involved and whether added value was measured. A special note is taken that not all these publications are specifically submitted to explain in depth the PM course or curriculum, not all reveal all information. Table 2 lists the overall results.

The diversity of the publications is illustrated in table 2, column context. About half are part of an specific curriculum like Engineering, MBA or ICT, the rest are elective, specifically designed for industry, part of a leadership course etc. The publications are somewhat spread over the globe. Asia and South America are not represented, Africa is underrepresented with one publication, Europe, North-America and Australia make up the bulk of the publications. Almost all specify the teaching method and the majority specifies intended learning outcomes. Around half specify the test method at the end in order to let the students 'pass'. Most do not specify the involved study time or credits. Around two thirds of the publications incorporated measure whether value has been added: whether students gained competences.

An important work on project management Education is the "Project Management Curriculum and Resources" (PMI, 2015), outlining possible subjects and combinations to incorporate in a curriculum. The scope encompasses the deliverance of the core skill set a student must possess (page I-14). Defining a minor or specialization as the minimal core for project management underlines the ambition of the document, aiming at a curriculum that allots a considerable amount of space for project management.

The amount of space in curricula is usually limited, and project management is not an easy subject to teach (R. Ellis, Thorpe, & Wood, 2003). These limits are acknowledged by the project management Curriculum and Resources (page I-20) underlining the complexity by the big number of skills incorporated (pages I-16 & I-17). The foundation course specified in part II will be used as comparison material in the remainder of the paper.

ref	Author (first only)	Context	Region	Teaching specified	LO specified	Test specified	Credits	Added value
1	Fish (2005)	Elective	USA	Yes	Yes	Yes	unknown	SALG post
2	Ojiako (2011)	unspecified	UK - Europe	No	Some clues in questionnaire	unclear	unknown	SALG post
3	Mengel (2008)	Leadership course	Canada	Yes	Yes	unclear	unknown	Comparing products
4	Townsend (2014)	industrial and mechanical engineering	Canada	Yes	Yes	unclear	4 hrs?	Student statements
5	Flores (2016)	Software Engineering	Portugal - Europe	Yes	No	Yes	1 hr	Comparing test with other track
6	Gonzáles-Marcos (2016)	ICT	Spain - Europe	Yes	Yes	Yes	Max 15	Pre- and post test
7	Córdoba (2012)	Business / Business Information	UK - Europe	Yes	No	Yes	unknown	SALG post
8	Bergman (2014)	Overall (international project management)	Sweden - UK - Europe	Yes	Yes	Yes	unknown	none
9	Hartman (2005)	unspecified	Canada	Yes	Yes	unclear	unknown	enhanced ability
10	Alam (2008)	Industry	UK - Europe	Yes	Yes	Yes	probably 60	Comparing graduates with non particpants
11	Shelley (2015)	Unspecified	Australia - Asia	Yes	No	Yes	unknown	none
12	Pagano (2014)	Unspecified	UK - Europe	Yes	Yes	unclear	one or two days	SALG Pre and post on perceived ability
13	Zwikael (2015)	Engineering	Australia & USA	Yes	No	unclear	unknown	3 Pre and post tests: knowledge, energy and attitude
14	Brown (2000)	MBA	USA	Yes	Yes	unclear	unknown	Student statements
15	Martin (2000)	MBA	UK - Europe	Yes	Yes	unclear	unknown	none
16	Alam (2010)	Industry	UK-Europe	No	No	unclear	probably 60	Comparing graduates with non particpants
17	De Los Rios (2015)	Engineering	Europe	Yes	Yes	unclear	Unclear	SALG pre and post on perceived ability & SALG Post
18	Pollard (2012)	ICT?	USA	Yes	Yes	unclear	unknown	Student statements
19	Chen (2009)	unspecified	USA	Yes	No	Yes	unknown	none
20	Larson (2010)	MBA?	USA	Yes	Yes	Yes	Max 15	none
21	Van Rooij (2009)	Information Technology	USA	Yes	Sort of specified by the	Partly	unknown	SALG post

ref	Author (first only)	Context	Region	Teaching specified	LO specified	Test specified	Credits	Added value
					processes			
22	Tatnall (2005)	IT	Australia	Yes	No	Partly	unknown	SALG
23	Nooriafshar (2004)	unspecified	Australia	Yes	Yes	unclear	unknown	none
24	Saungweme (2015)	Unspecified	South-Africa	Yes	Yes	Yes	unknown	none
25	Walker II (2004)	unspecified	USA	Yes	Yes	unclear	4hrs	none
26	Walker (2008)	project management	Australia	No	Yes	unclear	probably 60	none
27	Stoyan (2008)	Divers	Swiss - Europe	Yes	Yes	unclear	3	none
28	Divjak (2008)	unspecified	Croatia - Europe	Yes	Yes	Yes	9	none
29	Fernández (2010)	Engineering	Spain - Europe	Yes	Yes	unclear	6	none
30	Kloppenborg (2004)	unspecified	USA?	Yes	Yes	Yes	unknown	none
31	Davidovitch (2006)	Engineering	unspecified	Yes	Yes	unclear	3, 5	Measured objectives, comparing 1st, 2nd and 3rd run
32	Jewels (2004)	ICT	Australia	Yes	Yes	unclear	unknown	One test question and one SALG question
33	Misfeldt (2015)	Construction	Denmark Europe	Yes	No	unclear	unknown	none
34	Car (2007)	Telecommunications +	Zagreb, Europe	Yes	Yes	Yes	unknown	SALG
35	Jugdev (2007)	Executive MBA	Canada	Yes	Yes	Yes	Unknown	None
36	Sankaran (2005)	Business and technology	Australia	Yes	Yes	Yes	Unknown	None

Table 2. Literature on project management education

Practice in the Netherlands and at reference institutions

Learning project management is an integral part of several higher education curricula. The Dutch Higher Education system hosts two types of institutions: Universities where the emphasis is on Masters as an end-degree and Universities of Applied Science (UAS) where the emphasis is on Bachelor as an end-degree – although these institutions also host Professional Masters. The UAS represent a large portion of the Higher Educational landscape in the Netherlands.

Data collection is done between January 2016 and May 2016. All institutions on the website http://www. kiesjestudie. nl/, listing all possible higher education curricula and institutions, are scrutinized. Of every institution the website is visited and the keywords 'project management' are sought using the search engine duckduckgo and the search engine(s) supplied by the institute including available course databases of the institute. Not all institutes allow searching through the course database. Results like commercial training and collaboration projects are discounted, leaving courses and programs aimed at higher education students.

The dataset consists of 127 institutions: 98 UAS and 29 Universities. A total of 72 do not show any positive search results: project management is not a (mentioned) part of any of their curricula. The other 55 institutions (38 UAS and 17) show positive search results: courses and/or programs with project management as a (partial) learning outcome.

As a reference, 6 higher education institutions recently mentioned as frontrunners on project management education (Söderlund & Maylor, 2012) are incorporated as well: Stanford in America and the Scandinavian Aalto, BI, KTH, Linköping and UMEA.

All positive search results are followed-up by looking into the descriptions, looking for as much details as possible like program descriptions with specified courses and course descriptions containing learning outcomes. In total 491 documents and web-pages are collected with program and/or course descriptions containing project management. In some cases this follow-up leads to a dead end: a course or program only claiming project management as a career option, discontinued courses or a commercial training.

Analyzing this data shows that there are more types to discern when it comes to project management education: next to courses and programs there are several minors (elective) and sets of compulsory courses. The latter are incorporated in the dataset both as semi-programs (all courses combined) and as courses (each course separately). UAS shows 61 courses, 19 minors, 101 programs and 6 semi programs. The 17 Universities together have 62 courses, 6 minors, 5 programs and 4 semi-programs in project management. No minors or semi programs are found at the reference institutions, amounting to a total of 297 descriptions. The results are shown in table 3.

	Courses	Minor	Program	Semi Programs
University	62 (3. 5 per institution)	6	5 (1 in 3 institutions)	4
UAS	61 (1. 5 per institution)	19	101 (3 per institution)	6
Benchmark	25 (3 per institution)		8 (1 per institution)	

Table 3. Project management education in Higher Education (Netherlands & Reference)

Relatively the same number of courses are found at the Dutch Universities that promote PM education as in the benchmark institutions as illustrated in table 3. UAS are clearly lagging. Dutch Universities are not promoting PM as a part of their curricula to the outside world, something that UAS show in abundance. The benchmark institutions are in between.

Practitioners in the Netherlands

A workshop on the subject 'what do we teach and need to teach?' is held on the Dutch project management Parade (April 2016), with 33 practitioners attending. The object of the workshop is dual: collecting views and beliefs from practitioners on the subject en showing them results of a research among commercial offerings on project management education (Nijhuis, 2016). In order not to influence the practitioners, the results of the study were only discussed at the end. The practitioners have an average age of 46, 26 are male, 7 are female. A little over half (18) consider them to be project managers, the others are (project) consultants, program managers, managers, sponsors and educators. The project managers have an average budget of 5, 7 million Euro's and an average of 14, 5 years' experience as a project manager. At the start the group was randomly split in four groups, each dedicated to an open question: thoughts about training a starting project manager, subjects to incorporate, phases to incorporate and competences to address. After twenty minutes of discussion the whole group was allowed to mark on two structured questions the groups and competences to incorporate in training of starting project managers. The first uses the ISO matrix for project management (Normcommissie 381236 "Projectmanagement", 2012), the second the ICB4 Competences (IPMA, 2015).

Comparison between literature, practice and practitioners

Teaching methods

Teaching has evolved through time, from the traditional methods where a teacher shares knowledge and/or hands out assignments in a classroom to a more elaborate construct with group work, individual research assignments, student presentations, project based learning (PBL) and even service learning. The distinctions between them are sometimes subtle. One of the publications calls an assignment for four students PBL, which is actually just group work. Another calls a service learning project – where a group of students performs a project beneficial to (a part of) the society – PBL.

PBL is the most mentioned teaching nontraditional method in literature with 9 instances (13 if service learning and group work are included). Simulation is 'trailing' with 6 and workshops with four, two courses are offered online. Nonetheless, exchanging knowledge in a traditional setting remains necessary, even in PBL where at least introductory lessons are scheduled.

The overall practice of teaching reveals a traditional approach. Lectures and seminars are the dominant teaching form mentioned. Group work (not PBL!) is the second most dominant form, closely followed by exercises/assignments/cases. Lagging but still noteworthy are self-study, project participation (including but not restricted to PBL) and workshops. Scoring less (especially because of a low frequency at UAS) is literature study. Hardly mentioned are managing a school project, excursions, simulations, class preparation, coaching, management games, computer laboratory and rotating management of a (school)project. The various forms and their frequencies are illustrated in figure 1.
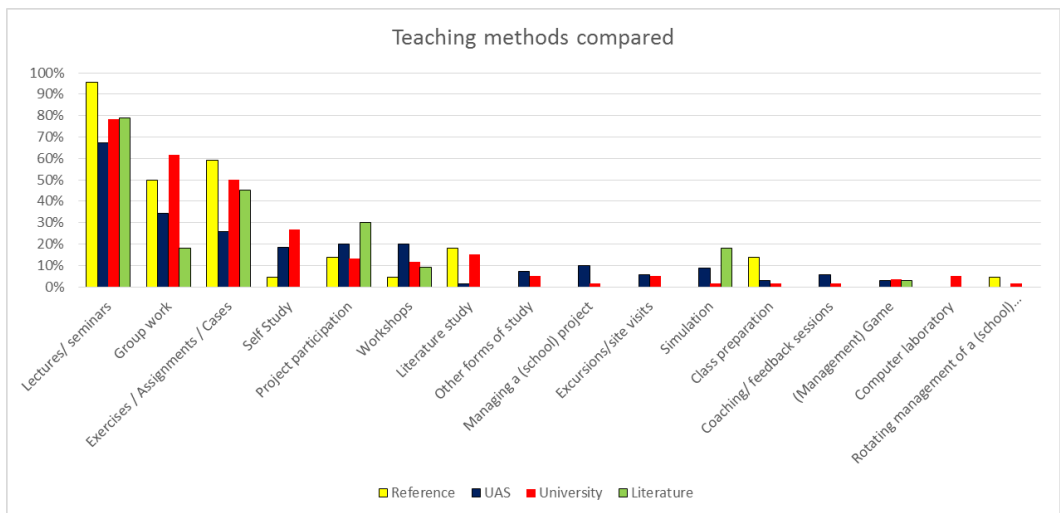

Figure 1. Comparison of teaching methods

As noted, the often mentioned PBL from literature is translated to project participation. The majority of students is not managing the group but participating in it. Only very few practices specifically mention the rotation of the management of the group. Apart from differences in group work, project participation and simulation the results of literature and practice are roughly comparable. Practice shows little differences between reference, UAS and universities, except on group work, exercises/assignments/cases and the previously mentioned literature study: all are mentioned less at UAS.

The foundation course (PMI, 2015) mentions and hints at several learning methods: lectures, assignments, homework and a final project. The latter is not a project that is undertaken by the student or student groups but a real life project that is analyzed by the student, to be categorized as either assignment or essay, especially since a case study is proposed as an alternative for this project.

Discussion

Counting the mentioned teaching methods is not the same as the spread of learning time over the teaching methods. As shown, teaching involves a multitude of techniques and most do not rely on only one technique. That said, it is strange that project participation, managing a project or simulation are mentioned so little. It is claimed that a real world experience is required to teach project management (Chen & Chuang, 2009) and stated that application of the material learned will provide deeper learning (Kloppenborg & Baucus, 2004). A big portion of literature suggests that PBL or Service Learning is the preferred method of teaching project management, thereby ignoring critique on this method (Ashraf, 2004).

The evolution of PBL is described by De Graaf & Kolmos, (2003), describing several characteristics of PBL and the didactics. The complexity PBL and several important choices in designing PBL are illustrated by Volkema (2010). Both of

them illustrate that PBL alone is not a guarantee for obtaining efficient learning, and risks are looming. Illustrative is the incorporated study, where PBL results are found only in the third offering of the unit, and only in the student groups that really put an effort into it (Jewels & Ford, 2004). Would these groups have learnt less in a different form of study? This is supported by the findings of Jollands et. al. that found similar learning results between PBL and non PBL students (Jollands, Jolly, & Molyneaux, 2012). Incorporated in the list of literature is a specific exercise created because 'the project context often distracted students form the fundamental principles of project management' (Heineke, Meile, Liu, & Davies, 2010). To add to these concerns, PBL is sometimes even wrongly considered equivalent to a project management course (Strang, 2013).

It becomes apparent that using PBL is not a guarantee for learning project management, based on the previous paragraph. An important factor for learning project management through PBL is that the student is actually leading the project, which is usually not the case for all students. At the same time the project should be realistic, incorporating at least a possible exchange between time, money and quality, which is usually not the case in PBL since time is usually fixed and money is not incorporated, leaving only quality as a parameter (Nijhuis, 2012). Service Learning aims to fix those deficits but large scale project management education would require unrealistic amounts of those projects: more than 5000 in the Utrecht area alone when combining data from Saungweme (2015), the ambitions of the Higher Education institutions in that area for teaching project management and the number of students.

Some call the (academic) review of a real life project a project (Bergman & Gunnarson, 2014; PMI, 2015). As noted before (Larson & Drexler, 2010) some call the creation of a project plan a project (Kloppenborg & Baucus, 2004). Some call a theoretical case study or even the writing of an essay a project (quite often a 'capstone project'). This rather inflates the use of a the term project especially in project based learning. The use of project based learning should be restricted to real projects that run from initiation to closing.

Simulation, although promoted less than PBL and hardly used in practice, looks to suffer less from all these concerns, but just running a simulation is no guarantee for learning project management (Zwikael et al., 2015). In a study of different modes of delivering Ellis et. al. found no significant differences (R. C. T. Ellis, Wood, & Thorpe, 2004), suggesting that the focus on delivery mode could be of lesser importance.

Methods of testing

In Higher Education credits are given to students after they have proven a certain mastery or understanding of the elements of the course. The same applies to project management courses.

A little less than half of the publications specify what test the students have to take before credits are awarded. Assignments and examinations are quite common, with the project trailing somewhat. The project test is not an uniform one, with descriptions ranging from the project plan to deliverables to result and success. Only one of the publications really relies on the project for the test with a report on the project with self-reflection (Bergman & Gunnarson, 2014), but that 'project' is actually an assignment for a pair of students interviewing a company to find evidence for a project management maturity level.

In the practice of teaching, the testing methods show a very traditional approach. The results of assignments and group work are graded, multiple choice tests or written examinations are a close second. Presentations and essays are trailing and only fifth is the individual assessment. Barely mentioned are individual portfolio, individual projects, attendance, oral examination, peer evaluation, discussions and laboratory assignments, as illustrated in figure 2. Noteworthy is that the reference institutions appear to cling more to traditional ways of examination than the Dutch institutions. Class attendance and/or class participation scores relatively high in reference and universities. The tests methods mentioned in literature are projected on the same categories.

The first module as defined in the project management Curriculum and Resources (PMI, 2015) lists up till 21 assignments which together test whether the student has mastered the learning outcomes (page II-10), which are not specified in the remainder. The homework assignments and grading standards of a typical semester course (pages II-88 & 90) does give clues to the nature of these assignments like write a charter, a scope or develop a cost estimate. The suggested grading standards are very much in line with the practice of teaching: homework assignments, midterm examination, project and final examination. Please note again that the project in this foundation course is an analysis of a project and not a project managed by the student.
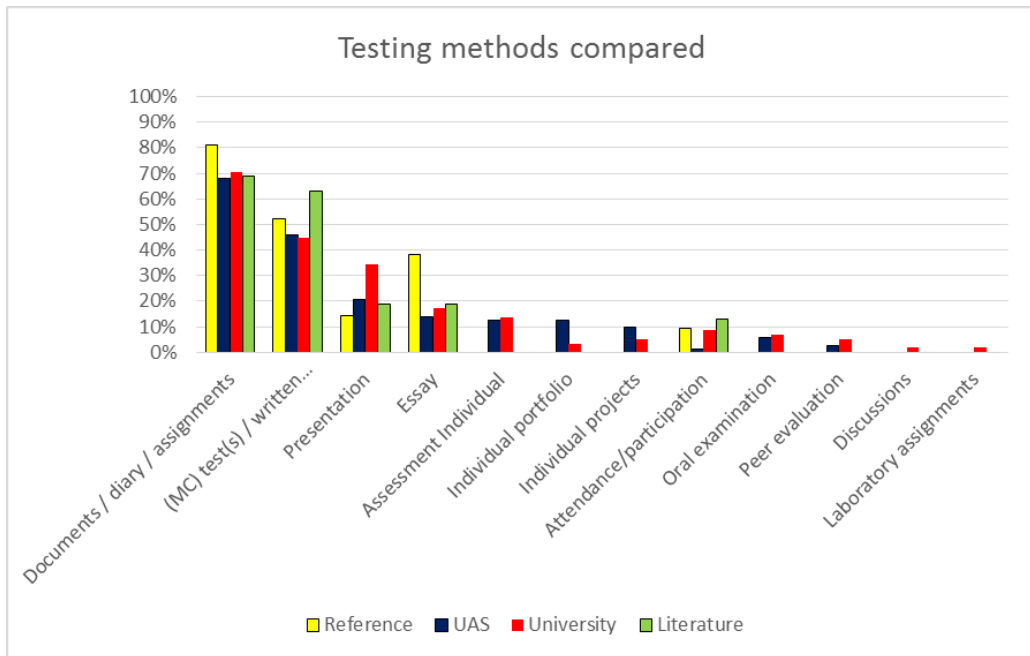
Figure 2. Testing methods compared

Discussion

All data sources reveal a strong traditional method of testing, a small portion even including attendance and participation.

The testing methods suggest that the focus is on knowledge and insight. Whether students have developed or shown an ability in project management can hardly be tested by examining produced documents, written examinations or essays. Apart from presentation skills, the test method presentation is not fitting for testing developed or shown abilities either. Methods that could test those abilities are hardly mentioned like individual assessment or portfolio, oral examination and peer evaluation.

A hypothetical question concerning attendance/participation: do we really need this to motivate students to learn project management?

Intended learning outcomes

On the open question 'share your thoughts on project management training for a starting project manager' on the workshop with practitioners, several highly differing answers are given, like the basics, looking from different perspective, behavior and culture, moral compass, risk management, team communications and best practices. A different group worked on the question 'which subjects – maximum of five – would you incorporate in such a training', leads to more agreement, but still a total of 17 subjects are mentioned, in descending order: team, planning, organizing, project methods, budget & cost management, reporting, stakeholder management, coaching, agile. Mentioned, but getting less than five votes: project approach, business case, sustainability, time management, contract management, project startup and procurement. Communication, scope and stakeholder management are favored by the practitioners as are initiating and planning, when the question is structured as described. In tables 4 and 5 these last results are shown as votes.

The intended learning outcomes are described by most of the publications. They all describe aspects of project management, some describe them in detail like the experiential learning project management workshop with 6 learning outcomes and stating that the main purpose is getting students acquainted with a beneficial attitude for their capstone project (Townsend & Urbanic, 2014). Some list a number of competences derived from Prince2 (González-Marcos et al.,

2016) or point to the 46 competences of IPMA (De los Rios et al., 2015). Like in the practitioner workshop, there is not much structure in the described learning outcomes in literature. This paper uses the ISO standard for project management (Normcommissie 381236 "Projectmanagement", 2012), specifying 10 subject groups and 5 process groups to categorize the learning outcomes. Discussions in focus groups about critical processes led to the addition of one subject group (Value management) and one process group (Accepting the project) (Nijhuis, Kessels, & Vrijhoef, 2015). The descriptions of the learning outcomes are scrutinized on whether these 17 groups are mentioned / incorporated.

A majority of the publications (21) supply learning outcomes of which some or all could be categorized to these 17 groups. Fifteen of them supply extra leaning outcomes. Seven supply learning outcomes that could not be categorized. The number of groups found varies per publication: 11 publications mention five or less groups, 4 more than ten groups.

Planning is mentioned by 17 publications. Time, Scope and Risk are the three highest mentioned in subjects. In processes Initiating and Controlling are both number two, trailing far behind Planning.

The same analysis is performed on the courses specified in the practice of teaching. To favor comparison a relative score is computed: the descriptions that mention a certain subject are counted and divided by the total number of descriptions that mention at least one subject. The same procedure is repeated for process groups. These percentages are listed in tables 4 and 5. There is some similarity between the four categories: literature, reference institutions, universities and UAS: the subjects Risk and Time are in the top three of all. The last item in the top 3 differs: Scope in literature, Resource at the reference institutions and Cost at universities and UAS. In almost all subjects large difference can be seen, the lowest differences are found in Procurement (generally low scoring) and Risk (generally high scoring). The highest difference is found in Scope (21% at the reference institutions, 67% in literature). The most disagreement between literature and practice can be found in Scope, Communication, Quality and Time, all these groups are mentioned much more often in literature than in the closest category in practice. Only the added subject Value/business case is mentioned less by the literature descriptions than in practice.

Subject group	Literature	Reference	University	UAS	Pract. Ws.
Communication	53%	21%	12%	25%	32 votes
Cost	40%	26%	49%	46%	9 votes
Integration	27%	0%	7%	2%	7 votes
Procurement	20%	21%	22%	5%	1 vote
Quality	53%	16%	27%	30%	11 votes
Resource	53%	32%	29%	30%	13 votes
Risk	73%	58%	63%	54%	10 votes
Scope	67%	21%	34%	39%	19 votes
Stakeholder	47%	21%	27%	40%	18 votes
Time	73%	42%	51%	44%	12 votes
Value/Business Case	7%	16%	15%	28%	Not inc.
Total number mentioning a subject	15 of 36	19 of 25	41 of 62	57 of 61	132 votes

Table 4. Subject groups as mentioned in the five categories, top 3 of each highlighted,

In the process groups there is also some similarity between the four categories. Highest scoring with all is Planning, second is Controlling (with Initiating tied second in literature and Implementing tied second at the reference institutions). Again some differences mostly in the Initiating and Closing process with university scoring lowest in both and literature scoring highest in both. Accepting the project is not a mentioned group in any of the categories.

Process group	Literature	Reference	University	UAS	Pract. Ws

Initiating	53%	29%	18%	38%	42 votes
Planning	89%	95%	77%	87%	38 votes
Implementing	42%	48%	36%	38%	18 votes
Controlling	53%	48%	54%	55%	26 votes
Closing	47%	14%	8%	25%	8 votes
Accepting the project	0%	0%	0%	0%	Not inc.
Total number mentioning a process	19 of 36	21 of 25	39 of 62	60 of 61	132 votes

Table 5. Process groups as mentioned in the five categories, top 2 of each highlighted.

The foundation course (PMI, 2015) lists the topics (page II-88). Of the process groups Planning and Control are specifically mentioned. Closing is specifically not incorporated (page II-8). All subjects are specifically mentioned, with an addition of Ethics.

Discussion

The projection of learning outcomes onto the ISO matrix greatly reduces the information given in the text. A level of understanding of the group is not discerned. Is the course merely about knowledge of the process of planning or is the intended learning outcome that the student will be able to plan any project including time, budget, risk management strategies, communications management structures and quality control processes?

Projecting learning outcomes on ISO and classifying them in levels is a reduction of the data available, but does make them comparable. Not all mentioned learning outcomes could be classified onto the ISO groups, like teamwork or negotiation. Teamwork could be part of the resource management, but it is definitely not the same. Negotiation could be part of resource management, scope management, stakeholder management, initiating and planning. Classifying these would require a competence classification system like a taxonomy (Nijhuis, Vrijhoef, & Kessels, 2015b) which is beyond the scope of this paper.

Often mentioned competences in literature are negotiation, teamwork and –building, leadership and using computers. Especially the last one is intriguing, but is supported by the foundation course (PMI, 2015) spending lectures on automation tools (page II-88).

The results from literature and practice do not align with the votes practitioners give. Note that the practitioners answers are not completely congruent: while team scores highest in the open question, Resources (including project team) did not make it into the top 3 when ISO is used as structure.

Literature on average mentions more included topics than practice, suggesting a more complete overview of the playing field of project management. There is some but not complete focus in the mentioned subjects and processes. The commercial development courses in the Netherlands, mainly aimed students without experience, show a similar distribution as practice and literature (Nijhuis, 2016). The point of complete agreement, Planning, could be debated: it is not likely that an inexperienced project manager will get this task (Nijhuis, 2016).

Intended level of learning outcomes

In the previous section a comparison is made on the groups mentioned in the text. As noted, this reduces the information given, especially the intended learning level. This section deals with the intended learning level of the learning outcomes. In this section the following levels will be used: knowledge, insight, experience, ability and unknown. These are explained in table 6. Appendix A lists some found examples of experience and ability.

Level	Learning outcomes promise that student
Knowledge	has knowledge of project management terms, processes and methods
Insight	shows insight in project management terms, processes and methods

Experience	has experience in applying (some) project management processes and methods
Ability	has the ability to successfully manage projects
Unknown	No information supplied or classification unclear

Table 6. Levels of learning outcomes

In some cases the information is not fit for classification with learning outcomes described like 'core subject', 'course including project management' or 'getting to know subjects that go beyond the daily routine of project management'. In this case the classification 'unknown' is given. A course that does not supply information is also classified as unknown (13 out of 34 unknown in practice). The 33 publications dealing with course material (3 describe a complete master program) are classified accordingly.
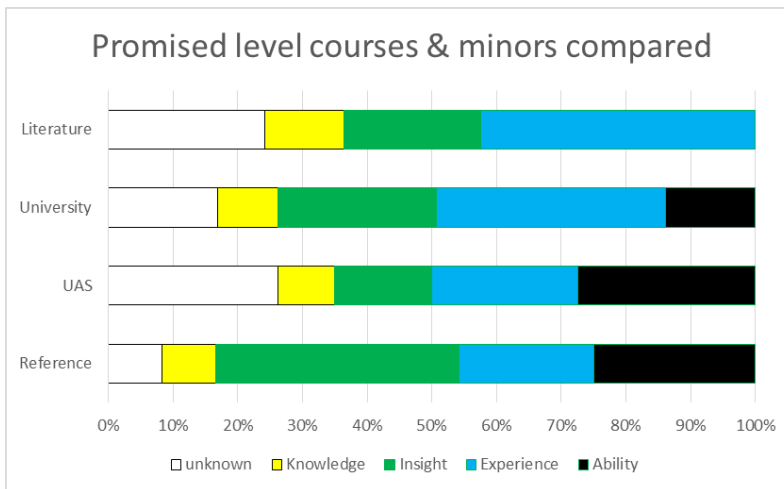

Figure 3. Levels of learning outcomes compared

As illustrated in figure 3 the Dutch Universities are holding back on claiming ability. Literature does not claim it at all in the courses described. The two highest categories (Experience and Ability) amount to 40 to 50% in all categories. The benchmark institutions have a large portion of courses that 'only' claim insight. A fairly large portion of courses and minors have descriptions that fall into the unknown category. The reference institutions perform better on that accord.

Then fundamentals in project management (PMI, 2015) shows several levels (page II-10). The advanced ability to create comprehensive project plan can be classified as ability. In contrast the fractional ability to plan and monitor project budget and schedule would be experience at most, more probably only insight, especially since the topic 'acquainted with the principles of identifying, developing and managing resources' is explicitly excluded. This is rather confusing, since a comprehensive plan contains a budget and schedule and does identify resources. The implementation schedule (page II-88) shows several homework assignments that should at least create insight and maybe experience. Since this involve the fundamentals, insight would be an appropriate level.

Discussion

Even when restricting to courses, there is a considerable amount of courses found that do not describe learning outcomes in such detail that the level of the learning outcomes can be deduced. In literature that is expected, as explained before, the intention of some is not in the detail of the course itself. In course descriptions of universities, UAS and reference institutions this is not expected, especially since the course descriptions found are usually the official ones and not popular translations, like one is likely to find in brochures.

Looking at more brochure-like texts, the descriptions of programs, aimed at 'luring' students into the curriculum, confirms that those are less specific as illustrated in figure 4. Where they are specific, the average promise of learning outcomes is higher than of courses, almost completely losing the knowledge level.
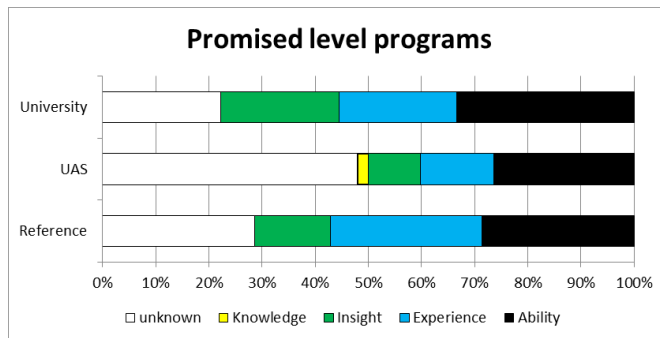

Figure 4. Comparing levels of learning outcomes in program information

Credits involved

Although seldom specified, most of the publications deal with a course or workshop that is (considerably) less than 15 credits, which is comparable to a quarter of a study year. The foundation course (PMI, 2015) does not specify credits. The courses found in practice do specify in vast majority (>85%) the number of credits involved. The number of credits involved in a course does not always equal the number of credits for project management, since subjects are sometimes combined, quite often with the credit distribution specified. If not specified an equal distribution is assumed. The average PM load in a course which has PM as a learning outcome shows similarity, with an average of (around) 5 for UAS, (around) 6 for university and (around) 7 for the reference institutions.

The total credits in a program is interesting: the attention spend in a complete curriculum on PM. The view is restricted to compulsory PM attention, restricting to compulsory courses. More than half of the incorporated information in the dataset concerns compulsory courses: 186 or 63%. The others are unspecified (60) or elective (45), with 6 mixed or supplying conflicting information. The overlap between programs and courses is minimal: In total 13 of the compulsory courses overlap: 6 are part of a incorporated program and 7 are part of a compulsory set of multiple courses. These 13 are removed from the analysis of courses, since these are already analyzed as multiple courses or programs. In UAS there are three Professional Masters of project management. Those 60 credit programs commit the whole program on project management subjects. For comparison sake those are removed from the analysis as well.

The results vary greatly per category. In programs reference institutions dedicate 24 credits to project management, but the compulsory courses in other programs average 'only' 4, 9 credits. At Dutch Universities the same effect is visible: 9, 5 average compulsory credits in programs, 6, 8 in compulsory multiple courses and 6, 1 in compulsory courses. UAS shows a different pattern with 13, 6 credits in programs, 18, 3 in compulsory multiple courses and 5, 1 credits in compulsory courses.

Average credits dedicated to PM	Reference	UAS	University
Course (single course in a program)	4, 9	5, 1	6, 1
Multiple course (in a program)		18, 3	6, 8
Program (only program description)	24, 0	13, 6	9, 5
Overall average	14, 4	11, 5	6, 5

Table 7. average credits per category in compulsory courses without incorporating Professional Masters in PM

Discussion

A note is given that program information is supplied to get students enthusiastic about a study, therefore possibly showing a more positive image than realized in reality.

Only the reference institutions come somewhat in the neighborhood of the specified minimum of 30 credits in the project management Curriculum and Resources (PMI, 2015). The rest is not even close to that target. One can debate whether 30 is a correct amount, given restrictions in a non PM-curriculum. Notwithstanding this debate, the averages overall and the course information shows that in practice it is more likely that a student, in a curriculum that includes PM, receives between 5 and 10 credits in project management.

Students can do more, like following a minor, in theory adding considerable amount of time focused on PM. The amount of PM credits involved in those minors shows a large variety from 1 credit up till the maximum of 30.

Measuring added value

Whether the course was sensible is the subject of many publications. Measurements are installed to support claims of enhanced abilities and or insight. Some publications do a comparison study. An often used method is that of Students Assessment of Learning Gains (SALG) (Seymour, Wiese, Hunter, & Daffinrud, 2000) although only one actually refers to this method (Rooij, 2009). SALG takes on several forms, the most notable are post assessment of students whether learning gains are achieved – with either a structured list or using open questions - and comparing pre- and post-self-assessments of students ability (or perceived ability). Most of the publications using SALG use a post assessment SALG, one uses a pre- and post-perceived ability and one combines both. Table 8 lists the found methods in literature.

Method	Used by
SALG	11
Pre- and post test	2
Student statements (comparison)	2
Comparing plan versus report	1
Enhanced ability	1
Measured objectives, comparing 1st, 2nd and 3rd run	1
One test question and one SALG question	1
Test (comparison)	1

Table 8. Found methods to measure added value in literature.

In the practice of teaching there is no reference to measurements found to test whether students gained in knowledge or ability. A pre-test is not mentioned either. The foundation course as specified in page II-88 does specifically mention the identification of projects in the students experience, but does not elaborate on that.

Discussion

SALG relies heavily on student's self-assessment of learning gains. Self-assessment is not without problems as Symons et. al. conclude: 'Most studies of self-assessment are in areas of technical knowledge and ability. Even in concrete areas such as these, self-assessment has been found to be inaccurate' (Symons, Swanson, McGuigan, Orrange, & Akl, 2009). Asking students whether they learned something will trigger a positive answer (Pligt & Blankers, 2013), adding to the inaccuracy. To determine whether something is learned, a comparison of pre- and post is necessary (Kirkpatrick, 1959; Kirkpatrick, 1996), to avoid measuring satisfaction of the student on the course material, training facilities and teaching staff instead of actual learning. Several of the incorporated student statements in the literature illustrate student satisfaction. Even when pre and posttests are used, SALG has been proven to provide unrealistic results (Nijhuis, 2015; Nijhuis, Vrijhoef, & Kessels, 2015a).

Pre- and posttests are necessary to compensate for differences in entry level, and those differences are real (Passerni, 2007), especially when comparing two different methods of conveying. No proof is found that this is actually done, except in comparing a virtual training (González-Marcos et al., 2016).

Measuring the real added value of a course or specific method is difficult. SALG provide a quick, easy but unreliable tool, mostly measuring satisfaction of the students. Most of the literature incorporated tries to measure added value, but the supplied proof is can be questioned. This questioning is usually missing.

Discussion

Data collection from institutions is based on publicly available information only. It is to be expected that more information is available, especially from those institutions that promise project management education in program descriptions where no course information is found. It is not expected including this data will lead to different conclusions.

Most of the comparison in this paper is facilitated by mapping text to teaching or testing methods, ISO or an intended learning level. In those interpretations errors can and will be made. The mapping is performed before analysis to avoid subjectivity in coding. Looking at the differences described, it is argued that these interpretation errors will not affect the conclusions.

The workshop used as a source of reflection is not a representative research into the real needs of practitioners. Especially since it involved on average very experienced project managers, and not juniors. It only provides some clues for educational needs and illustrates very nicely how much influence structure and questioning has on research results.

Teaching and testing methods for project management courses are fairly traditional. Literature promotes some less traditional approaches but one can doubt whether the most advertised method of project based learning actually leads to a better learning of project management. The incorporated subjects show several discussion points.

Considering traditional teaching and testing and restricting students projects to planning or to a theoretical exercise, the course materials examined show an unrealistic claim of learning level. Although spending on average more time on project management, the reference institutions show a lower claim on average than the institutions in the Netherlands.

Combining the critique on the use of 'project' in education and the (on average) unrealistic claims of learning level compared to teaching and testing methods, raises the question whether the examined institutions have a solid understanding of project management, what needs to be taught and how. Apparently the reference institutions have a slightly more realistic view of what can be achieved with the teaching methods used. The strong focus on the planning process, restricting most PBL and group work to the planning phase and therefore denying students the possibility of applying their planning leads to the speculation that project management subjects are merely fit into existing ways of teaching.

Presuming that the learning level found here are too optimistic, this offers an explanation why some authors find nearly no effect of a different mode of teaching (R. C. T. Ellis et al., 2004; Jollands et al., 2012). If the level is actually more knowledge or insight instead of the suggested experience and ability, project based learning and simulation could be really distracting the students from what is taught as suggested (Heineke et al., 2010).

Dutch universities are much more inclined to share the in depth descriptions of courses than UAS. The information found at UAS is much more focused on the broader perspective. The data of courses looks less flattered than of programs, programs appear to inflate the amount of time spend on project management and the level achieved by students. This seems to be true for all types of institutes examined.

Although project management education appears to be exaggerated, bear in mind that this paper deals with institutions that actually mention courses or programs with project management education. A majority of Dutch institutions does not. The comparison with reference institutions suggests that findings in this paper are fairly universal.

Conclusions and further research

The object of this paper is to explore the actual practice in project management education in the Netherlands. A little over 40% of the institutions in the Netherlands mentions PM education in programs and/or courses. A total of 264 courses, minors and programs in the Netherlands are analyzed in teaching and testing methods, in learning outcomes and credits assigned. The data is compared to reference institutions, literature on teaching PM, thoughts of practitioners and the foundation course recommended (PMI, 2015).

This comparison uncovers several discussion points:

The on average claimed high learning levels are inconsistent with the teaching and testing methods reported.

The promoted teaching method from literature will most probably not elevate the learning level tot the claimed level.

The incorporated subjects show different preferences and do not align with a small study among practitioners.

Circumstantial evidence (SALG) is usually the proof of added value of teaching methods.

No easy solutions are found to resolve existing critique on project management education (o. a. Berggren & Söderlund, 2008; El-Sabaa, 2001; Pant & Baroudi, 2008). This paper finds extra grounds for critique. Although an impressive work, the project management curriculum and resources (PMI, 2015) does not provide solutions. Further research is necessary. First educational needs need to be researched (Kessels, 1993; Thiry, 2004), in subjects and in level, before a fitting educational model can be developed.

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Appendix excerpts learning outcomes

Experience
Ability to - in an independent way - manage the project work using a project model with limited support in terms of supervision
Ability to (consistently) plan a project
Ability to collaborate in and manage project work
Ability to monitor project progress
Ability to perform project control on level 1
Ability to plan and execute a simple project
Ability to prepare and execute a PPC project
Ability to use a project management method
Ability to use scrum
Ability
Ability to be in control of integration, scope, time, costs, quality, HR, communication and risks
Ability to better plan, monitor and manage your projects
Ability to create a realistic budget and planning
Ability to organize a startup, write a project contract, make a planning and a project evaluation
Ability to prepare and execute a project
Able to hold responsibility for your project
Able to manage and implement projects
Adopt new attitudes and working strategies to get successful software projects
Getting sustainable results on time and within budget
Getting your project to the best result
Has all the professional skills of an IT project leader