Introduction to Discipline-Based Education Research
Course leaders: Arnold Pears & Felix Ho

Course Overview

This workshop-based course provides a structured overview of Discipline-Based Educational Research (DBER) as a field of enquiry. It is intended for a non-specialist audience, including PhD students and researchers who have an interest in learning more about DBER, but who currently have little or no experience in engaging in this kind of research. We will consider questions such as: What issues are addressed in DBER and how is it done? How do I read and interpret such research publications? What topics are researched within my scientific discipline? What issues might be interesting for further research?

The course is structured into five, interactive sessions. We will introduce DBER, discuss theoretical underpinnings and methodologies for data collection and analysis, as well as the various research traditions and publication traditions for DBER in STEM areas. Participants will read and discuss DBER literature from their respective fields, and the course will provide a forum for collegiate discussions, including the relevance and applicability of this research to innovation and development of teaching and learning in the participants’ own disciplines and departments.

As guidance for PhD students, the suggested credits for this course is 3 ECTS credits. The course would also be a valuable addition to continuing professional education that could be included in a teaching portfolio (e.g. supporting an application for promotion or appointment as Distinguished University Teacher).

Session 1: Overview of DBER
Facilitator: Arnold Pears
14 Sep 2022, 1 - 5 pm

The session provides a general overview of tertiary teaching and learning research in STEM disciplines and the link between DBER and Scholarship of Teaching and Learning (SoTL). In particular the session deals with the following topics. What is meant by “theory” and “theoretical frameworks” in DBER? Some of the major theoretical frameworks used in DBER include: what such a study might comprise, covering aspects such as: constructing a research question, considerations in selection of theoretical framework, study design and method, connecting these to research questions and how theoretical frameworks provide assistance in addressing issues of reliability and validity.

Facilitator: Felix Ho
24 Oct 2022, 1 - 5 pm

This session features short presentations in which the seminar participants each present an area of their research and teaching that they think would be of interest to education research. Each presentation is expected to give an overview of what such a study might comprise, covering aspects such as: constructing a research question, considerations in selection of theoretical framework, study design and choice of methodology and method, as well as how the results might contribute to insight for both further research and innovative practice.

Session 3: Methodology and Method, Data Analysis
Approaches and Communication of Results
Facilitator: Arnold Pears
3 Oct 2022, 1 - 5 pm

What constitutes well conducted DBER research? Starting from a general discussion about how to structure DBER studies we explore several DBER fields through reading and discussing selected papers from highly ranked journals in a range of areas. Papers will be chosen based on the disciplinary areas of the participants. The goal is to establish a foundation for assessing the knowledge and innovation claims of papers in DBER as well as to assess the research quality and validity and reliability of the research results.

The session provides examples of data collection and analysis methods for these approaches. We cover a range of considerations in relation to the choice of methodology and method, connecting these to research questions and how theoretical frameworks provide assistance in addressing issues of reliability and validity.

Ethical considerations of DBER and the nature of the relationship between the researcher and the study participant is an important aspect of any DBER study. The session explores the VR guidelines and ethical approval frameworks relevant to tertiary DBER.

Session 4: Reflecting on DBER Literature
Facilitator: Felix Ho
13 Oct 2022, 1 - 5 pm

The goal of the session is to explore research in areas that are specifically relevant to the participants’ disciplinary expertise, and in particular to provide additional insight into where to find such research, and identify current trends. We address the following areas: Where DBER research can be found, from both primary and secondary sources; identification of DBER “hot topics” in one’s own discipline; overview of what specific questions are asked and what approaches are used to provide answers to research questions.

Session 5: Participatory DBER
Facilitator: Arnold Pears
24 Oct 2022, 1 - 5 pm

This session focuses on students’ use and understanding of mathematics in their learning in Engineering Sciences at KTH. His research interests include broadening interest in STEM in underrepresented groups, computational thinking in the Swedish School curriculum, theory and practice of DBER in STEM disciplines and the systematic enhancement of higher education through research driven innovation.

Biographies

Arnold Pears is Professor of Engineering Education (KTH), Professor of Computing Education Research (UU), and Head of the Department of Learning in Engineering Sciences at KTH. His research interests include broadening interest in STEM in underrepresented groups, computational thinking in the Swedish School curriculum, and practice of DBER in STEM disciplines and the systematic enhancement of higher education through research driven innovation.

Felix Ho is Associate Professor at the Department of Chemistry - Ångström Laboratory, Uppsala University, as well as the Chair of the MINT Centre. He has a research background in biophysical chemistry and more recently in chemistry education research, where his research focuses on students’ use and understanding of mathematics in their chemistry studies, as well as systems thinking in chemistry education.