Qualitative Methods
Creswell, Ch. 9

Research Methodology in Computer Science
CSCI 514

Qualitative research is an inquiry approach where the inquirer:

- Explores a central phenomenon (one key concept)
- Asks participants broad general questions
- Collects detailed views of participants
- Analyzes and codes the data for description and themes
- Interprets the meaning if the information drawing on personal reflections and past research
- And writes the final report that includes personal biases and a flexible structure.

A good qualitative purpose statement includes:

- “The purpose of this study ….”
- Qualitative words, e.g., explore, understand, discover
- Central phenomenon
- Participants
- Research site
- Example: *The purpose of this study is to explore how first-year computer science students understand algorithmic thinking during their introductory programming course at a mid-sized public university.*

Writing Good Qualitative Research Questions

- Two types
  - Central question
    - The most general question you could ask
  - Sub questions
    - Sub-divides central question into more specific topics questions
    - Limited number
- Use good qualitative wording
  - Begin with words such as “how”, “what”
  - Tell the reader what you are attempting to: discover, generate, identify, describe
  - Ask “what happened?” to describe
  - Ask “what happened over time?” to explore a process
  - Ask “what was the meaning to people of what happened?” to understand

Activity 1

Work with a peer on creating 3 sub-questions for the following central question. Make sure the questions align with qualitative research. Are they open-ended and exploratory?

Central Question:

How do undergraduate computer science students experience team-based learning in capstone projects?

Examples of Qualitative Designs (Analytic Frameworks)

- Case Study
  - In depth analysis of a single or small number of units
  - E.g.: Studying how a specific university's CS department integrates accessibility into the curriculum
- Ethnography
  - Interpretation of a cultural or social group or system
  - E.g.: Observing the daily practices of open-source software contributors as a developer community
- Postmodern Research
  - Critique and deconstruction of norms
  - Discourse analysis, social constructivism
  - E.g.: Analyzing online developer forums to explore how discourse around gender and skill is socially constructed
- Narrative Analysis and Autoethnography
  - Life stories and lessons through stories
  - E.g.: A female CS professor shares her story navigating bias in academia
- Grounded Theory
  - Build theory from data
  - E.g.: Developing a theory of how CS students cope with imposter syndrome based on open-ended interviews

Qualitative Data Collection Methods

- Interviews
- Observations
- Documents
- Audiovisual, social media, and digital materials

Interviews are (the most) common method of data gathering in qualitative research.

A variety of Forms of Qualitative Research Interviews

- Questions
  - Specific
  - General
- Order
  - Predetermined/fixed
  - Flexible
- Responses
  - Precise
  - Open ended

When To Consider Doing Interviews

- Wonderful tools for exploratory investigation.
- Often can drive the formation of theories and hypotheses.
  - common in mixed-methods designs
- Great way to validate data!

You Will Probably Encounter / Do Semi-Structured Interviews

Chris Bird – Microsoft

- I was investigating code review latency at Microsoft when I found something odd in the data for a team in Bing: Many of their code reviews were signed off in just minutes (sometimes under a minute) after the code review was created.
- “I meticulously looked at the data collection code, I conducted a number of statistical tests on the data based on guesses that I had. Nothing.
- “As a last resort, I contacted one of the developers on the team and scheduled an interview. She explained that the reason for the lightning fast reviews was that they often conduct code reviews in person with two or three reviewers huddled around the developer's screen as they explain the change. Once the reviewers were happy, the author would create the request in the review system and the reviewers would immediately sign off on the review.
- “In just a few minutes, she had answered a question that I hadn't been able to answer after hours of testing hypotheses on data. You can learn things in an interview that you would never have thought of yourself.”

https://www.cabird.com/static/c010c32d510dafe0245d12245e50fcaf/bird2016interviews.pdf

Goals and Characteristics of Qualitative Interviews

- Goals
  - see the research topic from the perspective of the interviewee;
  - understand how and why they come to have this particular perspective.
- Characteristics
  - low degree of structure imposed by the interviewer;
  - preponderance of open questions;
  - focus on specific situations and action sequences in the world of the interviewee rather than abstractions and general opinions.

Interview Advantages

- Usually yield richest data, details, new insights
- Permit face-to-face contact with respondents
- Provide opportunity to explore topics in depth
- Allow interviewer to experience the affective as well as cognitive aspects of responses
- Allow interviewer to explain or help clarify questions, increasing the likelihood of useful responses

What are the disadvantages of interviews?

Interview Disadvantages

- Usually small sample size.
- The time required for each individual interview.
- The challenge of finding appropriate interviewees and scheduling a time that works for all parties.
- Potential bias introduced by the interviewer during the interview (word choice, tone of voice, body language can all affect responses).
- The time required for transcription and subsequent analysis.

Steps

1. Defining the research question
   - Typical focus is on how participants describe and make sense of particular elements of their lives
   - Goal is not to quantify individual experience.
   - Avoid reflecting your own presuppositions or biases.
2. Creating the interview guide (protocol)
3. Recruiting participants
4. Conducting the interviews
5. Analyzing the data

Step 2: Create the interview protocol

- Not formal schedule of questions to be asked word-for-word in a set order
- Instead, list:
  - topics the interviewer should attempt to cover
  - probes which may be used to follow-up responses and elicit greater detail from participants
- Guide can evolve after each interview:
  - adding probes / topics that emerged spontaneously in interviews
  - dropping or re-formulating those which are incomprehensible or consistently fail to elicit relevant responses

Sample Interview Protocol
From Open to More Specific, Then Back to Open

- Introduction
  - Introduce yourself,
  - Discuss the purpose of the study
  - Consent form
- Interview content questions
  - Opening questions, e.g., experiences, responsibilities
  - Follow up questions
    - More detail
    - Specific areas to elaborate on
  - Other important points
    - Anything to add?
    - Anything we missed?
- Closing instructions
  - Thank the interviewee
  - Debrief
  - Assure confidentiality

Typical Practice

- Include many information-seeking questions
  - Followed up with probes to explore the interviewee's views and experiences in more depth
- Prefer questions that focus on concrete examples, rather than abstracted generalities
- Incorporates fully formed questions as well as just topic headings
  - The latter encourage the interviewer to be responsive to the interviewee and avoid presuppositions

Step 3: Recruiting Participants

- Amount of time and resource available
- Diversity of expected views
  - Representative of the sample
  - Depends on the design for which the interviews are being used
- How Many Participants Are Enough?
  - Sufficiency
    - reflect the range of participants and sites that make up the population
  - Saturation of information
    - not learning anything new

Remember, you need to satisfy reviewers as well as yourself!

You must obtain IRB approval before recruiting participants.

Step 4: Conducting the Interviews

- Interview Process
  - Motivating
  - Asking
  - Listening
  - Understanding
  - Probing
  - Maintaining Control
  - Reinforcing
  - Recording

Motivating Interviewee to Participate

- The purpose of the interview should be related to the respondent's own goals and values.
- Explain what will be expected of the interviewee in the course of the interview (e.g., the length of the interview, degree of expertise required).
- Specify the way in which information is used.
- The interviewer must create and maintain an atmosphere in which the respondent feels fully understood and safe to communicate fully without fear of being judged or criticized.

Motivating – Have Answers Ready for:

- Why are you doing this study?
- What do you get out of it?
- What does university X / company Y get out of this?
- What will I get out of this?
- Who is paying for this?
- Will I receive the data?
- How do I know it will be confidential?
- How long will this take?
- Are you doing other parts of the company?
- Why did you select my group / me?

Asking Questions

- Avoid asking multiple questions at once:
  - ‘Why did you join this open-source project, and do you think it has brought benefits to your programming experience?’
- Avoid leading questions:
  - ‘So you felt that using NL2Code improved your productivity?’
    - Instead: ‘What, if any, impact did NL2Code have on your productivity?’
  - ‘Your parents pushed you to study, didn’t they?’
  - ‘How satisfied were you with NL2Code?
- Avoid assuming that the answer to a question is so obvious that it need not be asked:
  - ‘Whether, and to what extent, are you concerned about your privacy online?’
- Avoid imposing your perception:
  - ‘So what you’re really saying is …’

Asking Questions

- Do ask questions in a simple, direct, clear manner.
- Do be flexible:
  - Topic order may change during interview
- Do open with a question which can be answered easily and without potential embarrassment or distress
  - E.g., requests for factual or descriptive information
- Do ask open ended questions
  - “Grand tour” questions:
    - ‘Take me through a day in your work life.’
    - ‘Reconstruct your day for me from the time you wake up to the time you go to bed.’
  - Subjective experience questions:
    - ‘What was attending this class like for you?’

Asking Questions

- Do follow up on what the participant says.
  - Clarifications, details, stories
  - Trust your instincts, explore emerging directions
- Do ask participants to reconstruct, not remember, their experience:
  - ’What happened?’ (reconstruction) vs
  - ‘Do you remember what happened?’ (memory)
- Do ask for concrete details.

Listening and Understanding

- Listening means
  - Attending to verbal and non-verbal cues
  - Attending to the total message — facts and feelings
  - Being an active listener
  - Testing listening with feedback
- Understanding means
  - Put yourself in the interviewee's frame of reference
  - Be non-evaluative
  - Don't prematurely analyze or draw conclusions
- Listen more, talk less!
  - Listen to yourself in recordings / check length of your paragraphs in transcripts

Directive Probes

- Open-ended probe:
  - You: “What were the major responsibilities of your most recent job?”
- Specific probe:
  - Them: “I’ve always had the ability to learn a new programming language quickly.”
  - You: “What specific steps do you take to learn a new language?”

  - You: “How would you rate your contributions to this open source project?”
  - Them: “I think I’m a major contributor”
  - You: “I’m glad to hear that. What contributions in particular made you feel that way?”
- Elaboration probe:
  - “Is there anything else?”
  - “What else can you think about?”
  - “Any other thoughts?”

Non-Directive Probes

- Reflecting feelings:
  - Them: “…I’ve been here for 15 years and I don’t feel I have been treated fairly.”
  - You: “You feel you haven’t been treated fairly?”
- Indirect follow-ups:
  - “Tell me more”
  - “I would like to hear more about that point, could you elaborate a bit?”
- Pause

Dealing with Difficult Interviewees

- Uncommunicative interviewee — symptom: monosyllabic answers
  - Helps to be clear about required time and anonymity
  - Phrase questions as open as possible
  - Use silence
- Over-communicative interviewee — symptom: repeatedly straying far from your questions without adding anything of significant interest
  - Politely interrupt at a natural pause; refer back to an earlier point:
    - “That’s very interesting. Could we go back to what you were saying earlier about X, I’d like you to tell me more about that”

Feedback/Reinforcement

- Interviewees need to know how they are doing in producing information.
- Reinforce early and often (i.e. throughout the interview).
- Provide positive feedback without reinforcing specific content:
  - “We are making good progress.”
  - “I appreciate your willingness to help us in this project.”
  - “Your comments are very helpful to us.”

Dealing with “Contradictions”

- What you consider a contradiction may not be for the respondent
- Note any perceived contradictions with a quick note
- Postpone probing contradictions
- Wait for some natural break
- Feedback the ideas that seem to be conflicting in a neutral way:
  - “You mentioned X. You also mentioned Y. Help me understand the relationship between these two points.”

Recording and Transcripts

- Record the interview, capture everything verbatim.
- But still take copious notes during the interview.
  - Much easier to refer to notes than find a particular place in a recording.

- Whatever can go wrong, will go wrong!

Activity 2

In small groups, develop an interview protocol for research *examining how GitHub, with its powerful collaboration, social and awareness features, can be used for educational purposes*.

- Recruitment
  - Who would you recruit?
  - How would you find them?
  - What ethical considerations arise?”
- Questions
  - Write 8–10 interview questions
  - Label the type (introductory, follow-up, probe, closing)