Learn how to design high-quality qualitative educational research! – A workshop for disciplinary STEM faculty by disciplinary STEM faculty

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I. Goals of the Workshop

The purpose of this workshop—designed for **instructional and disciplinary STEM faculty** interested in learning about qualitative research—is to (1) introduce participants to high-quality qualitative research design and (2) practice this design process alongside disciplinary STEM faculty to expand their STEM education research abilities and network. We will do so using the ProQual approach, a methodologically unencumbered and widely accessible way of thinking about qualitative research design that was deployed and refined over the last three years as part of the NSF-funded ProQual Institute for Research Methods [1]. This workshop will be conducted by ProQual Institute alumni, who are culturally sensitive to the challenges faced by disciplinary STEM faculty. Leveraging a propagation model of effecting academic change [2], the workshop leaders will serve as a community of practice to help participants move their educational research ideas forward during and after the workshop. In doing so, we strive to further FIE's mission to create a **collaborative, supportive, and inclusive community** of educational researchers.

II. Content: The ProQual Approach

The premise of the ProQual approach is that training faculty to conduct high-quality qualitative research should begin not with an overview of approaches, theories, and methods. Rather, it should begin by helping participants identify and answer the right questions to design their studies from the ground up to with quality in mind. We call this approach a "methodologically unencumbered" introduction to qualitative research. The first step in research design is identifying a **social reality under investigation (SRUI)**, which clearly defines the boundaries of the problem or phenomena that will be studied. Drafting a properly scoped investigation of a well-defined SRUI is the most critical first step in research design, and other decisions involved in the conduct of qualitative research flow more easily from there. Fig. 1 shows a high-level overview of the entire ProQual process visually.

Once the SRUI is refined, the next steps of the ProQual approach help researchers determine how to collect and analyze

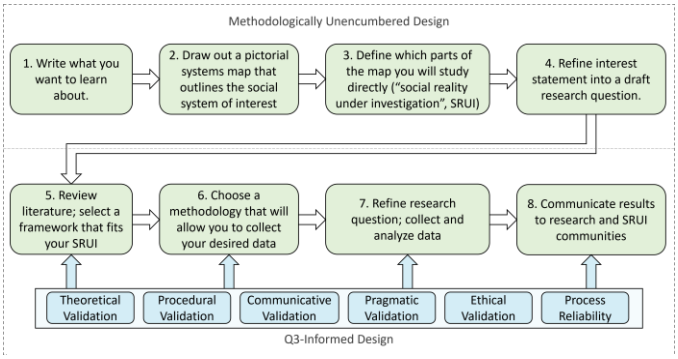

Fig. 1. A high-level outline of the ProQual approach

data, guided by the Qualifying Qualitative Research Quality (Q3) framework pioneered by Walther, et al. [3]. This framework presents qualitative research quality as an essential and context-sensitive consideration in every aspect of a study's design, rather than as a series of specific strategies that can be added to a research design to increase quality [3, 4]. It divides research quality into six forms of validation that must be considered in both the making (collection) and handling (analysis) of qualitative data during the process of planning and conducting research about the SRUI. Table I defines these dimensions in greater detail.

TABLE I. OVERVIEW OF THE Q3 FRAMEWORK FOR QUALITATIVE RESEARCH QUALITY

Q3 Component	Key Concern in Making Data	Key Concern in Handling Data
Theoretical Validation	Does the research process wholly capture everything the researchers want to learn about the SRUI?	Do researchers' interpretations fully reflect the coherence and complexity of the SRUI?
Procedural Validation	Do the research procedures afford the researchers an authentic view of the SRUI?	What processes are in place to mitigate risks of the researchers misinterpreting the participants' lived experiences?
Communi-cative Validation	How is meaning co-constructed with participants to ensure that data represent participants' social realities on their own terms?	How is data co-constructed with research communities to build upon existing work while remaining authentic to research participants?
Pragmatic Validation	Is the selected theoretical framework a good fit for the SRUI?	How meaningful are the study's results to the SRUI (and other similar social realities?)
Ethical Validation	Is the study conducted reflexively, responsibility, and in the best interests of the SRUI?	Do the findings do justice to SRUI, and positively impact the people that comprise it (and other similar social realities?)
Process Reliability	How can random influences on the research process be mitigated, and how can the SRUI be dependably captured or recorded?	How can the researchers demonstrate and document the dependability of their data collection and analysis approaches?

III. EXPECTED INTERACTION AND AGENDA

To introduce the ProQual approach to disciplinary STEM faculty, we employ an approach used by the ProQual Institute that helps participants understand how to integrate high-quality research practices into all aspects of the research design process. The approach is accessible, intuitive, equitable, and mapped to the intellectual curiosity of the researcher.

The 3-hour workshop will focus on the first four steps of the ProQual approach, but will also cover the Q3 framework as the basis for the next steps in the process. Participants will be asked to come into the workshop having filled out a worksheet (provided by workshop leaders) to write about what they are intellectually curious to study in their educational context. We will also bring pre-written backup scenarios that participants can use if they did not fill out the worksheet. Table II provides a detailed agenda of the activities.

TABLE II. DETAILED WORKSHOP AGENDA

Activity	*Detailed Description*	*Duration*
Workshop Leader Introductions	The nine workshop leaders will briefly introduce themselves, including their institutions, roles, and a summary of the projects they worked on as ProQual participants.	10 min (0:10)
Participant introductions	The leaders will ask participants in the room to introduce themselves, including name, institution, and educational research interest.	10 min (0:20)
Introduce qualitative research and the ProQual approach to research design	A mini lecture describing the value of qualitative research and describing the ProQual approach to designing qualitative research plans (Fig. 1). Leaders will use an example project to demonstrate each step.	20 min (0:40)
Pictorial systems mapping demo	Leaders will walk through drawing a pictorial systems map, extrapolating from the example used in the mini lecture. This demonstration will help participants prepare to draw their own systems maps.	20 min (0:60)
Participant think-pair: mapping your social realities	Participants will have approximately 25 minutes to draw a pictorial systems map for their project of interest. Participants will be provided with whiteboard or flipcharts for this purpose. Participants will be able to ask for help at any part of their mapping, and the nine leaders will have ample ability to provide support. The remaining 10 minutes will be spent sharing their maps with a nearby partner, so that participants can see examples of others' maps.	35 min (1:35)
Break	A 10-minute break.	10 min (1:45)
Sharing pictorial systems maps (gallery walk of volunteers)	During the break, participants will be invited to volunteer their pictorial systems map to showcase in a gallery walk. During this walk, all participants will walk from map to map, and each volunteer will spend 2-5 minutes describing their map and how it helped them flesh out their research interest. This activity will expose participants to a wider array of systems maps to see how these maps can come together for different educational research contexts.	25 min (2:10)
Introduce the Q3 framework as a guide for carrying out qualitative research	A mini lecture describing the Q3 framework and its use as a foundation for the latter half of the ProQual approach. Workshop leaders will cover the six constructs of the framework outlined in Table I, providing examples by extrapolating from the example project described in the first mini lecture activity.	20 min (2:30)
Workshop leader "conver-stations"	Each workshop leader will sit at a different table, and participants will be free to roam between tables to talk to different leaders about questions they have and next steps to move their ideas forward. A slide will be displayed summarizing each leader's discipline and educational research interest, allowing participants to make an informed decision. This part of the workshop is meant to give participants a chance to receive personalized feedback and begin to build community with ProQual leaders.	25 min (2:55)

Invitation to engage with the ProQual community to support moving your research forward	Workshop leaders will share their emails and encourage participants to reach out to further advance their project ideas into the next stages of the ProQual approach. Additionally, following the workshop, leaders will reach out to participants with whom they interacted via the "conver-stations" to move further conversations forward.	5 min (3:00)

IV. Anticipated Takeaways

At the end of the workshop, participants will achieve the following:

1. Knowledge of the ProQual approach to qualitative research design and the Q3 framework to guide future educational research efforts.
2. Construction of the foundation for a qualitative research study, in the form of a well-defined SRUI.
3. Access to the ProQual educational research community, who will help interested participants continue to develop their research ideas beyond the workshop.
4. Access to a repository of materials from the ProQual Institute to support qualitative research development.

V. Workshop Team Qualifications

Our team consists of nine workshop leaders and one workshop organizer. The workshop leaders, listed in Table III, are all technical STEM faculty who have successfully used the ProQual approach to design and (at least partially) execute a qualitative research project, making them ideal candidates to help other technical STEM faculty do the same. They cover a wide range of disciplines and academic roles, as elaborated in the table below. This diverse set of nine workshop leaders will be able to provide ample support to participants during small group activities and provide a large range of disciplinary backgrounds and academic roles for participants to choose from during the workshop's "conver-station" phase, helping participants connect with someone of similar background.

TABLE III. List of Workshop Leaders

Name of Leader	Role	Discipline
Michelle Jarvie-Eggart	Assistant Professor	Engineering
Heather Chenette	Associate Professor	Chemical Engr.
Sara Hooshangi	Collegiate Assoc. Prof.	Computer Science
Betsy Chestnutt	Lecturer	Engineering
Sarah Wilson	Assistant Professor	Chemical Engr.
Azadeh Bolhari	Teaching Assoc. Prof.	Environmental Engr.
Kirsten Dodson	Associate Professor	Mechanical Engr.
Iglika Pavlova	Academic Professional	Biology
Rebecca Reck	Teaching Assoc. Prof.	Bioengineering

Dr. John Morelock—the PI of the ProQual NSF project at University of Georgia—is acting as the workshop organizer, working together with the leaders to plan the workshop curriculum, prepare the workshop proposal, and ensure all preparations for the workshop are complete before the conference begins.

VI. Intended Audience

This workshop is intended for instructional and disciplinary STEM faculty who want to develop skills in qualitative educational research. The workshop could support up to 30 participants.

VII. Required Equipment & Fees

The workshop will require access to powered presentation equipment (projector/screen, HDMI hookup) and preferably communal drafting equipment (e.g., whiteboards or flip charts). We will impose no additional fees upon participants.

VIII. Acknowledgements

This material is based upon work supported by the National Science Foundation under Grant No. 1937741. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Special thanks to Dr. Dominik May for his contributions to conversations that helped shape this workshop.

IX. References

[1] J. R. Morelock, D. May, A. Reid, A. Boyce, N. W. Sochacka, and J. Walther, "Impacts of the ProQual Institute for Research Methods: Building communities of technical STEM faculty for long-term engagement in educational research," presented at the ASEE Annual Conference, Baltimore, MD, June 25-28, 2023.

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