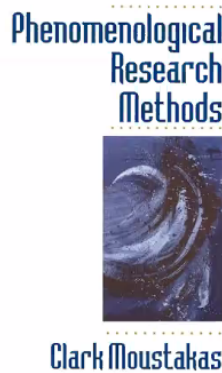
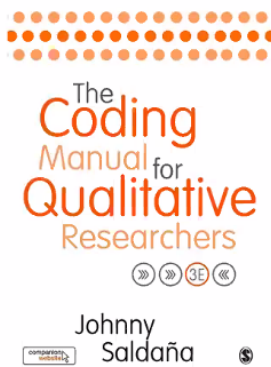
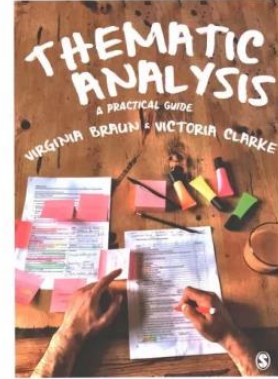
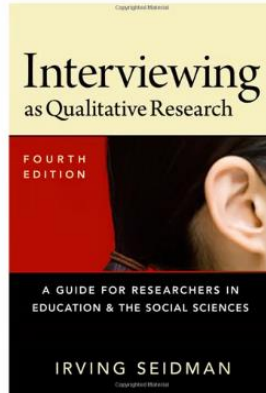
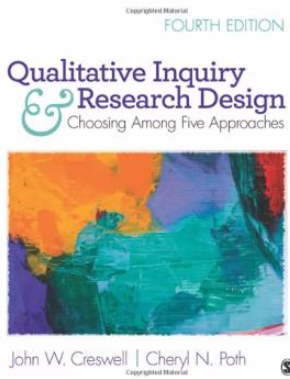


Presenters: Lead: Antanjot Kaur, Department of Engineering Education, Virginia Tech

Topic: Qualitative Research for Engineering Educators

Resources:

- Good Textbooks:



- Qualitative Analysis Tools:

- Dedoose: <https://www.dedoose.com/>
- NVivo: <https://lumivero.com/products/nvivo/>
- Highlighting or commenting codes in a word document or excel using macros
- Taguette: **Free open source version: <https://www.taguette.org/>
- QualCoder: <https://qualcoder.wordpress.com/>

Discussion and Lecture Notes:

- What is Qualitative Research?
 - We want to go beyond the numbers and we want to explore other people's experiences in the real world
 - We use it to investigate the "what", "why" and "how" questions of the research question
 - We do this through interviews, focus groups, artifacts, surveys, and other sources of data
- Quantitative vs. Qualitative Information:
 - We look at numerical data to understand the and confirm the observation, while qualitative data we understand the why and the depth of the data
 - Quantitative: numbers, confirm something, Qualitative: synthesize themes, understanding something
 - E.g. who is passing or failing in a course vs. how and why students are passing or failing
- Why do we do it?
 - Be able to look at the whole picture! Understand the person/group and details
- How do we start?
 - Start with a good research question that is open-ended
 - Look at data collection site and think about questioning the data collection site and the participants, how to collect data at that site, institutional procedures, how it will be stored, and how we will engage with the data
 - Think about how you will protect the population and build a report with that population
 - Methodology – systematic methodology process and steps to data collection and analysis
 - Ensure you will answer the research question at the end of the day
 - Methods: ethnography, phenomenology, interviews, case studies, observations, narratives
 - Theory: explain why it is working and has constructs that explain the phenomenon
 - E.g. Godwin's Identity Theory is framed in the methods and interview questions to base it on the framework
- Data Collection:
 - Ethics are important – work with IRB, have IRB training, store data in safe location, make participants aware of what they sign up for and how data is used and have right to withdraw to ensure wellbeing.
 - Good practice is to make aware of consent multiple times and use lay person terms
 - Deidentification is important to ensure that identifiable information is removed
 - Build relationships and reciprocity as these are humans who are sharing stories with you, so you need to connect with them and do things like asking "are you okay with sharing all of the information you shared today?"
- Data Analysis
 - Organizing data
 - Qualitative coding
 - Reading and organizing based on themes into memos
 - Look at one or more methods to analyze these processed data
 - Representing our findings appropriately
- What is Coding?
 - A way to label data
 - Can use method frameworks to identify codes or a priori coding to create codes as you analyze it
 - Codebook:
 - Example: (Engineering Identity)
 - Performance/Competence
 - Recognition
 - Interests
 - In Vivo Coding:

- Rigor
 - Peer-Peer Relationships
 - Imposter Syndrome
- Memoing
 - Taking quotes based on the themes and linking them to these themes
- How do we know we are doing it well?
 - Trust Worthiness
 - peer review, debriefing – engage with others to validate that we are doing it properly
 - triangulation – bring in multiple forms of data (document analysis/bring in artifacts with stories)
 - Researcher bias – how our own identity impacts our research, or be more collaborative as we are studying a different group we are not a part of
 - Member checking – sharing preliminary findings with the research participants to verify accuracy
- Takeaways:
 - Pick a good research question, theory, method, and data collection and analysis
 - Make is systematic

Discussion:

- Questions:
- Can you explain the difference between frameworks and constructs?
 - We are looking at engineering identity as the framework, but the constructs would be performance/competence, recognition and interest (the pieces of the framework)
- Can you explain Memoing?
 - Look at data, take codes, and put quotes of the data into sections
 - Take rigorous notes not just about what they are saying, but what we are noticing about their behavior or underpinnings of what they are saying
 - Synthesizing the information into each of the themes
 - Example: if student talking about rigor, may have own quote or own thought that saw in regards to rigor or behavior observed during data collection that is in regards to rigor
- Interview bias – how to handle this aside from coding?
 - When asking questions to interviewee, may ask for clarifications, don't guide them to the answers you want but instead ask more questions that have them define or clarify it themselves in their own words so you don't sway the participants answers or lead them to an answer
- Do you do it blind, or train someone else to verify?
 - We do training and read textbooks in resources to learn how to make interview and answer questions on things like how to do clarification on questions, talk to field matter experts to learn how to deal with interview bias
 - Lean to literature and experts to ensure that you aren't being bias
 - Having a mock interview with others to see if you are implementing your own bias
- Do you recommend any tool to support analysis work?
 - Uses Dedoose, costs money, NVio, Taguette is free
- Did you ever have a large volume of data without a research question and wanted to do qualitative analysis on it?
 - Did this using in vivo coding and simple thematic analysis to develop a code book, and as you get familiar with data, go back and pick a specific theoretical framework, then having more rigor about to your study
- For those interested in conducting qualitative research or education research in general, how do you recommend broaching higher ups for resources and time to dedicate to data collection, experimental design, etc.?

- Can be difficult to do if teaching only
- To get started, you can do some volunteer work and publish with others in space and use that to leverage the time
- You mentioned that with qualitative research you don't need much data, how do you know when you have "enough" or you've actually captured the population opinion/thoughts
 - It depends on the methodology you use, if narrative analysis, it could just be a really in depth experience with a few people, with phenomenology, it could be 1 person, and depends on how you frame the argument relative to the method
 - There is saturation where the theme can start "yelling at you"
 - E.g. if class is 35 and 25 answered it, is that acceptable? Can start coding responses to come up with themes to answer the question?
- Any tips for those who don't have background in it?
 - If you see same thing over and over again throughout most of your students, you can use that to create a theme and support it by the data. That's a good place to start.
 - Creswell's Qualitative Research for Beginners – it lists the 5 traditions and has guidelines for "what is enough"
 - Main themes you see in data set is a great way to start and can back up through the data
- Fundamental bias against qualitative research – methods are so different and data types are so different, is there a way that qualitative research frames and communicates the research such that the impact is obvious and clear? How do we communicate results of quantitative research?
 - Synthesize themes on open-ended questions on surveys, can show barriers in classroom, and can highlight themes and create the themes into actionable items to be able to improve classroom
 - Way of seeing before and after and communicating impact it that way
- If you are going to do a survey or interview, the questions you ask are important, how do you create questions that are open-ended but not too open-ended? Survey design is a skill – how do you learn about how to write a survey?
 - Survey vs. interviews – it's an artform and go through and do pilot studies to do an iterative process where you add/edit/and change how you engage each time to be able to get the information you want based on how participants respond to research questions. Use literature as well to help.
- When you publish in your group, are they purely qualitative or a mix?
 - Usually qualitative given the PI
 - Quantitative research is either through classroom experience