

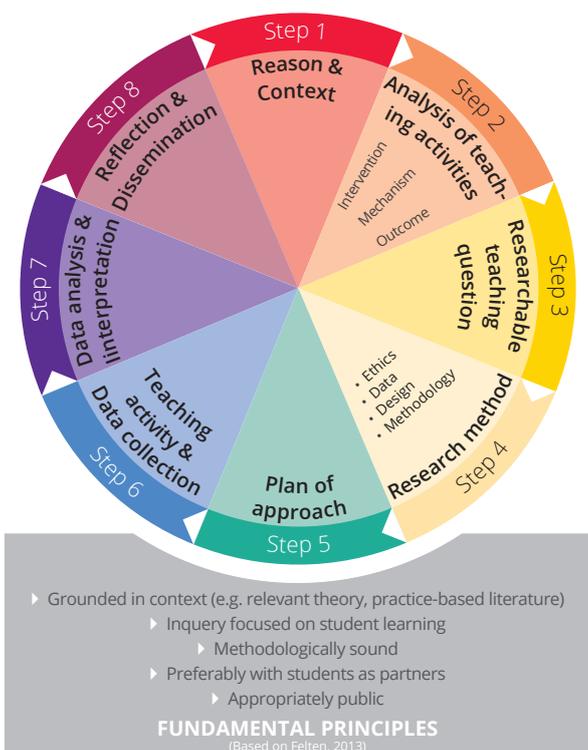
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Introduction

The Utrecht Roadmap for Teaching Innovation and Scholarship is a useful tool that can help you with systematically investigating your own teaching practice. In eight steps you will be stimulated to think critically about the way you organise your teaching and the effect this has on your students' learning. Relevant information, tips, and targeted questions help you, in a structured manner, to turn your ideas into practice-oriented research. The aim is to increase your knowledge of your students' learning or to improve your teaching. The tool is developed by education experts at the Utrecht University and based on their teaching experience, knowledge of theories on education and executing practice-oriented research based on the principles of Scholarship of Teaching and Learning (SoTL). This tool has been developed for everyone who wants to professionalise as a teacher and who wants to optimise their own teaching practice. The only thing you need to do is start at step one.

For questions or information you can contact Femke Kirschner (F.C.Kirschner@uu.nl) or Lindy Wijsman (L.A.Wijsman@uu.nl).



LEGEND

-  In-depth information
-  Tips & tricks
-  Caution
-  Relevant questions

Figure 1. Utrecht Roadmap for Teaching Innovation and Scholarship

Step 1

Reason & Context

Describe the reason for, and the context of, this project. What question would you like to answer, what would you like to try or understand better? And what does your teaching practice look like?

Reason

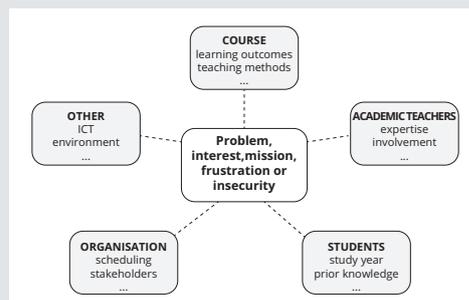
You might want to test out a solution to a problem that you have experienced in your teaching, try out a new teaching practice, or you may want to better understand how your students learn within your teaching context. It is useful to think of this as three possible motivations for carrying out a project:

- Try a possible solution to a problem in your teaching that is affecting students' learning;
- Try a new learning activity (innovation) and describe the effect on students' learning;
- Discover something about how your students' learn within your existing teaching context.

Context

Your project is situated within the specific context of your teaching practice. This context determines the possibilities of your project. It is important to describe the most important characteristics of this context.

 Consider how this project will benefit you personally, your students, and/or the organisation. Choose a teaching and learning project that excites you.



 Make a mind map to visualise your teaching and learning context.

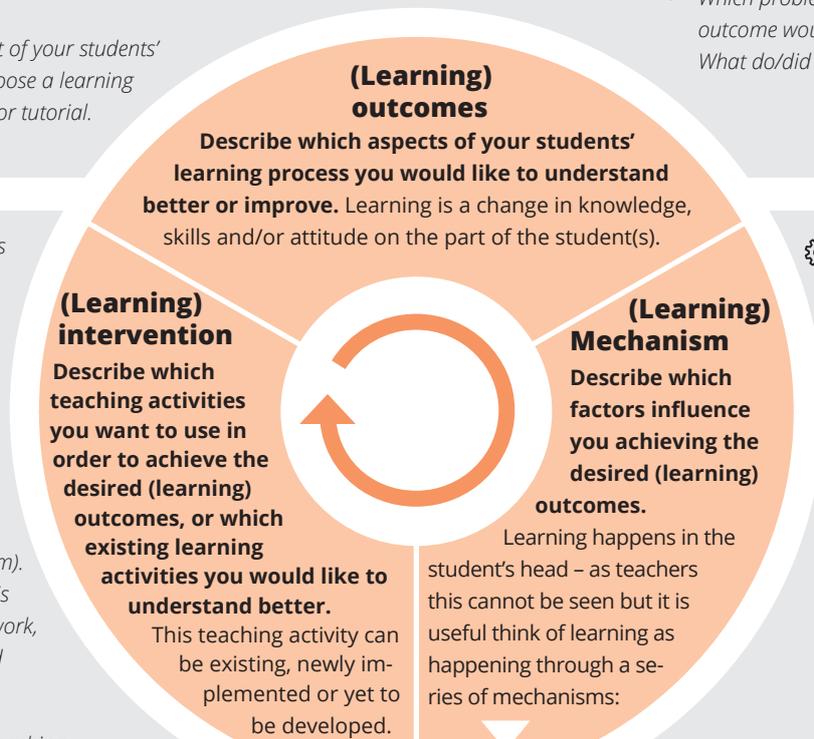
Step 2 Analysis of teaching activities

 Investigate the objectives of your teaching and consider the (learning) outcomes that you would like to achieve.

 Focus on a specific aspect of your students' learning, for example, choose a learning activity such as a lecture or tutorial.

 Ask yourself the following question:

- Which problem am/was I solving or which outcome would I like to understand better? What do/did I want to achieve?



 The Intervention concerns all changes that you are about to make or have made: the materials, assessment, pedagogy, etc.

 Put the intervention in the context of the literature of how students learn (learning mechanism). Why do you think that this specific intervention will work, or why do you think it did (or did not) work?

 For inspiration look for teaching activities by others in your discipline who have worked on a similar issue. Do keep in mind that your context is unique.

 Keep track of the scope of the project and be sure to keep the intervention manageable. Pick a comprehensible, once-only teaching activity or a series of similar teaching activities.

 Ask yourself the following questions:

- What will I change in my teaching to achieve the desired (learning) outcomes?
- Which learning activity do I want to understand better?

 Be sure to search educational and subject-specific pedagogical literature to determine which mechanism is most relevant. Try to find literature on student learning in your own discipline.

 If you don't know which mechanism is the root of your problem, or why your learning environment is not working as well as you would like or it needs improvement, try to determine this first.

 Ask yourself the following questions:

- What needs to happen in the students' heads during the teaching activity (intervention) to ensure optimal learning? What is needed to ensure
- that my students activate the required learning process and meet the required learning outcomes?

Step 3 Researchable teaching question

Formulate a question based on your (learning) intervention, (learning) mechanism, and (learning) outcomes that can be investigated.

A researchable question is Specific, Measurable, Achievable, Relevant and Time-bound (SMART).

- **Specific:** Have you specified the who, what, when, where, and why of your research in the question?
- **Measurable:** Is your question answerable?
- **Achievable:** Is answering the question achievable in relation to your circumstances and to your own knowledge and experience?
- **Relevant:** How does your question relate to the context and theory? How relevant is it for your students, yourself, and the organisation? How new and original is the question?
- **Time-bound:** Is the answering of your question achievable within the planned timeframe?

 Keep in mind that a question about solving a problem has a focus on the (learning) outcomes, while with a question about insight into student learning the focus is the learning(mechanism).

 Ask yourself the following questions:

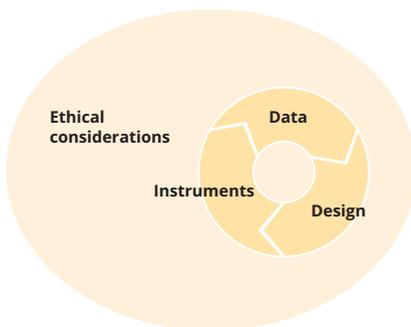
- Which terms or sentences in the research question need clarification?
- Does my research question consist of multiple ideas or sub questions? Can I use these to further focus my research?
- Can I specify which (sub)group of students is the focus of my research in my question?

Step 4

Research Method

Develop a plan for systematic data collection to answer your researchable teaching question.

The research plan consists of a description of the instruments that you will use during specific moments in your teaching practice (design) to collect data from students and teaching staff to be able to answer your researchable teaching question. All of this must be carried out within an ethically acceptable framework.



 Be sure to maintain a good alignment between your researchable teaching question and the different parts of the research plan: ethical questions, data, design, and instruments. By the end of your project, you need to be able to answer your researchable teaching question by having results.

 You can answer your researchable teaching question using qualitative or quantitative methods, or with a combination of both. A combination of both (mixed methods) often proves better interpretable data and a more valid answer to your researchable teaching questions. The choice you make influences all parts of the research method.

Ethical considerations

Carefully consider the ethical issues that can arise when collecting data from students and staff.

Four important ethical issues to consider are:

1. Conflicts of interest and power relations: e.g. can you conduct a focus group yourself with a group of students that you will also assess?
2. Permission processes: e.g., should students give permission before you can use their data?
3. Equal and equitable participation in the project: e.g., can you divide your student group into two groups and have each group do something different?
4. Privacy and confidentiality: e.g., are you allowed to have the data you collected processed by a student-assistant?

 Keep in mind that participation of students must always be voluntary and cannot affect them negatively in any way if they choose (not) to participate. Participants must also be adequately informed of what your research entails to ensure so that they can make a well-considered and well-informed choice whether to participate or not.

 Check the ethical guidelines within your organisation regarding human ethics in research. If required, have your plan assessed by an ethical review board in your organisation.

 Research Journals are increasingly requiring evidence of ethical approval. Keep this in mind, should you want to publish your research.

Data

What would you like to know? Make a list of the data you will have to collect to be able to answer your researchable teaching question.

From step two, analysis of teaching activities, you should be able to get some indicators of the types of data that you need to collect to answer your researchable teaching question.

- If you want to know if your teaching activity is implemented correctly, look at your intervention to see which data you can collect.
- If you want to know which learning mechanisms your teaching is aiming to utilise, look at the list of possible learning mechanisms to see which data you can collect.
- If you want to know to what extent your teaching intervention has had an effect, look at your outcomes to see which data on knowledge, skills, and/or attitude you can collect.

 Don't be afraid to choose. Limit yourself in the amount of data you are going to collect. Your project should be manageable in its execution.

-  Ask yourself the following questions:
- What do I want to know about the intervention and which data do I then need to collect?
 - What do I want to know about the mechanism and which data do I then need to collect?
 - What do I want to know about the outcomes and which data do I then need collect?

 If you collect the same data on different points in time, you can describe the changes after a passage of time. If you collect the same data in different groups, you can compare the groups.

 Don't fixate on having a control group – this is usually very difficult and often impossible and/or an unethical way of answering a question.

-  Ask yourself the following questions:
- From whom do I want to collect data?
 - When do I want to collect data: Before or during my teaching? Immediately after my teaching ends or sometime after my teaching has ended?
 - Do I want to compare groups, if so, which groups do I want to compare?

Design

Describe when and from whom you are going to collect data.

Generally, there are three types of designs:

- A comparative study which, in many cases, compares (statistically or not) multiple groups;
- A descriptive study which describes, in many cases, a single group in detail in one moment or multiple moments;
- A combination of both.

Instruments

Describe which instruments you will be using for your data collection.

- You can collect numerical data. Think of instruments such as (standardised) questionnaires, time-on-task, pre/post testing, or collection of student evaluations. This is mainly suitable when you use a quantitative approach.
- You can collect non-numerical data. Think of instruments such as focus groups, interviews, journals, writing exercises, observations, or think-out-loud protocols. This is mainly suitable when you use a qualitative approach.



Student-assignments and assessment scores can also provide important data for your project. This is a win-win situation that saves time of both yourself and your students.



Initially use methods that you are familiar with from your own discipline and ask for help with methods which are less familiar to you.



Ask yourself the following questions:

- Which instruments generate the data needed to answer my question?
- Can I use a mix of qualitative and quantitative methods?
- Which data is already available from my current teaching practice?
- How can I adapt my teaching so that relevant data is generated?



To be able to answer your researchable teaching question you need to properly calibrate your instrument to ensure that your measurements are accurate (reliability) and that you are measuring what you want to measure (validity).

Step 5

Plan of approach

Describe, as specific as possible, the outline and approach of your project.

The goal of the plan of approach is making a clear summary of the steps 1 to 4, in which you explicitly describe when you do what, and who is involved. Think about developing your instrument, designing your intervention, ethical review, and the recruitment of students for the data collection. After the plan of approach, you will start to execute your project.



Ask yourself, along with the description of steps 1 to 4, the following questions:

- What are the key points in terms of data collection and completing the intervention on time?
- How do I ensure that I can keep to the schedule?
- What support do I need? Consider, for instance, support from colleagues, an educationalist or IT-specialist.
- Who is/are responsible, at what moment, for the different parts of the project?
- Who will collect the data? Will this be me, and is this practically feasible and ethical?
- Which potential risks do I expect when executing my project? How could I prevent or solve these?



Make your plan of approach as specific as possible. A colleague who doesn't know anything about your project should, after reading your plan, understand the who, what, when, and how. A specific plan also helps you to carry out the project within the available time. Should you get doubts about the feasibility of your project then return to step 2 to 4 to and see what changes you can make.



Be sure to check possibilities to obtain a grant for (a part of) your project to, for instance, employ a student assistant.

Step 6

Teaching activity & Data collection

In this step you will execute your plan of approach. Before, during, and/or after the implementation of your teaching activity, you will collect data to be able to answer your researchable teaching question.



The data collection can be an iterative process in which data collection and data analysis alternate until you have enough data to answer your researchable teaching question.



Note down remarkable occurrences during the implementation of your teaching activity and data collection. This can later help you with the interpretation of your data.

Organise, analyse, and describe the data in a manner that matches your research method. Consequently, interpret the results and formulate an answer to your research question.

The manner of analysis is dependent on the methods you have chosen, quantitative or qualitative. If you have chosen a mixed-method approach, you will have to use a combination of different analysis methods.

Data analysis

Quantitative data (numerical)

The data analysis consists of the following steps, usually conducted in the following order:

- **Preparation:** (a) loading the data into an appropriate program (Excel, SPSS, or otherwise), and (b) cleaning up your data by removing or adding to incomplete data in a responsible manner.
- **Analysis:** carrying out descriptive, and possibly statistical analysis. Thinking about the accountability and validity of your data.
- **Presenting:** Clearly displaying your most relevant results making use of e.g., tables and graphs.

Qualitative data (non-numerical)

Categorisation and interpretation are key to analysing qualitative data. This normally follows a series of steps, though not necessarily always in the following order:

- **Preparation:** making a transcription of your (auditive) data, and, if applicable, loading it in an appropriate program.
- **Exploration:** (re)reading your data and organising it in a logical manner (for instance using codes or a rubric). Thinking about the accountability and validity of your data.
- **Categorizing:** coding of your data by identifying categories and themes, with the aim to looking for relationships and patterns.
- **Presenting:** Clearly displaying your most relevant results making use of e.g., graphs, and quotes.

Interpretation

Using the results, you attempt to answer your teaching question and also compare your results with those found in existing literature or previous studies. From this you draw your conclusions. If you have used multiple instruments to collect your data, look for consistency and cross-links.

Ask yourself the following questions:

- **The teaching practice context:** What effect can the results of my research have on my teaching practice and the teaching practice of others?
- **The (educational) literature:** How do my results match up to my expectations and the relevant (educational) literature? Are my results consistent with those of other researchers? If not, then why not?
- **The limitations:** What are the limitations of the design of my research and data analysis, and how does this influence the results of my research? Consider for instance the loss of participants, or an intervention that panned out differently than expected.
- **The continuation:** How do I want to continue with your project? Did I find enough answers? Is my project complete? Would I like to continue this project, and if so, how?



Once again take a close look at your researchable teaching question. What do you want to know and how can you use your question to gain more focus in analysing your data? Ask yourself questions such as: Why are these data important? What can I learn from these data? How do these data answer my researchable teaching question?



Applications such as NVivo and MAXQDA are available for organising and coding qualitative data. These applications are especially suited for analysing a large data set and/or analysing the data in detail.



Consider which form of support you could use when analysing your data. For instance, a student assistant, a colleague, or the help of an experienced statistician. Be sure to always keep the ethical aspects of your research in mind. For instance, to what extent can a student be involved while still guaranteeing the privacy of participating students.

Step 8

Reflection & Dissemination

There is no doubt that during this project you have learned a lot and gained new interesting insights on your students' learning and teaching within your own discipline. Reflection and dissemination are important next steps to take.

Reflection can help to better understand your situation and achieve more effective behaviour in all kinds of work situations.

Reflection

Develop and professionalise yourself by learning from the research process that you have gone through. Think about your own experiences and behaviour concerning:

- Looking back on the experience: What exactly happened? What did I want to happen? What did I do, think and feel?
- Awareness of essential aspects: How do the answers to the previous questions relate to each other? What did I learn? How would I like to keep developing? How enthusiastic am I still about my topic/question?
- Designing and choosing alternative approaches: What will I do differently/the same in a next project? What kind of help do I need next time? Are there colleagues I can involve?

Dissemination

Your results and insights are not only important and interesting for yourself, but also for others: it provides more insight in the learning of your students and can therefore improve education. Sharing is therefore an important step.

There are different ways to share your results:

- **Orally:** a presentation for your colleagues during a work meeting, an education related activity within your organisation, e.g., at an internal staff development conference, or at an (inter)national conference or workshop.
- **Written:** a blog or a webpage, publication in an (inter)national peer reviewed scientific journal, book chapter or poster presentation.
- **Multimedia/video:** a short video or vlog, social media, and other IT-initiatives.

Especially for first projects it is recommended that you start with local and/or national conferences or journals. There are many specific discipline-related educational journals which are extremely suited to publications about teaching projects and experiences from a certain discipline. The writing style in these journals is often similar to what you may be accustomed to in field-specific publications. Specific SoTL journals and conferences are also very accessible and open to publications on a systematic approach to teaching.



Based on the reflection write an advice for yourself with steps and recommendations for future projects. You can use this advice in future projects so that you can immediately employ what you have learned.



Don't think that your results are too limited or insufficient to share with others. Sharing also ensures that you and others will obtain new insights and ideas. Therefore, also share results that you did not expect or partial results from longer studies.



When writing a peer-reviewed publication, ask for help from a critical friend or mentor. Seeking connection with others and forming a writing group are also good ways of supporting, inspiring, and learning from each other. See if there are options offered to you within your organisation or form your own group.



Stel jezelf de volgende vragen:

- Which message(s) would I like to pass on? What is the most important result in my project that I would like to share?
- Who would be interested in the results? Does my target audience only exist of colleagues within my own discipline, or are the results also interesting for those outside of my discipline?
- In which format would I want to present my results?
- Do I want to share the results locally, regionally, nationally, or internationally?
- When do I want to share the results?

References

- Bishop-Clark, C. & Dietz-Uhler, B. (2012). Engaging in the Scholarship of Teaching and Learning. *A guide to the process, and how to develop a project from start to finish*. Styling Publishing, LLC, Virginia.
- Denyer, D., Tranfield, D., & van Aken, J.E. (2008). Developing design propositions through research synthesis. *Organization Studies*, 29(3), 393-413
- Dewar, J. M., Bennett, C. D., & Fisher, M. A. (2018). *The Scholarship of Teaching and Learning. A guide for scientists, engineers, and mathematicians*. Oxford University Press, Oxford
- Felten, P. (2013). Principles of Good Practice in SoTL. *Teaching & Learning Inquiry: The ISSOTL Journal*, 1(1), 121-125
- Korthagen, F. & Vasalos, A. (2005). Levels in reflection: Core reflection as a means to enhance professional growth. *Teachers and teaching*, 11(1), 47-71.
- Vermunt, J. D. & Donche, V. (2017). A learning patterns perspective on student learning in higher education: state of the art and moving forward. *Educational Psychology Review*, 29, 269-299.