Course information

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

The course starts on **Thursday September 23** and will run during the fall semester (part I), and during half of the spring semester (part II).

Part I), during fall 2021, focus on paradigms, methodologies and qualitative methods (see overview of course meetings below). Course meetings are scheduled every second Thursday.

Part II), starts at the end of January 2022, and include meetings scheduled between Jan-March with focus on quantitative approaches and mixed methods.

Course responsible & contact: Linda Barman, lbarman@kth.se, zoom: https://kth-se.zoom.us/j/2836504658

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 focusses 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, comparative studies, 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 2022)

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)

*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.

Course activities

The course includes seminars where we discuss and elaborate our thoughts based on literature reading. You are expected to prepare for each seminar by reading the suggested texts.

Grades assignments (examination)

Students' performances will be assessed based on completion of 2 written assignments, (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

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, course meetings & covid restrictions

Course meetings are scheduled at campus (KTHB) if/when possible and in accordance with FHM (https://www.folkhalsomyndigheten.se/the-public-health-agency-of-sweden/communicable-disease-control/covid-19/) and KTH recommendations. Some course leaders will teach online, however on those occasions, there can be possibilities for the doctoral students to sit together at campus. Canvas (LMS) will be used to share information and literature, and interaction between course meetings. Canvas will open about two weeks before the course start.

Please make sure to check Canvas updates on whether course meetings will take place at KTHB or online. Changes from campus to online meetings may occur with short notice (even the same day). All participants should make sure to follow the FHM and KTH policy for attendance on campus.

Overview dates & course meetings

Sep 21 at latest: Introduce yourself and your doctoral project at Canvas

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?

On campus**, 23 Sep,**
10.15 – 12 Course introduction (Linda Barman, LB) room Geisendorf KTHB
13-15, Research traditions and paradigms Arnold Pears

Online/zoom, **7 Oct,**
10.15 - 12 Methodology and methods (LB) (Geisendorf available for students to collaborate)
13-15 Phenomenography & learning studies

On campus **21 Oct, 13-15,** Hermeneutics, analysis and interpretation & Grounded theory (LB)

On campus **4 Nov, 13-15,** Comparative studies, Lars Geschwind

On campus **18 Nov, 13-15,** Case Studies, Lars Geschwind

Online/zoom **2 Dec, 13-15,** Design based research, Stefan Hrastinski

On campus **16 Dec,** Scientific integrity, ethics and quality in research (LB), Discussion examination/assignment

On campus **20 Jan Obligatory, peer-review and discussion of assignment**

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.