Welcome to the course Introduction to research methods in technology and learning!

The course starts on **Thursday September 14** and will run during the fall semester (part I), and during half of the spring semester (part II).

Part I, (fall 2023), focus on paradigms, methodologies and qualitative methods. Course meetings are scheduled every second Thursday at KTH Campus, Brinellvägen 68.

Part II), starts at the end of January 2024, and include meetings scheduled between Jan-March with focus on quantitative approaches and mixed methods.

Course responsible & contact: Linda Barman, lbarman@kth.se

Additional teachers: Arnold Pears, Stefan Hrastinski, Ernest Ampadu

Aim

The course aims to strengthen the doctoral student's ability to choose methods for data collection and analysis and to consider questions regarding research ethics (in the area of technology and learning*). The purpose is also to contribute to the doctoral student's ability to interpret and critically evaluate studies in technology and learning regarding method choices.

Intended learning outcomes

After successfully completed the course, the doctoral student should be able to:

- Compare different research methods in technology and learning and discuss the connection between method and basic methodological assumptions.
- Reason about the basic choices regarding studies with quantitative and qualitative approaches.
- Reflect on and discuss study design, including choice of research methods and its possibilities and limitations in relation to different research questions.
- Reflect on and discuss ethics and quality aspects that concern data collection and analysis.

Content

During this course the doctoral student become acquainted with different research methods that are applied in the research area 'technology and learning'. The overview of different methods is intended to support the ability to make adequate choices in the design of scientific studies. The course includes research methods based on qualitative and quantitative approaches in data collection, analysis and interpretation. During the course, different types of study design and its possibilities and limitations in relation to different research questions are discussed. Furthermore, scientific integrity, ethics and quality aspects in research are discussed. The course also concerns different scientific traditions and how underpinning methodological assumptions relate to methods for data collection, analysis and interpretation of results.

Part I focuses on qualitative research approaches in data generation and analysis, including:

- Research methods, methodologies, interpretation and paradigms
- Different methodologies/ methods including: hermeneutics / interpretation theory, phenomenography, case studies, grounded theory, and design-based research.
- Examples of different kind of data collection/generation including interviews, text/documents and observational studies, as well as qualitative methods to analyse different kind of materials.

- Quality criteria relevant for qualitative research, such as trustworthiness and credibility.
- Ethics in data collection and protection regarding research involving human participants.

Part II (spring semester 2024)

The second part of this course will introduce students to the different mixed methods designs (i.e triangulation, embedded, explanatory (sequential) and exploratory designs). In addition to this, students will also discuss the different quantitative research designs (i.e. survey, correlational, cross-sectional, ex post facto, longitudinal, and experimental designs). One of the common tools used for collecting quantitative data is the use of questionnaires. Students will also be introduced to the different types of questionnaires and the steps in designing questionnaires. Through active participation, students will examine the different ways of analysing quantitative data. The two main approaches to be discussed are descriptive statistics (measures of central tendencies and dispersion) and inferential statistics (e.g. T-test, ANOVA, Regression, Factor Analysis etc.).

This part of the course is divided into three sections;

- Mixed methods and quantitative designs
- Designing of questionnaires/surveys and quantitative sampling techniques
- Quantitative data analysis (descriptive and inferential statistics)

Course activities

The course includes seminars with opportunity to discuss and elaborate thoughts based on literature reading. You are expected to prepare for each seminar by reading the suggested texts. Between meetings, we interact via the discussion forum in the learning platform Canvas. You are welcome to post questions before each seminar, and continue conversations between meetings.

Graded assignments (examination)

Students' performances will be assessed based on completion of two written assignments submitted at the end of each course part (part I and II). Grading will be based on completion of both assignments (10.0 credits, grading scale: P, F).

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability. The examiner may apply another examination format when re-examining individual students.

Obligatory requirements for final grade

In addition to the written assignments, participation during the peer-review seminar at the end of part I is obligatory. In addition to passing the written assignments, students are required to actively participate during the course meetings to receive a final grade. Students that miss out on course meetings, should contact the course management lbarman@kth.se for discussion on relevant complementary assignment.

Course literature

The course literature includes one online course book and additional research articles. You can access the course book through KTH library.

Flick, U. (2014) *the SAGE Handbook of Qualitative Data Analysis*. e-book via KTHB:
DOI: DOI: https://dx-doi-org.focus.lib.kth.se/10.4135/9781446282243 (please note that you need to, not only log in to KTHB, but also be connected via VPN or be at KTH campus to gain full access).

Communication and course meetings

Course meetings are scheduled at KTH campus (Brinellvägen 68), and Canvas (LMS) will be used to share information and literature, and to interact between course meetings. Canvas will open about two weeks before the course start.

Preparations before first course meeting

Sep 13 at latest: **Introduce yourself and your doctoral project in Canvas**

1) Readings, both the morning and the afternoon session will be related to these papers.

- Cohen, L. et al. (2018) The nature of enquiry, In: Research methods in education, 8th Ed. Routledge: Abingdon. Chapter 1.
- Case & Light (2011) Emerging methodologies in Engineering Education Research, Journal of Engineering Education, 100(1), 186-210. I recommend that you read p. 186-191 more closely since these pages provide an overview of the terms method and methodology. Also, I recommend the discussion and conclusion that starts on p. 205. (if you don't have time, you can skim through the rest of the paper for now)
- Reichertz, Induction, deduction, abduction. Chpt 9 in Flick. (you can skim through this paper if you don't have time to read closely, we will come back to the concepts in this paper)

2) **Post 1-3 questions or reflections** based on your readings before the seminar (at latest the day before). Visit the discussion forum (see the navigation menu to the left) to post your questions/reflections.

3) **Introduce yourself and your research topic** to your peers and the teachers – be very short:

- What phenomenon/phenomena are you investigating and/or develop in your doctoral project? Summarize in maximum one-two sentences.
- What theoretical framework, if any, do you use? Or, plan to use?
- What kind of learning/ educational situation/ technology for learning are you studying/ plan to study? Eg. Individuals' learning? Educational processes? Conditions for learning? Or, artefacts useful for learning? How technology is used to enhance learning? How technology impacts learning? Other?
- What methods of inquiry have you used so far/plan to use in your ongoing study? Qualitative or/and quantitative? What kind of data will you analyse? Interviews/documentation/questionnaires/video-materials/other?

Schedule Course Meetings

Course Meetings at KTH Campus, Brinellvägen 68. Due to the ongoing change of facilities (Department move) the seminar rooms will be notified later.

Date	Time	Content
Sep 14	10.00 - 15	Course introduction & introduction to qualitative research, Linda Barman (LB) followed by Research traditions and paradigms, LB & Arnold Pears (AP) – *please see instructions of what to read and prepare*
Sep 28	9.15 -12	Introduction to qualitative analysis (AP & LB)
Oct 12	13 -16	Phenomenography & learning studies (AP & LB)
Oct 26	13 -16	Hermeneutics, analysis and interpretation (LB) Thematic and Content analysis
Nov 9	13-16	Participatory Research Designs (LB)
Nov 23	13-16	Design based research, Stefan Hrastinski
Dec 7	13-16	Scientific integrity, ethics and quality in research (LB) Discussion examination/assignment (LB)
Jan 9		**Deadline written assignment part I**
Jan 18	10-14	**Obligatory, peer-review and discussion of assignment**
Jan - March		Mixed methods and quantitative designs Designing of questionnaires/surveys and quantitative sampling techniques Quantitative data analysis (descriptive and inferential statistics)
March		**Deadline written assignment part II**

Literature

Chapters from Flick and additional literature will be specified in the detailed schedule in Canvas. Readings include:

Andersson, T. & Shattuck, J. (2012) Design-based research. *Educational Researcher* 41(1), 16-25.

Bernhard, J. & Baille, C. (2016) Standards for quality of research in engineering education. *International Journal of Engineering Education,* 32(6), 2378-2394

Case, J. & Light, G. (2011) Emerging methodologies in Engineering Education Research. *Journal of Engineering Education,* 100(1), 186-210

Cohen, L. et al. (2018) The nature of enquiry, In: *Research methods in education*, 8th Ed. Routledge: Abingdon. Chapter 1.

Hrastinski, S., Keller, C., & Carlsson, S. A. (2010) Design exemplars for synchronous e-learning: A design theory approach. *Computers & Education*, 55(2), 652-662.

Maxwell, J. & Chmiel, M. (2014) Note toward a theory of qualitative data analysis. In: Flick, U. (2014) *the SAGE Handbook of Qualitative Data Analysis*. Chapter 2.

Palmberger, M. & Gingrich, A. (2014) Qualitative Comparative Practices: Dimensions, Cases and Strategies. In: Flick, U. (2014) *the SAGE Handbook of Qualitative Data Analysis*. Chapter 7.

Reichertz, J. (2014) Induction, deduction, abduction. In: Flick, U. (2014) *the SAGE Handbook of Qualitative Data Analysis*. Chapter 9.

Thornberg, R. & Charmaz, C. (2014) Grounded Theory and Theoretical Coding. In: Flick, U. (2014) *the SAGE Handbook of Qualitative Data Analysis*. Chapter 11.

Willig, C. (2014) Interpretation and analysis 1. In: Flick, U. (2014) *the SAGE Handbook of Qualitative Data Analysis*. Chapter 10.

About the research area Technology and Learning
(About Third-cycle education in technology and learning | KTH)

Technology and Learning is a cross-disciplinary, practice- and policy-related subject. Research methods, theories and empirical approaches are based on traditions and perspectives from the humanities, social sciences as well as from engineering and natural sciences. The subject comprises conditions for learning and communication, processes of learning, teaching and communication, as well as results and effects of learning and communication within Engineering Sciences. Important research areas include technology education, engineering education, digital learning, policy, management and change processes, teaching and learning within professional education and the importance of technology in society.