The UM Handbook for PBL & Research Skills

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Version 1 – September 2017

This handbook is a production of the Maastricht University Institute for Education Innovation (EDLAB). Experts from all UM faculties have worked together at EDLAB over the course of 2016 to share and write down their knowledge and experiences regarding PBL & Research Skills. The information has been bundled in this handbook and can be viewed at https://edlab.nl/research-skills. EDLAB is grateful for the all the input it has received and wants to thank the UM colleagues involved in the process. Special thanks go to the following authors: Geraldine Clarebout, Kurt Driessens, Catalina Goanta, Sascha Hardt, Henrietta Hazen, Anique Hommels, Walter Jansen, Nynke de Jong, Wendy Kicken, Jan Nijhuis, Leonne Portz, Mirko Reithler, Emilie Sitzia & Ragna Zeiss. We would like to express our gratitude to Patrick Bijsmans, Pietro Bonizzi, Thamar Bovend'Eerdt, William Bull, Rachel Cavill, Roy Erkens, Sylvia Heeneman, Irma Kokx, Lotte Lemmens, Wilco Letterie & Jeroen van Merriënboer for their input and contribution to this handbook.

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Introduction & reading guide

i. PBL & research skills education at UM

The development of research skills is an essential part of academic training. Problem-Based Learning (PBL) at Maastricht University (UM) has the full potential to prepare students to conduct high-quality academic research. Although some research skills are faculty-specific, there are overarching research skills that university graduates should have developed throughout their study; a claim supported by the various definitions of 21st-century skills (see Terminology). Such overarching research skills include critical thinking, creating and executing a research design, information literacy, retention, data/source collection, selection, qualitative and/or quantitative analysis, interpretation, writing and argumentation. At UM, these skills are trained throughout the curricula, yet, there is a perceived dichotomy between the systematic and integrated teaching of research skills and the PBL key learning principles.

PBL is widely embedded in the UM teaching model. PBL at UM relates to four key learning principles constructive, collaborative, self-directed, and contextual learning (Dolmans, 2005). Whereas several formats for PBL (e.g. seven-step method) are used to organise the learning process, the key learning principles remain at the core of UM's teaching and learning activities. This project approaches PBL from the perspective of these four key learning principles.

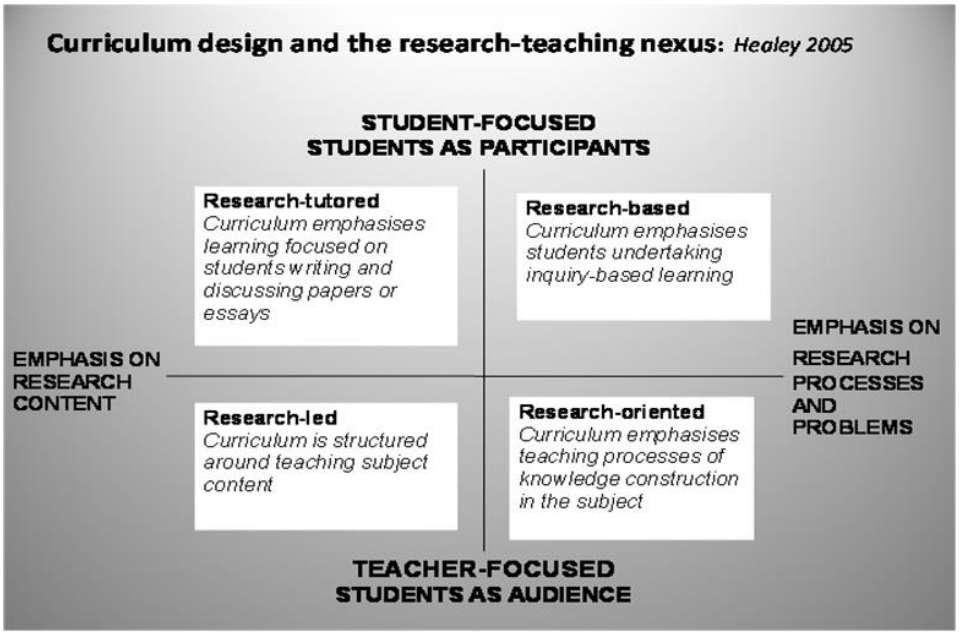

Figure i Linking Research and teaching: disciplinary spaces (Healey, 2005).

Looking at Healey's (2005) research-teaching nexus matrix (see Figure i), it is clear that PBL at UM covers research-led teaching (content lectures, seminar on lecturers' research, etc.), research-oriented teaching (PBL tutorials, skills training, etc.) and research-tutored teaching (assignments, essays and research and writing courses, etc.). Research-based education however (top right in model), while perfectly achievable through PBL, remains under-represented in the curriculum until students start writing their thesis. Regarding research-based education, there is room for improvement in the quality of intended learning outcomes on the course level and structural coherence of research skills training in the curriculum.

Project rationale

This project starts from the paradoxical observation that PBL at UM, on the one hand, seems perfectly fit for training research skills because it mimics the research process, while on the other hand, students are not always prepared well enough for conducting (thesis) research.

This project aims to present educational improvements for research education at UM and focuses on:

- Integrating content and research skills education on the course level:
  - Applying PBL core learning principles to research skills education
  - Connecting skills and content
  - Linking to real-world problems and involving professional stakeholders
- Stimulating research skills learning trajectories

As depicted in figure ii, the project's overall aim is to provide high quality research education and ultimately to better prepare students for conducting research.

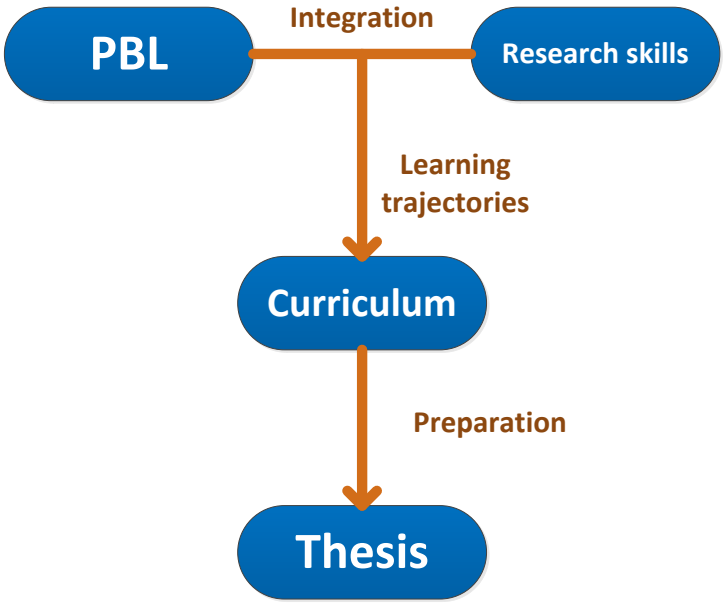

Figure ii Project Aims

ii. How to read this guide?

This guide (and accompanying website) presents best practices of research skills training at both the bachelor's and master's level at the UM faculties for future course and curriculum revision. Furthermore, it will reflect on the possibilities to align research skills within curricula to train research skills in an integrated and consistent manner.

Chapters 1, 2 and 3 of this guide (Part I) present hands-on tools to more firmly connect the four core principles of PBL to research skills training. Moreover, research skills training often occurs through 'stand-alone' courses without a clear link to content courses or to other skills training sessions in the curriculum. Chapters 4 and 5 (Part II) emphasise the integration of research skills in curricula (e.g. in learning trajectories). This part of the guide is underpinned by the four components of the *4C/ID instructional design model*. 4C/ID is an "evidence-based instructional design model that supports the design and development process of whole-task learning environments" on both the course and the curriculum level (Vandewaetere et al., 2015, p. 5).

For whom

This guide serves those stakeholders in higher education at UM that are responsible for 1) teaching of research skills, 2) designing and/or coordinating curricula, and 3) ensuring the quality of students' research capabilities and performance. Essentially, all the chapters stand on their own, which makes redundancy and overlap inevitable.

This guide is particularly useful to (see Table i):

- Course Coordinators and tutors: responsible for the quality and whole-task approach of research skills education at course level (part I in particular).
- Programme Directors: responsible for the quality of the educational programme and coherence of research skills education (part I & II).
- Deans of Education: responsible for the quality of the whole curriculum and the achievement of learning objectives related to research skills (part II in particular).
- Programme Committee: an advisory body (opleidingscommissie) that reflects and advises on the quality and coherence of the programme's curriculum (part II in particular).

Table i Reading guide

	Course Coordinators & tutors	Programme Directors	Deans of Education	Programme Committees
Chapter 1: Research skills & PBL	X	X		
Chapter 2: Merging skills and content	X	X		
Chapter 3: Starting research from real-life problems	X	X		
Chapter 4: Integrating skills in curricula		X	X	X
Chapter 5: E-support research skills development		X	X	X

Terminology

21st-century skills

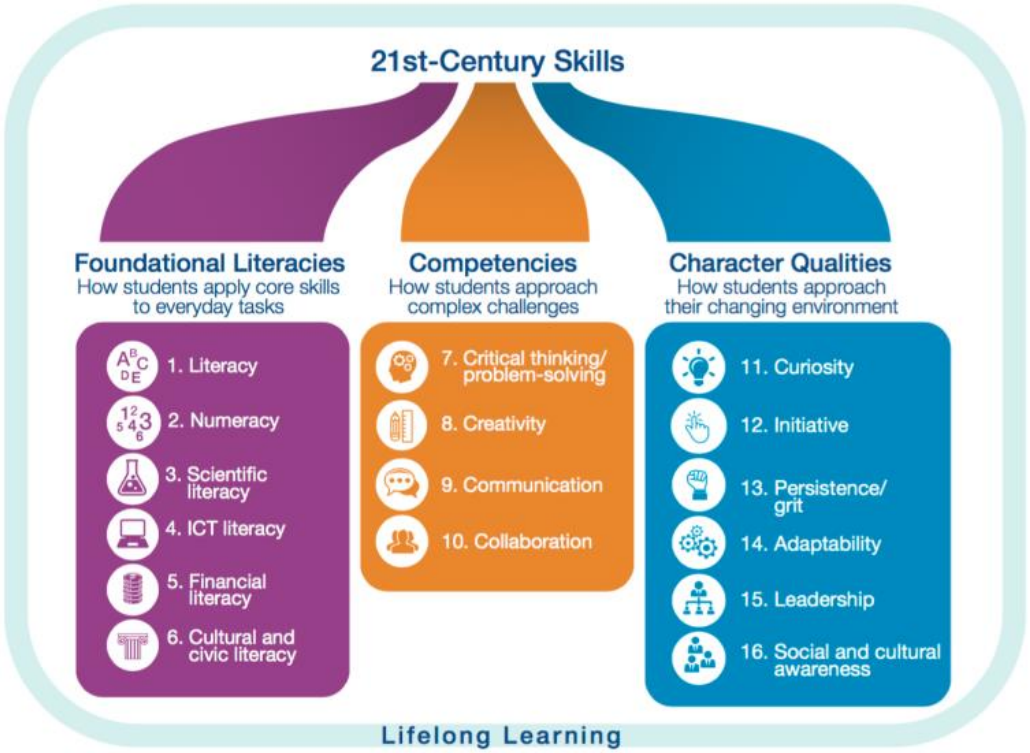

Figure iii 21st-Century Skills (World Economic Forum & The Boston Consulting Group, 2016)

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Vandewaetere, M., Manhaeve, D., Aertgeerts, B., Clarebout, G., Merriënboer, J. J. G. van, & Roex, A. (2015). 4C/ID in medical education: How to design an educational program based on whole-task learning: AMEE Guide No. 93. *Medical teacher*, *37*(1), 4-20.

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Part I

Chapter 1. Research Skills & PBL

This chapter was written with input from:
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1.1 Introduction

This chapter provides an overview of current best practices of teaching research skills at bachelor and master's level at UM and additionally serves as a general introduction to PBL and research skills. The following chapters are focused on essential elements to training research skills through PBL, such as merging skills and content, collaborating with external partners, alignment and repetition.

Research skills are perceived as essential competencies of academic students and include: problem definition, brainstorming, finding information, information literacy, retention, selection, critical reading, understanding of concepts, critical thinking, qualitative and quantitative analysis/analysis of empirical data, interpretation, logical reasoning, writing and argumentation, making use of existing knowledge, referencing, and data management. This chapter is guided by the following questions:

- What can be/are the strengths of research skills training at UM?
- What are current good practices of teaching and assessing research skills at UM faculties at both the bachelor's and master's level?
- What are the do's and don'ts of teaching and assessing research skills?

To answer these questions, each faculty created an overview of best practices of research skills training. This overview is non-exhaustive, but offers a satisfactory variety of cases. From this overview, we selected one best practice per faculty to present a range of cases that vary in terms of skills and embedment into the curriculum (see Annex 1 for a detailed presentation of best practices per faculty). We have used the following selection criteria:

- Innovative course design or practice;
- Application of PBL principles such as self-directedness, collaboration, constructiveness, and starting from real-world problems (contextualisation);
- Alignment (building on previously learned skills/embedment into learning trajectory);
- Sustainability (e.g. do students benefit from the research skills training when writing their thesis?);
- Encouraging/motivating students (e.g. seen in student evaluations);
- Transferability (the extent to which the course design could be applied to courses across UM faculties).

This chapter will first discuss the relationship between research skills training and PBL. This is followed by several recommendations (do's and don'ts) based on the lessons learned from the best practices (see Annex I for a detailed presentation of the selected cases). This chapter is of practical value to tutors, course coordinators, and programme directors.

1.2 PBL & research skills

Although the best practices are in diverse in their set up and application, the cases are all in accordance with UM's PBL philosophy, following the four core principles of collaboration, constructiveness, contextualisation, and self-directedness. Some cases follow the seven-step approach, whereas other practices demonstrate that there are other formats to incorporate the core principles of PBL to enhance active learning and student ownership.

Duch, Groh, and Allen (2001) describe the PBL model and the specific skills it nourishes. These include critical thinking, analysing and solving complex, real-world problems, finding, evaluating, and using appropriate learning resources, collaborating, demonstrating effective communication skills, and using content knowledge and intellectual skills to become continual learners. While this chapter did not take 'the skills that students learn through PBL' as a starting point, the analysis of the cases demonstrate that research skills can best be taught through engagement with the core principles of PBL. The best practices teach us that:

- Students often learn (or are taught) in smaller groups (e.g. FASoS, FHS-UCM);
- Students often do hands-on work (e.g. SBE, LAW);
- Students often work on real-world problems (e.g. FHML, FHS-UCM);
- Students must activate existing knowledge (e.g. FASoS, FHS-DKE, LAW);
- Students must construct problem definitions, be aware of assumptions, and understand that there may be more solutions (e.g. FASoS, FHS-DKE, FHS-UCM);
- Direct contact with, and guidance from, a tutor is essential (LAW, FASoS).

These lessons bear similarities to the core principles of PBL. Literature on PBL confirms these key elements. As Dolmans et al. (2016) outline, PBL activates students, enhances deep learning and facilitates the development of specific research skills: "The mechanisms through which PBL is assumed to enhance deep learning are active and self-directed learning. PBL is considered an active form of learning, since students need to analyse, compare, contrast, and explain information" (Dolmans et al., 2016, p. 1097). Furthermore, building on Gurpinar et al. (2013), Dolmans et al. (2016) emphasise the importance of finding the right sources in the PBL process: "They [students] are actively involved in their learning process because they themselves need to develop and explain hypotheses for the problem at hand and search for evidence for these explanations and hypotheses, using various literature and other learning resources" (Dolmans et al., 2016, p. 1097). To Dolmans et al. (2016), self-directedness is key to train research skills through a PBL format. As they highlight: "Self-directed learning comes into play in PBL since students take responsibility over their own learning. They have, to a certain degree and within the boundaries of the problem, the freedom to select their own resources to answer the learning issues, which gives them ownership over their learning" (Dolmans et al., 2016, p. 1097). The lessons mentioned above show a diversity of practices of research skills training. There is strength in the variety of formats presented, as it offers different approaches to research skills training.

1.3 Recommendations

Based on the faculties' best practices, a set of general recommendations on training research skills through the PBL format is presented below.

1.3.1 Do's

Multidisciplinary planning groups

A multidisciplinary course planning group can be very useful. This allows to 1) prepare the students for multidisciplinary research, 2) strengthen a competency-based course design, 3) agree as a team and discuss with other course planning groups what the key research skills for a given programme are and 4) work together with the Programme Coordinator on common criteria for alignment and evaluation of research skills training on the level of the curriculum. Such an approach supports the process of constructive alignment of skills education within the faculty. The importance of alignment (aligning learning objectives, assignments, courses and curriculum) is also a key element for successfully teaching research skills courses and is further elaborated on in chapter 4.

Training of and communication between tutors and course coordinators

The case studies demonstrate that training tutors and course coordinators and communication between them are important. Tutors and coordinators should for example be trained in guiding a brainstorming session, i.e. knowing when to go off the beaten track, how to construct intentionally ill-defined problems and how to provide the rationale for intended learning outcomes. One of the roles of the tutor is to guide processes and to make learning steps explicit, to tackle the assumption that students learn by simply 'doing'. Tutors need to be well prepared to be able to do this.

Link content and skills by infusing the coordinator's/tutor's expertise

The case studies put forward the importance of an explicit relationship between content and research skills. The course should simulate/follow the research process in terms of designing research questions and showing a diversity of research designs. Step-by-step student guidance is important. However, this guidance should be moderated by the student's self-directed attitude (e.g. through choice of topics). Expectation management is important: a small course cannot give all students the key to all research methods. The tutor should take on the role of both the instructor and model researcher. Furthermore, the tutor should provide a point of entry for the student to his/her research community. Cases should be tailor-made for each curriculum/discipline/field and allow for course coordinators and tutors to link their expertise to the course. The integration of content and method is further explored in chapter 2.

Enhance the link to real-world problems

Our cases present a wide variety of formats to approach research skills training from a real-world perspective, such as interview training for clinical practice and research, creating ill-defined problems with real-world applications (e.g. in mathematics) and papers that serve as an exercise to provide expert advice to a government. With such real-world problems as the course's foundation, students understand the relevance of the course's content and are motivated by this. Chapter 3 further explores research skills training through real-life problems.

Increase group-work

Collaboration in small classes or study groups increases interactivity and engagement, and maximises learning. In order to encourage self-activation, motivation and the sense of responsibility, it is advisable to reduce the class size and to diverge from the traditional lecture format. Student self-directedness, while the concept implies a loss of control, greatly improves the learning experience.

Use students' existing knowledge
Using the students' existing knowledge facilitates the integration of research skills within the curriculum. Some cases present students with real-world problems which they will need to solve by using existing knowledge, critical thinking and argumentation skills. Abstracting these problems and linking the content to existing knowledge is key to linking real-world problems to academic theories/solutions. A risk to this approach is that students may have 'wrong' knowledge/assumptions.

Promote self-directedness
Give students freedom and ownership of their learning experience, e.g. provide them with a challenge and the right set of tools to think out of the box. Relinquishing control will not necessarily impact the learning process negatively. Tutors should not be too afraid to let students go off track and give them the freedom to be guided by their curiosity. The element of curiosity needs to be embedded into assignments. For instance, the students are not supplied with predefined answers and the problems students are presented with should have more than one answer or multiple ways to reach a solution. However, tutors should not assume that learning will take place automatically.

Combine formative and summative assessment
A combination of formative and summative assessment is often successful as the students gradually learn about the process of research. Alternative forms of assessment, e.g. assessing engagement rather than result or knowledge-driven assessment, are also effective especially if the course aims to enhance self-directed learning.

Use a variety of PBL approaches
A variety of PBL approaches can serve as an alternative to the seven-step PBL method. For instance, tutorial groups may be explicitly focused on determining the quality and/or credibility of the reading assignment's material (see Annex I, FHML case, for an example of journal clubs).

1.3.2 Don'ts

Do not assume students will learn automatically by doing
Do not assume that the students will learn and recognise research skills automatically just by 'doing' and repeating them in several courses.

The process of research needs to be unfolded for students to understand and be able to conduct research. The rationale behind research skills training needs to be clarified. Step-by-step instruction, explanation and guidance are crucial.

One size does not fit all
There is no *one-size-fits-all* approach that can be transferred to all research courses. The variety of tasks and the right groups size are key to successfully organising research skills training. Our case studies demonstrate the importance of training research skills in various professional and academic contexts.

Too much content, large groups, and lack of time
Do not try to fit too much content and exercises in the course. Large groups and limited time may result in superficial learning. Choice and integration in the curriculum are key.

1.4 Overview of the cases

See Annex 1 for a detailed presentation of best practices per faculty.

Table 1.1 Overview of the cases

Faculty	Programme	Skills	Key elements
FASoS	Bachelor European Studies	• Brainstorming • Critical reading and thinking • Making use of existing knowledge • Problem definition	• Training brainstorming skills • Form to prepare pre-discussion • Own learning self-assessment form
FHML	Bachelor Biomedical Sciences	• Finding information • Critical reading • Information literacy • Interpretation • Writing and argumentation	• Journal club sessions • Specific questionnaires used to evaluate academic articles with different research designs
FHS-DKE	Bachelor Data Science and Knowledge Engineering	• Critical thinking • Information literacy, retention, selection • Interpretation • Argumentation	• Use the students' existing knowledge to reach a solution to a problem, before explaining the state of the arts solution. • Provide solutions with 'missing steps'.
FHS-UCM	Bachelor University College Maastricht	• Critical thinking • Argumentation and interpretation • Qualitative/quantitative analysis	• Tailor-made case work • Encourage students to put together knowledge from different parts of the course • Multiple solutions to problems or multiple pathways to a single solution
FPN	Research master's programme in Cognitive and Clinical Neuroscience	• Critical thinking • Qualitative analysis • Interpretation • Writing and argumentation • Logical reasoning	• No final exam • Practice of interview • Expectation management
LAW	Bachelor European Law School	• Information literacy • Critical reading • Interpretation • Writing and argumentation • Referencing	• Peer panel to discuss student's own work
SBE	Master International Business	• Academic writing • Analysis of empirical data • Critical thinking	• Flexible course that allows for combining teaching and research which motivates both staff and students • Exercise in translating theory to practice

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Part I

Chapter 2. Merging skills and content

Authors: Catalina Goanta, Sascha Hardt & Emilie Sitzia

2.1 Introduction

Research skills courses are among the least popular courses from the viewpoint of teachers and students alike. Epstein (1987) illustrates students' reluctant reaction to research courses in this often-quoted passage: ''No other part of the social work curriculum has been so consistently received by students with as much groaning, moaning, eye-rolling, hyperventilation, and waiver strategizing as the research course'' (Epstein, 1987, p. 71). Similarly, teachers often appear to have endless ingenious plans to avoid teaching research courses.

One of the reasons for these courses' unpopularity is their perceived disjunction from the rest of the curriculum. Therefore, this chapter will address the challenge to integrate research skills training within the curriculum. The core question this chapter aims to answer is: how to best merge skills and content?

This chapter starts with a list of recommendations regarding the integration of research skills and content: general theoretical recommendations issued from a theoretical exploration of educational theories (see Annex II), as well as concrete recommendations extracted from three UM case studies (two Law faculty cases, one FASoS case). This is followed by the analysis of specific assignments that put forward how the theoretical recommendations can be applied in practice. The case studies present a variety of practices and were chosen for their creative approach to merging research skills and content. Annex III provides a detailed overview of the case studies, detailing the context of the course (discipline, type of research skills, learning goals, position in the curriculum) as well as more practical aspects (design process, implementation, evaluation, and revisions).

This chapter is particularly relevant to UM course coordinators, tutors and programme directors. It will provide theoretical and practical insights and both faculty-specific and general knowledge on how to best merge skills and content.

2.2 Recommendations

This recommendation sub chapter merges general theoretical recommendations based on an exploration of educational theories (see Annex II) with concrete recommendations extracted from an in-depth study of three UM case studies.

Facilitate mastery of learning

Developing research skills should be regarded through a constructivist perception of learning. Pay attention to differences in sequencing and elaboration per individual student in order to provide a 'mastery learning' process in research skills education.

Link diverse knowledge fields (skills & content) and diversify tasks

The complementary nature of different approaches needs to be highlighted; there is no one-size-fits all approach to merging content and research skills. A diversity of tasks, assignments and assessment

methods is desirable while keeping a strong focus on the transferability of skills to the work place and to different academic endeavours.

A mixture of classical skills and 21st-century skills is also desirable. Classical research skills training and applied research skills edutation are important to meet the demands of the students. Our case studies demonstrate how to merge traditional research skills with content, while additionally training soft skills such as communication skills, creativity and leadership.

Freedom of choice
Give students freedom to choose research topics and research methods. This is paramount to ensure a minimum amount of student directedness and motivation throughout the research process.

Contextualise and highlight transferability
Contextualise research skills to enhance concrete experience and meaningful learning.
The case studies demonstrate that raising awareness among students of the link between skills and employability (hard and soft skills) makes a big difference in terms of student engagement and perceived relevance of the courses. Creating videos such as skills at work (by alumni and professionals highlighting what kind of skills they use in their jobs) is an efficient way of giving prominence to the skills. Research skills do not work in isolation; they need to be connected to content and professional practice.

Active experimentation
Offering opportunities to students for active experimentation increases the learning experience on the level of motivation, transferability of research skills to the real world (i.e. employability) and anchoring learning. Formative assessment facilitates active experimentation.

Demystify research
Demystify research by creating a sense of a community (e.g. show the diversity of research practices within a field) and by putting forward the commonalities between research and teaching.
Additionally, incorporating the staff's research into the course wil further facilitate this process.

Tailor-made material
The case studies demonstrate that sometimes artciles from educational books and manuals might not fully match the needs of each course. As a result, the prescribed course material might not be fully used. This problem can be avoided by creating a unique course manual in line with the particular content of the programme. To this end, cooperating with publishing houses could fill the gap identified above.

Consider assessment
Make use of formative assessment and assess different elements of research skills training through assignments focusing on acquired skills, applied methods, process and the final product.

2.3 Before you get started

There is always room for better integration between skills and content, this is, however, often difficult to achieve. This sub chapter presents tips for merging content and skills in both existing parallel courses and merged courses.

2.3.1 Parallel courses

Communication between coordinators

The key tip for merging skills and content in parallel courses is to work closely with other course coordinators (or co-coordinators) and to mind how the course is represented by other course coordinators.

Pay attention to the position of the course in the curriculum

Mind the position of the course in the curriculum when you are planning a research skills course. Consider existing prior knowledge, workload of other courses and relevance to other courses.

Student motivation

Assure that the course covers a variety of tasks, offers a satisfactory level of interactivity, links the tasks to the professional world to demonstrate the relevance of the assignments, use gamification (with measure), invest time in role plays, and make sure that you stay connected to your students' needs. Forging a community of students and staff will contribute to the demystification of research and contributes to the course's good reputation.

Assessment

Often a small number of ECTS is attributed to research skills courses. Keep the workload (assessed assignments) to a small number and keep the workload in line with the amount of ECTS. Use formative assessment.

Responsive course

Include element of responsiveness: keep track of issues students may encounter and create on-demand responses to content questions.

2.3.2 Merged courses

Work in teams

Work closely with thesis supervisors in designing the course to ensure constructive alignment of research skills education on curriculum level and communicate the relevance of research skills training to students.

Explicate links

Explicate the link between the content and the research methods in coursebooks, tutorials or workshops.

Transferability

Establish a link to the real world, e.g. create assignments that are transferable to the professional realm.

Place in the curriculum

Mind the connection with previous and follow-up courses where the skills are used and keep track of constructively aligned research skills education in the curriculum.

Example of educational activities related to the PBL core learning principles

Table 2.1 presents a variety of educational activities related to the previously defined key principles of PBL (Dolmans, 2005). The examples of educational activities are based on this chapter's case studies (see Annex III).

Table 2.1 PBL principles and educational activities

PBL Principle	**Example of assignments/tasks merging content and research skills**
Constructive (gradual knowledge creation)	Seminar Workshop Interactive lecture Expert meeting
Self-directed (student directs the learning process)	Choice of presentation topic Choice of written assignment topic Choice of thesis topic Skills casts Vlogs
Contextual (links to real-life cases)	Role play Moot court Site visit Field trip Expert meeting Internship Real-life task/project
Collaborative (students learn to work in groups)	Extracurricular peer-mentoring Group assignment Group presentation Group hands-on project Moot court

2.4 Overview of the cases

	Bachelor/ Master	Skills

LAW 1 (Annex 3)	*Bachelor European Law School*	• An introduction to PBL
		• Legal research
		  ○ Working with legal information
		  ▪ Finding legal sources
		  ▪ Assessing the quality and use of various types of sources/information
		  ▪ Using sources in papers/research projects
		  ○ Introduction to legal academic writing
		  ▪ Setting up a research project, developing a research question
		  ▪ Structuring a research project/paper
		  ▪ Writing in appropriate style
		• Legal reasoning
		  ○ Introduction to (formal and informal) logic
		  ○ (Legal) argumentation, assessing the quality of arguments
		  ○ Oral argumentation and public speaking / debating
		  ○ Working with legal rules
		  ▪ Rule analysis
		  ▪ Application of legal rules to fact patterns and cases
		  ▪ Writing simple legal opinions

LAW 2 (Annex 3)	*Bachelor European Law*	• **Legal translations** - developing the necessary skills and knowledge to be able to understand legal documents properly and to translate them from

	School	one language into another. • **Comparative legal research** - writing a legal paper on a European private law topic as part of the moot court exercise. The acquired knowledge can be used for any other course with a research/legal writing component, as well as for the bachelor thesis. • **Presentation skills: moot court** - synthesising issues arising from a fictitious case and formulating legal arguments (public speaking and argumentation training).
FASoS (Annex 3)	Master Arts and Heritage	• Critical thinking • Creating a research design • Executing a research design • Information literacy • Data/source collection • Selection of information • Qualitative and/or quantitative analysis (the course is mainly focused on qualitative analysis) • Interpretation • Argumentation • Writing

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Part I

Chapter 3. Starting research from real-life problems: collaboration with societal and industrial partners

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3.1 Introduction

Research skills courses are among the least popular courses from the viewpoint of teachers and students alike (see Chapter 2). One way to make teaching research skills more attractive and arguably more relevant to both students and staff is to start from real-world problems, with real-world clients. While many students behave like a *homo economicus* during most of their study, aiming to reach the best results with the least amount of effort, dealing with external partners turns out to be one of the best motivators to go the extra mile and showcase what they are capable of. Noticing the practical usefulness of what they have learned during their coursework, being given an opportunity to influence the real world, and to be taken seriously by society not only makes them rise above themselves but also gives them the best preparation possible for taking their first steps on the labour market. Besides giving students the opportunity to apply the PBL principles to a new type of assignment, it also offers society a view into what the university does, which and may lead to spin-off cooperation between businesses, organisations and the university.

This chapter presents how research skills are taught and can be taught in collaboration with external partners at UM and how this relates to PBL. The chapter is based on a literature review and selection of best practices of undergraduate research projects in collaboration with external partners. The practices were selected by Directors of Studies and other staff members with knowledge of the diverse educational practices at UM. Ten interviews were conducted with coordinators of the courses involving external partners at several UM faculties. Six approaches to working with external partners are included in this chapter. The cases present a non-exhaustive overview of a diverse set of approaches at UM (see Annex IV for a detailed presentation of the case studies).

The chapter starts with a set of recommendations that were abstracted from these different approaches. In the next section, we present several considerations for those wanting to add collaboration with external partners in real-world projects to their course catalogue. The section also outlines the differences between the current (PBL) approaches at UM and presents, amongst others, reasons and motivations of UM staff, students and external partners for engaging in such projects. Lastly, an overview of the cases is provided highlighting the course context, the motivations of the different parties, details about the courses and projects, the relation to PBL, and challenges and tips.

The chapter offers practical value for programme directors and course coordinators who are deliberating to set up research projects in collaboration with external partners.

3.2 Recommendations

The current UM initiatives that allow students to interact with external partners during their course of study are quite diverse in terms of their approach and organisation. Nonetheless, this section highlights several general recommendations.

Appoint a single contact person for external partners and ensure that enough time is allocated to this person for the task of maintaining good relationships with external partners.
Building and maintaining relationships with external partners requires a lot of work. The motivation and priorities of external partners are often very different than those of academic stakeholders. Coordinating time schedules and end-result expectations is a non-trivial task. Aligning the agendas of an external partner with a course schedule may require leniency on the part of the external partner. For example, an industrial company might be under time pressure to reach a solution for their problem and managing these expectations in stressful situations requires trust that can only be built up over time. Appointing a single contact person makes it obvious for the external partner where to turn to with questions and also avoids conflicting or confusing messages.

Spend time preparing the students for dealing with an external partner.
Although there is some discussion and disagreement on the level of preparation PBL offers students in preparing them for real-world problems (see also paragraph 3.3.7), there is consensus that students are not used to, and often ill-prepared for dealing with external clients. Preparatory training can range from preparing students for the added stress and goal-oriented mind-set of external partners, to teaching students how to communicate on a more professional level than what is expected or tolerated at an educational institute.

Do not involve external partners in the grading process.
Getting feedback from the external partners on student performance is a good idea, but including them in the actual grading process might cause conflicts of interest. The interest of external partners usually does not lie with the education of the students, but more often with finding a solution to their problem. The course's learning goals and scope are often unknown to the external partners. For example, the educational institute might expect the students to spend some time in carefully investigating and building support for their suggested solution, while the external partners might be mostly interested in timely and/or fast delivery the solution.

Define the end-terms with care, but be prepared to be lenient.
Being confronted with a real-world problem can easily lead students to get side-tracked and to lose sight of the course's learning objectives. Additionally, students may feel pressured by the external client to present a timely solution. This may lead to students taking shortcuts and resorting to non-scientific approaches to solve the client's problem. Be clear in the communication to students about the expected end-terms. Don't give up on academic quality, but add assessment criteria such as application of knowledge, cooperation, client interaction, etc. Be prepared to be lenient and understanding towards the expectations of the external partner to keep them happy and interested in the students' work, but also to avoid students encountering conflicts of interest between the expectations of the university and the external client.

3.3 Considerations before getting started

A wide variety of approaches to collaborating with external partners in research skills courses should be considered. The considerations below aim to explicate the choices involved in developing and assessing undergraduate research projects, and to create awareness regarding potential pitfalls that

should be handled appropriately. These considerations, outlined in one paragraph and followed by more detailed supportive information, are based on the literature and the UM case studies.

The literature review, although not exhaustive, revealed that there is limited academic literature on undergraduate research (and research skills) projects in collaboration with external partners. Undergraduate research as such, is widely discussed. The body of literature on students' (professional) experiences with non-academic parties is growing, these articles however, do not always focus on undergraduate research and research skills. Yet, both bodies of literature provide important insights for establishing research projects with external partners. An article by Beckman and Hensel (2009) is particularly relevant in outlining choices that need to be made, which were also often mentioned during our interviews. Beckman and Hensel outline tensions between various components and practices of undergraduate research by defining several continua. Zeiss (2017) further explicates these continua in the context of undergraduate research with external partners and adds a final continuum to the considerations below (see Table 3.1). The most relevant continua are further discussed in the following paragraphs.

Table 3.1 Continua to consider

Continua specified by Beckman and Hensel (2009)			**Specified for undergraduate research with external partner (Zeiss, 2017)**
Student-, process-centred		Outcome-, product-centred	
Student-initiated		Faculty-initiated	A project can be initiated by the external partner who facilitates access to material and acts as gatekeeper. A project defined by the external partner provides students more time to work on their research and arguably creates more relevant outcomes, but may decrease the emphasis on educational objectives (e.g. learning to define research questions).
All students	↔	Honour students	
Curriculum-based		Co-curricular	
Collaborative		Individual	
Original to the student		Original to the discipline	
Multi-or interdisciplinary		Discipline-based	
Campus/community audience		Professional audience	Writing for an external audience motivates students. However, this may result in additional pressure on the students. Students will also adjust to different/additional requirements.
Relevance to external partner/societal relevance		Academic relevance	Conducting research relevant to an external partner strongly motivates students (i.e. their research matters). Relevance is often defined in terms of (direct) knowledge utilisation. Although theories can help to approach or explain practices in specific ways, external

			partners are generally more interested in reaching concrete recommendations and practical solutions to solve their problem. The final work is assessed on academic criteria for quality and relevance, whereas students tend to focus on relevance to the external partner. Make sure that students do not forget about academic quality, but consider adding criteria such as knowledge utilisation and collaboration to resemble the complex context in which much current research takes place.

3.3.1 Reasons/rationale

Reasons for setting up undergraduate research projects with external partners include motivation of students, staff and external partners, the learning students engage in in terms of understanding what research entails and training research skills in meaningful contexts, and enhancing students' employability.

Motivating

Real-world projects motivate students, staff, and external partners alike. Students are motivated to achieve good results as their work is perceived as meaningful and valuable, and may be utilised by the external partner. They enjoy working on real-world problems that go beyond academic course material, and value the eye-opening experience of working with an external partner. Additionally, such projects provide students with the opportunity to enhance their employability. Collaborating with external partners provides faculties with the opportunity to increase the visibility of a research group, department, faculty or study programme. For staff, it is often an opportunity to link their research expertise, interests and experience to teaching, which increases their enthusiasm to tutor such projects. External partners' motivation to participate in a collaborative project may vary from the need for a certain expertise or skills, to simply profiling themselves in the community by cooperating with a respected university, and engaging with students to give back to society.

Learning

Students learn specific research skills by training them in the meaningful context of a real-world problem (contextual learning) and receiving just-in-time feedback (see also paragraph 3.3.7). Additionally, students recognise that the content of their study and the academic knowledge they have acquired thus far, are helpful in tackling real-world problems; students experience the practical use of any skills they have obtained during their training, ranging from project management to communicative skills.

Moreover, students experience science in practice which helps them to conduct research themselves and to evaluate scientific knowledge as citizens and future professionals. Students often think that conducting research is reserved to a select group of scientists with special skills (Murtonen & Lehtinen, 2005). Undergraduate research helps to demystify research, increases the scientific literacy of students and their capacity to make informed decisions, and improves students' understanding of the complex and often misrepresented nature of science (Brownell & Kloser, 2015). It teaches students how scientific knowledge emerges from the collaboration of people, organisations, materials and instruments, and how researchers familiarise themselves with new

literature, analyse data, and make and justify claims (Murtonen & Lehtinen, 2005, p. 219; Brownell and Kloser, 2015). This chapter argues that undergraduate research in the context of collaborating with an external partner further enhances the students' understanding of research in practice.

It is widely claimed and substantiated in the literature that PBL is an "engaging and motivating way to learn as the learner works with problems that are challenging and perceived as relevant" and the "student realises that the learning required to solve and understand the presented problems is useful and appropriate" (Barrows, 2002). Yet, both PBL and science lab courses are often experienced as "confirmatory exercises in which students perform tasks that produce a known answer and can be graded as right or wrong" (Brownell and Kloser, 2015, p. 527). This provides an inaccurate representation of ways in which science is practised. Undergraduate research in collaboration with an external partner and working on a research question with a genuinely unknown answer, makes research an authentic experience and is a good approach to avoid this problem.

Additionally, the projects prepare students for a professional and/or academic career. Students learn professional skills and have the opportunity to operate in a changing research context. Research increasingly takes place in multi-disciplinary teams and in collaboration with non-academic partners. Knowledge utilisation, valorisation and impact are becoming increasingly important evaluation criteria of academic research.

3.3.2 Type of external partner

The type of external partner and their role within the project depends on the programme's goals and learning objectives, the expertise on offer, and the availability/schedule of the partner.

The case studies (see Annex IV) demonstrate that the type of external partner is very much linked to the content of the study. Partners vary from private companies (both small and large businesses), consumer organisations, patient organisations, action groups, to public institutions such as Marres, House of Contemporary Culture. Usually, external partners are selected from a pool of potential (regional) employers related to the students' field of study.

This chapter explicates the considerations and benefits regarding research skills training in collaboration with external partners. Another approach to working with external partners, however, is presented in educational literature. An increasing body of literature stresses the need for universities to facilitate students to grow into responsible (global) citizens and to provide them with a sense of social and civic responsibility (Liss & Liazos, 2010). Community-based research based projects are promoted for students to find (personal) meaning in the research process and to understand how they can make a difference (Paul, 2006). Such projects are very much valued by students, staff and external partners:

> Undergraduate community engagement opportunities are widely held by academics and practitioners as representing one of the most effective, valuable and beneficial forms of learning and teaching for students (Bednarz et al., 2008; Hammersley et al., 2014).

Community-based research may include a range of research approaches such as (participatory) action research, science shops and service learning. Importantly, it allows for various degrees of community participation in the research process (Savan & Sider, 2003). A key outcome for civic

education is relating academic texts and theories to real-world problems to establish, amongst others, an 'intellectual foundation for engagement' and to develop the capacity to utilise their abilities in new contexts to act in the community (Liss & Liazos, 2010; Hammersley et al., 2014).

3.3.3 Role of the external partner

External partners can take on different roles during a collaborative project. They can act as a client, a resource, or a party interested in the research. These differences lead to different project set-ups and to some extent to differences in skill training.

The external partners take on different roles in the case studies. Usually, the external partner is the client, from whom the project assignment originates. This can be in the form of a clear question, or an ill-defined problem that first requires refinement and translation into a clear research question, such as the case of the *UCM ThinkTank* illustrates. Given the multi-disciplinary nature of the UCM curriculum and the diverse interests of their students, even a well-posed question can (and will) be approached from very different directions by the members of the project group making it imperative for the students to clearly define the goals and terms of their own project. This particular role of the external client allows students to practice, for example, interviewing and reporting skills. Additionally, it trains students to formulate a clear problem statement and to define the parameters of the chosen task. Another example of the external partner as a client is provided by the *Care in Context* case. Health Sciences work in student teams for a patient organisation, where they specifically train, among others, their communication skills.

In other cases, external partners are interested in the students' research, but do not assume the role of the client by posing a specific research question. The MaRBLe project *An up-hill fight? The long history of the struggles to protect the Sint-Pietersberg* (FASoS) provides an example of this type of role. The project evolved around the controversy and public debate concerning the transformation process of the cement company ENCI in Maastricht. Interested parties ranged from the ENCI to stop-ENCI foundations. The students were free to come up with their own research questions. In this role, the external partner(s) act as critical observers of the student work and results, teaching the students to motivate their decisions and to back up their conclusions.

The external partner may also serve as a resource, e.g. a lab or an institute with the expertise/facilities to answer a question that students cannot answer themselves. In this case, students will learn to estimate the value of an external resource and to weigh benefits, expected yields and costs of research efforts.

3.3.4 Attracting and maintaining a sufficient number of external partners

Attracting and maintaining a sufficient number of partners, and ensuring that there are enough research projects for students to participate in, is a recurring challenge that will always remain an important hurdle in offering projects with external partners. There are no guarantees for the duration of the partnerships. In fact, most will only stay on for, at most, a couple of years and even regular partners may require some time between projects to come up with a new and suitable research project. Long-term partnerships are beneficial as finding new partners can be a time-consuming activity without guarantees of success. Additionally, it may lead to different kinds of research in subsequent years as a relationship of trust is built, and students, staff and the external partner know what to expect from each other. For example, the partner might provide access to

archives and confident documents, and more sensitive topics may become part of the research (see also Zeiss, 2017).

Developing and maintaining good relationships with external partners requires regular contact, is time-consuming and, depending on the number of partners, can amount to a substantial workload. With the right kind of set-up, the costs for increased staff hours can in some cases also be covered by the external partner. That said, support staff may not always be able assume this role. In most cases, collaboration results from the staff's personal contacts with external organisations. This personal relationship is important as trust usually is usually built between people, and not between an external organisation and a faculty or the university. Even when the collaboration results from an external request for expertise or skills, it remains important to maintain and take care of the relationship built with any external partner. The time and work that it takes to set up and maintain contacts needs to be recognised.

The case studies demonstrate a varying degree of difficulty in finding external partners. Some programmes have the strong advantage that potential partners are lining up to collaborate/participate in student projects. For example, the Department of Data Science and Knowledge Engineering (DKE) receives a great amount of internship offers from external partners, but does not have enough students who are eligible to participate in the *KE@Work* honours programme to participate in all these potential projects. This is due to the substantive promotion of *KE@Work*, the current popularity of data science and big data analysis and the number of external partners already involved with the department. For other programmes, it appears to be more difficult to find external partners. For example, almost all external partners used by the Maastricht Science Programme result from the course coordinator's personal contacts.

3.3.5 Assessment of student work

Most of our case studies agree that the grading process should be exclusively carried out by UM staff. It varies per case, however, whether the assessment covers the final work and/or the learning trajectory as a process. Student numbers and the number of project groups strongly influence this decision. For instance, when the project is part of the regular curriculum such as the *Care in Context* course, it is impossible to follow closely follow individual students' learning process. In such cases, grading is based on a final report, and possibly a presentation for the external partner or stakeholders. Feedback from the external partner can of course be considered.

The continua defined by Beckman and Hensel (2009) are also helpful in defining important aspects for assessing undergraduate research in collaboration with an external partner. For example, should assessment criteria include "the degree to which the student involved community partners in the research process—that is, the effectiveness of collaboration, of teasing out non-academic expertise needed in the project" or "the usefulness of the information provided to the community organisation for which the project was undertaken" (Beckman & Hensel, 2009)?

According to Beckman and Hensel many academics do not regard criteria on effectiveness of collaboration or usefulness of information as valid assessment criteria. However, it is argued that such aspects may grow in importance when problem-solving becomes more interdisciplinary in nature. Considering the changing research context and discussions on the inclusion of valorisation, impact or knowledge utilisation as potential evaluation criteria (e.g., Van Drooge et al., 2010), it is important to ask what we regard as the nature of academic research and how we want to translate

that to (assessment criteria for) undergraduate research (Zeiss, 2017). Hammersley et al. (2014) discuss a case in which the assessment of students' fieldwork was outcome-oriented. This raised difficulties as unpredictable challenges were hard to align with learning objectives and assessment requirements. Hence, evaluation criteria make the difference between a failed and a successful project and perhaps a balance between process and outcome can be negotiated.

3.3.6 Project duration

The case studies demonstrate varied approaches as to the project duration. For example, the *UCM ThinkTank* project spans a period of four weeks, whereas KE@Work provides students with a two-year internship. Other projects have an average duration, such as Care in Context (one block period) or MaRBLe projects (one semester). Each of these approaches has its advantages. Longer projects allow the external partner to spend time and effort on integrating students into their organisation through mentorship or even allowing the student to follow additional training courses. Shorter projects hold the advantage of generally attracting more partners and the courses are easier to embed into the curriculum.

3.3.7 Which (PBL) demands do such projects place on students and how can we train them?

Students trained through PBL are well-prepared for some of the aspects of conducting research and collaborating with external partners: they are not afraid of the unknown. Although they may not have been sufficiently trained in specific research skills, just-in-time coaching and learning by doing solve this issue.

However, some skills that are assumed to be acquired through PBL may not have been trained in a way as required when collaborating with external partners. It is often assumed that students will easily flow into becoming a member of a project team. This is due to the perception that students have ample experience with group dynamics, communication, self-reflection and self-reliance. However, it is important to be aware of the differences between being a member of a study group and being part of a project team. In a project team, the stress arising from dealing with a client's expectations and demands, the need to come up with a working solution and strict deadlines, can impact group behaviour and requires a different communication strategy as well. Preparing students for such group dynamics, can require additional investments such as designing a skill classes on these topics.

Additionally, students also tend to lack professional communication skills. While they receive training in academic communication such as writing reports and presenting their ideas and work, they often forget about the need for formalities in both written and personal communication. Training these skills can vary from guiding or reviewing email communication, to advising students on professional attire.

There is a trade-off to consider here: for the student learning experience, it is beneficial to allow the students to learn by doing, supplied with just-in-time coaching when they make mistakes. However, when considering that the external partner's first interest might not lie with the students' education, providing in advance training might lead to better and easier to maintain relationships with the external partner.

PBL preparation and research skills

Our cases also demonstrate that PBL prepares students for certain aspects of collaborating with

external partners. The MaRBLe project *An up-hill fight? The long history of the struggles to protect the Sint-Pietersberg* (FASoS) provides an example:

In comparison with students who have not been trained through PBL, 'our' students have learned to come to grips with a (new) subject quickly. PBL and their bachelor's programmes in general have helped to train an attitude of openness for new subjects. Students are not afraid of something they don't know. In addition, FASoS students are not positivistic, do not take 'facts' for granted, and understand that problems need to be examined from different perspectives. This is found to be very valuable.

Coordinators remarked that students are not or not sufficiently prepared for specific research skills such as archival research, interviewing, and referring to historical sources. However, it was not considered problematic that students did not yet have developed these specific research skills. Students learned these skills by using them in a real and messy context. The context provided students with hands-on and relevant learning and authentic experiences. The attitude of openness helped students not only with coming to grips with new content quickly, but also in acquiring new skills.

Bottlenecks and training

The bottlenecks in projects and the issues students often wrestle with are, for example, defining and narrowing down a problem, interdisciplinary work, time management, and communication in the project team and with the external partner. Some projects provide students with training on these often called professional or soft skills e.g. teamwork, creative thinking, time management, and leadership (e.g. Premium). These workshops are valued by the students. In other cases, students learn (or not) by doing.

The ill-defined, or perhaps too broad, question of an external partner is not a disadvantage, but rather a feature that confronts students with the task of problem specification. For students trained through PBL, this is, or should be, a well-known procedure, but the involvement of a client with their own expectations can add a new level of complexity to the task (see Annex IV: cases of the UCM ThinkTank and Marres/Premium). Research in collaboration with an external partner can thus take the four core principles of PBL to the next level. According to the 4C/ID model (see Chapter 4) a project should be a real-world task, but the tasks' complexity increases during the course.

3.3.8 Place within the curriculum

Dealing with external partners can induce more stress and an additional workload for students in comparison to standard learning tasks. Due to the nature of the projects, it is usually not possible to make any guarantees regarding the focus of the project and the lessons students will learn. Standard student projects or tasks are often extensively studied with respect to content and attainability of the solution. They can be repeated and as such also often benefit from lessons learned in previous years during previous runs of the project or task. This makes standard classical assignments easier to fit into the curriculum. If the goal is to teach students how to conduct and evaluate research in a real-world setting and/or to raise responsible global citizens with experience in working with non-academic partners, such projects should also be part of the regular curriculum. Courses that focus on the process of collaborating with an external partner, are easier to embed into the curriculum although the actual amount of work and time spend by students on these assignments remains more difficult to estimate and control.

For example, *KE@Work* students replace part of the regular curriculum (i.e. the semester project in which students work in small teams of four to six students on a large assignment) by an internship at a company, where they work on developing the same skills such as working in a team, project management and self-study. Maastricht Science Programme students can opt to enrol in a real-world project instead of a standard project task, at least once during their study.

3.3.9 Excellence

Students who collaborate with external partners can be viewed as ambassadors of the UM and their study programme. This, the added stress and workload induced by projects with external partners, point towards reserving such projects to selected, top-tier students. This approach is taken by, for example, the MaRBLe project and *KE@Work* only allowing top 25% students to participate. This is in line with literature stating that most research projects are generally only available/feasible to a small select number of students (Brownell & Kloser, 2015).

Although one may argue that all students should attain a certain level of research skills and experience (which FASoS aims for), Zeiss (2017) argues that projects in collaboration with an external partner may pose some limitations to this objective. External partners are willing to collaborate because they, as an organisation, will benefit from the projects. External partners who are not interested in the results of the project often lose interest and don't return for future projects or even abandon the project prematurely. Consequently, the external partner must have confidence in the added value of the students and their work, in terms of their professional and academic attitude and the quality of the produced results. As the trust in the students' capabilities grows, so does the challenge and interestingness of the research, due to the role change of the external partner from gatekeeper to facilitator. Although this sounds like a plea for selecting students based on academic excellence, this is not necessarily the case. Motivated students with the right skillset can also contribute to these projects.

Some courses are open (*ThinkTank*), or even compulsory (*Care in Context*), for all students. Especially when the course trains core skills that should be acquired by all students, the collaborative project should be embedded into the regular curriculum. For instance, the *Care in Context* course provides each student with the opportunity to work with a patient organisation and its patients as part of the curriculum. Additionally, if the aim is to train all students to evaluate scientific knowledge as citizens and future professionals, the opportunity to participate in such research allowing students to understand the way in which scientific knowledge is constructed may need to be given to all students (Brownell & Kloser, 2015).

3.3.10 Relevance to external partner and/or academic relevance

Conducting research relevant to an external partner strongly motivates students – their research matters. Relevance is often defined in terms of (direct) knowledge utilisation. Although theories can help to approach or explain practices in specific ways, coming to concrete and practical outcomes and recommendations relating to their core business is generally more interesting to non-academic partners. Final products are assessed on academic criteria for quality and relevance, whereas students tend to focus on relevance to the external partner. Make sure that students do not lose sight of academic quality, but consider adding criteria such as knowledge utilisation and collaboration to resemble the complex context in which much current research takes place.

Hammersley et al. (2014) highlight that the main assumption in literature on student engagement is that student (research) projects are also beneficial to community partners. They point out that the ideal of doing research as presented in the literature was challenged during the fieldwork students needed to carry out. Students struggled with a lack of reference point about how 'useful' was defined by whom. This relates to a point Zeiss (2017) makes regarding relevance to the external partner. This relevance is often, certainly initially, defined in terms of (direct) knowledge utilisation. However, during the course of a project or several projects the ideas about relevance may shift and other more intangible 'relevancies' may become important too, such as students providing a new perspective or challenging things taken for granted in a specific context.

3.3.11 Group size

A continuum not mentioned by Beckman and Hensel (2009), although it is discussed in other literature, is the continuum between larger and smaller groups of students. Our case studies encompass projects with individual students (*KE@Work*) and small groups (all others). Smaller groups require more time investment from the tutor. However, for an external partner, a large group is often too time intensive to deal with. In addition, students have to collaborate closely and small groups make it easier for students to become acquainted with each other's' work.

3.3.12 Approaching external partners

This is not only important to maintain partners for further collaboration in following academic years, but also for the image of the university as a whole, as many partners will not make a distinction between faculties or departments and any experience with a university partner will reflect on the whole university. External partners should be approached carefully. It turns out to be very difficult to maintain the distinction between faculties or departments, and external partners assume all contacts with them are known and can get confused if this turns out not to be the case.

3.3.13 Product/process-centred

Although the external partner is aware of the students' learning process and keen to contribute to this, the strong motivation to deliver something useful for the external partner means that the students, the coordinator and the external partner tend to be focused on the final product.

Sometimes there is a tension between the two, for example when the research group encounters unexpected problems. Learning to deal with this is an important part of the process, while it may hamper the final result. At the same time, this is a normal part of conducting research, also for experienced scholars.

3.4 Conclusion

Although one may argue that all students should attain a level of research skills and experience undergraduate research is often regarded as enhancing cognitive and personal skills, understanding of the subject matter, and student satisfaction (Willison & O'Regan, 2007; Healey, 2005), projects in collaboration with an external partner may pose some limitations to this. Collaborative projects may be more likely to be sustained when students work in small groups and students are selected on academic quality as well as on aspects such as high motivation and professional attitude.

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Part II

Chapter 4. Integrating skills in curricula: An analysis based on the 4C/ID model

This chapter was written with input from:
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4.1 Introduction

This chapter engages with the current trend and ambition in academic education to develop learning trajectories in curricula. This implies a consistent and reflexive alignment of final qualifications, learning objectives, courses and assignments. We will focus on the development and implementation of skills trajectories in a few selected UM bachelor's programmes.[1] This chapter provides both strategic theoretical advice and a description of best practices. In particular, this chapter will build upon the 4C/ID-model. This model contains four components: learning tasks, supportive information, procedural information, and part-task practice. To be effective for learning, these four components should be reflected in the training of research skills in curricula. In this chapter, the model will be compared to best practices at UM faculties. Based on this comparison, its pro's and con's will be evaluated.

This chapter will focus on three UM bachelor's programmes and the ways in which they try to integrate skills into their curriculum: Arts & Culture (FASoS), Health Sciences (FHML) and European Law School (Law). The chapter will first describe and compare the way in which the final qualifications for these programmes and the master's programme Physician-Clinical Investigator are formulated and which research competencies (in terms of knowledge, skills and attitude) are defined. Second, we will describe a model for embedding learning trajectories into curricula: The *Four Components Instructional Design (4C/ID)* model. We will present what a learning trajectory for teaching students the research competency of 'conducting a literature review' could look like, following the 4C/ID model. Third, we will describe three examples of research skills learning trajectories at UM: the research and writing track within Arts & Culture, European Law School's skills track and the academic writing trajectory within Health Sciences. We will reflect on the strengths and weaknesses of the way these learning trajectories are set up, and compare them to the 4C/ID model. Fourth, the chapter draws out some best practices from the cases and considers strategic issues in the setting-up of new learning trajectories. This part of the chapter provides some strategic lessons that can be used by programmes that plan a curriculum revision or want to design a new learning trajectory.

4.2 Comparison of final qualifications

The 4C/ID-model was developed by van Merriënboer (1997) as a model for complex or whole-task learning. Complex learning refers to the integrated acquisition of knowledge, skills and attitudes and aims at transferring what is learned in a formal context (e.g., at university) to daily life or

[1] In this chapter, we will not focus on MaRBLe, although this program is an excellent example of training bachelor's students in research skills. For more information on MaRBLe, and the application of 4C/ID within various MaRBLe programmes, see Bastiaens et al. (2017).

professional settings (van Merriënboer & Kirschner, 2013). In the 4C/ID-approach, curriculum development and revision starts by looking at the final qualifications and the definition of competencies. Therefore, we have looked into which research competencies (knowledge, skills and attitudes) are defined in the final qualifications of three UM bachelor's programmes and one master's programme. Furthermore, we studied how bachelor's research competencies compare to master's research competencies. Which level can we expect to reach in a bachelor's programme?

The final qualifications of European Law School, Arts & Culture and Health Sciences are quite similar regarding the research skills they address. They all contain skills such as problem definition, selection of relevant material, critical reflection, academic writing, and the application of research methods. The qualifications of European Law School and Arts & Culture also classify multi- or interdisciplinarity (or approaching a problem from different angles) as relevant research skills. The final qualifications of Health Sciences include social skills such as learning to collaborate in groups and 'reflecting on science and scientific discussions, on the relationship between science and society, and on their own future role as scientists/expert/professional'.

The final qualifications of the master's programme Physician-Clinical Investigator are much more detailed. This is most likely due to the programme's professional orientation. Through a scale from 1 to 5 (with 5 being the most advanced), the qualifications state the level of competence students should have reached. Interestingly, the structure of the final qualifications for Physician-Clinical Investigator follows the research process. A graduate "is able to design and conduct a small-scale empirical scientific study" and thus:

- can formulate a problem statement and research question;
- conduct a literature review;
- can design an appropriate methodological approach;
- can collect data;
- do basic data-cleaning and data-input;
- can do a basic statistical analysis;
- can write a report on the results;
- can present and discuss research results.

Sumner et al. (2010) differentiate between requirements at the bachelor's and the master's level by distinguishing requirements regarding the research question, content-related knowledge and independence. For instance, the relevance and originality of the research question are less important in bachelor's research projects, whereas master's students generally study a question that is not yet dealt with satisfactorily in the existing academic literature. Furthermore, bachelor's theses can be based on textbooks (and a few articles), whereas master's theses should also include references to sources such as PhD theses and academic (legal) journals. Finally, bachelor's students generally receive guidance and supervision throughout their thesis period. A master's student is expected to formulate a research question, conduct research and report the results without much guidance (Sumner at al., 2010, pp. 64-65).

In the next section, we will focus on training one specific research skill: conducting literature research. We will describe how conducting literature research can be trained in accordance with the 4C/ID model.

4.3 Training students to conduct a literature review in accordance with the 4C/ID-model

Within the 4C/ID-model meaningful, authentic realistic learning tasks form the starting point and backbone of an instructional programme (van Merriënboer, 1997; van Merriënboer & Kirschner, 2007). These tasks orient the learner to the end goals and competencies that need to be acquired. The learning tasks are chosen in such a way that they represent the tasks of a professional. They are called *whole-tasks* or complex problems. To facilitate transfer of learning, the tasks vary from one another as they would in a real-life situation (Norman, 2009). For instance, within the context of learning research skills, *searching for literature to answer a research question* could be an authentic learning task. Using the approach of whole-task learning, as proposed in the 4C/ID-model, provides a solid framework for the development of learning activities that foster students' functioning in variable and complex settings (Yardley, Hookey, & Lefroy, 2013). As a result of using a whole-task approach, the development of a rich set of mental models and cognitive strategies is facilitated, allowing students to use efficient problem-solving strategies in various situations.

A learning trajectory based on the 4C/ID-model is composed –as its name suggests- of four components (see Figure 4.1):

1. Learning tasks
2. Supportive information
3. Just-in-time or procedural information
4. Part-task practice

These components are explained in more detail in the next sections. Furthermore, the application of the four components in instructional design is explained by presenting an education design for the complex skill 'Conducting a literature review', a constituent skill of the complex skill *'Developing research skills'*.

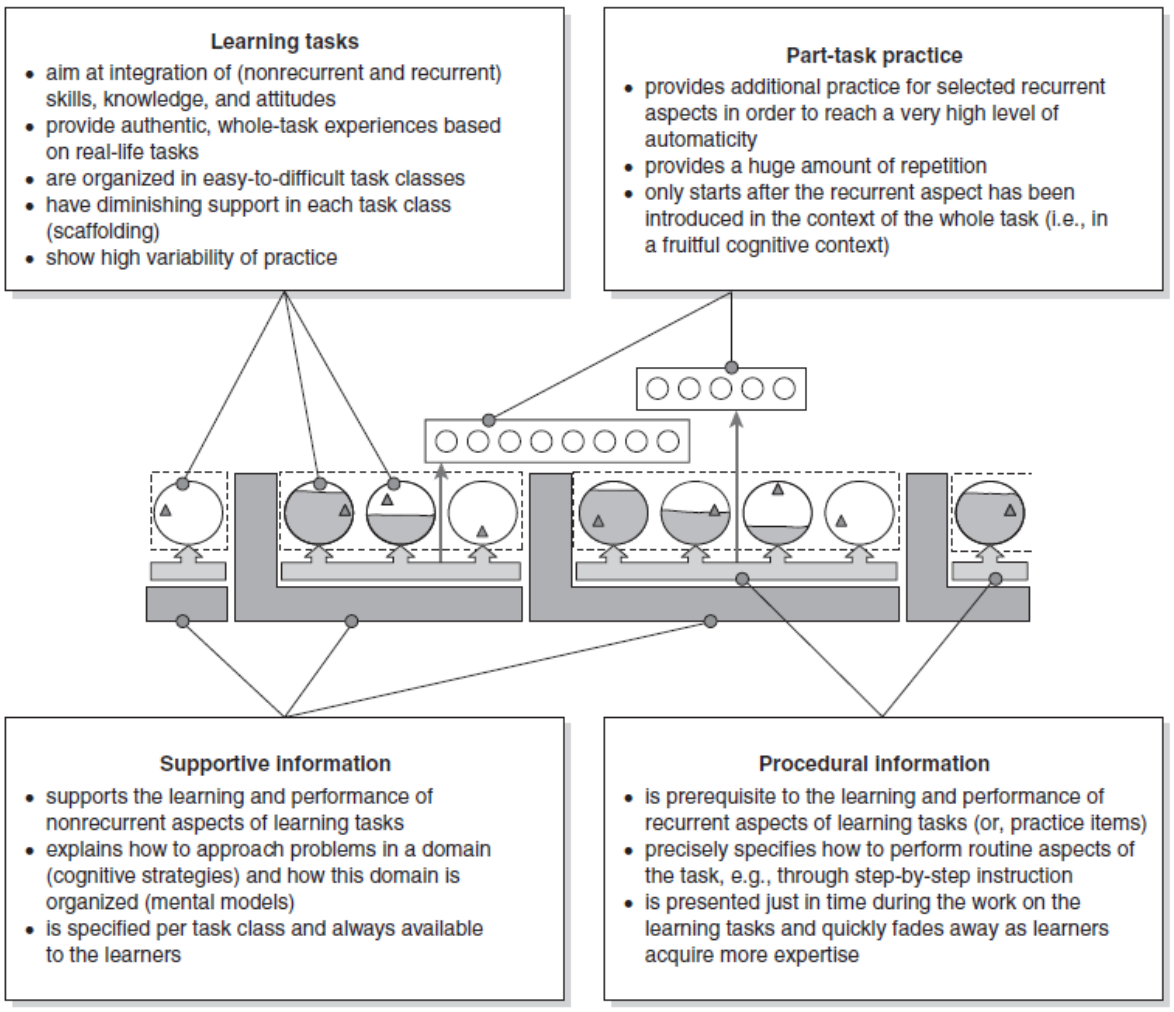


Figure 4.1 4C/ID-model (Kirschner & van Merriënboer, 2008, p. 247)

4.3.1 Learning tasks

Figure 4.2 4C/ID-model

In order to define realistic learning tasks, the different constituent skills that are involved in performing the skill should be defined first.

Box 4.1 Learning tasks

The following skills are essential in the process of conducting a literature review: 1) define question(s), 2) search for sources, 3) select sources, 4) process information, 5) present information. Taking these skills into account, an authentic realistic learning task for conducting a literature review could be:

The student is provided with a newspaper article on 'Diet Bibles' and is asked to prepare a debate on the usefulness of a diet.

Most learning tasks include both routine and non-routine aspects. For instance, when conducting a literature review, selecting the databases or making a list of search terms can be seen as recurrent. Non-routine aspects are actions that are rather new to students, require effort and have a problem-specific outcome. They are also called *non-recurrent* aspects to indicate that they still require problem solving, reasoning or conscious decision making also after students have finished their educational programme. For instance, in the literature review example, deciding on the topic of the review, which literature to include and exclude, etc.

One of the assumptions of the 4C/ID-model is that for the acquisition of competencies, the learner should be confronted with a varied set of tasks. These tasks are clustered in *task classes* according to their complexity (see the dotted lines around the circles in Figure 4.2. That is, within one task class all learning tasks are equally complex but differ from each other on all characteristics on which professional tasks may also differ from each other. Task classes differ from each other as they comprise tasks of a different complexity level requiring different knowledge or more elaborated knowledge for their successful performance.

To compose these task classes, one must define the simplifying assumptions of the complex skill. That is, which conditions influence the complexity of the performance of the skill?

Box 4.2 Defining simplifying assumptions

The following simplifying conditions can be identified for the process of conducting a literature review:

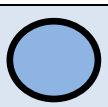
- The type of review: narrative and/or systematic reviews are less complex than a meta-analysis.
- The language of the articles: articles written in the native language are less complex than articles written in a foreign language.
- The problem definition: well-defined problems or topics are less complex to research than ill-defined problems or topics.

As explained before, the learning tasks in one task class have the same level of complexity. However, they do differ regarding the **amount of support** provided to learners when performing these tasks. Much support is given for learning tasks early in a task class, and no support is provided for the final learning task in a task class. This process of diminishing support as learners acquire more expertise is called *scaffolding*. In Figure 4.1 this is indicated by the diminishing filling in the circles.

Box 4.3 Define variation in learning tasks and design support

Table 4.1 provides an example of conducting a literature review, where the variation in learning tasks within one task class and the gradual withdrawal of support is illustrated, as well as the implications for the role of the instructor (tutor) and the student.

Table 4.1 Diminishing support and evolving role of student (S) and instructor (I) in a series of learning tasks in a task class (or block)[2] [3]

					
Constituent skills	PBL –training / learning task 0	Learning task 1	Learning task 2	Learning task 3	Learning task 4
Define question(s)	S: study example I: explain, model	S: study example I: explain, model	S: study example I: explain, model	S: study example I: explain, model	S: define question(s)
Search for sources	S: study example I: explain, model	S: study example I: explain, model	S: study example I: explain, model	S: search for sources	S: search for sources
Select sources	S: study example I: explain, model	S: study example I: explain, model	S: select sources	S: select sources	S: select sources
Process information	S: study example I: explain, model	S: processing info, analyse, link with question	S: processing info, analyse, link with question	S: processing info, analyse, link with question	S: processing info, analyse, link with question
Present information	S: study example	S: present info	S: present info	S: present info	S: present info

Regarding the instructions for a literature review, the first learning task could involve an example which demonstrates the entire process of the literature review and the different constituent skills involved. It is important to explain the decisions that have been made by the author, but also to stress rules and restrictions (for instance, explaining why a blogpost on the internet is not a valid source). This can be done through a video-recorded modelling or the tutor explaining and modelling the whole process, or during a PBL-meeting. The topic of the literature review is then related to the content of the course. In the next learning task students perform the first step themselves. In the subsequent learning tasks the amount of guidance gradually decreases. Table 4.1 provides an overview of the different constituents and different learning tasks, and demonstrates how the role of the student changes throughout the process. Completion forms can be used to structure this

[2] This example is strongly based on Wopereis, Frerejean, and Brand-Gruwel (2015).
[3] Instructor can refer to the PBL trainer, a video recorded worked-out example, a tutor etc.

process and to ensure that each learning task addresses the constituent skills. The form is filled out completely for the first learning task, and gradually leaves more space for students to complete the exercise.

4.3.2 Supportive information

Figure 4.3 4C/ID-model

In order to be able to address the different learning tasks, students will need some supportive information (thick grey lines Figure 4.3), to have the necessary prior knowledge to start working on the tasks. In the case of giving presentation on the analysis of a scientific article or a research report, the supportive information may include pointers on deciding what should be reported, how to address the public, elements to be included (for instance, references), copyright issues etc. Such information is available to the students during all tasks (over the different task classes). Supportive information may also include cognitive feedback on task performance. This entails elaborate feedback on students' performance, presenting possible solutions and providing insight into the problem-solving approach (decision process) to reach the best solution.

Box 4.4 Determine the required supportive information and cognitive feedback

Determine which information students need, to conduct a literature review. Provide students with an overview of what kinds of literature reviews exist, what the aim is of a literature review, the general structure of a research article, structural models of how databases are organised and can be used. This information can be provided in a lecture, through video-material or handbooks. Cognitive feedback can be provided after every learning task, or before the final and most complex task. While the role of the 'instructor' decreases with respect to the execution of the task, their role may increase with respect to providing cognitive feedback to the students.

4.3.3 Procedural information

Figure 4.4 4C/ID-model

Procedural information is information (black lines Figure 4.4) that students need just-in-time, when they are working on the task. The information is task-specific and assists students in the performance of the task. It often refers to recurrent aspects of a task, aspects that are often performed routinely in a professional setting. This information is often provided in a step-by-step manner. The flow of information gradually decreases as students gain more knowledge.

Box 4.5 Determine the required procedural information

The procedural information will differ for each learning task. For learning task 1, students may receive information on how they can analyse and present their results, the use of tables or graphs, information about what needs to be included when presenting results, procedures used in academic writing, APA referencing system, etc. For learning task 2 this may be information on the reliability of resources, information on what kind of sources have been used (peer reviewed, handbooks, etc.). For learning task 3 this may include a tutorial on how to search databases, how to determine your descriptors, how to use Boolean operators, etc. For the final learning task, this may be information on how to construct a good research question and the difference between open and closed questions. Again, the medium used to provide this support may differ. This procedural information may be provided by the tutor, or through online materials that students can consult just-in-time.

4.3.4 Part-task practice

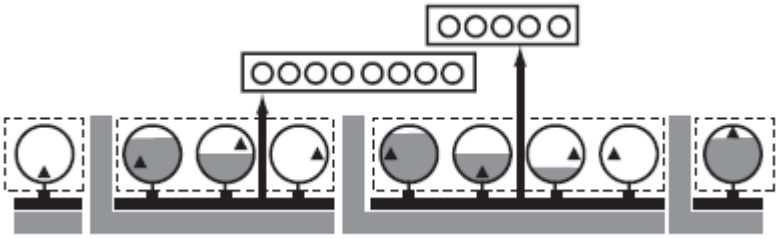


Figure 4.5 4C/ID-model

Part-task practice (small rounds in Figure 4.5) is provided by exercises related to the acquisition of routine skills; skills that need to be automated to increase the capacity/time for working on non-routine tasks. Such tasks are not always part of the learning environment.

Box 4.6 Determine part-task practice

The use of Boolean operators could be a part-task practice, in the process of learning to conduct a literature review. Additionally, activities such as APA referencing and creating tables and graphics, could be part of this part-task practice. Part-task practices can be trained through online exercises and PBL training sessions.

In the next section, we will discuss a real-life example of a learning trajectory that trains students to conduct a literature review. We will compare this practice with the 4C/ID-model.

4.4 Real-life examples of skills learning trajectories at UM

4.4.1 Research & Writing skills - Arts & Culture

The bachelor's programme Arts & Culture/Cultuurwetenschappen offers a learning trajectory in research and writing skills. The trajectory is comprised of two courses, spans 1.5 years and starts in period 1 of the first year. Upon successful completion, students receive 7 ECTS in year one and 7 ECTS in year two.

The main aim of the trajectory is to help students develop key skills which they will need to successfully complete their bachelor's thesis at the end of the programme. Students write an academic paper for each Research and Writing course. The 3000-word paper for '*Research and Writing I*' must be connected to the course's theme 'memory'. Students attend weekly lectures by FASoS staff members presenting their research on (cultural) memory. The lectures off explanations of key concepts and examples on how to study memory from a cultural perspective. The paper for '*Research and Writing II'* has a length of 6000 words. Students are free to choose their own topic within the field of Arts and Culture. The assessment criteria for both papers are based on the criteria for the bachelor's thesis. The expected level of competencies is higher for the second-year paper.

In addition to writing research papers, students also complete other tasks in order to develop and practice relevant skills. In the first period of year 1, students are asked to write a summary of an academic article. Naturally, students get plenty of help from their tutor and receive individual feedback on their progress. The learning task becomes a bit more complex in the second period: students must compare two academic texts from key scholars within the field of memory studies. This involves reading skills, summarising, juxtaposing two different perspectives, and evaluating the arguments and evidence the two texts present. Again, students are supported by the feedback of the tutor, who particularly pays attention to the quality of language and the ability to reproduce authors' key arguments in a coherent and well-structured way. Students are encouraged to revise, improve and resubmit what they have written. In the second year students write a literature review, thus combining the skills of the two previous exercises by providing a connected overview of five to seven academic sources. Building on this literature review, students then formulate a proposal with a productive and feasible research question for their final paper.

Throughout the skills trajectory, students can consult an electronic learning environment containing supportive and procedural information. For example, a checklist assists students with the application of the rules for correct formatting and referencing. Another important component is the *Digital Information Skills* tutorial, developed by the University Library. This online tutorial provides information, exercises and support to make students more competent in their search for relevant secondary sources.

Other resources include lecture slides, instructional videos, background articles, examples, guidelines and feedback forms.

Formative feedback is a key aspect of the entire training. The structure of the trajectory contains many opportunities for feedback, such as regular group meetings, individual feedback meetings with the tutor to discuss draft versions of the papers and assignments, an oral presentation on the paper in year one and a peer review exercise in year two.

4.4.2 Skills training - European Law School

The European Law School offers a course trajectory aimed at developing skills used in legal education.[4] These skills include the classically trained skills such as the ones mentioned at the beginning of this chapter (e.g. problem definition, selection of relevant material, critical reflection, academic writing, and the application of research methods). This view on skills training is rather traditional as it goes hand in hand with accreditation requirements that mostly reflect generally

[4] The features and background of this program have been extensively covered in Annex III

accepted standards for higher education such as the Dublin Descriptors. However, a Law School programme that does not exclusively train students to accede to standard legal professions or academia is a niche type of study, and it is necessary to build on this foundation with further skillsets for employability reasons. To this end, the skills trajectory of the European Law School includes 21st-century skills/competencies such as communication skills, collaboration and creativity.

The skills trajectory within the European Law School is comprised of four courses: Skills: *Legal Research and Reasoning, Skills: Introduction to Comparative Law*, *Moot Courts*, and *Academic Legal Writing*. All courses entail a combination of hard skills (e.g. research skills) and soft skills (e.g. communication skills), albeit with a different distribution. This paragraph focuses on the course *Skills: Introduction to Comparative Law*, which takes place in period 4 and period 5 of the first year. The primary purpose of the course is to provide students with a general overview of the uses of comparative law, through legal research, writing and a moot court exercise.

While the course was not designed in accordance with 4C/ID, it does bear some similarities to the model, as both the course and the model underline that the student must be confronted with a varied set of tasks. The tasks range from drafting a contract, drafting a translation of a given legal text, as well as collaborating, within a team, to the realisation of a written memorandum submitted for the purposes of the moot court exercise. Additionally, the course works with the concept of '*mastery learning*'. Students are allowed to revise the first two tasks once, and incorporate the feedback they receive in their initial assignments.

The course aims to enhance students' self-reflection skills by providing them with questions to guide their research during the first two assignments (e.g. ask students why they trust specific sources, etc.). For instance, in drafting a contract, students are asked to use examples of contracts which they find on the internet or through independent research (e.g. contacting notary offices, etc.). Students are allowed to use such examples, provided that they explain how they have investigated the trustworthiness of the respective source.

4.4.3 Academic writing trajectory - Health Sciences

Over the past two years, a completely new academic writing trajectory was developed and implemented into the bachelor's programme Health Sciences.[5] Within this trajectory, students are trained to write an academic report. In the past, student reports were evaluated by many different tutors. Consequently, the feedback on papers appeared to be inconsistent. Due to the large number of students enrolled in the programme, it was not possible to implement a system of individual supervision.

The programme found a solution in assigning a mentor to students, who evaluates and provides feedback on each of his students' papers throughout the year. This approach allows the mentor to track students' progress over the course of an academic year and to provide them with accurate feedback on their work. Students' progress in academic writing and their mentor's formative feedback is stored in an electronic portfolio system. Due to the large number of students enrolled in the programme, the feedback sessions are organised in groups of three students.

[5] This section is mainly based on an interview with dr. Herma Roebertsen, the 'founder' of this Academic Skills trajectory. Interview conducted by Geraldine Clarebout and Henrietta Hazen.

The skills track was designed with the 4C/ID-model in the back of the mind. The learning task of writing a paper is divided into various sub-tasks with increasing degrees of complexity. Students first deliberate the topic and write an introduction. Subsequently, they write an introduction and a method section. During the fourth and final step, the paper is completed. The mentor provides feedback on the first three assignments. The final product receives a (summative) grade.

4. 5 Conclusions: Strategic lessons and best practices for designing research skills trajectories
In this final section, we will single out some strategic lessons for designing learning trajectories for training (research) skills.

The cases described in this chapter show quite different approaches to developing skills trajectories. In the case of European Law School, the choice was made to explicitly broaden the traditional academic research skills with 21st-century skills such as collaboration, creativity, leadership and communication. Such skills are perceived as vital elements in enhancing students' employability. Therefore, this skills track can be considered a best practice. European Law School is one of the few programmes that explicitly train consultancy and global citizenship skills, in addition to traditional academic and research skills.

Another difference between the programmes is the degree to which the alignment of skills throughout the programme and with content courses is prioritised. The Law faculty, for instance, perceives integrating skills training within substantive courses as less beneficial. It is rather preferred to train these skills in project-based or simulation-based activities. According to the faculty, such skills can be trained in stand-alone courses without necessarily further aligning them with other skills trainings. In contrast to the Law faculty's approach, the Arts & Culture Research and Writing trajectory (FASoS) is characterised by a comprehensive set-up spanning two years. It follows the tenets of 4C/ID in the sense that it takes the 'whole-task' of the bachelor's thesis as a starting point to define its intended learning outcomes and assessment requirements. The course is designed to balance student responsibility and ownership of the learning process with clear and effective guidance. Thus, the 4C/ID-model seems to fit better with FASoS' approach than the method of the skills training at the Law Faculty. Although the skills trainings at European Law School equally start from real-life learning tasks (such as drawing up a contract), the alignment of skills throughout the curriculum is less prioritised. In that sense, the research and writing trajectory at FASoS is an example of a best practice in combining real-life tasks and decreasing degrees of support in a long learning trajectory that spans two years.

FHML (Health Sciences) aligned key academic skills in a learning trajectory. The faculty set up a completely new track to teach students how to write academic reports. A system of formative feedback was developed in which students receive feedback from the same mentor. The learning task of writing a report is divided into separate assignments in which students write an introduction, followed by an introduction and a method section, and so on. An 'academic skills working group' was established to guarantee a proper description of the various assignments and to make sure that the assignments gradually became more complex and that support gradually decreased (cf. the 4C/ID-model). Moreover, the faculty introduced a 'knowledge atelier' – a repository with all important academic skills-related documents, assignments and sources, accessible for all students and staff members. This practice of staff collaboration in a skills committee and establishing a repository with relevant information, is another best practice.

Box 4.7 Three best practices

- LAW: broaden-up traditional academic skills and link them to 21st-century skills to enhance the employability of our graduates.
- FASoS/FHML: align academic skills throughout the curriculum, start from small learning tasks, gradually increase the complexity of tasks, adapt the level of supervision by tutors.
- FHML: collaborate in working group to enable a clear coordination between learning tasks and create an archive for relevant material to be consulted by both staff and students.

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Part II

Chapter 5. E-support research skills development

Authors: Jan Nijhuis & Leonne Portz

5.1 Introduction

Academic education aims to train students in research skills, e.g.: finding a topic, formulating a research question, writing a research proposal, conducting a literature review, writing the theoretical framework, applying research methods, analysing the data and reporting results. This is achieved through courses and skills training sessions offering a variety of assignments and different educational formats. Although students are provided with course books and articles, they will also have to gather their own material in order to enhance their (research) skills. Material should be easily accessible and available at the instant they need it for their research. This is, and could be further facilitated by offering students two digital options to acquire material necessary for research skills training: a web-based platform offered by the University Library (see paragraph 5.2) and a research skills wiki (proposal outlined in paragraph 5.3) to meet these requirements. Staff is stimulated to include references to such resources in course books to facilitate student learning. Furthermore, this chapter invites staff to participate in the development of the Wiki.

5.2 Skills support services offered by the University Library

The University Library's website already offers the following skills support services:

1. The Thesis SupportAll portal provides tips and articles on the process of writing a thesis. Additionally, it addresses personal issues such as time management and fear of failure.
2. The Writing Studio helps students reflect on their thinking, searching and writing process.
3. Peer Point provides free research assistance to students.

In addition to these services, the University Library also offers curriculum-integrated skills training, monthly training sessions and online training modules (see Annex V).

The next paragraphs elaborate on each of three skills support services by evaluating their visibility and promotion and the type of assistance provided to students. The sections also include recommendations for improvement and lessons learned.

5.2.1 Thesis SupportAll

Thesis SupportAll[6] was developed by the University Library and study advisers from SBE under the umbrella of the *Leading in Learning* programme.[7] The objective of the project 'Thesis SupportAll' was to develop an operational web portal covering thesis-related issues on both the bachelor's and master's level. The portal was created in close collaboration with student focus groups who provided input on content and design.

[6] More information: http://library.maastrichtuniversity.nl/skills-and-support/thesis-supportall/

[7] The former university-wide programme 'Leading in Learning' has supported projects in the field of educational innovation. The programme aimed to share knowledge and experience, and to disseminate promising innovations throughout the university.

Thesis SupportAll provides information, tips and articles on the process of writing a thesis such as choosing a thesis topic and a brief academic writing guide. The portal additionally addresses personal issues such as time management, procrastination and fear of failure.

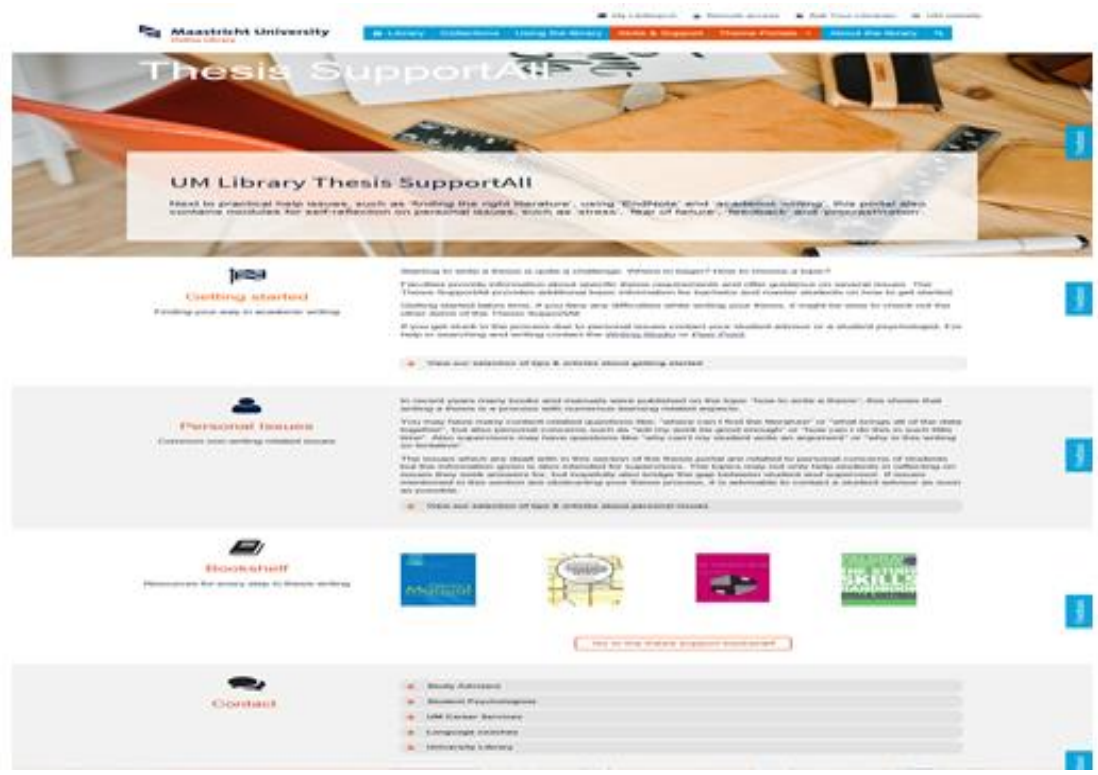

Figure 5.1 Thesis SupportAll website

Visibility and promotion

Thesis SupportAll is promoted in the following ways:

- Library staff refer to the portal during skills training sessions;
- University Library website, Facebook, and newsletters;
- Flyers;
- Peer Point (see paragraph 5.2.2) actively promotes the portal on their website and during events.

Use of the portal

Figure 5.2 demonstrates the growth of visitors. An analysis of the visitor logs revealed that the number of visitors peak during the library's training sessions.

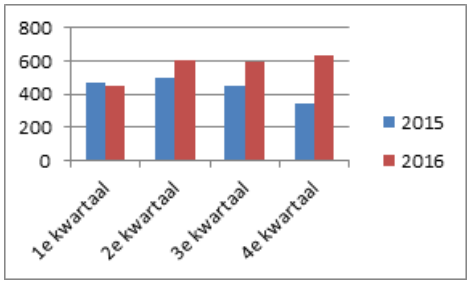

Figure 5.2 User statistics Thesis SupportAll (only available for 2015 and 2016)

Evaluation

Thesis SupportAll was evaluated during the period of December 2016 to March 2017. Eight study advisers, eight thesis supervisors and several library staff members were interviewed in focus group meetings. Additionally, a survey among students was administered. The evaluation concerned user satisfaction regarding the content and design of the portal. Users were also asked to provide feedback on topics and information that in their opinion should be added to Thesis SupportAll. The evaluation has yielded the following conclusions:

- Most study advisers and thesis supervisors are not aware of the portal's existence.
- Both bachelor's and master's students who are in the process of writing their thesis are generally unfamiliar with the portal. Only a couple of students remembered that the Thesis SupportAll was mentioned during library skills training sessions.
- Both students and staff stated that the information on the portal could be expanded with articles on research methods, statistical analysis and faculty guidelines for thesis writing.
- The portal's design is evaluated positively. Some remarks were made on the website's structure and the amount of information on the entry page.

Recommendations for improvement

- The portal should become a collaborative effort of the faculties (study advisers, thesis supervisors, etc.), Language Centre and University Library to expand and actualise the topics and to enhance the promotion/visibility of the portal. This could be achieved through the establishment of an advisory board comprised of staff and students.
- New topics to be added:
    - Links to faculty guidelines for thesis writing (thesis evaluation forms etc.)
    - Article on research methods
    - Article on statistical analysis
- Link to Thesis SupportAll on Student Portal.
- Include links to the portal in course books and course information (especially skills courses and thesis manuals).

Conclusion

Although the number of visitors of the Thesis SupportAll portal is gradually increasing, more attention should be paid to promotion. Make sure the portal is advertised on the Student Portal and in course books. Collaborate with thesis supervisors to raise more awareness of the existence of this service. Also make sure to add new topics and find a way to keep the information up to date.

5.2.2 Peer Point

Peer Point's[8] mission is to help students improve their skills in searching, referencing and writing by providing free research assistance on topics such as developing search strategies, using databases, structuring papers, and referencing. Peer Point is staffed by students trained at responding critically and constructively to the work of fellow students. Students can set up a private appointment or can attend one of the daily session at the University Library.

Visibility and promotion

Peer Point is promoted in de following ways:

- Library staff refer to the portal during skills training sessions;
- University Library website and newsletters;
- Flyers;
- Facebook has become the services' main method of communication;
- Peer Point students are present at events such as the introduction week and organise workshops in university buildings;
- Peer Point students wear a red polo shirt with the text Library Student on the back;
- At the University Library, Peer Point operates from a small room next to the front desk with a Peer Point sign next to the door;
- A sandwich board and video screen at the University Library advertise Peer Point's services.

Overview of assistance provided

Since its foundation in 2011, 582 students have approached Peer Point for help. The numbers of request increase on an annual basis, except for the academic year 2015-2016. As of January 2017, 87 students have used the service during the academic year 2016-2017. Figure 5.3 shows the number of inquiries per faculty.

[8] More information: http://library.maastrichtuniversity.nl/service/peer-point/

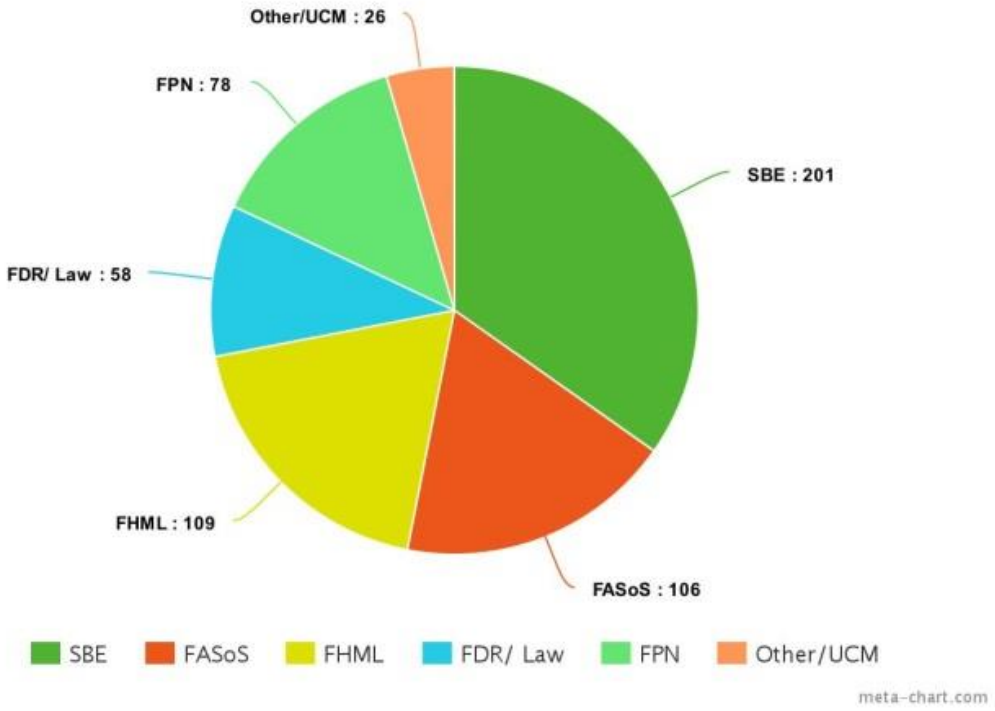

Figure 5.3 Peer Point questions per faculty

Table 5.1 provides an overview of topics on which students consult Peer Point. It should be noted that students are referred to specialists within or outside the University Library in case Peer Point is unable to help with the problem at hands. For instance, students who face language-related issues, are often referred to the Writing Studio (see paragraph 5.2.3). In some cases, students are referred to content specialists. Additionally, many students are advised to contact their supervisor or tutor to address the problem, or to get more information which could help Peer Point in the process of answering the student's question. Finally, several students have been advised to attend data analysis workshops at SBE.

Table 5.1 Reasons for approaching Peer Point

	2012	2013-2014	2014-2015	2015-2016	Total	Perc.
Referencing	12	15	26	25	78	11%
Structuring	17	55	34	57	163	23%
Literature	18	34	23	42	117	16%
Writing	14	7	25	46	92	13%
Research	19	13	72	51	155	22%
Statistics	n.a.*	14	17	15	46**	7%
Personal development	0	6	6	11	23	3%
Other	2	15	3	17	37	5%
Total	82	159	206	264	711	100%

*included in research category in 2012 report
** likely to be slightly higher due to 2012 categorisation

Evaluation

Peer Point evaluates their services by sending students an online feedback form after their session.

During the period November 2012 to May 2016, 711 students have received a feedback form. The form was completed by 165 students (23%). The evaluation has yielded the following conclusions:

- In 2012, approximately 75% of the respondents felt that the session had been helpful. This has percentage has increased during the subsequent years, and has consistently been between 95% and 97% over the past three years. Reports from the past several years show that more than 70% of the respondents state that they made significant progress after contacting Peer Point.
- The majority of students state that they would recommend Peer Point to a friend (92% in 2012; 100% in 2015-2016).
- Furthermore, in the academic year 2015-2016 students were asked about their level of comfort during the session and how easy it was to talk to Peer Point students. Responses were very positive, with average scores of 4.70 and 4.74 respectively, on a scale of 1 to 5.
- Interestingly, negative feedback and experiences mainly concern situations in which the student had different expectations on the services offered by Peer Point (e.g. content-specific questions).
- The evaluations show that Peer Point is easy to find at the library, with rates of 95%, 98% and 100% over the past three years, respectively.

Recommendations for Improvement

Based on the feedback form, frequent recommendations or suggestions for improvement include:

- Enhance the promotion of Peer Point among students and (teaching) staff;
- Increase the number of weekly office hours;
- Increase the number of peers with sufficient knowledge of statistical analysis;
- Collaborate with faculties' peer support initiatives.

Although statistical analysis lies not within the scope of Peer Point, the service receives a lot of requests for help on topics pertaining to statistics. Therefore, more attention should be paid to students who need assistance with such issues. This is of particular concern as there is currently no specific support service for statistics. At this time students are referred to the faculty for help with statistical analysis.

Conclusion

In conclusion, Peer Point has grown and developed extensively since its foundation in 2011. Overall, Peer Point is positively evaluated and perceived as a helpful and necessary service. However, Peer Point is still relatively unknown among students. Therefore, further intensive promotion efforts are necessary. Furthermore, misconceptions or lack of familiarity with the service are widespread and may affect students' expectations of and experiences with Peer Point. Such issues require attention in order to improve student awareness and the quality of support.

5.2.3 The Writing Studio

The Writing Studio[9] was founded in 2012 as an initiative of the Leading in Learning programme. The Writing Studio was initially launched as a pilot programme among SBE students (*langstudeerders*). The main goal of the Writing Studio is to help UM students reflect on their thinking, searching and

[9] More information: http://library.maastrichtuniversity.nl/service/writing-studio/

writing process. The studio is a collaborative effort between information specialists from the University Library and Language Centre teachers.

Students can turn to Ask Your Librarian (virtual helpdesk) and fill out details such as personal information, thesis topic, a short description of the problem (writing skills/language – finding sources, literature/source references), the language of the thesis and their native language.

Based on this information, the University Library will arrange a 45-60-minute intake within two working days. Depending on the nature of the request, the student will meet with an expert from either the University Library or the Language Centre. If necessary, a second meeting will be scheduled.

Visibility and promotion
The Writing Studio is promoted in de following ways:

- Library staff refer to the portal during skills training sessions;
- University Library website, Language Centre website, Facebook and newsletters;
- Flyers;
- Peer Point promotes the Writing Studio at events and workshops.

Overview of assistance provided
The Writing Studio receives requests from students from all faculties (see Figure 5.4). Generally, the studio receives two types of inquiries:

1) Language-related requests. These questions are answered by teachers of the Language Centre. Usually, non-native English speaking students ask questions on academic writing in English, structuring, etc. A couple of Dutch students have asked for help with their Dutch writing skills.

2) Literature-related requests. These questions are answered by information specialists from the University Library. Most questions are related to search strategies, database selection, data analysis and referencing.

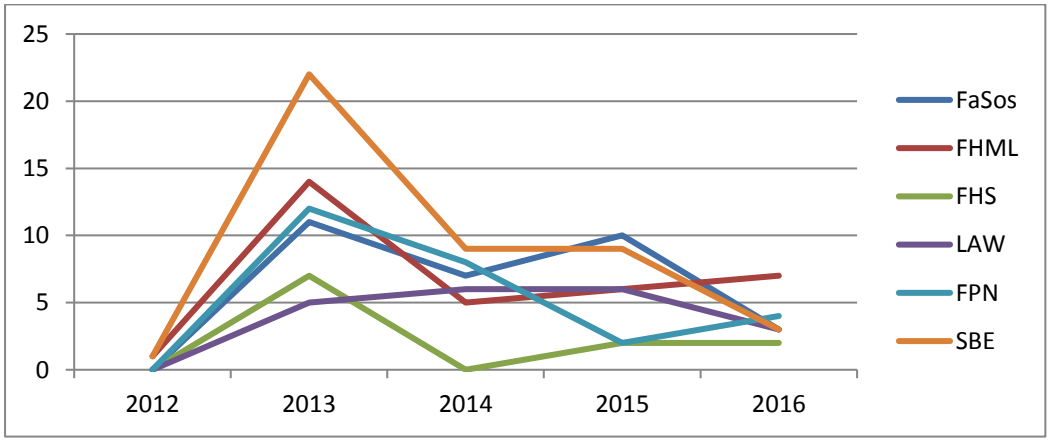

Figure 5.4 Writing Studio requests per faculty

Evaluation

The Writing Studio was evaluated during the period of December 2016 to March 2017. Study advisers, thesis supervisors and library staff were interviewed were interviewed in focus group meetings. Additionally, a survey among students was administered.
The number of inquiries at the Writing Studio are decreasing, this is due to the following reasons:

- Students usually contact Peer Point for writing-related issues.
- Students are mainly referred to the Writing Studio by Peer Point or by library staff.
- Study advisers and thesis supervisors are unfamiliar with the Writing Studio, and therefore don't refer students to this service.
- Students are unfamiliar with the service. Some students assume that the Writing Studio is a paid service, others have wrong expectations regarding the services on offer.

Recommendations for improvement
Based on interviews with students, study advisers, thesis supervisors and library staff the main recommendation is to better promote the Writing Studio, among students and (teaching) staff.

Conclusion
Students are mainly referred to the Writing Studio by Peer Point or by library staff. Typically, a student is referred to the Writing Studio for any questions which require a more professional (language teacher, information professional) level of support than Peer Point is able to offer. The University Library and the Language Centre should discuss the continuation of this service.

5.2.4 Overall conclusion and lessons learned

- Students often need additional support in developing their academic skills such as finding literature and data, referencing and academic writing. The University Library and the Language Centre provide such (online) services to cater to this need.
- The existence of such services remains relatively unknown among students and staff. The promotion of these services should be intensified. For instance, course books could contain an information page on additional skills training services.
- Students and staff confirm the need for these services and generally evaluate Thesis SupportAll, Peer Point and the Writing Studio positively.
- Training on specific research methods and statistical analysis typically occur at the faculties. Additional services for currently not available through the library.
- It is recommended to stimulate the faculties' involvement with the services.
- Collaborative efforts between the University Library, Language Centre and faculties will result in the creation of more content and better promotion of the services.
- The Thesis SupportAll portal could be improved by adding more (up-to-date) content, interactivity and making the overall design more attractive.

5.3 Wiki

Before discussing the ins and outs of a wiki, it is useful to define its concept first. We will use the definition of Cunningham and Leuf (2001), a wiki is: "a freely expandable collection of interlinked Web pages, a hypertext system for storing and modifying information - a database where each page is easily editable by any user with a forms-capable Web browser client" (p. 14). In this section we elaborate on the development and maintenance of a wiki, more specifically: the features of a wiki

(5.3.1), building content (5.3.2), and quality assurance (5.3.3). Finally, a possible design of a research skills wiki is provided (5.3.4).

5.3.1 Features of a wiki

The definition of Cunningham and Leuf (2001) implies that there are several aspects related to wikis. First, there is the content aspect, i.e. storing and modifying information. A wiki is comprised of a variety of linked topics. A wide range of different types of content can be published on a wiki page such as text, pictures, formulas, references, links to other wiki pages, and links to video's. Typically, a wiki does not contain a table of contents or an overview of all the topics.[10] Instead, a search application (engine) facilitates the user in finding topics. Second, the content can be edited by several users, i.e. a broad range of users can edit the (dynamic) content. Finally, the technical aspect concerns the software that is used to create and maintain the wiki. For instance, is it necessary to have an own server to store the wiki, or is the data stored on the provider's servers?

There are several advantages to working with a wiki:[11]

1. Anyone can edit the content, i.e. it allows for necessary additions from authors with different backgrounds.
2. Editing a wiki page requires no complicated training as the system is user friendly and it is easy to learn the basics.
3. Wikis are instantaneous; there is no need to wait for a publisher to create a new edition, or to ask a webmaster to make changes.
4. People located at different places can work on the same document.
5. The wiki software keeps track of every edit made and it's a simple process to revert to a previous version of an article.
6. The wiki has no predetermined structure - consequently it is a flexible tool which can be used for a wide range of applications. The structure of wiki pages emerges over time, and this structure is based on consensus among the wiki's users. This is radically different from traditionally designed webpages, in which the structure of pages is imposed on users.

Disadvantages:

1. Anyone can edit the wiki which may be problematic in some cases (e.g. use of confidential documents). It is, however, possible to restrict user access.
2. Risk of editing wars, spam and vandalism if not managed properly. However, there are easy ways to restore a page. Additionally, the user must be logged on to edit pages, which reduces the risk of vandalism by automated spam bots.
3. The flexibility of a wiki's structure may result in disorganisation of information. As the wiki expands, the community plans and administers the structure collaboratively. This risk can be diminished by working with templates and establishing an editorial board.

A wiki can contribute to the dissemination and sharing of knowledge on any topic. Creating a UM wiki on research skills could be beneficial. However, the risks described above should be minimised.

[10] See Annex V for an example of a wiki with a table of content.
[11] http://wikieducator.org/Wikieducator_tutorial/What_is_a_wiki/Advantages_and_disadvantages

Additionally, several technical aspects should be considered before reaching the decision to create a wiki. Table 5.2 provides an overview of important considerations.

Table 5.2 Selection criteria for a wiki

Functionality	System	Administrative
• Editing capabilities • Common features: preview, change summary, page history • Special features: categories, Unicode support, search engine • Entering links • Syntax features, HTML tags, math formulas, footnotes, FAQ tags	• Hosting features, storage quota, number of users, domain • Security/anti-spam • Search engine • Are there differences between the free and professional versions?	• Statistics • Support • Costs • Who can be granted access to the wiki? • Different levels or security

See also Schwartz, Clark & Rudolph (2004) or http://www.wikimatrix.org

Generally, each wiki hosting platform offers the same the editing capabilities. Costs are an important consideration. It is possible to create a wiki for free with platforms such as PBWORKS. Free wikis, however, are limited in terms of the number of users and capacity.

A wiki can have different functions such as note keeping, facilitating discussions, providing a space for documentation, opportunity for follow-up, references and links to resources, archiving and inventory (Cunningham & Leuf, 2001). Wikis have several applications in education:

1. Platforms such as ELeUM/ Blackboard, used for announcements, providing course books and course content, publishing schedules and assignments.
2. Creating a wiki as a course assignment (group work).
3. As an information source for students. The wiki serves as a collective repository of expertise.

The aim of the proposed *Student Research Support Platform* (SRSP) is to provide UM students with a research skills wiki comprised of content, documents, references and links to resources.

The SRSP will deviate from the wiki concept as editing will be restricted. Due to the educational aims of the platform, only teaching staff (from different disciplines), Peer Point students and University Library staff are permitted to create and edit content. It could be considered to dedicate certain pages to tips and tricks and to let students contribute to this topic as well.

5.3.2 Building Content

Generally, a wiki covers a variety of topics. In the case of the SRSP, each topic is related to research skills. A wiki is rather unstructured; it presents a collection of interlinked webpages. Usually, wikis have a front page, which is the landing page for entering the wiki (Cunningham & Leuf, 2001, p. 127). A front page may contain:

- The scope of the wiki
- A first-level topic page
- A Search page, explaining the search capabilities.
- A short explanation of the Wiki in general
- Tips and templates for editing

- Some pointers on wiki etiquette
- A legal page (copy rights, disclaimer, fair use, etc.)

Several rules need to be followed when adding topic pages to the wiki:

- Before adding a topic, take a look at the already available content. Avoid providing redundant information. Consider adding links between your page and other topic pages.
- Create new content with the template offered by the wiki-administrator. This will ensure uniformity.
- Think about the design of the topic. If your topic page is too long, consider splitting the topic into mini topics and create a short wiki page for each topic.
- Provide each page with tags.

A wiki is edited with a software application which allows users to create and fill the pages with relevant input, such as: text, formulas, figures, tables, and links to other pages. Figure 5.5 shows an example of a wiki editing tool.

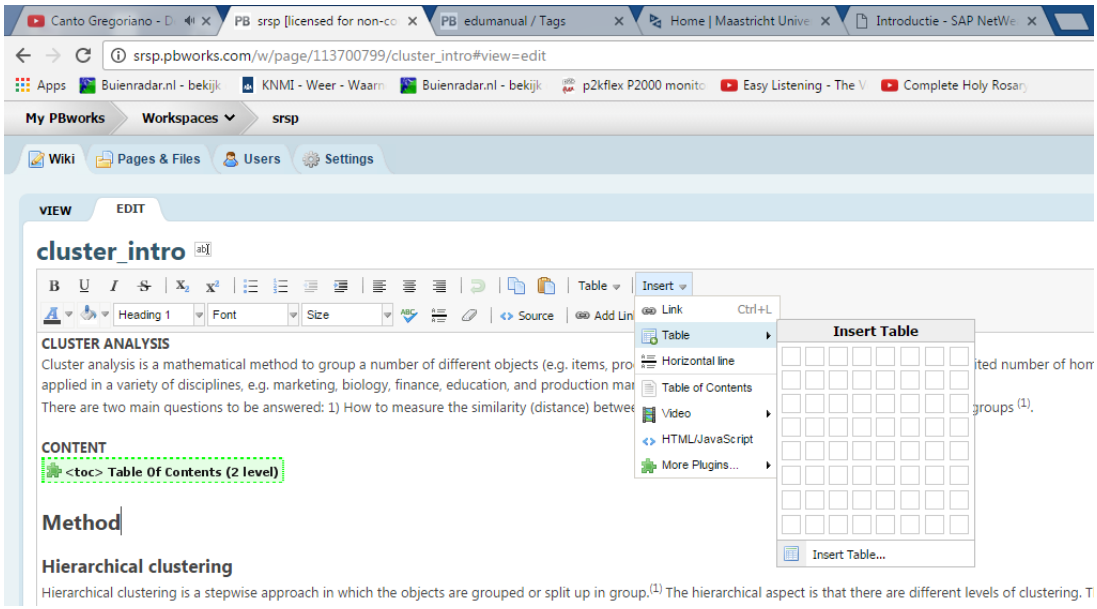

Figure 5.5 Example of the wiki editing tool and the editing toolbar (PBworks)

Editing tool requirements:

- User-friendly design.
- Tool to create a table of content with different levels.
- Must offer plugins to upload a variety of content such as texts, pictures, files and formulas.

Several choices must be made regarding the content. The wiki is not meant as a replacement of a course, but can be based on course material (consider copyrights). Furthermore, the content is usually a condensed version of more elaborate material. The wiki's content should provide the basics which are supplied with references and links to books and articles. As many students prefer to find their sources online, it is recommended to refer to digital content as much as possible.

5.3.3 Quality assurance

The administrator is responsible for the wiki. Additionally, the establishment of an editorial board comprised of representatives from the faculties and library should be considered. The editorial board takes is responsible for the following activities and content:

- The Wiki's frontpage
- The quality of the wiki
- Inviting staff to contribute to the wiki
- Providing editors access to the wiki
- Training
- Creating and consistently using a template (language, style, etc.).
- Statistics and loose ends.
- Resolving conflicts
- Creating a FAQ

5.3.4 Example: creating the topic pages

In this section, we briefly discuss the steps to create a topics page and provide an elaborate example.

Steps:

1. Submit a request to edit or create content for the wiki
2. Take a look at the already available content. Avoid providing redundant information.
3. Think about topic design, e.g. how many pages does it cover?
4. For each page, use the template as provided by the administrator.

Table 5.3 Example of the structure of a wiki page

Page name	
Topic	Topic
Description	
Content	Content
	Sub1
	Sub2
	Sub3
	References
	Other Sources
	Exemplary article
Sub1	
Sub2	
Sub3	
References	
Other sources	
Tags	Target group, level, topic
FAQ	

5. If your content covers more than one page, split your topic into mini topics and pages.

Figure 5.6 provides an example of linked topics. The wiki page “Two step in SPSS” can be linked to the topic “Cluster Two Step”, or to the “SPSS” topic.

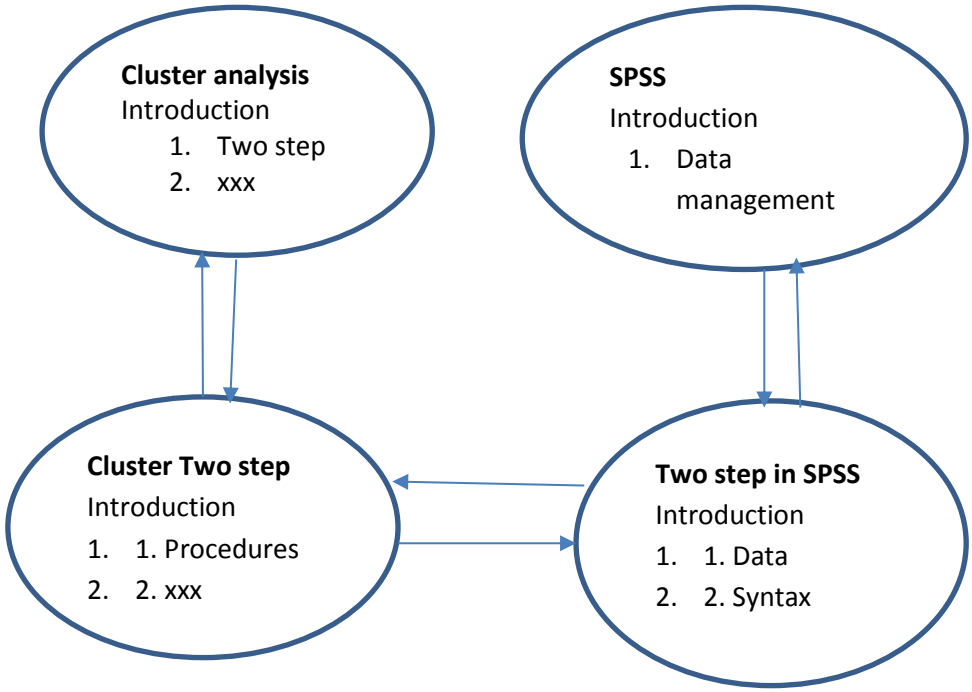

Figure 5.6 Topics and links

If you would like to create a new page, clink on the workspace button ‘new page’. Figure 5.7 depicts the editing tool for setting up a new page (test). Several useful editing features are marked in Figure 5.7:

- 1: Edit/View
- 2: Save your changes
- 3: Insert table of content
- 4: Edit tags
- 5: Insert images, documents and other files

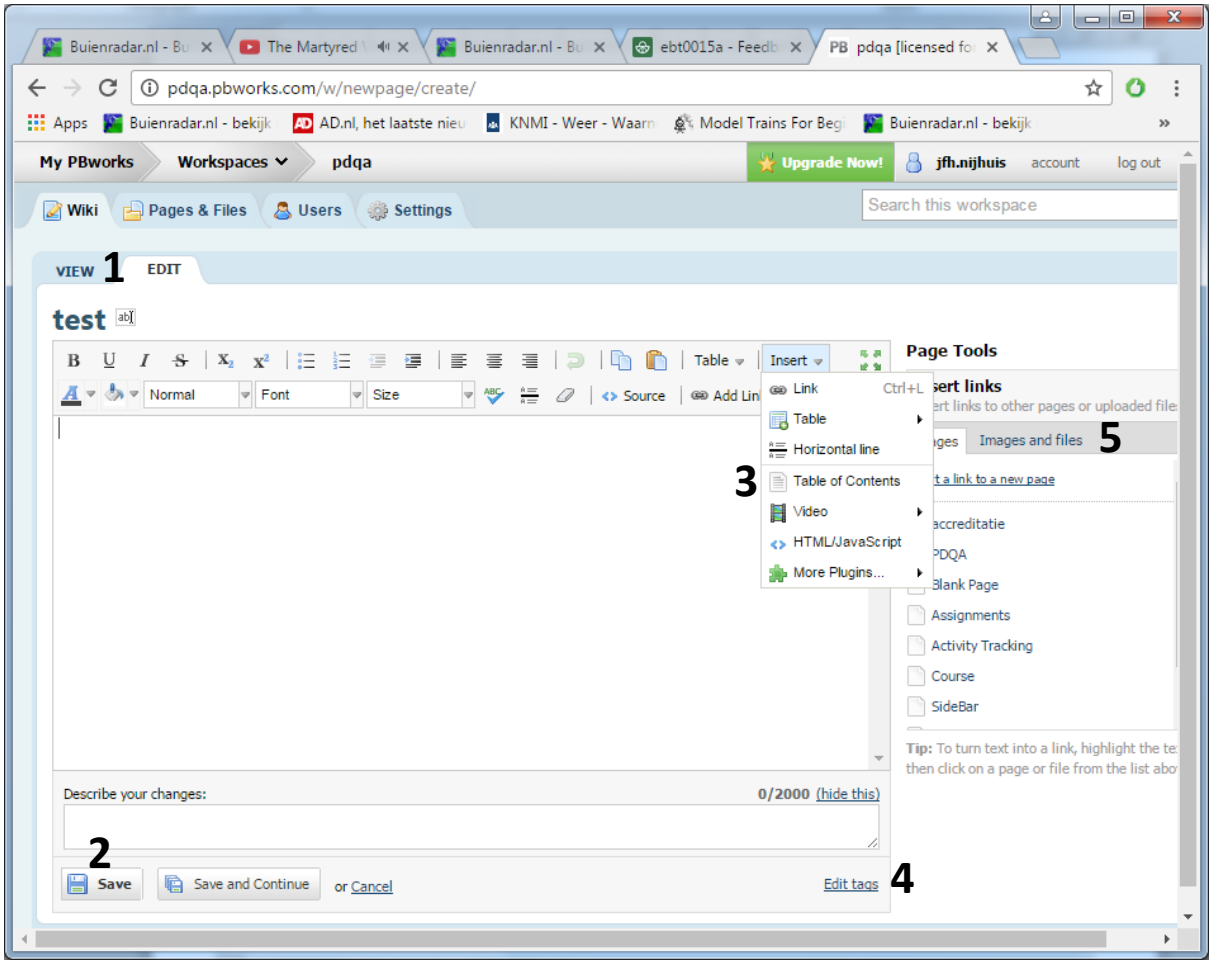

Figure 5.7 Starting your topic page

References

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Annex I: Chapter 1 - Case studies: best practices across faculties

Faculty of Arts and Social Sciences case
Bachelor's course: An Introduction to Academic Research and Writing
Bachelor's course: EU Politics, Institutions, Theories and Challenges

Focus on research skills: critical reading and thinking, brainstorming, making us of existing knowledge, problem definition

Key elements: training brainstorming skills, form to prepare pre-discussion, own learning self-assessment form

Course context
This case study comprises two first-year courses of the bachelor's programme European Studies at FASoS: *EU Politics, Institutions, Theories and Challenges and An Introduction to Academic Research and Writing*. European Studies explores Europe and European integration drawing from insights and methods from history, political science, international relations, law, economics, philosophy, and sociology. The method was developed to enable students right from the start to have better brainstorming sessions. Although the course is a skills training, it is set up with the seven-step PBL approach, i.e. students read and discuss about the skills they are training.

Rationale and design
The course coordinator was disappointed with the students' level of brainstorming skills and general knowledge of the research process. In the first year the brainstorm usually entailed writing down some keywords and drawing lines between them. Students (and in some cases staff) did not see the value of the brainstorm and saw it as an obligatory step to pass as quickly as possible. Additionally, students spent valuable time in class to read the assignment text. The post-discussion however, is often seen as more valuable and a sufficient amount of time should be allocated for this step. The previous course coordinator used forms to prepare for the pre-discussion; the new coordinator continued to use these forms. Moreover, he transferred this practice to a first-year skills course, set up with a PBL format and of which the brainstorm is still an important aspect. Consequently, students are trained in brainstorming and understand the rationale behind it right from the start of their study.

Practice
Students receive a form to prepare the pre-discussion. This enables students to think about the material beforehand and forces them to read the assignment text, which adds more structure to the pre-discussion. Moreover, the forms make it easier for everyone to contribute as students are more active. The post-discussion also benefits from the use of the form. The allocated time for the pre-discussion is 30-45 minutes. At times students are left to wrestle with this step, in order to be able to reflect the pre-discussion can be improved next time. Collaborating, listening to each other and identifying a problem and/or solution are perceived as important research skills. Students also receive a mid-term evaluation form, through which they assess their own learning and evaluate the group. Subsequently, the group presents three points they would like to improve on. The forms assist students in understanding PBL as a research process.

Implementation
The forms are meant as a tool for students to better prepare the pre-discussion. They are not checked as such, although the coordinator may ask the students to bring the forms to the meeting in case a student or the group does not seem well-prepared and/or does not participate. Students have thought about the content in advance, but structuring the brainstorm in class is still needs to be taught to students. Therefore, the course coordinator highly emphasises the brainstorm process. At times, students are allowed to go off track which teaches them where things go wrong. There is no formal training in conducting the pre-discussion, but the tutor comments on the quality of the pre-discussion during the meetings. They need to make students aware of the rationale behind and the importance of the brainstorm.

Evaluation, revision and challenges
Students positively evaluate the learning trajectory (including going off track) in the course evaluation. Going off track may sound counter-intuitive to some staff, as it is often assumed that students prefer more guidance or even appreciate being handed the learning goals. The tutor's guidance during the going off track process is, however, greatly valued.

There is thought to create a post-discussion form with questions such as: What was the puzzle? What did you know prior to the meeting? How has your knowledge on the topic changed? Such forms probably work best for (bachelor's) students who are new to PBL. Once they have learned PBL in a structured manner and understand how PBL resembles the research process, the forms may serve as a checklist for students, but not more than that. The mid-term evaluation mostly focuses on PBL, but could be adjusted to evaluate research plans students have made for their papers.

A challenge is that students who are more reflexive and understand PBL as a research process tend to make better use of the form while they are arguably in lesser need of reflection. The coordinator only adjusted a few formulations on the form for the sake of clarification.

Transferability
The pre-discussion form and the mid-term evaluation form are easily transferable to other courses.

Faculty of Health, Medicine and Life Sciences case
Bachelor's course: Critical appraisal of a biomedical publication CABP

Focus on research skills: finding information, critical reading, information literacy, interpretation, writing and argumentation

Key elements: journal club sessions, using questionnaires to evaluate academic articles with different research designs

Course context
The course is part of the bachelor's programme Biomedical Sciences. It is the final course of the first year and the concluding course of the trajectories *Academic Writing* and *Critical Reading*. All first-year courses contain teaching and learning activities (TLAs), and assessment-feedback tasks (AF-Ts) for this trajectory. The course is completely dedicated to the Critical Appraisal of a Biomedical Publication (CABP), and addresses/teaches skills such as finding information, critical reading, information literacy, interpretation, writing and argumentation.

The Biomedical Sciences curriculum is competency-based. Four competencies are defined: Biomedical Expert (B), Communicator-collaborator (C), Investigator-scholar (I) and Professional-organiser (P); BCIP. On the year level, Intended Learning Outcomes (ILOs) are defined that are the basis of the TLAs and AL-Ts. The trajectories *Academic Writing* and *Critical Reading* are captured in the C and I competencies. For this course, the ILO verbs according to Bloom's revised taxonomy are 'argue, value, discuss' (C-competence) and 'reason, analyse, appraise' (I-competence) (Biggs & Tang, 2011).

Rationale and design

The design of the *Academic Writing* and *Critical Reading* trajectories and this course result from the need to have more coherency and constructive alignment in teaching and assessing the skills necessary for reading, writing and presenting of (biomedical) research papers.

Practice

The course's TLA focus on three published papers, selected by the course planning group. These papers have three different study designs: diagnostic human research, intervention research and fundamental research. Each paper is analysed by the student guided by specific (quality-based) questionnaires (aggregated by the Equator network).[12] Three questionnaires are selected and adapted to the TLA, for the topic and design used in the three selected papers (the STARD, CONSORT and RIPOSTE questionnaires). The sessions are organised as a journal club composed of 12 students. Sub teams of two students analyse the paper by using the questionnaire (one paper per group session). Certain concepts will be provided (e.g. randomisation) by the course planning group as the specific focus of the paper. Students must find a definition of the concepts, analyse how concepts are used, and appraise consistency and quality of the use of the concepts by using the questionnaire (applying, analysing, evaluating). The students write a report and present the paper in the journal clubs. The ultimate objective is that the student practice and learn critical reading skills.

Each report is supported by a Team-Based Learning session (TBL) (Parmelee et al., 2012). Students prepare for a group session (four tutorial groups). These sessions start with a limited number of multiple choice questions, the individual Readiness Assurance Test (RAT), which tests preparation and knowledge level. After the individual RAT, sub groups take the same test, the team RAT, and discuss answers, discrepancies to deepen the level of understanding. The questions are then discussed by the whole group and the tutor.

The Assessment Feedback tasks of the course consist of formative feedback on the three written assignments and presentations in the journal clubs. The students write an individual CABP report on an additional paper (using the same format, paper and specific topics selected by the course planning group, use of the questionnaires), that receives a summative grade. The weighted score for the RAT's can add a bonus point (0.5 points) to the final course grade. Finally, students take an end-of course multiple-choice exam.

The course uses a PBL teaching format, given the collaborative learning of students in small and larger groups (duo's, tutorials and TBL). Although the seven-step model is not used, the CABP report and a scenario exercise can be considered as an alternative PBL approach. In this scenario exercise, a situation is presented for which the students need the critical appraisal of the paper (e.g. the

[12] www.equator-network.org

student assumes the role of a biomedical expert and provides advice to a government institution on topic X). In addition, the practice is embedded in a clearly defined context, the quality-based appraisal of biomedical research papers, which are all linked to the overarching theme of the course: Cholesterol. The TLAs and AF-Ts are competency-based, and embedded in a trajectory that is linked to previous first-year courses.

Evaluation, revision, challenges and do's/don'ts
A challenge is the assumption that students will learn critical reading/appraisal by 'doing'. On the contrary, such skills training demand a firm educational format and support. Another challenge in this context is that both the Biomedical Science programme and the students tend to focus on the knowledge-domain only, while other competencies are just as important.

It is recommended to have a multidisciplinary course planning group (e.g. composed of epidemiologists, educationalists and topic experts).

Transferability
This design is easily transferable to other programmes:

- Establishing a multidisciplinary course planning group, responsible for selecting papers with diverse research designs.
- Appraising articles through a form (tailored to teach how a paper is critically appraised and to help students identify, find, evaluate, apply and acknowledge strong points and weaknesses of a paper)
- Organising team-based sessions and journal clubs.

Faculty of Humanities & Sciences - Department of Data Science and Knowledge Engineering case
Bachelor's course: Introduction to Bio-Informatics

Focus on research skills: critical thinking, information literacy, retention, selection, interpretation, argumentation

Key elements: using students' existing knowledge to reach solutions to ill-defined problems before looking at the state-of-the art solution, providing solutions with 'missing steps'

Course context
The course presents a general introduction to the methods and techniques of bioinformatics, providing the students a view into a possible application field of the more general data science education they receive in the bachelor's programme and of the specific techniques applicable to the domain.

Practice
The introductory lecture revolves around a bioinformatics question, somewhat comparable to the PBL approach, but with an intentionally ill-defined problem (quote: "*woolly*"). The students receive clear instructions to only use their existing knowledge (from previous lectures, or previous courses) to first construct a clear problem definition and subsequently reaching a possible solution, while keeping in mind and demonstrating why this solution may not be optimal. Eight of the in total ten lectures are based on such an ill-defined/woolly question. Students are divided into eight groups. Each team is responsible for tackling one of the questions. Their interpretation of the problem and

their suggested solution is presented at the start of the corresponding lecture. Since this year, it is explicitly mentioned that students are not to read the chapter that covers the state-of-the-art solutions to the problem, but to rather focus on existing knowledge in order to reach a solution. The students must build their own interpretation of the problem, formulate their assumptions, and consider any issues that might come up. This forces them to practice and develop their abstract interpretation, critical thinking and argumentation skills.

The solution offered by the students functions as a starting point for the presentation of the bioinformatics material related to that problem. A challenge that can be observed is that students presenting mathematical or computational material are not (yet) confident and tend to make errors that are hard to correct in large classes and may confuse other students. In smaller groups however, it is easier to use group dynamics to correct mistakes. This is tricky for larger groups composed of 20-45 students. It takes longer than a PBL cycle to become confident and competent with the highly technical material, especially if students are learning from textbooks. Students do not fully understand the material until they have applied the material during the practical sessions.

The computer labs are designed to theoretical understanding of a research setting. Each practical exercise guides the student through a basic bio-informatician's solution to one or two of the problems presented in the previous lectures. These guides intentionally omit some of the specifics necessary for the application, and students must research how to apply the steps correctly. There is plenty of room for curiosity in these assignments.

Revision

Last year, some topics were much easier to relate to previous work than others. As groups were presenting sequentially, some of the later groups were left struggling for new things to present. This year, the problem-based approach should prevent that, but sometimes teams can move from a vaguely worded starter question to a completely different direction than the one intended. In this case, the lectures can students hints as to the direction they need to follow. Students going off track in an unexpected direction is not necessarily a bad thing, if the students still clearly define how they understand the question and work from there, practicing their abstraction and interpretation skills.

Transferability

This model is partially transferable:

- Exposing students to ill-defined problems, to let them define the research question.
- Letting students reach a solution based on existing knowledge before giving them access the state-of-the art solutions.
- Offering students incomplete solutions to let them bridge the research steps.

Faculty of Humanities & Sciences - University College Maastricht case

Bachelor's course: Linear Algebra

Focus on research skills: critical thinking, argumentation and interpretation qualitative/quantitative analysis

Key elements: tailor-made case work, encourage students to put together knowledge from different parts of the course, multiple solution problems or multiple pathways to a single solution

Course context

The mathematics course *Linear Algebra* is part of the University College Maastricht bachelor's programme. The 2000-level course is positioned in period 5 of the academic year. Skills that are trained are related to the following content areas: 1) linear equations, vector and matrix equations, solution sets, linear independence, and matrix algebra, 2) linear transformations, matrix inverse, and vector spaces, 3) column space and null space, basis, coordinate systems, dimension and rank, 4) determinants, eigenvectors and eigenvalues, 5) diagonalization and orthogonality, and 6) symmetry. The PBL aspect of the approach in this course is twofold. The first aspect is the amount of interactivity. Students are stimulated to think by asking them questions, requiring them to actively participate in lectures and letting them work on case studies (theoretical or practical examples to solve). The second aspect is the small group size. Students collaborate in groups of 3 to 4 students (even within the setting of a lecture the group is split up). In this way, all students need to get involved in the mathematics, which maximises their learning experience. The course is comprised of biweekly two-hour lectures and a weekly tutorial session. In the first hour of the tutorial a case is presented based on the knowledge from the lecture. The second hour is used to do exam-like exercises. In all this, students are in charge of the pace of the sessions.

Practice

Several skills are trained. Critical thinking is stimulated by challenging students to go beyond what they know; they need combine knowledge from different parts of the course. Argumentation and interpretation skills are enhanced, as students need to justify their mathematical approach and choice of methodology. Qualitative and quantitative analysis skills are trained through the case work in which students need contextualise mathematics. Mostly more than one solution or multiple pathways to a single solution are available, i.e. the students need to be able to apply several analysis methods. These skills fit the learning goals of the programme since they develop skills to solve real-world problems and go beyond inserting numbers into equations. Students learn how the issue at hand can be transformed into a well-defined research question and generate the steps to answer that question. These skills are not explicitly assessed in the course and do not contribute towards the final grade.

Design and implementation

The design process of the course cannot be retrieved as this course was set up by a tutor who has left DKE. The content was already defined. We have since added new cases to the course. The training seems to work out quite well in practice. Students are happy and appreciate the real-world application. The use of real-world problems matters as it adds to the usefulness of the trained material. Students choose the course and are motivated to work on the cases. The course is characterised by interactivity, as a result of the small group size. The coordinator is also satisfied; the course runs smoothly and meets the educational objectives.

Revision

The only change that is planned is to adept the lecture class size to tutorial-sized groups. This should further improve the teacher-student interaction.

Transferability

Depends on the case. It is not recommended to apply this case to disciplines that are too far removed from the sciences. The method of case work might work out, but the cases need to be adapted to the programme. Tailor-made cases are very important. Exact/quantitative sciences are probably best taught in a skills setting, as a specific mindset/approach needs to be trained. A sufficient amount of practice and guidance from the tutor are key to doing this process. Training these types of skills might therefore not work in a traditional PBL setting. However, a strong point of PBL is the pro-activeness and the learning-by-yourself attitude. These are very important characteristics of PBL that aid in training the skills discussed above.

Faculty of Psychology and Neuroscience case

Research master's course: Clinical Skills III: Clinical Interview for the DSM IV (SCID I and SCID II)
Research master's course: Clinical Skills IV: Intervention Techniques of the specialisation in Psychopathology

Focus on research skills: critical thinking, qualitative analysis, interpretation, writing and argumentation, logical reasoning

Key elements: no final exam, practice of interview, expectation management

Course context

The selective research master's in Cognitive and Clinical Neuroscience attracts talented students who aim to become high-level researchers in academia, or aspire a career in industrial, governmental, clinical work environments. Distinguishing aspects of the programme are its small-scale, group-based education, allowing for close interaction with both the teaching staff and other highly motivated students, and its attractive mix of theoretical and practical training. The specialisation in Psychopathology (one out of six tracks) provides the theoretical background and clinical skills needed for conducting research in the discipline of mental health. Emphasising interaction among biological, psychological and social pathways leading to disorder, this specialisation focuses on research questions that can inform prevention and intervention strategies. The programme focuses on research questions that can inform prevention and intervention strategies and combine science and clinical practice. Psychopathology has a broad focus on various mechanisms leading to disorders.

The skills training programme of the Psychopathology track was developed to teach students the basic skills of discussion and anamnesis techniques as a preparation for those who want to conduct clinical research and/or want to combine clinical practice with research.

Practice

The skills training course *Clinical Skills III* focuses on conducting a semi-structured interview for the classification of mental disorders using DSM-IV-Tr Axis I (SCID I), Axis II (SCID II) and the DSM-5 (SCID 1 and 2) classifications.[13] The aim of this introductory skills training is to train the Structured Clinical Interview of psychiatric disorders and the Structured Clinical Interview of personality disorders.

[13] Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) is the standard classification of mental disorders used by mental health professionals.

Students will learn to conduct the interview, interpret the outcomes, establish differential diagnoses and to summarise their findings in a written report.

This training consists of four 2-hourgroup meetings and homework assignments. The format of the four sessions is a combination of first observation, practicing with fellow students and finally, a self-evaluation and self-reflection exercise. The groups are divided into small subgroups in order to gain as much practical experience as possible.

There is no final exam. The students are evaluated (pass/fail) on three aspects: (1) attendance to all meetings, (2) sufficient preparation (completing all homework assignments), and (3) active participation during the group meetings. The homework assignments comprise literature study, scoring of videotapes and writing of case descriptions.

The skills training *Clinical Skills IV* is quite similar; the course is short and introductory. Cognitive behavioural therapy (CBT) is considered as the evidence-based treatment for a wide range of psychopathological disorders, including anxiety disorders and depression. The goal of the skills training is to acquire knowledge of Elementary therapeutic procedures (CBT), making a case conceptualisation, explaining the rationale, applying exposure and cognitive therapy, and writing a verbatim report of therapy sessions.

The course's format is the same as *Clinical Skills III*, consisting of acquiring theoretical background in the different topics, practicing with fellow students, self-evaluation and homework assignments. In addition, there is no final exam but a pass/fail grade based on attendance, participation and preparation.

Evaluation, revision, challenges, and do's/don'ts
The skills training courses are evaluated with a standard questionnaire. Additionally, the group evaluates the course at the end of the final sessions. Last year we interviewed two students who had followed the skills training in the previous year, to get feedback for improvement.

Changes for the coming year include clinical practice guest lectures, increased use of subgroups (mixed in terms of participants and size), and more focus on DSM V (latest version).

It should be avoided to fit too much content and exercises in only a few sessions. What should be done, is to clarify right from the beginning that the training is introductory to avoid students having too high expectations of the course. There should be a good mix between listening, practicing and homework assignments. Finally, it is important to encourage self-activation, motivation and responsibility of the students without asserting too much control over control them. Of course, working in subgroups creates a sense of social control as students are dependent on each other's participation.

Transferability
This format could be transferred to other courses, because the actual training takes place in the sessions, while the theoretical background is acquired through the homework assignments. The sessions focus on getting hands-on experience in subgroups with an emphasis on feedback and reflection. As the topics should relate to professional practice, this could be implemented in a variety of disciplines and related to different skills.

Faculty of Law case
Bachelor's course: Academic Research Skills

Focus on research skills: information literacy, critical reading, interpretation, writing and argumentation, referencing

Key element: peer panel to discuss student's own work

Course context
The course is a second-year mandatory course of the bachelor's programme European Law School (English track). The course *Academic Writing* has been redesigned around the principal elements and criteria required for the bachelor's essay, which are reflected in the new Assessment Form prescribed for the assessment of bachelor's essays. Accordingly, in the conception and production of an academic paper of around 3000 to 4000 words (i.e. roughly half the length of the bachelor's essay), students will be guided step-by-step through the advanced academic writing process, working in turn on aspects such as the research topic, bibliography, research question, structural outline, main body of text, etc.

The course has the following objectives:

- Analysing, questioning, and evaluating written texts;
- Arguing and supporting a position;
- Recognising audience and disciplinary expectations;
- Identifying and applying the stages of the writing process;
- Identifying characteristics of effective sentence and paragraph-level prose;
- Applying proper citation practices;
- Discussing how to transfer and apply student writing knowledge to other writing occasions.

PBL with its emphasis on student-centred learning is a fitting format for any course, including the *Academic Research Skills* course. The course consists of five plenary sessions, five peer panel meetings and autonomous self-study, spread over the course of teaching periods 2.4 and 2.5:

- The plenary sessions are the ideal occasion to discuss reading materials and to obtain useful tips and guidance on key stages in the academic writing process.
- The peer panel meetings are designed to discuss students' own work evolving during five key-stages of drafting and writing an academic text, as well as that of their peers, and particularly to give and receive feedback on several selected issues pertaining to the relevant key-stages.
- The five key-stages are:
  - Deciding on a research topic
  - Building a bibliography and preparing an introduction
  - Elaborating a research question and developing a structural outline
  - Reviewing and revising
  - Drafting a conclusion
- Peer panel meetings are held in group sizes of roughly 30 students and are led by two tutors. This allows for the creation of several smaller subgroups in each peer panel meeting, in

which students work in close collaboration with each other throughout the course, and for the tutors to monitor and intervene in the discussions of all the sub-groups at various stages.

Rationale

The main aim of this course is to develop the skills of academic legal research and writing, to enable students to become self-sufficient in their academic writing endeavours, including notably, but certainly not only, the bachelor's essay or master's thesis. In particular, the present course seeks to build on the knowledge acquired through the course *Skills: Legal Research and Reasoning* by further expanding, deepening and practicing students' written communication skills with the introduction of new concepts and insights. Students in this course are assessed (primarily) based on a 3000-4000-word research paper.

While second-year students have already practiced technical aspects of academic research and academic writing in previous courses, this course invites students to take their current writing skill a step further and to undertake a broader and deeper exploration of the various components in researching and writing an academic project. In this way, the course is intended to help them improve their ability to be self-sufficient in future academic researching and writing endeavours such as the bachelor's essay or master's thesis. The course team gives students guidance where needed, while at the same time letting them make their own choices and decisions whenever possible.

The fundamental idea behind this course is that all participants should benefit from it, not only in the short term but also in the longer term. On a short-term basis, the most immediate benefit one might think of is the fact that most of the new Assessment Form's criteria (e.g. drafting a clear research question, style of legal writing, editing and formatting, etc.) for bachelor's essays are covered in detail in the course, which will ultimately improve the theses that students will write in future. Speaking from experience, we can safely say that we frequently encounter essays that are solid on the content, but significantly less so on the technical aspects. In fact, in some instances the latter has a negative effect on the former, such as instances where the outline is confused or unbalanced, or the main body of the essay does not go towards answering the research question posed, or the conclusion does not answer to the topic and/or research question introduced, or the intended meaning is lost in poor grammar, etc. Undoubtedly, many students could obtain a better final grade for the essay if they paid more attention to the technical writing skills involved. In addition, the course provides an opportunity to write a research paper in a field of law that students are interested to explore.

Several key decisions must be made regarding the set-up of such a course. The most important one is the link between the specialisations of the teaching staff and the topics students prefer to write on. A deliberate choice with pedagogical value has been made for students to choose their own topics, and the main question that the coordination team has been dealing with was how to ensure that the same research standards are explained and applied as a common denominator between the differences in staff specialisation and student substantive focus. We have addressed this issue by focusing on the common criteria used in the Assessment Form for the bachelor's essay.

Transferability

Legal research and writing are very specific to the programme, as they require skills (e.g. footnotes, etc.) that other disciplines do not seem to be confronted with. Legal argumentation is a self-standing method of analysis, which does not exist in other fields: doctrinal research, namely the analysis of

legal rules and case law to make appreciations as to how the law is in the present (*lege lata*) and how the law should be like in the future (*lege ferenda*), entail research and writing skills that are not shared by other disciplines. Moreover, the methodology of the study of law is controversial even within the field of law. Given the limitations of the study of such skills at our university (separate courses, teaching staff composition, variety of departments contributing to teaching staff, etc.), it is difficult to draw generic lessons that could fit completely different disciplines in different organisational environments. It may prove that skills are transferrable to other faculties/programmes, only in case that they deal with law. However, the peer panel meetings are transferable. The peer panel meetings provide students with considerable freedom: they are guided through discussing the key stages of writing, but it is their responsibility to ask for (the right kind of) guidance. The course explicitly links specialisations of the teaching staff with the students' papers which enhances the motivation of both groups.

School of Business and Economics case
Master's course: Alliances, Mergers & Acquisitions

Focus on research skills: academic writing, analysis of empirical data, critical thinking

Key elements: flexible course that allows for combining teaching and research which motivates both staff and students, an exercise in translating theory to practice

Course context
The course *Alliances and Mergers & Acquisitions* is a mandatory course in the master's International Business specialisation Strategy and Innovation and is offered in period 4. Students from other International Business specialisations may choose this class as an elective course. Requirements for the course are that students must have a bachelor's degree and an advanced level of English. About 100 (eight tutorial groups) students participate in the course, coming from a variety of bachelor's programmes and consequently trained in a variety of research skills. The course is aimed at developing s better understanding of alliances, mergers and acquisitions, and their challenges and opportunities. The specific research skills to be developed are:

- Understanding several crucial theoretical, empirical and managerial issues.
- Developing an academic/critical attitude.
- Raising more awareness concerning appropriateness various empirical approaches.
- Building the ability to derive managerial/practical implications from academic material.
- Developing data management competences.

Practice
In this course PBL is not applied through the seven-step approach. It rather emphasises group learning, clear problem definition, communication skills and self-study. The course utilises two approaches to research skills training, 1) discussion of statistical techniques, this approach focuses on students reading about research; and 2) writing a research paper, this approach focuses on students conducting their own research. The research paper replaces the written exam.

Rationale and design (process) of the course
There are several reasons for this format. 1) Students are used to the seven-step approach; another format is a new experience to them. 2) Presentations are trained in other courses, so this was not an

option. 3) The individual contribution of the student is rewarded. 4) The tutor is provided with a more active role. 5) The acquired research skills are useful when writing the master's thesis.

Implementation

1. Discussion of statistical techniques in the tutorials.

In the tutorials, the statistical technique and material for that specific session is discussed in a structured way (see Figure A). Students must read the material before the meeting. For each session, a discussion leader is appointed. Not only the statistical technique itself but also related topics, like assumptions, sampling, and interpretation are discussed. The statistical techniques, to be discussed in the course, are selected by the course coordinator, based on his expertise. Application of the technique is demonstrated in articles from journal in the field. So, it is not the intention to acquire the technique.

The course is structured around the textbook of Greve, Rowley and Shipilov (2014), *Network Advantage. How to unlock value from your alliances and partnerships*. The articles are embedded in the textbook.

1. What is the main topic of the meeting?
2. Are there any difficulties, questions or issues to be clarified?
3. What are the main contributions of the material studied?
4. What is the quality/credibility of the material (assess the data, theory, empirical approach)?
5. One empirical approach will be discussed per meeting. The method is indicated in the course book under the description of the individual meetings. Main questions that need to be addressed in class are:
    a. Why was this empirical approach for this study? (Do not focus on the technicalities of the statistical method)
    b. How do we determine whether the hypotheses have been (dis)confirmed?
6. Links to other meetings:
    a. Is there any overlap with other material seen so far in this course?
    b. Are there major differences with other material seen so far in this course?
    c. Make a mind map.
7. What are the managerial implications?

The group and tutor conduct a brief (5-10 minute) evaluation of the discussion.

Figure A Structure of the meeting

Good participation can be achieved through following behaviour:

- Reading the literature prior to the meeting.

- Preparing the questions/tasks for each session.
- Being well-prepared, actively contributing and advancing group learning as a whole.

2. The research paper.

The objective of the individual research paper is to write a recommendation on a firm's strategy regarding alliances, mergers and acquisitions. The recommendation must be based on the book by Greve, Rowley and Shipilov (2014) and several additional articles. Moreover, the recommendation must be based on data obtained from the Securities Data Company (SDC) Platinum Database[14], potentially supplemented by other information publicly available.

SDC Platinum provides detailed information on new issues, mergers and acquisitions, syndicated loans, private equity, and more, for the global financial marketplace. Some of the SDC databases go back to the 1970s. However, it can typically be relied upon to provide comprehensive data for at least the past ten to fifteen years.

The paper is assessed using the following criteria: content (e.g., correct use of course material, analytical level and depth, clarity of reasoning, analysis of the data, managerial implications, creativity, form, and quality of the data.

Evaluation (by students and course coordinator), revision, challenges and do's and don'ts
Students positively evaluate the course, book and literature. However, some students did find the course too theoretical and the requirements for the research paper unclear. Furthermore, an introduction of the SDC platinum would have been appreciated.

In general, the course coordinator is satisfied with the approach and participation of the students. They, as a tutor, feel comfortable with a more active approach.

A recommendation is setting requirements to the research paper. Don'ts include giving too much structure and prescribing the content of the research paper. In later life students also have to make their own decisions when writing a paper/report. There are different ways of writing a good paper or report, as long it is based on clear decisions. Students should learn to deal with these uncertainties. A possible solution could be to introduce a session where students give peer feedback on each other's paper.

Possible revisions are introducing an exam about theories discussed in class; however, this would move the focus to memorising, whereas the research paper focuses on understanding and interpretation. The latter is more desirable in academic training. Another consideration is to organise guest lectures.

With respect to the research paper it is essential that there is a variety of easily accessible, structured secondary data. This could be in the form of a database or library. It should be avoided that students need a lot of time gathering the data.

[14] http://financial.thomsonreuters.com/en/products/data-analytics/market-data/sdc-platinum-financial-securities.html

Transferability

The approach of discussing different statistical techniques per meeting is transferable, if there are different techniques used in the field of research. This is not restricted to statistical techniques, but could be extended to other research methods in the field, either qualitative or quantitative. Course coordinators and tutors are, within the broader context of the course, encouraged and able to link the specific examples and techniques to their own expertise and research. Linking research and teaching motivates both students and staff. The flexible design of the course is thus transferable.

The structure of the meeting with very explicit attention to quality and credibility of the material and knowledge from previous courses serves as an alternative to the seven-step approach, allowing for a focus on different issues.

Annex II: Chapter 2 - Theoretical exploration focusing on educational theories

1.1 Background

A clear distinction should be made between:

- A *research-led* curriculum, which content is selected according to research interests of the academic staff and focuses on information transmission and understanding of research findings rather than research processes.
- A *research-oriented* curriculum, which emphasises understanding the processes of knowledge production as much as content, the teaching focuses on skills.
- A *research-tutored* curriculum, which centralises written assignments and discussion of student products, resulting in a curriculum designed to facilitate educational research in the teaching and learning process itself.
- A *research-based* curriculum, where students are expected to conduct research and where activities are based on authentic research processes (Griffiths 2004; Healey 2005).

When teaching research in a PBL environment, the research-based model is under scrutiny. While it does not exclude aspects of other models, the emphasis seems to be on the 'doing' aspect of research. However, this focus on 'doing' has justified a separation of skills and content in many curricula. At FASoS, for instance, skills courses run parallel to content courses, but are separated. Over the years, with changing course coordinators, the disappearance of planning groups, and limited contact between course coordinators, a loss of harmonisation has taken place in certain programmes and a course dislocation is sometimes visible between paired skills courses and content courses. Student course evaluations also show that students often do not understand the relationship between the skills course and parallel content courses and how the acquired skills should be transferred to content courses.

There is a debate in the field of education on merging skills and content. On the one hand, some academics argue that research skills should be integrated with disciplinary content teaching to allow for a direct application and better understanding of research in its proper context. On the other hand, some call for an approach to teaching research methods separating them from any disciplinary content to promote interdisciplinarity and transfer of research methods from one field to the other. This dichotomy is key to understanding the issue of teaching research skills as: "students who take more than one discipline-based research methods course are often frustrated by overlapping curricula, but students in cross-disciplinary courses may struggle to relate their training to any substantive discipline" (Wagner, Garner & Kawulich, 2011, p. 84). In theory, this struggle should be offset by the PBL model, since "instead of learning small parts piece by piece, PBL emphasises the integration of knowledge and skills" (Torre et al., 2016). It should therefore be an educational priority to reconsider the links between skills and content in PBL curricula by offering a range of options to merge skills and content (from integrated content and research courses to separated research skills courses that respond to content courses). This should enhance deep learning, a very important aspect of research courses. As Torre et al. (2016) highlight: "A surface approach to learning has typically been defined as an intention to reproduce content, with learning processes

characterised by rote learning and memorisation. A deep approach to learning has been described as a student's intention to understand content together with the processes of relating and structuring ideas, looking for underlying principles, weighing relevant evidence, and critically evaluating knowledge" (Torre et al., 2016). PBL has the potential to enhance deep learning (if applied throughout the whole curriculum). But for this to be true, teachers need to make sure the teaching environment promotes deep learning.

1.2 The benefits of merging skills and content

This section scrutinises the benefits of merging skills and content. It focuses on aspects specific to PBL: learning as a constructive, self-directed, contextual, and collaborative process (Dolmans, 2005).

1.2.1 Learning as a constructive and self-directed process

For John Dewey, education begins with the curiosity of the learner. Participation is essential in the educational process. Dewey argues for institutions to offer "flexible readjustment" (2008 [1916], chapter 7) to address a variety of learners. To him, education is an exchange between learner and teacher (2008, chapter 12). Based on Dewey's ideals, constructivist approaches argue for individuals *constructing their own knowledge* from experience (Hein, 1998, 1999). Hein offers a synthesis of models of educational theories. Constructivism is placed in the quarter where knowledge is constructed by the learner personally and socially and where the learner him/herself constructs that knowledge by making new connections.

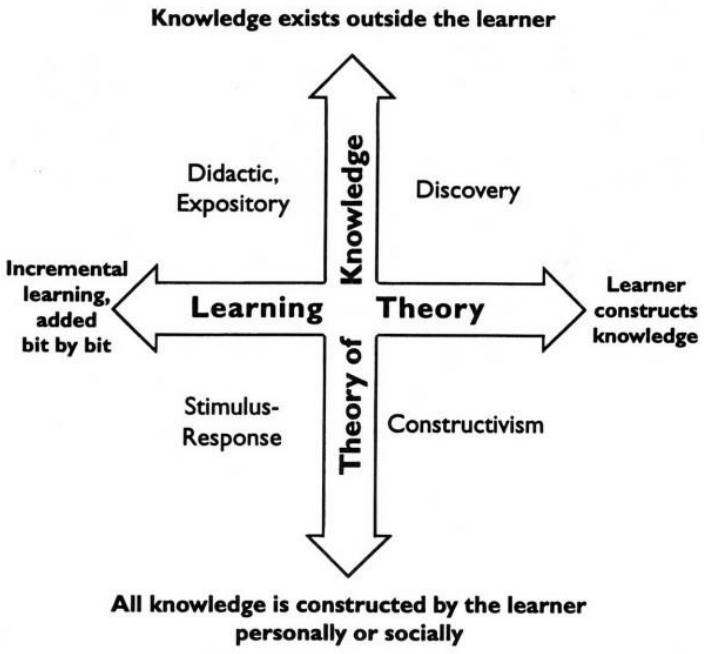


Figure B Model of Educational Theories (Hein, 1998, p. 25)

Simons and Elen reinforce the place of research in the knowledge production process as to them "research as a process of knowledge construction, emphasises learning" (Simons & Elen, 2007, p.623). As Castley notes, this constructivist position is especially true for "higher levels of learning, such as application, integration, and synthesis, the articulation of problems and their elegant or efficient solutions" (Castley, 2006, p. 26).

PBL is a constructivist approach. In the PBL context, learning is perceived as a constructive process. The elaboration process is emphasised through discussions, debates, etc. This is particularly put into practice in research activities such as seminars, workshops and interactive lectures as well as during expert meetings.

In the constructivist and PBL perspective, the learner is in charge of his/her own learning. Learning as a self-directed process encourages students to play an active role in the content of the course and direct their learning process. Tutors are perceived as facilitators in real-life research projects, moot court, role play and workshops. Furthermore, students are given much freedom regarding the topics of research throughout the programme (for presentations, written assignments and thesis topic for example). As is noted by Savery: **"**PBL is an instructional (and curricular) learner-centred approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem" (Savery, 2006, p. 12). As such, PBL should be ideal for teaching research and merging research skills and content education.

From the viewpoint of learning as a constructive and self-directed process, a few aspects stand out from literature:

- It is important to facilitate the elaboration process (an essential process in the constructivist perception of learning).
- To achieve this elaboration process the linking of diverse knowledge fields (skills & content) is key to the knowledge production of students.
- The freedom of choice (within parameters) in terms of topic of research topics and research methods is paramount to insure a minimum amount of student directedness in the research process.

1.2.2 Learning as a contextual process

PBL is a contextual process, which demands that learning takes place in meaningful contexts. Consequently, the link between content, skills, and real-life situation is key to efficient learning. Active experimentation and concrete experience are key steps in the learning process to ground the learning experience. This provides the students with higher rates of motivation and depth of understanding. Learning as a contextual process is embodied in teaching through real-life situations, role play, moot court, site visits, field trips, expert meetings and link to internships for example.

Looking at learning as a contextual and active process, literature emphasises:

- The importance of context to enhance concrete experience and meaningful learning.
- The importance of active experimentation in the learning experience both for motivation, transferability of research skills to the real world (i.e. employability) and anchoring learning. Room needs to be made for formative assessment that allow for this active experimentation.

1.2.3 Learning as a collaborative process and social learning

PBL is known to promote learning as a collaborative process. This is underpinned by social learning theories. To Wenger, learning is a social experience. He bases his concept of learning on 'communities of practice'. While his concept applies to a broad range of practices, it is particularly well suited to tertiary education communities rallying around research. To him, the basic

components of learning are identity, community, and practice. The kind of learning covered are learning as doing, learning as belonging, learning as becoming, learning as experience. To Wenger, "learning happens in the relationship between the social and the individual" (Omidvar & Kislov, 2013, p. 271). Therefore "students should become members of academic communities of practice" (Elsen et al., 2009, p. 70). When students feel part of a social group, their learning can develop and improve greatly (Healey, 2005).

In that perspective, it is important for teachers to put forward the commonalities between research and teaching (Brew & Boud, 1995). As "a common element shared by teaching and research - a concern for learning" (Brew & Boud, 1995, p. 261). It is also key to demystifying research (Murtonen & Lehtinen, 2005), so students do not think research is for special people with special skills and do not cultivate an image that is unattainable. It should be made clear to students that "scientific knowledge emerges from a nexus of interacting people, agencies, materials, instruments, individual and collective goals/interests, and the histories of all these factors" (Murtonen & Lehtinen, 2005, p. 219). In that framework, researchers should be presented "as experienced learners" (Brew & Boud 1995, p. 271) and as part of a community of practice. Furthermore, matching staff research interest with teaching has been shown to be beneficial in such cases (Castley, 2006, p. 24).

The lack of agreement on what research is, should be made clear to the students, exposing them, for instance, to Brew, who identified four conceptions of research held by senior researchers – the domino conception, the layer conception, the trading conception and the journey conception – (Brew, 2001). For a community of researchers to be built, the research of the teacher needs to become apparent and be incorporated in the teaching. The perception of student's courses is shown to be greatly improved by integrating the teacher's research into the framework of the course (Jenkins et al., 2003, p. 15). Learning as a collaborative process creates a mutual and shared understanding, working towards a common goal is promoted in tasks such as our real-life projects or group assignments (hands-on projects, reports, presentations, etc).

Regarding learning as a collaborative process anchored in social learning, the literature emphasises the importance of:

- Putting forward the commonalities between research and teaching;
- Demystifying research;
- Putting forward the idea of a community of researchers (and show the diversity of research practice within a field);
- Incorporating staff's own research.

Annex III: Chapter 2 – Case studies (Faculty of Law and FASoS)

These case studies represent best practices from Law and FASoS. The cases were also selected as best practices for Chapter 1, as both cases demonstrate interesting strategies for merging content and research skills. For the topic at hand, these case studies vary in terms of scale and merging approach. Additionally, both cases present different teaching methodologies and assessment formats. The case studies are based on information from the course books, course evaluations interviews with coordinators and focus groups with students and tutors.

A full integration between skills courses and content courses (FASoS case study) is not always possible due to administrative and pedagogical constraints. The Law case study shows how tutors can solve this issue by offering relevant skills at the right moment in the curriculum.

Case study 1 - Faculty of Law, European Law School (first-year skills courses)

1.1 Introduction

This case study will discuss the two first year Skills courses in the *European Law School* curriculum. In particular, it shall address the specific problems arising in the context of Skills education in that curriculum, as well as the efforts made and experiences obtained over the past three years in redesigning the two first Skills courses with a view to adapting them to the content and nature of the *European Law School*.

1.1.1 The European Law School bachelor programme

Since the 1990s, the Faculty of Law offers the bachelor's programme *European Law School* (ELS), or commonly referred to as the *European Law School classic* (ELS classic). The programme is currently being phased out and will end with the graduation of its current students. ELS classic was a Dutch law programme, albeit with a strong focus on European and international law. Its curriculum largely overlapped the curriculum of the bachelor's programme R*echtsgeleerdheid* and resulted in the same set of qualifications. Consequently, ELS *classic* mainly attracted Dutch and Dutch-speaking Belgian students, supplemented by only a couple of students with other nationalities.

Since 2006, the Faculty of Law offers a new European Law School bachelor programme, which, as the first LL.B. programme at Maastricht University, is taught entirely in English. Over the first ten years of its existence, ELS has become by far the largest programme at the Faculty of Law, with a yearly influx of more than 400 students and a student population comprised of 58 nationalities (September 2016). The international character of the ELS programme is also reflected in its teaching staff, as 41% of the faculty's academic staff come from abroad (UM Website).

The curriculum of European Law School differs significantly from that of other bachelor programmes in law, as it does not teach the law/legal system of a specific country. It rather takes a comparative and conceptual approach to its subject. Consequently, students do not become experts in any national law, but are broadly educated lawyers with the ability to operate in and familiarise themselves quickly with different legal systems. Additionally, ELS graduates have profound knowledge of both the European Union law and international law. The fact that ELS differs considerably from traditional legal education programmes (i.e. the end terms and the comparative and transnational approach), combined with the UM-wide adherence to problem-based and

practice-oriented learning, leads to several additional aims which should be considered in in any attempt to design skills education for this programme and to embed it in the curriculum in a meaningful way.

For instance, ELS does not – or not without additional qualification – prepare students for a 'classic' legal profession (e.g. lawyer, public prosecutor, judge, or notary) nor for a job in any specific legal system. This 'disadvantage' should be compensated by ensuring that graduates are not only equipped with knowledge that 'classic' law graduates do not have (e.g. knowledge of other legal systems), but also with a set of abilities that gives them an advantage on a broader, more interdisciplinary, more competitive and less secure labour market. Therefore, it is important that skills training in a programme like ELS includes and emphasises, in addition to classic legal and research skills, 21st-century skills'.[15] Such skills include digital technology and information literary, critical thinking, creativity, flexibility and adaptability, collaboration, communication, as well as social and intercultural skills (Dede, 2009, p. 21).

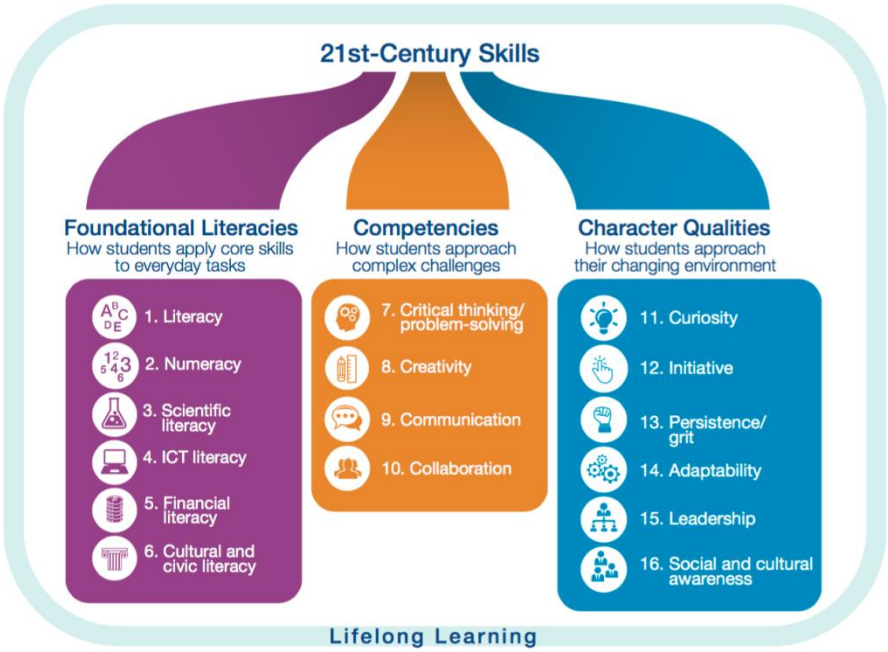


Figure C 21st-century Skills (World Economic Forum & The Boston Consultation Group, 2016).

With a history of jurisdiction-oriented studies, law faculties have always faced the problem of trying to expand legal knowledge and familiarising students with multiple other legal families or legal cultures. The European Law School tries to solve this problem by creating an interdisciplinary comparative approach to the study of law. ELS graduates have the tools to adapt to an ever-changing landscape of jobs that might require a legal component. For this purpose, students are trained in the classical skills required of a legal practitioner, and are additionally equipped with 21st-century skills: "To thrive in the 21st century, students need more than traditional academic learning. They must be adept at collaboration, communication and problem-solving, which are some of the

[15] Definitions and lists of these skills differ, for an overview see Dede (2010).

skills developed through social and emotional learning (SEL). Coupled with mastery of traditional skills, social and emotional proficiency will equip students to succeed in the swiftly evolving digital economy" (World Economic Forum & The Boston Consulting Group, 2016, p. 4).

Figure D Teaching 21st-century Skills (World Economic Forum & The Boston Consultation Group, 2016).

ELS has become by far the largest programme at the Faculty of Law, with a yearly influx of more than 400 students and a student population comprised of 58 nationalities. Given the diversity of student backgrounds, and the diversity of vision regarding the future of legal education, the programme's curriculum faces some important challenges which are further elaborated below. The main difference between a typical law school programme and ELS is the way in which graduates access legal professions. Becoming lawyers, notaries, judges and other typical roles for the classical law graduate entails accessing liberal professions that are very much nationally guarded by high eligibility criteria. In the Netherlands, this translates into a need for graduates to have what is called *civiel effect*, which renders bachelor's students to join legal traineeships at law firms upon completing a master's degree. One of the authors exploring the pressure of bar associations to hold on to such eligibility criteria is Richard Susskind. In his view, a classical projection for the need of legal services does not do justice to the ways in which the legal service landscape is changing. In other words, students trained in today's legal mentality might not be fit to fulfil the roles of tomorrow's law scene. This is of course up for debate, as there are others who do not agree that the legal professions should concede to external pressures, as doing so would entail losing essential qualities embedded in law studies.

Whether or not Susskind's predictions are accurate, students have been giving us constant feedback on employability and skills training. Students often contact the coordinators of the skills courses during their internships when they must apply the knowledge these courses taught them. Two similar examples: a third-year German student doing an internship at a law firm in Germany, as well as a second-year Finnish student doing her internship at a consumer organisation in Finland. Both students expressed that research, drafting contracts and making translations have been exactly the

tasks they received in practice, and they felt very well equipped to handle them in the light of their previous skills training.

1.1.2 Common features of the setup

It follows from the above that that skills training – including but not limited to teaching research skills – is an important component of the ELS curriculum. However, several structural challenges and constraints must be considered, which can be summarised as follows:

- **Internationality of the programme**
  - *Wide range of different background of students*: while its internationality is perceived as one of the key assets of ELS, it also presents the great difficulty of having to answer to the educational expectations, needs, and levels of existing knowledge, skills, and experience of students from a very wide range of backgrounds.
    - Different education systems (secondary school): students from different countries (and social backgrounds) enter ELS with very different educational backgrounds, ranging from school systems whose *leitmotifs* are frontal teaching and reproductive learning to systems which focus on critical thinking, creativity, and participatory learning. Designing skills education in such a way that it caters to all students of the programme is impossible; finding an adequate middle ground on which to base our skills education is a major challenge.
    - Language I: the language of instruction in the ELS programme is English, but few students and staff are native speakers. Moreover, to this date, there is no entry requirement for new students regarding their level of English (e.g. TOEFL or IELTS). As a result, the level of English of new ELS students ranges between native and substantially deficient. This, along with the teaching staff's varying proficiency of the English language, poses another major challenge to the teaching of both skills and content.
    - Language II: Neither the UM, nor the Faculty of Law have conclusive policies or guidelines regarding the relative importance (and the definition) of correct and adequate use of language by students, for exams, papers, assignments, bachelor's and master's theses and other written products, presentations, etc. Among ELS teaching staff, debates as to whether or not the use of language should have a bearing on grades and other forms of assessment has been inconclusive. With opinions ranging from "no, or very little importance" to "very high importance", this is a matter of strong beliefs. Since language is often perceived as the more "formal" or "technical" aspects of education, and since the latter are considered a matter of skills courses, skills education and those responsible for its design must position themselves on this issue, coordination is however, often challenging.
    - Cultural diversity: a challenge that must not be underestimated is posed by cultural differences among students, students and staff, and among staff. While this cultural diversity is a tremendous asset, as it is liable to enhance

cross-cultural communication skills of everyone involved almost *en passant*, it also creates challenges that must be considered by tutors and coordinators (clarity of instructions, prevention of cultural misunderstandings of all sorts, political correctness, prevention of inadvertent offensiveness, etc.).

- **Structural and logistical constraints**
  - Staffing: whereas a steady increase of the number of new ELS students creates staffing requirements that are sometimes difficult to meet, this is *a fortiori* the case for skills courses.
    - Interdepartmental staffing: since skills courses are not (and should not be) attached to a legal discipline or department, the teaching staff comes from different departments. However, while the importance of skills education is recognised at faculty-level, the organisation of teaching staff by discipline into departments (*capgroepen*) often means that skills courses take a low – and late – position on the staff distribution priority list of a given department. Accordingly, the teaching team for a skills course is often known comparatively late in the year. This, in turn, makes it difficult to establish teams of 'expert skills tutors' over several years, or to engage in measures of training, team building, etc. that might improve the quality of skills courses and enhance staff sympathy towards them (see below).
    - Staff aversion: scientific staff are often most interested in (and best at) teaching that is related to their own field of research, which is regarded as ideal by most staff. Since skills courses do not offer this link between staff's own research interests and teaching, teaching skills courses is often held in low regard among staff. In addition, as a result of frequent staff fluctuation in skills courses (many new teaching staff each year), the workload for coordinators and teaching staff (preparation, tutor instructions, extra work due to staff insecurity regarding course content and methodology, etc.) remains high.
    - Staff qualification and abilities: teaching methodology differs between 'content teaching' and 'skills training'. While the teaching skills of a member of the academic staff are of course highly relevant and important in 'content courses', they are even more so in skills courses. Hence, even though all academic staff are expected to *have* the skills taught in ELS, not all staff are equally adept at teaching in skills courses and this difference in teaching abilities between staff members is more significant in these courses.
  - Rooms: because of a shortage of rooms and limited availability of teaching staff, skills courses are taught in double-sized groups at ELS (max. 28 students). This constitutes a constraint on interactive teaching, individual feedback, etc.
- **Student perception**
  - Due to the small number of ECTS awarded for skills courses (four ECTS over two course periods), skills courses run the risk of a negative and low priority student perception. This adds urgency to the need to (a) embed skills education in the general curriculum in a meaningful and relevant way, (b) communicate the

relevance and use of skills education well to students, and (c) make skills education intrinsically attractive to students.

Some of these issues and conditions are, to a certain extent, present in all programmes offered at UM, while others are more specific discipline-specific or result from the approach that ELS takes to teaching law. It follows, therefore, that neither the problems nor the solutions described in this case study can easily be transposed to other programmes.

1.2 Skills: Legal Research & Reasoning

Skills: Legal Research and Reasoning is the first skills course of the first year in the European Law School (ELS) bachelor's programme. The course lasts from September to December (block periods 1.1 and 1.2).

1. Given the particularities of the setup, what skills do you focus on in the course?

- An introduction to the problem-based-learning system (student-led group discussions, self-study, etc.)
- Legal research
    - Working with legal information
        - Finding legal sources
        - Assessing the quality and use of various types of sources/information
        - Using sources in papers/research projects
    - Introduction to legal academic writing
        - Setting up a research project, developing a research question
        - Structuring a research project/paper
        - Writing in appropriate style
- Legal reasoning
    - Introduction to (formal and informal) logic
    - (Legal) argumentation, assessing the quality of arguments
    - Oral argumentation and public speaking/debating
    - Working with legal rules
        - Rule analysis
        - Application of legal rules to fact patterns and cases
        - Writing simple legal opinions
- The last week of the course is devoted to applying the learned reasoning techniques in the (exams of) parallel courses

The principal starting points in the development of this course in its current form were:

- The skills required to succeed in the courses of the first year of the ELS curriculum
- The necessity to structure and sequence the elements of the course in such a way that it serves the parallel 'content' courses:
    - Legal information literacy, working with legal sources, and legal academic writing are taught in block period 1, thus preparing students for the written assignments due in period 2.

- The 'reasoning' element of the course is taught in period 2, working with relevant examples from the parallel courses of that period, in which the same legal reasoning skills are required for the first time in the curriculum.

2. Why did the course need to be built/redesigned?

In the years prior to the redesign (before the academic year 2013/14), this skills course was one of the worst-evaluated courses of the curriculum. The following elements were identified as primary causes for the negative evaluation results:

- A (perceived and partly actual) dissociation of the skills taught in the course from the tangible requirements in other courses at the same stage of the curriculum: the course 'Skills Training for Lawyers' aimed to teach students a range of skills required both for law students and for graduates practicing law. However, recognising the relevance of (part of) the skills taught in the course required a degree of awareness, perspective, and initiative which students at this stage of the curriculum did not (yet) have.
- A lack of coordination between this course and the parallel and subsequent 'content' courses of the curriculum, leading to a (partly merited, but widely held) sense of irrelevance of the skills taught in this course.
- The failure to communicate and explain the aims, tenets, and methods of the course to students clearly and in an appropriate manner.
- A selection of content that only partly reflected both the capacity and the needs of beginning students.

The redesign followed a combination of three strategic elements:

- First and foremost, improving communication between students and course staff:
  - By explaining the general content, the aims, the methods, and the order of individual elements of the course more clearly, more often and through a variety of channels (course manual, lectures, other outlets such as Facebook groups);
  - By increasing the number of contact hours through the introduction of lectures, part of which are consistently interactive, giving staff the opportunity to respond both immediately and structurally to questions and needs of students which staff had previously (at least in part) remained unaware of;
  - By introducing, with the debate moot court, a tangible, hands-on element of application of the skills learned in the course.
- Second, a 'streamlined' selection of skills taught and improvement of the course structure:
  - This entailed a critical review of all elements of the course, leading to the abandonment of elements (for instance an analysis of the theory behind google searches) without immediate practical use for students in their curriculum.
  - At the same time, those elements which are of immediate use in the curriculum (for instance practical exercises on literature searches through various relevant portals (from google to Westlaw or the UM library systems) are strengthened
  - Various parts of the course were rearranged to match and facilitate the requirements of the parallel 'content' courses as best as possible.
- Lastly, the course's assessment and feedback system was completely overhauled:

- Where the course had previously featured several mandatory written assignments, only part of which could be graded and/or returned with feedback (a major cause of frustration), the number of written assignments was reduced to two large exam assignments, to which a multitude of guided practical in-class exercises (with immediate in-class feedback) would gradually lead up.

3. Course-specific settings

The course features a structure of weekly tutorials (14) and bi-weekly lectures (7). The tutorials are true 'practicals', used primarily to provide students with the opportunity to engage in in-class exercises under the guidance of the tutor, who is also able to provide feedback. Since the size of tutorials is – unfortunately – very large (with 30 students, twice the number of students of a regular tutorial), the course does not follow a 'classic' PBL-pattern, but instead works with pre-defined tasks, assignments, and learning goals.

Lectures are used:

- To explain the usefulness of the skills taught in the respective phase of the course and their place in the ELS curriculum: what do we do this for, and why now?
- To explain the practical tasks and to provide examples and background information (with a strong focus on application but little theory).
- To respond to students' questions and, where necessary, provide additional guidance and explanations in a central place (which is useful in a student cohort of now over 400 first-year students, and a growing number of often inexperienced tutors teaching the course).

4. Course-specific issues

Many of the issues this course faces have already been detailed above. However, the most fundamental issues, in a nutshell, are the following:

- An extremely diverse group of students with a very wide range of pre-existing skills levels, an enormous cultural diversity, including tremendous differences in students' command of the English language;
- The need for strong coordination with the parallel and subsequent courses of the ELS curriculum;
- Issues arising from the perception, on the part of students, that skills courses are non-essential and the corresponding low levels of intrinsic motivation – a problem that is endemic wherever skills are taught separately, especially where skills courses yield a comparably low number of ECTS. While all skills courses face this problem initially, it is also relatively easy to overcome. Still, this usually requires efforts often found unnecessary in 'content' courses, whose content is both more 'interesting' and hence more accessible materially (to most students) and whose yield in terms of ECTS makes them more 'important', especially in the first year of the curriculum, where students live under the threat of the negative BSA and allocate their efforts accordingly.

5. How does the course relate to the overall curriculum?

First, the course caters to the needs of the ELS bachelor's student by choosing as a starting point and guiding thread the skills required to succeed in this programme in general. This is reflected in the

choice of skills taught, their relative emphasis in the course, as well as the sequence in which they are taught.

Second, wherever possible, the course works with scenarios and materials from the parallel courses (for instance, the topics for the written paper that constitutes the first exam assignment are chosen from the manual of the parallel course Introduction to Law; in the second course period, many examples for the rule analysis and case solving exercises are taken from the parallel courses Comparative Government and Comparative Contract law.

6. In what way does the course integrate with student life?
For this question, please refer to the second case study on the course *Skills: Introduction to Comparative Law and Legal Translation*. Apart from the use of the peer coach system, which Skills: LR&R does not use, the answer is very similar. In addition, it may be pointed out that many students report (usually at a later moment in their study) that this course has impacted their personal development rather greatly, through the development of generally essential skills like analytical thinking and (importantly!) public speaking, but also through intensive personal interaction with other students in the skills groups.

7. Does the course work with student tutors and if so how?
This course is usually taught by both multiple staff tutors (3-4) and several student tutors. Experience shows that student tutors are ideally suited for teaching this course, provided that they have the necessary pedagogical skills (more important in skills courses than in others) and motivation. While the material content of skills courses is not particularly 'difficult' for advanced students who have long mastered the relevant skills themselves, skills courses are usually difficult and often little attractive to teach for scientific staff (problems include that they do not relate to the field of expertise of any scientific staff, they require intensive preparation, they are more pedagogically intensive than regular courses, *capgroepen* or other relevant administrative units of faculties may not wish to allocate experienced teaching staff to skills courses, since they do not contribute to their content 'profile'), skilled student tutors often have exactly the right mix of the proximity to first-year students necessary to understand their needs and issues and the experience necessary to understand the importance of the skills taught in this course.

Wherever the student tutors teaching this course have been selected specifically for a stills course and possessed the necessary pedagogical interest and skills set, our experience with student tutors has been nothing but positive, often much better than our experience with staff tutors unaccustomed to teaching skills.

8. Does your course use multimedia tools, and if so, how?
This course makes use of lecture recordings and, in the sections on research and information literacy, teaches the proper use of digital media. Tutors of the course also regularly interact with students in the ELS Facebook group of the relevant year Apart from this, the coordinators of this course have thus far made a conscious choice not to broaden the use of multimedia tools as media of instruction. They are, however, open to broadening their use in the future.

9. Assessment and grading model
This course features two exam assignments: a paper, a research paper, to be handed in at the end of the 'research' phase of the course (period 1) during which it is gradually prepared, as well as a take-

home exam at the end of the 'reasoning' phase, which reflects the practical skills learned during that period. The final grade of the course (0-10) is calculated based on the average of those two exam assignments. However, since the two exam assignments test very different skills, both must be passed in order to pass the course. A bonus point is added to the grade of the weaker one of a student's exam assignments where this student as performed well on the courses debate moot court.

In the past, this course used to be graded on a fail/pass/good basis. According to extensive student feedback received during these years, the absence of 'real' (numerical) grades for this course has contributed to its perception as a secondary curriculum item. Moreover, the coordinators of the course have chosen to introduce numerical grades because, on the one hand, they give the opportunity for a more accurate and differentiated assessment of a student's work and, on the other hand, reward outstanding students with a high grade that contributes to their GPA (relevant for a possible degree with distinction), while the situation of a failing student remains unchanged.

10. Is your course responsive to student perceptions during the running of the course, and if so how?
Yes. The entire overhaul of the course – including the introduction of the debate moot court, but also the switch to a numerical grading system – was initially driven by the desire not only to offer a highly relevant first segment of the skills education of a changing and growing student population, but also to respond to student feedback. While the major overhaul of 2013/14 has resulted in a strong and permanent increase of evaluation results, the coordinators continue to improve the course (e.g. by means of the introduction of a custom-published book by OUP in 2016).

Moreover, it is an essential part of the philosophy of this course to remain responsive to the (very different!) needs, divergent skills levels, and wide range of issues of our first-year students also during the course. This philosophy is implemented through interactive lectures, an emphasis on individual feedback, and the very approachable and flexible body of teaching staff.

1.3 Skills: Introduction to Comparative Law
Skills: Introduction to Comparative Law is the second skills course of the first year (European Law School bachelor's programme), ranging from February to June (block periods 1.4 and 1.5). Some of the questions used in the framework below will also touch upon the opinions of two students interviewed for this project, as well as one student-tutor (based on the focus group).
1. Given the particularities of the setup, what skills do you focus on in the course?

- **Legal translations** - developing the necessary skills and knowledge to be able to understand legal documents properly and translate them from one language into another.
- **Comparative legal research** - writing a legal paper on a European private law topic as part of the moot court exercise. The gained knowledge can be used for any other course with a research/legal writing component, as well as for the bachelor thesis.
- **Presentation skills: moot court** - synthesising issues arising from a fictitious case and formulating legal arguments (public speaking and argumentation training).

In other terms, as highlighted by the World Economic Forum classification, this course touches upon the following competences and character qualities:

- critical thinking/problem solving;

- creativity;
- communication;
- collaboration;
- legal writing;
- translating;
- information management;
- persistence;
- adaptability;
- social and cultural awareness.

When asked what skills they remember from the course, students mentioned the following:
Student 1: "I learned how to find legal, academic sources and what kind of sources we, as lawyers, need to be using in our pieces of writing."
Student 2: "Database researching, IRAC and introduction on how to analyse cases."

2. Why did the course need to be built/redesigned?
Together with the coordinator of the first skills course of the first year (Sascha Hardt), we have triggered a reform of the skills courses in the European Law School bachelor's programme. Our goal has been to strike a balance between the normative framework of teaching these courses (e.g. keeping the academic level of research which is mandated by university studies) and the more practical needs that students voice (e.g. practice-oriented skills they might need in the future). Moreover, this reform was also justified by the fact that skills courses used to have a rather unfortunate reputation. Exclusively focusing on academic skills in these courses has shown a disconnecting effect vis-à-vis students, as they lost motivation for performing tasks they did not understand the value of. We managed to tackle the motivation issue by adding gamified elements in the courses: for example, Skills (Introduction to Comparative Law) added a moot court focused on comparative law and international arbitration.

It must be mentioned that these reforms have been a success by the Faculty of Law, as both coordinators of the skills courses (Sascha Hardt and Catalina Goanta) have been awarded the Faculty Education Prize for their results in this reform.

3. Course-specific settings
The course tries to showcase the varied aspects of comparative law through different types of activities. The fundamental elements of the course are its lectures, literature, tutorials, assignments, screencasts and simulations. Every single component is designed to convey information in a distinct way:

- The lectures provide insights into comparative law theory and methods;
- The prescribed literature was selected with a view to making students understand comparative law from a general perspective – it is background reading for the course in its entirety, and it is not part of the evaluation, but rather to help students understand the context of the course activities;
- The tutorials are there to engage in interactive exercises and team-work: learning by doing;

- The assignments (comparative law questions, legal translations and alternative assignments) have been chosen to cater to different preferences and ensure a diversity of fields (private/public law, etc.);
- The skillscasts allow students to gain a straightforward view of the course and revisit the instructions in case of uncertainties;
- During the simulations (creativity exercises or the moot court competition), role-play is used to engage in creative thinking and develop improvisation skills in a constructive way.

Moreover, the teaching team strongly believes that great legal skills come with consistent practice. For this reason, we have adjusted the 'mastery learning' educational philosophy to the needs of our course. According to this theory, supported (among others) by Benjamin Bloom[16] and Salman Khan[17], reviewing knowledge in a student's own pace helps attain mastery in that particular knowledge.

In a nutshell:

- students learn differently;
- students learn in a different rhythm.

The assignment system has thus been designed to take these differences into account: students have the possibility to retake assignments, to improve their skills and achieve mastery in comparative legal research and elements of legal translation. However, for this option to be available, students need to take the original assignments, and not solely opt for the master assignments.

4. Course-specific issues

Given that our programme is highly international, students will have proficiency in very different languages, which entails that translation exercises need to be very abstract. Moreover, as the course is scheduled in the second semester of the first year, students have little to no pre-knowledge and must soldier on with finding their own solutions, something that is also prescribed by the root principles of our pedagogical approach (PBL). These two aspects (the abstract degree and lack of pre-knowledge) lead to a lot of confusion among students, who tend to send dozens of e-mails to clarify their tasks. The need for such micro-feedback also increases the challenges for the coordination of the teaching team.

Like many other programmes offered at UM, European Law School has opted to offer separate skills courses instead of fully integrating skills education with the curriculum's content. While it may be clear that this choice gives rise to or intensifies certain problems, like the fact that students are oftentimes less enthusiastic about skills courses than about 'content' courses (or at least that a similar level of enthusiasm is harder to achieve) and the fundamental issue of coordination between courses that function as separate organisations, we treat the organisational split between skills and other courses as a given institutional fact.

[16] Bloom's taxonomy is a taxonomy of educational objectives. For more on this see: https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/
[17] https://www.khanacademy.org

5. How does the course relate to the overall curriculum?
To our knowledge, skills courses have always had a problem in terms of choosing how to integrate substance into the exercises used within their ambit. Two main trends have been in place throughout time:

a) Not controlling substantive aspects – allowing students to research and write on topics of their own choice, thereby not limiting the fields of law available to the students;
b) Controlling substantive aspects – limiting the fields of law/topics that students can get engaged with during a skills course.

For *Skills: Introduction to Comparative Law*, the planning group decided to focus on option b). The positive aspects of this choice can be enumerated as follows:

- It allows for the teaching staff to have ownership over the content of the course;
- It allows the course planning group to choose a topic that the students have already dealt with in prior periods and have pre-knowledge on (in our example, contract law);
- It allows students to go more in depth with their understanding of a topic they have pre-knowledge on;
- It permits tutors to assess the acquisition of skills while controlling for the substantive knowledge.

In a nutshell, *Skills: Introduction to Comparative Law* builds upon *Skills: Legal Research and Reasoning*, as well as *Comparative Contract Law*. Moreover, it uses the same case analysis method (IRAC) that is prescribed throughout the curriculum, and students get to use it when solving a legal fictitious case for the moot court activity.

When asked how skills courses relate to the curriculum, students reported the following:
Student 1: “I have learned to how to format a paper, how to write an essay, and we had to do this for other courses as well.”
Student 2: “The skills we learned kicked in the latter part of the first year.”

6. In what way does the course integrate with student life?
We have developed a special extra-curricular component of this course in the form of a peer-mentoring programme. In the first year, the 13 peer-coaches played a fundamental role in guiding the 54 teams through the drafting of the memorandum and the preparation of their oral pleadings. The second year we did this, we had 22 peer-coaches catering to 92 teams. This year we have 36 peer-coaches for 90 teams.

We believe in peer coaching because apart from anything else, it offers us all the opportunity to become a community: volunteering to help younger students and share with them your experiences and advice makes our entire programme special: sharing truly is caring. Being helped when you need it and giving that experience back to persons who need it is a fantastic way of personalising the time spent in university.

In a nutshell, being a peer-coach benefits students immensely. Being able to coach a team will give volunteers insights into serious elements of team management and communication skills, and provided that the tasks detailed below are met, will also give them the opportunity to obtain:

- A course-based Peer Coaching Certificate to attest the practice of skills as exemplified above;
- A LinkedIn recommendation issued by the coordinator of the bachelor's programme (Bram Akkermans).

First year students are incredibly motivated, fun, and have very diverse inclinations and backgrounds. With student-help such as peer-coaches, they will be able to fully express their potential. Moreover, we have seen in the past that the teams' mentor coaches get so much more from the experience than being active in the course: they benefit from the knowledge spill over that occurs when they encounter more experienced students.

When asked if skills courses create a community of learning, students reacted as follows:
Student 1: "Tutorials were bigger and that was a chance to meet more people in the Law School."
Student 2: "Skills courses were a rather more relaxed environment that did foster a more collaborative community."

7. Does the course work with student tutors and if so how?
The course is usually taught by three to four tutors and two student tutors. Student tutors have been vital in the past, since they bring a very high motivation force to the course, and are a great bridge between what could be perceived as student reluctance and the awareness as to the actual practical importance of the skills obtained in the course. Working with student tutors also ensures the sustainability of a lot of the activities in the course (e.g. the peer-coaching aspect, etc.). Many tutors will not be available or willing to engage extra time in coming up with ideas or executing ideas for the general student population to become more excited about the course.

Student-tutor: "Having taken skills courses myself, I know that some staff members treat them differently because they think they are devoid of content. That's what I tried to make sure would not happen when I had to teach a skills course. These courses are important for future practitioners, and the sooner students realise this, the better they can build on such skills."

8. Does your course use multimedia tools, and if so, how?
As this course is a first-year bachelor's course (N=300) that focuses on three different skills categories - legal translation skills (developing the necessary skills and knowledge to be able to understand legal documents properly and translate them from one language into another); comparative legal research (researching and writing a legal paper on a European private law topic as part of the moot court exercise also included in this course); and public speaking skills (synthesising issues arising from a fictitious case to formulate and present persuasive legal arguments) - teaching such a course comes with several major limitations that have already been touched upon.

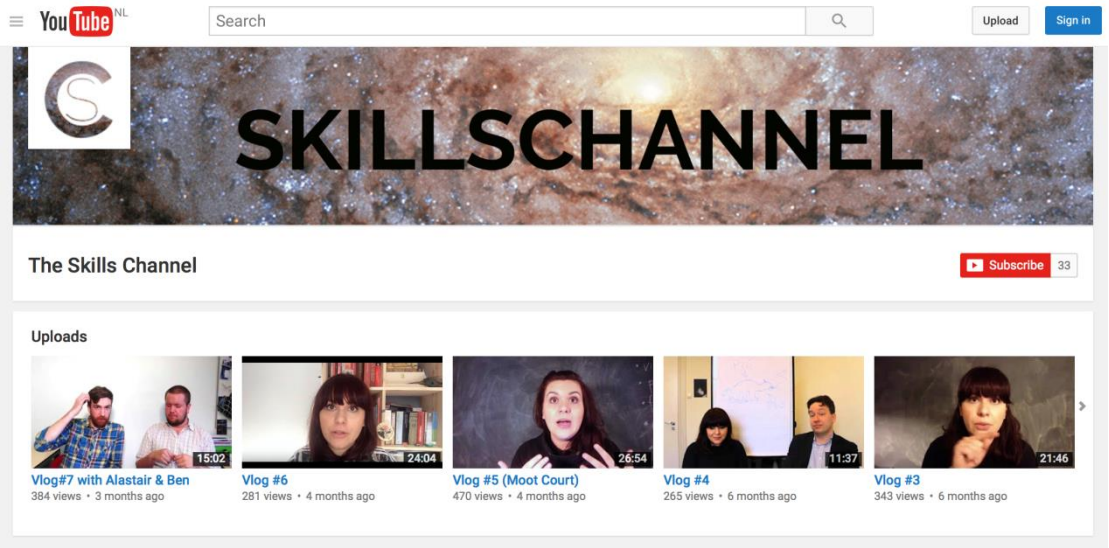


Figure E The Skills Channel (YouTube)

To facilitate engaging students in tech literacy as well as solving some coordination issues within the course, we tried to match skills courses in this programme with contemporary demands such as on-demand tailored feedback, online engagement and community-building. The starting point of this project has been to create an information flow that allows students to ask whatever questions they might have with respect to their assignments, without clogging their tutors' inboxes and creating repetition in answers. To do so, we have set up a YouTube channel (TheSkillsChannel), with three goals: (1) to upload DIY screencasts with general course instructions ('Skillscasts'); (2) to upload vlogs answering questions gathered via our specially-designed Typeforms ('You ask we vlog'); (3) to disseminate DIY videos made with international professionals and alumni answering the question of what skills they use in their jobs ('Skills@Work').

IWIO evaluations (2016):
Student 1: "I LOVED the communication process and the encouragement of our tutors throughout the stressful period. For communication, this course is the best first year course."
Student 2: "I really like the inspirational passion and positive energy of most of the tutors in this course. They have been next to us always when we need any help or assistance, providing vlogs and other additional and very helpful information."
Student 3: "The idea of using YouTube as a medium of information is amazing. Student-friendly, and generally showing how much the tutors actually care about students."

9. Assessment and grading model
The assessment for this course consists of three assignments (two assignments in period 1.4 and one in period 1.5). The separate assignments are graded on a numerical scale and the final result is reflected in a grade on a scale of 0-10.

Two of the assignments are research assignments comprised of either the drafting of a contract, or the translation of a document. The third assignment is the (team) submission of a moot court memorandum. We added the moot court to the course to stimulate and engage the students in pushing their own limits while developing empowerment and passion for the topics they approached.

IWIO evaluations (2016):
Student 1: “Oral pleading was really nice and intense, it gave us the possibility to taste how it is actually to be a lawyer.”
Student 2: “I enjoyed the moot court and it was a wonderful experience. The Skills team was very engaging and helpful. They were available all the time to answer our questions and were constantly encouraging us.”

10. Is your course responsive to student perceptions during the running of the course, and if so how?
You ask we vlog has been our course’s answer to a perceived need of providing students with on-demand content during the running of the course. The goal of this initiative was to find and combine online platforms that could help us centralise, manage and optimise the process of giving feedback to students. Finding a way to give tailored feedback to each student interested in understanding their assignments and performing them well has been one of the corner stones of our course for many years, and it falls in line with other policies we have adopted therein. One such policy is for instance, the Khan Academy-inspired concept of mastery learning, which we translated in giving our students the opportunity to retake assignments, as repetition has proven to be of the essence for the acquisition of skills. For this reason, our idea was to create a system that would help students understand their assignments despite a somewhat abstract level necessary for this specific international batch, and keep their confidence and perseverance levels high, by showing the commitment of their tutors to giving them constant feedback. This system came to life through our vlogging idea (You ask we vlog).

1.4 Analysis of the case study
UM has had a history of dividing the curriculum into skills and content courses, probably due to its long-standing reputation of delivering hands-on education. On the one hand, this approach comes with difficulties that are triggered by the body of students and staff, as well as the actual curriculum setup. On the other hand, external factors exist as well. HBO-level degrees are now embracing fields like European law or European studies, and a question arises as to how exactly university degrees are to be distinguished from HBO degrees if they are too practice-oriented.

However, it must be emphasised – and this is the fundamental belief of the *Skills: Introduction to Comparative Law* planning group – that legal studies in general tend to be highly path-dependent and focus on classical skills as opposed to realising the true revolution sweeping legal professions by way of information technology developments. This being said, our course, together with the first skills course of the year, has welcomed the challenge of striking a balance between the skillset that lawyers are expected to have in any century, and combined that with a more revolutionary outlook as to what can be done with technology (we even included a Google Glass experiment in the course under the guidance of education and technology specialist Gwen Noteborn).

21st-century skills in legal education focus on tech literacy, which can directly affect the research process, as well as soft skills, such as public speaking, team work or communication skills. For this reason, to describe this course exclusively in research terms would be unfitting, and rather unnecessary in the light of the pedagogical framework we have put forth.

Facilitating the elaboration process
Our course focuses, in the case of the first two assignments, on ‘mastery learning’ to raise awareness within the student body as to their different learning features, as well as to give them an

opportunity to retake assignments and build on obtained knowledge and feedback (e.g. vlogs), so that they can practice task repetition and master the skills necessary behind a given assignment.

Linking of diverse knowledge fields (skills & content) and contextualising research skills
The course uses real life cases and setups (e.g. the moot court and the cases behind it), to give students the possibility to engage in simulations that raise awareness as to the skills necessary for becoming employable, as well as train them in these skills. Moreover, our course has also implemented videos with experts and alumni (Skills@Work) who show students in practice what kind of skills are necessary in a given workplace.

Giving students freedom of choice (within parameters)
There are several activities students have a lot of freedom to influence with their own choices: the language to use in translation exercises; whether or not to engage in mastery learning; choosing their own teams (for team exercises). However, it is important to keep the structure of the course and the actual tasks within the discretion of the planning group, for very clear pedagogical reasons.

Offering opportunities for active experimentation
The use of simulations in our course create a realistic framework in which students become aware of how their skills play out, and what they can do to improve them.

Demystifying research and creating a sense of a community of researchers
Using peer mentors and constant feedback, we aim to create a strong feeling of community and get involved as well as involve students in a friendly atmosphere that creates knowledge spill overs.

Case Study 2 - Faculty of Arts and Social Sciences

2.1 Introduction
Setting
The Faculty of Arts and Social Sciences (FASoS) takes an interdisciplinary approach to teaching and research. The faculty's international character is reflected in both the teaching staff (50% coming from abroad) and the student body (70% coming from abroad). These interdisciplinary and international aspects gave rise to some challenges regarding research skills training. Several of FASoS' programmes faced issues regarding the quality of final works during the accreditation process in 2015. This prompted an in-depth reflexion amongst the staff about the place of research skills in the curriculum and their integration in the long-learning line at both bachelor's and master's level. From this reflexion emerged the need to homogenise the research skills training in the programmes (e.g. what is meant by discourse analysis in different disciplines) as well the aim to strongly embed research skills within the curriculum.

The international and interdisciplinary setting has a lot in common with the Law Faculty case studies and is quite representative of the setting throughout the university.

The master's programme Arts and Heritage is an example of the efforts to homogenise and embed research skills training. With a yearly influx of approximately 50 students with 20 different nationalities, the levels of research skills at the start of the programme are quite diverse. Before the repair plan, students were supposed to learn methodologies and research skills within content courses, while such skills and methods were never explicitly discussed in lectures or tutorials. The

research and writing skills training was limited to a four-week course in January that didn't allow for repetition, in-depth study or training of the research skills. While changes were already on the way, the emphasis on research skills was accelerated by the repair plan.

The repair plan set out to embed research skills in the programme. A course in period 1 (*Entering the Field*) introduces students to different approaches to the field of Arts and Heritage (sociology, memory studies, cultural economics, art history, history, etc.). In period 2, this course is followed-up by *Researching Arts and Culture*. The course was designed by Vivian van Saaze and Emilie Sitzia. Its purpose is to introduce students to research skills and research methods while combining the skills training with important content. In period 3, the redesigned four-week course *Research and Writing Skills* recaps key issues covered in period 2, and focuses on writing a research proposal. All the courses have been redesigned and fine-tuned after the reaccreditation procedure. The process of fine-tuning is still ongoing.

2.2 Researching Arts and Culture

1. Under these circumstances, we tried to teach the following skills:

- Critical thinking (guest lectures on challenging topics, reverse engineering exercises, peer reviews, etc.).
- Creating a research design (the final assignment of the course).
- Executing a research design (at least at experimental stage with exercises in ethnographic research and evaluation of an educational programme).
- Information literacy to some measure (finding relevant sources for tutorials and assignments).
- Data/source collection (to some extent).
- Selection of information.
- Qualitative (and/or quantitative) analysis (the course's main focus is on qualitative analysis)
- Interpretation.
- Argumentation (presentations).
- Writing (to some extent). As explained by student 1: "I don't really think this was the point of the course. However, I think it helped the professors spot which students would need extra guidance in terms of writing for the thesis."

2. Why was the course redesigned?

- What issues were there before the course was established?

The course used to be called *Current Debates in Arts and Culture*. It covered a broad range of engaging topics, but it didn't include research skills training.

- What motivated the new design of the course?

Partly the accreditation report, partly problems regarding theses and the timeline for final works.

3. Course-specific settings
The course aims to link current research and issues in the field of arts and culture to specific research methods and skills. The course is comprised of weekly workshops and biweekly lectures.

The lectures are held by a mixed group of practitioners and academics presenting a seminal area of study. The assignments of the workshop sessions require the application of theories, concepts and methodologies acquired through the lectures and the mandatory reading.

The first week we introduce the course and have a general lecture on quantitative and qualitative methods. Students read general literature about conducting research. The first workshop presents a reverse engineering exercise. Students read two scholarly articles on arts and culture and deconstruct the texts formally (introduction, development, transitions, conclusion, etc.) and in terms of content (what data is being presented, how, why, which methodological framework is being used, how, why, etc.). The aim of this workshop is for students to learn to identify and eventually appropriate academic approaches and structures. It serves as an introduction to make students aware of research skills issues. Research skills related to writing, research design, critical thinking, data analysis, selection of source, information literacy and argumentation are trained this week.

The second week focuses on researching object and performance. A researcher presents their work on contemporary performance, corresponding theories, etc. The methodology lecture covers critical visual analysis. During the workshop students write a catalogue entry using critical visual analysis to ground their text. Research skills related to different authorial voice and public, critical thinking, selection of information, interpretation and argumentation are trained this week along with the transferability of academic skills to the workplace.

The third week centres around researching the museum and museum practices. The students attend a lecture from a Tate Modern curator and a lecture on ethnographic research in the museum. The workshop prepares them to conduct an ethnographic research exercise in a local cultural institution, the results are presented two weeks later in a group presentation. The ethnographic exercise trains creating, developing and executing a research design, interpretation and argumentation skills.

The fourth week focuses on researching global practices. A researcher presents their work on the contemporary art market. This lecture aims to train critical thinking skills. The methodology lecture covers discourse analysis (with in-class practice). Again, research skills related to critical thinking, data analysis and interpretation are trained. The weekly workshop serves as preparation for the final assignment (a research design plan). We work on formulating a research question, selecting appropriate research methods, and data set selection. Essentially, this workshop trains the creation and development of a research design.

The fifth week centres around researching audiences, education and participation. The content lecture covers audiences in cultural settings and frameworks to analyse cultural education programmes (GLO). The methodology lecture focuses on interviews and case studies, and their use in different methodological frameworks. The workshop offers interview training where students are role-play a scenario. One student is assigned the role of a stakeholder in the cultural world, while the other student is provided with a research topic to interview the stakeholder about. Research skills related to data collection, interpretation, critical thinking, selection of information are trained this week.

The sixth week also focuses on participation, but from a digital perspective. Students attend a lecture on the positive and negative sides of cultural participation. This lecture sharpens their critical thinking. The methods lecture is on the Actor Network Theory methodology and its application in

the cultural field. During this workshop, the students present the results of their ethnographic research. Research skills related to argumentation, presentation, critical thinking and developing a research design are trained this week.

The seventh week carries on with digital heritage. The students attend a content lecture on digital heritage and a methodology lecture on conceptual analysis (with in-class practice). During the last workshop students give a presentation of the evaluation of an educational programme using the GLO model presented in week five. This week classes aim to train research skills related to data analysis, interpretation and argumentation.

Students' comments on the merging of content and skills are varied, but overall rather positive:
"I think it worked well in some cases, and less effectively in other cases. […] Although the content of [some] lectures was really interesting, because what they're researching is interesting, the link to research methods was less clear. I think the workshops were very necessary and helped to reinforce what we learned in lectures through hands-on activities." (student 1)

"It definitely makes clear that even in the field of arts and heritage, the methodology and articulation of research question is essential. From my experience of art historical education, this is often neglected." (student 2)

"It is a good way to put theory into practice which is a step sometimes missing in the classroom. Also theory, and text books, can be quite abstract so actually using it in class is a good way of narrowing ideas down into situations." (student 3)

4. Course-specific issues on merging skills and content

We took the best speakers/topic of current debates and added accompanying method lectures and workshops where student train specific research skills. Vivian van Saaze and I worked on the weaving of research skills and content with accompanying literature, choosing the research methods that we saw utilised most often in final works and that are the most transferable to the working environment.

- What impact does it have on staff, students, tutors?

Staff felt insecure at first, not sure how it would all work out. Keeping a clear red-thread and paying extreme attention to the sequencing of lectures and workshops, means it is always clear to the students how research skills and content relate. Staff also appreciated being able to talk about their own research and the nitty gritty of how to conduct research in their field.

Tutors presented a challenge as they have changed every year and it takes a solid knowledge of various research fields to be able to efficiently tutor in this course. The new tutor has been more integrated in the process (selection of examples, readings and cases). The tutor workshop guide is also much more precise now.

5. How does the course relate to the overall curriculum?

- How is repetition of skills/content tackled?

There is a healthy amount of repetition of skills with the research and writing skills training course in period 3. By then, students perceive it as useful as they are already working on their thesis topic.

The repetition of material between the content lecture and methodology lecture works well. The coordinator attends each lecture and draw links between them in the question time of the lectures and during the workshop.

Despite seeing the usefulness of the course, students state that the link to the professional world can be improved:

“I think methodology per se is not directly related to the degree, but there is no way we could have completed the degree without learning about it. In that sense, it was related to the overall curriculum.” (student 1)

“It was a very good introduction both to the methodologies and methods we could possibility use for our research in the field. It presented some of the main approaches to qualitative research within the arts and heritage practice. The final assignment, which reflected the structure of the course, was designed so we could start clarifying and articulating the thesis.” (student 2)

“I thought it set up the thesis well and how to decide to approach it. Having come from a History of Art field, I had only used the hermeneutic circle before and had not conducted interviews. It did feel that it was somewhat aimed towards those pursuing a career in academia. Personally, I felt more like I was learning to pass a thesis than gaining practical, employable skills, especially in such a short course. At the same time, I understand its importance as without the thesis you don't get a degree so it's a difficult situation.” (student 3)

6. In what way does the course integrate with student life?
Students comment that the workshops were in particular beneficial to student-life and creating a community of researcher/learner (social links and common interests):

“I think the best part of this degree was the small class sizes and the variety and opinions of other students. I think we most definitely established a community of learning during this Masters programme. For the methodology course in particular, I think the small workshops were a good start for facilitating discussion and learning from each other. However, I think this aspect was present in most of our courses.” (Student 1)

“The workshops were designed to encourage an interaction among students. This enabled me to get to know the varying fields of interests and consequently exchange ideas and literature on the topics.” (student 2)

“It helped identify the different areas that people were interested in. By finding people who wanted to use the same method as you, it built support connections for actually tackling the thesis. It also created a lexicon which everyone understood. After talking with friends who are currently studying for masters in the UK, I realised how different the familiar terminology I used was to their understanding of how to approach a thesis.” (student 3)

7. Does the course work with student tutors and if so how?
You need experienced researchers that are aware and comfortable with a range of methodology to tutor in this course. As a result, we don't use student tutors.

8. Does your course use multimedia tools, and if so, how?

- *And how does it contribute to the merging skills and content?*

The online environment is an extension of the class. Content links to material, videos, in-depth interviews of key players, theoreticians in the field are available along with videos and links on skills. However, students seem to have problems recalling the online materials and whether it helped them learn:

"I think the link explaining how to do discourse analysis was pretty good." (student 1)

While multimedia was conceptualised as a repository for students to use as a reference as 'just-in-time' learning while writing their thesis, this is only mentioned once (and limited to specific material) by a student:

"I often came back to the recommended literature regarding discourse analysis and to the two introductory presentations." (student 2)

9. Assessment and grading model
The students are assessed on research skills, methods and content. There are three graded assignments: the group presentation on their ethnographic research experiment, the group presentation on their evaluation of an educational programme and the final individual assignment of the creation of a research design. These assignments were selected for their link to real-life situations and applicability to real-life research. For each assignment students were free to choose (within boundaries) the topic and object of their studies. This exposed a diversity of interests but also gave a strong sense of community. The group presentations are beneficial as students can see other ways of working (and evaluate them).

The students were asked if the assignments promote self-directedness and if they have enough independence and freedom of choice. They agreed profusely. We also asked if the assignments demystify the research process and make research look do-able. Whilst students agreed, they supplied that they didn't always think that this is the most efficient way to learn:

"Yes. I think they were useful and relevant assignments. Maybe the catalogue entry writing activity seemed a bit left of field for some students who didn't have an art history interest. But I think all of the activities we did were relevant and helped us better understand." (student 1)

"Yes. It was fun." (student 2)

"I enjoyed the assessments. The final paper however felt somewhat irrelevant as I was still unsure of what I wanted to do therefore I created a fictional research design." (student 3)

10. Is your course responsive to student perceptions during the course, and if so how?

The course is relatively responsive as we have small groups and we can cater to a range of interests within the methods and topics presented. This was perceived by students as positive:

"I think that when students wanted to know more about certain topics, the classes were redirected which was useful." (student 3)

"In comparison to the structure of curriculum I have experienced before, it definitely encouraged student's own input, articulation of opinions, and discussion." (student 2)

2.3 Analysis of the case study in accordance with the framework

This course is *research-led* as content is selected according to research interests of academic staff (fitting in the overall programme), but it focuses as much on information transmission and understanding of research findings as it does on research processes. In this sense, the course is also *research-oriented.* Above all, it is a *research-based* course as students are expected to conduct research (ethnographic research, evaluation of educational programme, as well as developing their own research design).

Facilitating the elaboration process and l**inking of diverse knowledge fields (skills & content)**

The strong sequencing and links between content, skills and method improves the students' elaboration process. It helps them see how research concretely works in the field.

Giving students freedom of choice (within boundaries)

The free choice of topics for the assignment and flexibility in the emphasis of content ensures to some measure student directedness.

Contextualising research skills to enhance concrete experience and meaningful learning

Contextualising research and research processes are key to this course. This helps engaging students, showing them the relevance of the course within the curriculum, and demonstrates how research skills are used in their field. It encourages deep and lifelong learning.

Offering opportunities for active experimentation

The workshops allow for an active experimentation on the part of the students. This also increases their motivation and depth of learning.

Demystifying research and creating a sense of a community

This course is structured to maximise collaborative processes between students (with group assignments and class presentations). It also enhances the feeling of community among staff (staff presenting their own research, linking research and teaching and representing a broad variety of fields). The course demystifies research by breaking down the research skills into small manageable tasks and gradually extending the depth and difficulty of the tasks at hand

Incorporating staff's own research

The presentations allow the staff members to present their own research and show how they conduct research.

Annex IV: Chapter 3 – Case studies

MaRBLe project: Marble An up-hill fight? The long history of the struggles to protect the Sint-Pietersberg (Montagne Saint-Pierre) Faculty: FASoS Interview with Ernst Homburg – 28.07.2016	
Course/Project and context	Maastricht Research Based Learning (MaRBLe) project offered to third-year bachelor's students from both Arts and Culture and European Studies. MaRBLe projects run once a year, are offered on different topics, and last five months. A MaRBLe project is an inter-curricular course for top 25%-students.
Motivation	• FASoS • Students • External partners • Interested audience which turns out to be broader than only the immediate partners. The theses are published on the Internet and the coordinator and students have been contacted by people throughout the country. • Part of public/societal discussion • Students work on the book until September (after the course's deadline)
Practice	*Project* This project evolved around the controversy and public debate on the transformation process of the cement company ENCI. From 1921 onwards, numerous groups and individuals have protested the destruction of the rural landscape, and of the natural, cultural and historical 'monuments' of the Sint-Pietersberg. *Partners, nature, and duration of collaboration* This project involved collaboration with a diverse set of external societal partners with different interests regarding the controversy, such as ENCI, stop-ENCI foundations, the municipal council, and Natuurmonumenten. Students identified the themes they wanted to investigate. There was thus no commission. There was interest in what students had to say: 'Interest, not business'. The project ran for five years during which the trust between the partners increased and students gained access to archives and places to work (werkplekken). *Products* Bachelor's theses (for Arts and Culture students), a wiki, and a book. *Assessment* The societal partners have not been involved in the formal assessment. They have been present at the student presentations and provided feedback. Students could earn an extra half point for the group process and societal output.
Preparing	Students are not or not sufficiently prepared for specific research skills such as archival

students, research skills, and PBL	research, interviewing, and referring to historical sources (not just APA). An interview training was provided, but archival research was trained on the spot by 'doing' and with 'just-in-time' coaching. Excursions to archives were essential as students need to feel and see archival research in practice. However, it was not considered problematic that students did not yet have developed these specific research skills. In comparison with students who have not been trained through PBL, 'our' students have learned to come to grips with a (new) subject quickly. PBL and their bachelor's programmes in general have helped to train an attitude of openness for new subjects. Students are not afraid of something they don't know. In addition, FASoS students are not positivistic, do not take 'facts' for granted, and understand that problems need to be examined from different perspectives. This is found to be very valuable.
Challenges, observations and tips	*Challenges* • Another faculty also collaborated with the same partners, but the project did not yield the expected results. However, the external partner does not distinguish between faculties, but perceives them as representative of the UM as a whole. • Collaboration is not always easy. The different partners also have relationships with each other and partners need to be confident that students won't jeopardise these sometimes precarious relationships. Sometimes collaborations were not easy to set up as not all partners were able to e.g. make rather quick decisions or because societal developments develop faster than projects/project proposals. Time is essential in building relationships of trust. Such relationships are worthwhile and provide access to the partners and material to those who built these relations (not necessarily to others). There are differences between the bachelor's programmes in terms of how well students are able to use methods, develop systematic research and a research plan, and the extent of their constructivism/positivism approach.

KnowledgeEngineering @work Faculty: Faculty of Humanities and Sciences – Department of Data Science and Knowledge Engineering Interview with Ellen Narinx – 20.07.2016	
Course/Project and context	KnowledgeEngineering @work (KE@Work). Second- and third-year students work at (international) companies in the region.
Motivation	• DKE: - Keeping talented students who may lose interest in their study when they set up their own companies, etc. - Offering a unique programme and attracting more students. - Staying up-to-date with developments in the field and the labour market. • Companies

	• Students
Practice	Intense collaboration: two years. Matching and selection: the programme is available to top students. A large number of companies apply to be selected for the KE@Work programme. Not every company is chosen. Companies don't drop-out of the programme. Context: labour market shortage; companies value the high-quality training DKE students receive. Assessment of learning trajectory. Soft skills training Time consuming, e.g. maintaining contacts with the industry.
Preparing students, research skills, and PBL	
Challenges and tips	External partners collaborate with the UM, without much knowledge/awareness of the different faculties. External partners are often contacted by staff from different faculties.

Company Project (MSP) Faculty: FHS - Maastricht Science Programme Interview with Bart van Grinsven – 19.07.2016	
Course/Project and context	The Maastricht Science Programme (MSP) offers a 3000-level project called *Company Project*, available at least once to all students who wish to participate. Not compulsory, students can register for a standard project instead.
Motivation	*MSP* Aims to give students an experience that matches real life, e.g. their career after graduation. Provides students insights into what they can do with their degree. Students are introduced to business culture, which is also important for academically-oriented students, given the current valorisation requirements for research projects. *Students* Students are motivated by the influence they can have on society and the fact that their work or solution can make a difference to a company. *Companies* Companies might have a specific problem they want investigated, but may lack the

	resources or know-how to reach a solution themselves. Additionally, they can make use of the university's facilities, such as a chemical wet-lab.
Practice	*Project* The projects have a duration of four weeks, although companies have been asking for an eight-week course. Companies get to introduce themselves and their project to students before the project weeks start. Students are matched with companies in groups of three to four (smaller than normal project groups) and subsequently join the company's R&D department. The UM Project Coordinator contacts the company once every week. *Products* Students write a report and present their work at the end of the four-week period. *Assessment* The grade is based on peer-evaluation and the project coordinator's assessment of the student work. The company supervisor is consulted, but not directly involved in the grading process. Both the end result as well as the process are evaluated.
Preparing students, research skills, and PBL	Students receive extra training and supervision to be well prepared for the project. Students prepare a work plan under supervision of the project coordinator. Making and keeping up with such a work plan requires additional training. In the academic world, it is acceptable to get side-tracked after stumbling on an interesting side problem, in the industry this is often not the case. Students need to be warned/prepared for the industry's direct and goal-oriented communication. They are often not used to receiving such strong feedback. Interaction with companies and co-workers is different from the communication students are used to. Expectations and deadlines can result in stress and difficult communication, which students need to be aware of in advance. The PBL seven-step approach can provide an initial guideline to problem solving, but is often adapted to fit the situation. Report writing and presentation skills are trained in the programme's previous projects and courses.
Challenges and tips	*Tips* • The project coordinator maintains personal contact with companies. Look for added value to spark the company's interest. • Be willing to adapt the rules, regulations and expectations to specific companies. For example, do not rely on the same assessment criteria for all projects, that would be unfair to the students and uninteresting for the companies involved. • Let someone uninvolved with the companies (i.e. not the UM project coordinator or whoever maintains contacts with the companies) assign students to project groups. Students are central, not the companies. • Working with late-second-year or third-year students ensures that the students have a sufficient amount of specialised knowledge and research experience (e.g. from earlier projects). Companies do not have the time to teach students during a four-week project.

	• Assign the role of communication officer to one student per group. This student will serve as the main contact person for the company, which may prevent communication problems. • Require the company to acknowledge the students' contributions.

Premium project: Marres sensory walk Faculty: FASoS Interview with Ike Kamphof – 14.09.2016	
Course/Project and context	Premium
Motivation	Students: exciting, creative idea, experiencing Maastricht by using different senses. Outcome of the project: fun, creative, interdisciplinary. Involves marketing, phenomenology and medical science. Interactive sensory map. Touristic dimension of the project was decided on during a later stage of the project.
Practice (collaboration, assessment)	*Project* The project started from the idea to design a sensory network of the city, to experience Maastricht in a different way. *Partners, nature, and duration of collaboration* This project was set up in collaboration with the director of Marres and UM researchers. *Marres* Positioning Marres as a sensory centre and a valuable asset of Maastricht. This placed a lot of pressure on the project. Marres also received substantially less funding from the national government and the municipality of Maastricht; Marres had to prove itself. To Marres, it was interesting to collaborate with a local faculty and was very much interested in the Premium projects in general. *Products* The product was a sensory map for tourists visiting Maastricht. *Assessment* Three criteria are assessed: the product, satisfaction of the external partner, and practical reflexivity (which is considered to distinguish master's students from non-master's students in case they would work on such a project). Practical reflexivity entails questions such as: does the team discuss the problem definitions; do they ask themselves critical questions about the process, possible solutions, alternatives, argumentations, and assumptions; do students refer to existing knowledge/literature; do they take the easiest road, make use of stereotypes or do they challenge themselves; are they innovative and creative?
Preparing	Premium projects focus on professional competences rather than research

students, research skills, and PBL	competences as such. Students participate in several workshops such as teamwork, creative thinking, time management, and leadership. This is valued by the students. Students in this project learned several (challenging) competences: 1. To narrow down the problem and the product that could potentially become the project's outcome. Much of the narrowing down is done in advance in Premium projects, but a part needed to be done within the project. The partner had ideas about the project which were relatively broad and proved difficult in practice (setting up a network with e.g. bakeries; which bakery do you select and which bakeries do you leave out?). Narrowing down was challenging for students. It is, or should be, part of PBL however: what is the problem, how to formulate this, and can the learning objectives provide a satisfactory answer? Do students recognise that there are different perspectives and strategies to answer the learning goals and acknowledge that not everything can be done? PBL groups often make different decisions about learning goals and how to proceed. 2. To negotiate this with the external partner, one that has high expectations: does this fulfil your expectations and is it meaningful to us? How to get everyone on board? 3. Time Management. Students must manage their time also when they prepare for PBL sessions, to be well prepared (e.g. to read a text twice). Yet, we encountered problems regarding postponing, waiting until the last moment, and not realising how much revision is necessary after a first draft. 4. How to form a good team? PBL and tutors should and could prepare students for enabling them to independently ensure an effective tutor group. In practice, there is often too much focus on the content instead of the process, communication and peer feedback: what do we expect from the group, how can we learn effectively, what to do when students started to read the material too late? 5. Interdisciplinarity: through working with students from different faculties, it became very clear that one's own vocabulary and even what students find interesting is not evident for others from different disciplines. How to clarify this to the other students and how to bring that together in one project?
Challenges and tips	• Collaboration with external partners takes place within some curricula at FASoS. Sometimes this means that students involved in such projects are less interested in Premium. • Collaboration with external partners within curricula is a challenge as 1) accreditation committees evaluate content and sufficient use of literature, and theses, 2) it is hard to defend why reflexive reports are master's-level reports, and 3) criteria to evaluate reflexive reports are hard to make fully explicit and transparent to the outside world as they are qualitative in nature. Within curricula those requirements are higher/heavier. • Explicate the links with PBL during the course of the project.

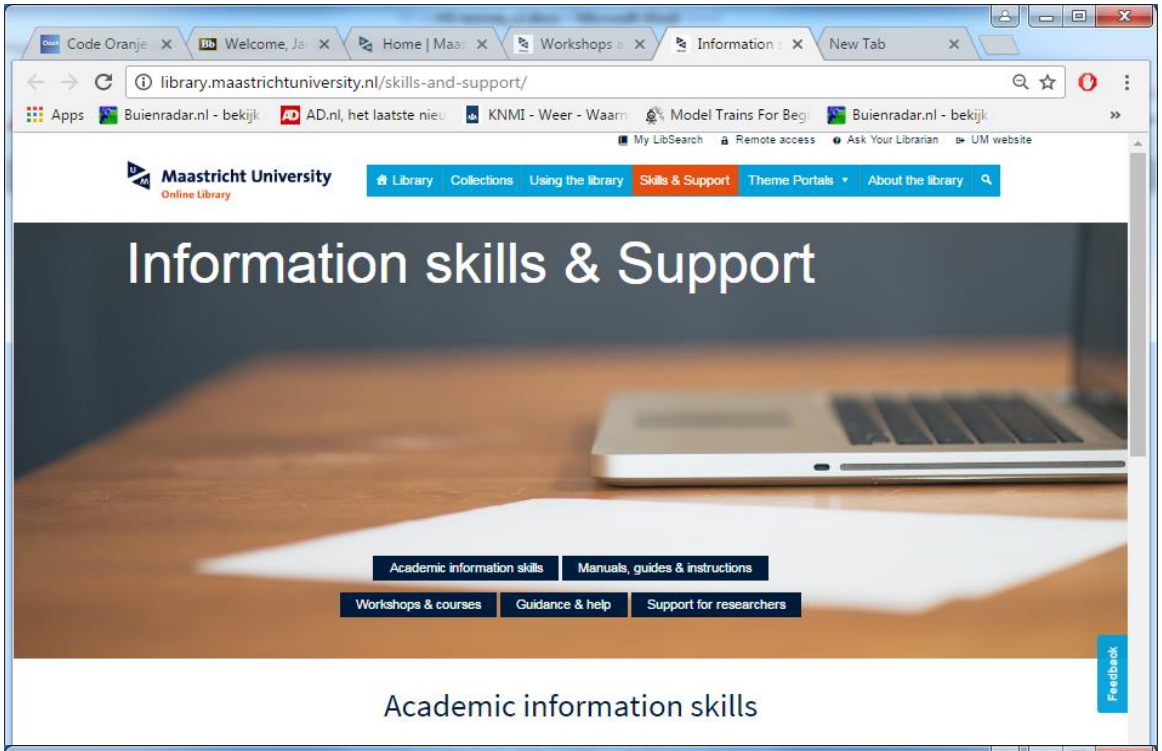
UCM ThinkTank Faculty: FHS - University College Maastricht (UCM) Interview with Wilfred van Dellen - 20.09.2016	
Course/Project and context	Four-week project (5 ECTS), offered two times a year. Groups of eight to ten students. Students can participate once. Students are required to have completed several courses before participating in the project. Students should have a sufficient amount of knowledge of qualitative research, quantitative research and argumentation.
Motivation	*UCM* To offer a new type of assignment to the students, something they have not done before. *Students* Working with an external partner and having an opportunity to influence society. *External Partners* Get a *free-of-charge* interdisciplinary team to take a look at their problem or current situation. This does not always lead to a complete solution, but often to a new (academic) perspective.
Practice	*Project* Students make a selection from problem statements that have been prepared prior to the start of the project. Project groups are multi-disciplinary. Week 1: problem-analysis. Weeks 2 and 3: research. Students write a memo in the third week. In week 4 they present and report the results to the client. Each week, the student groups meet with their supervisor multiple times. *Products* Report/memo and presentation. *Assessment* Rubric-based mainly on a good problem analysis, the logical foundation of the solution and the added value of the final product. These high-level categories are required for any task, no matter what the underlying problem is. The external client gives feedback but is not involved in the grading process. Usually, the group receives a joint grade for their work. In some cases, it is necessary to award individual grades, for instance if students do not sufficiently participate in the group.
Preparing students, research skills, and PBL	Starts with an opening lecture in week 1: additional training on argumentation and rhetoric. Group dynamics is intentionally not taught, but trained and solved as required. Students need to be able to formulate research questions before starting the project. *PBL*

	When confronted with a practical problem, students tend to skip several PBL steps. For example, they skip the brainstorming or determining the learning goals. The clustering step is an important element of the group sessions (especially when working with an interdisciplinary team), but since this step often receives little to no attention, students are not sufficiently trained to cluster their findings.
Challenges and tips	*Tips* • Four weeks is short, which may be stressful for students as they must present a useful result to the external client. • A vague problem definition forces students into action. • Giving the students enough time to come up with a clear problem definition is important. • Combine recruitment of partners for short projects and internships, to find and exchange topics. • Groups should be composed of maximum ten students. • Be aware that projects might fail and to explain this to the external partner. • Teach students to adapt their communication to the audience, e.g. a report may be grounded in academic theories, but an executive summary is a requisite to make the report accessible to the company supervisors. • You can, and should, show students that an academic way of working is always possible, on any topic and any problem. *Challenges* • PBL doesn't offer the core principles necessary to successfully run a project of this nature; the course involves project-centred learning. You can't count on students to set strong deadlines. • Relating a practical solution to theory is hard for students. Students need relate the client's problem and their solution to academic theories. This is not easy for students.

Zorg (Care) in Context Faculty: FHML - HSR Interview with Nynke de Jong – 19.07.2016	
Course/Project and context	Part of the curriculum of the second-year bachelor's course: *Zorg (Care) in Context*. Part of a care-life-cycle block in which the students are confronted with all stages of patient care, starting from the diagnosis to the moment the patient passes away.
Motivation	*HSR* Offering students a contextual learning experience, showing a possible career path, they might end up in. *Students* Working for real clients, with an 'investment' in the problem to be solved.

	External Partners Having a team of students pay attention to their problem or situation and have them invest eight weeks of their time.
Practice	*Project* Teams comprised of four students are assigned to a patient support group selected by the *Huis voor de Zorg*. They either receive a question from this group or select a topic to research in collaboration with the group. *Products* Report and presentation. *Assessment* Assessment is carried out by the project supervisor, based on the content of the report. Clients also provide feedback. The grade is a pass/fail only, this might be changed to fail/pass/good in the future.
Preparing students, research skills, and PBL	Students are closely supervised throughout the project. The course consists of bi-weekly live meetings and computer conference meetings. Required skills such as interviewing and data collection techniques are trained during the first year. *PBL* The project fits the PBL core ideas of contextual learning, self-directedness, collaboration and constructive learning.
Challenges and tips	*Tips* • Close supervision (e.g. meeting students on a weekly basis), is helpful in keeping students on track and producing successful projects. *Challenges* • Both students and patient organisations (clients) often set goals that are too ambitious for an eight-week project. • Students need to be made aware of professional conduct when dealing with external clients.

Annex V: Chapter 5 – Examples



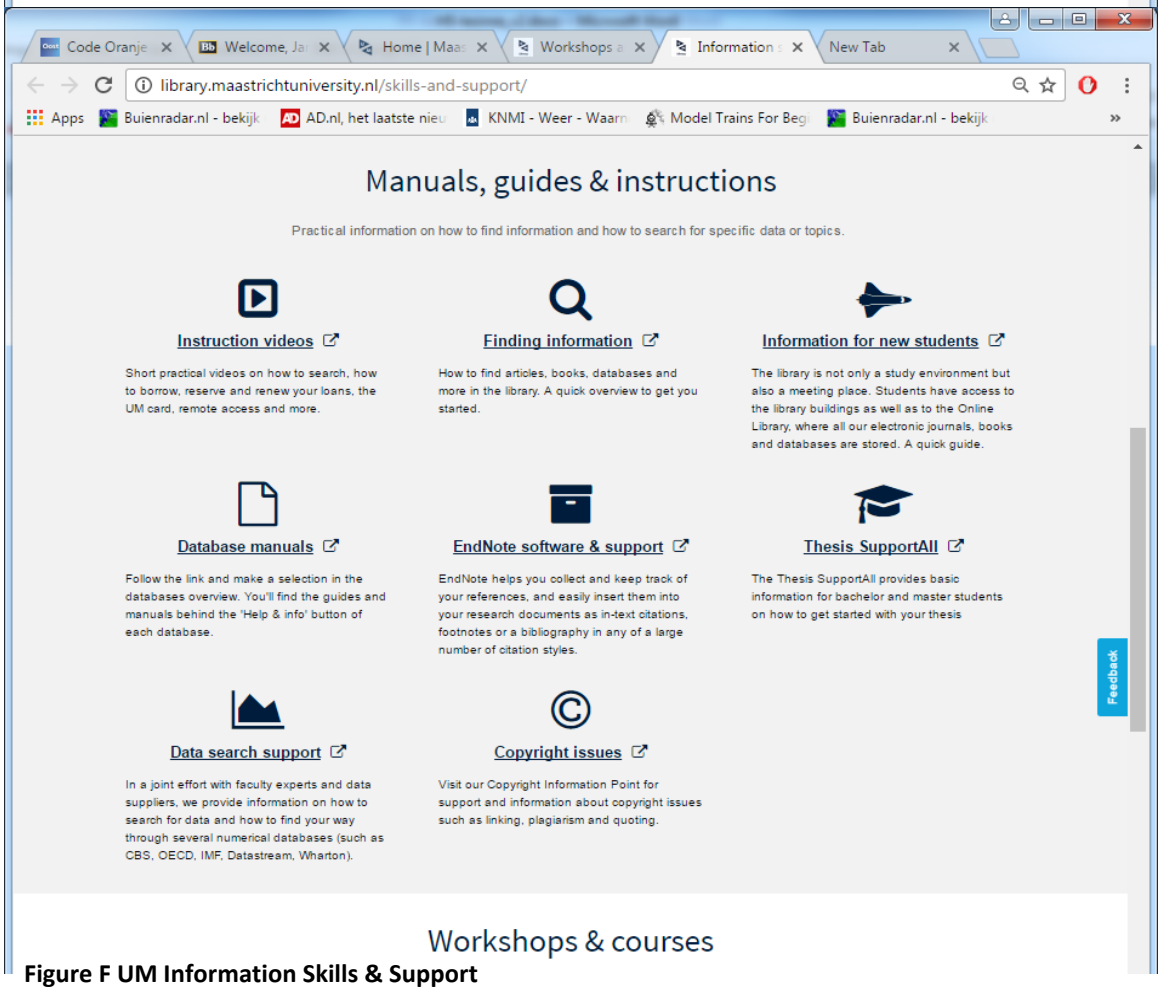


Figure F UM Information Skills & Support

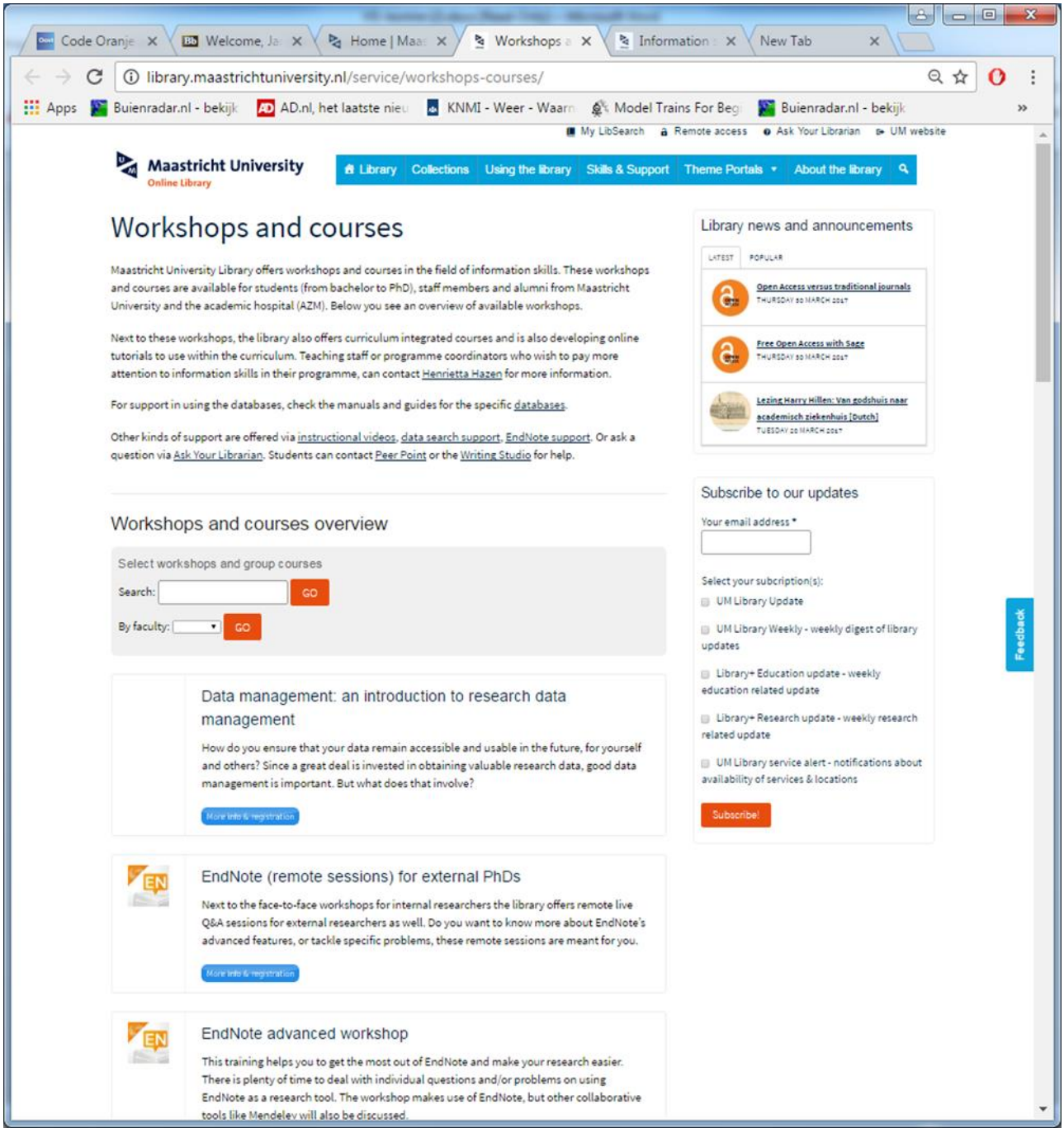


Figure G UM Workshops and Courses

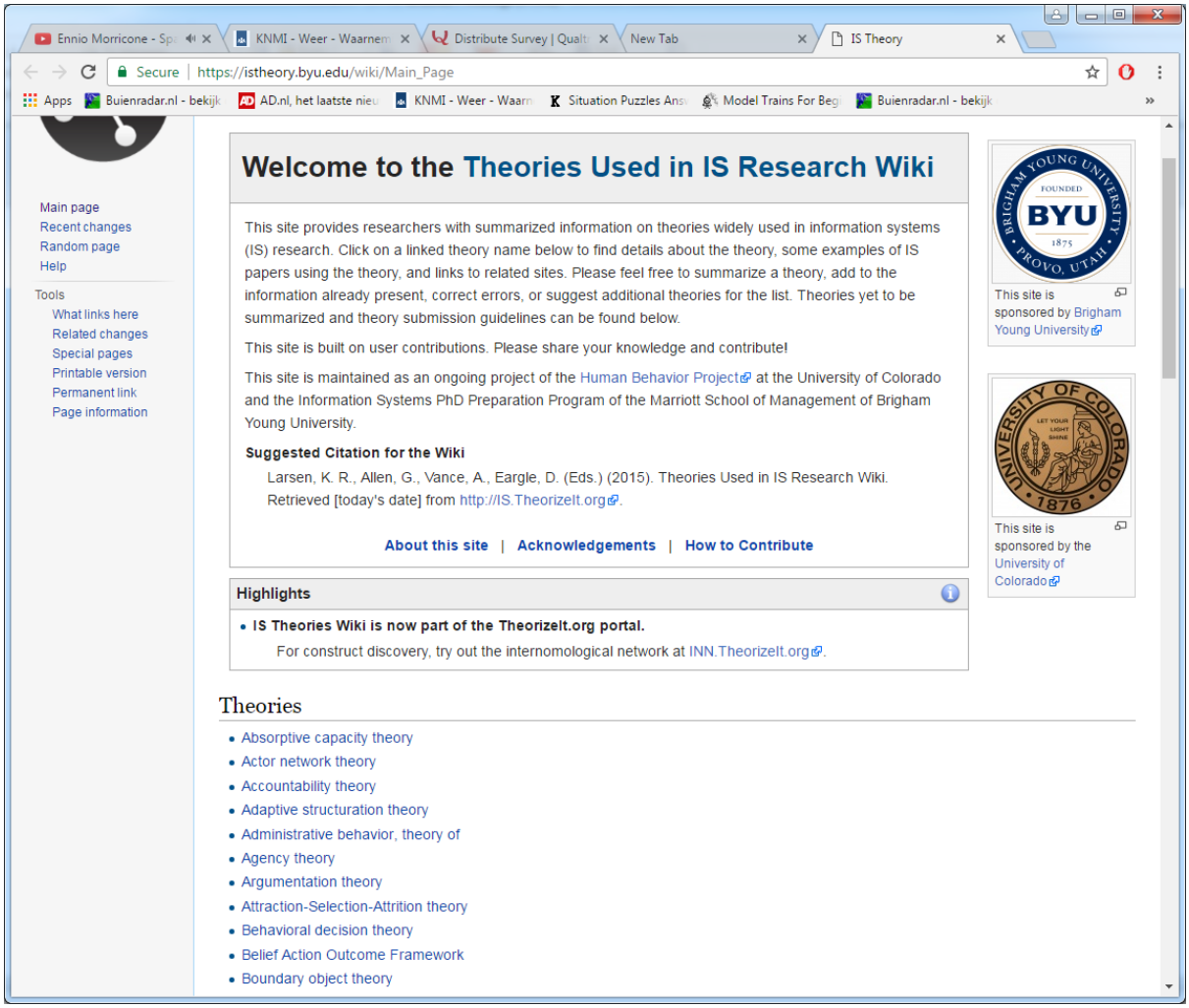


Figure H Example of Wiki main page (https://istheory.byu.edu/wiki/Main_Page)

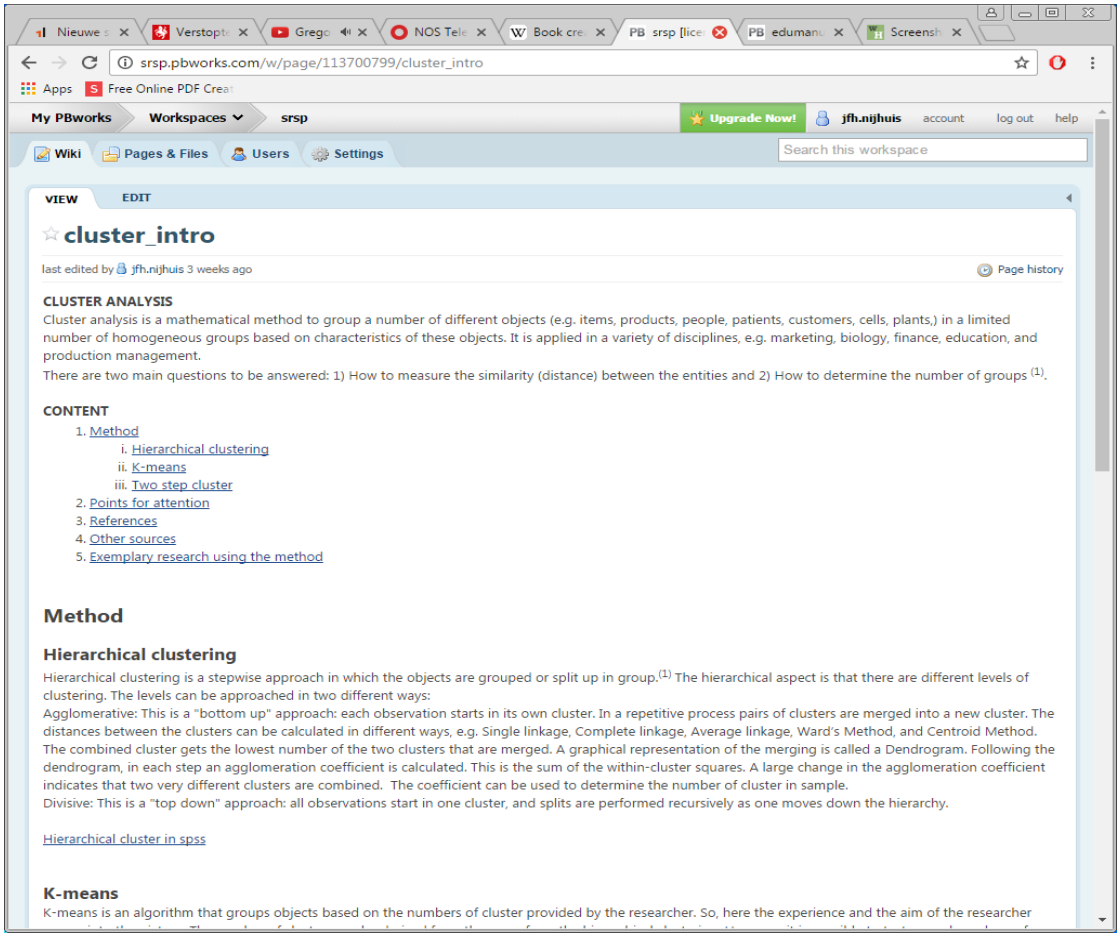


Figure I Example of topic page, table of content and links to other topics

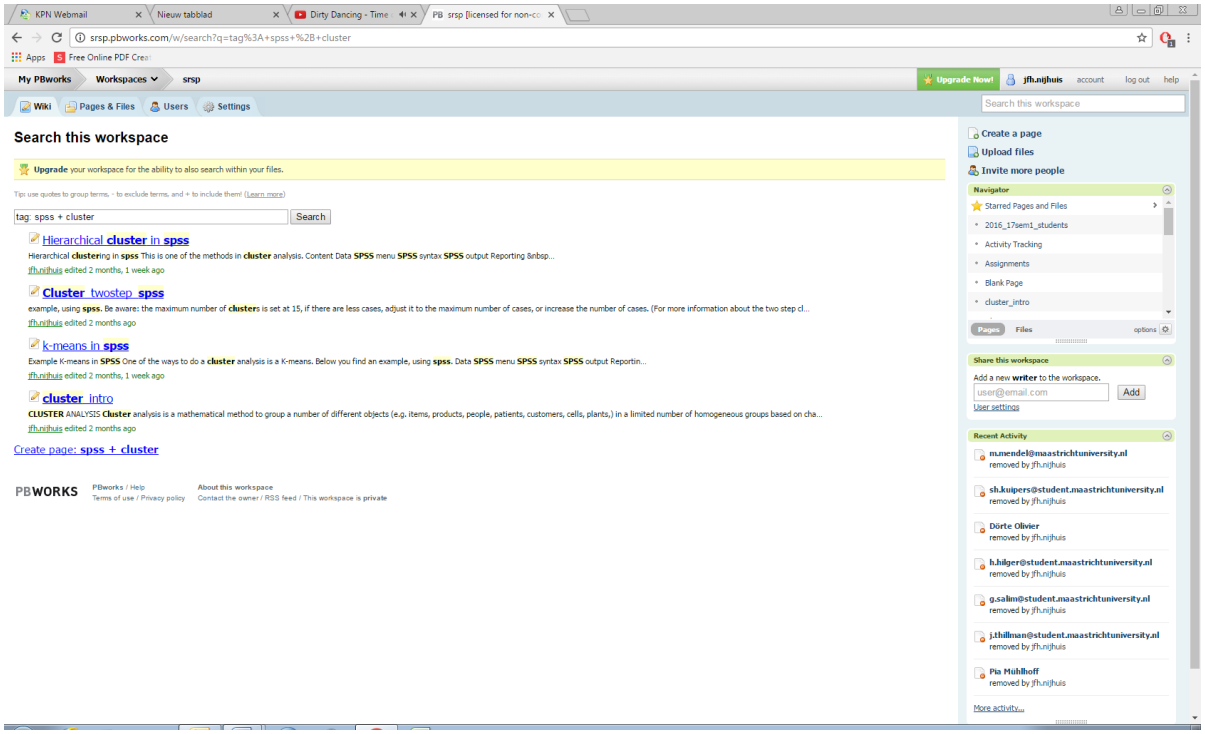


Figure J Example of wiki search engine