

## 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.

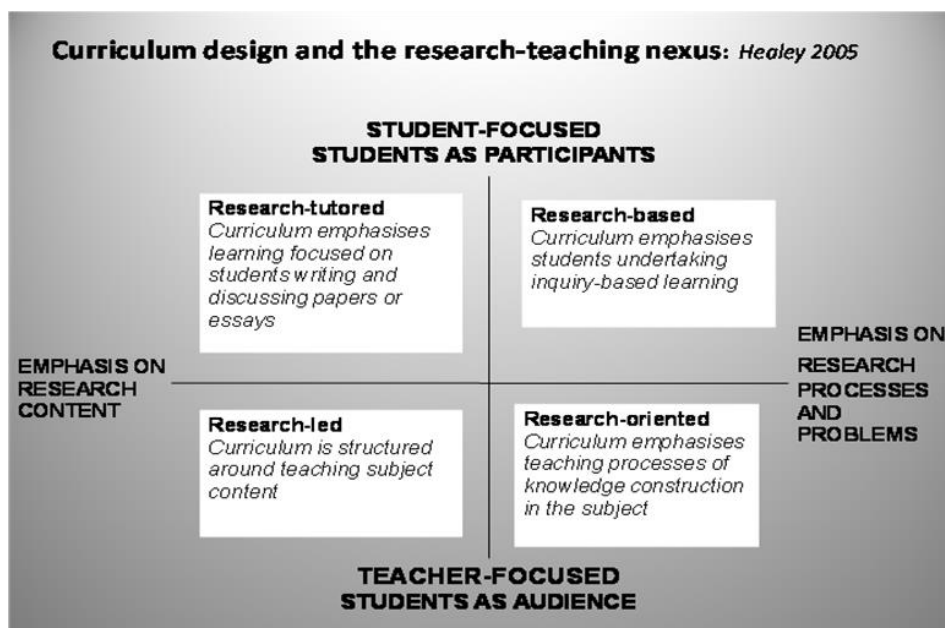


Figure i Linking Research and teaching: disciplinary spaces (Healey, 2005).

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.

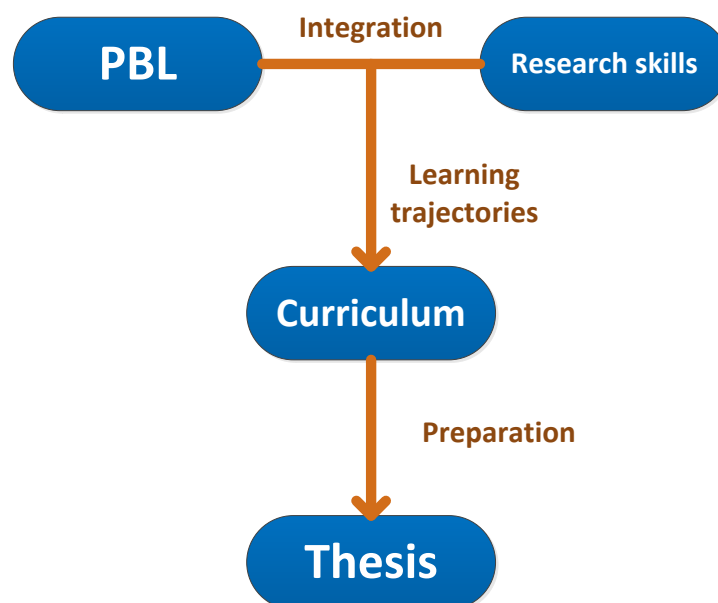


Figure ii Project Aims

## 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

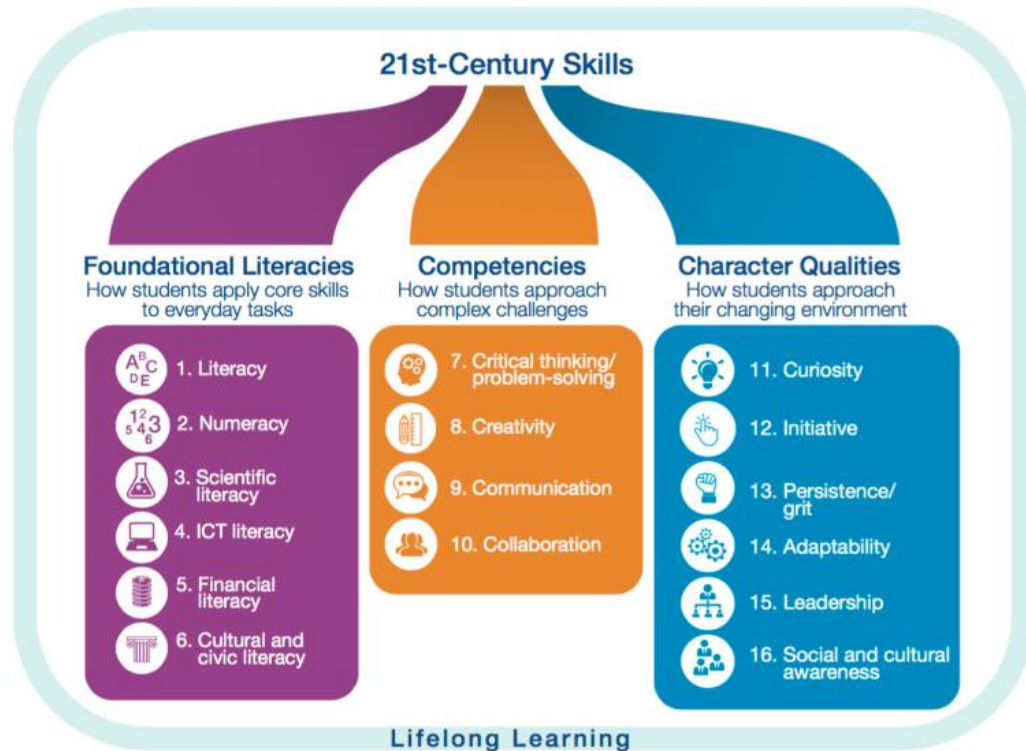


Figure iii 21<sup>st</sup>-Century Skills (World Economic Forum & The Boston Consulting Group, 2016)

## References

Dolmans, D. (2005). Problem-based learning: future challenges for educational practice and research. *Medical Education*, 39, 732–741.

Healey, M. (2005). Linking Research and teaching: disciplinary spaces. In R. Barnett (Ed.), *Reshaping the university: new relationships between research, scholarship and teaching*. Maidenhead: McGraw-Hill/Open University Press.

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.

World Economic Forum & The Boston Consulting Group (2016). *New Vision for Education: Fostering Social and Emotional Learning through Technology*. Cologny/Geneva: World Economic Forum.