Participatory Quantitative Ethnography

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Abstract. This symposium proposes that *Participatory Quantitative Ethnography (PQE)* is an important new strand of research for the QE community to develop. This paper introduces the participatory research values motivating PQE, outlines contributions from symposium speakers explaining the importance of PQE from different perspectives, before closing with a set of research questions that motivate a research agenda. It is hoped that this symposium may spark fruitful conversations and collaborations that advance PQE concepts, methodologies and tools.

Keywords: participatory research, co-design, visualization

1   Introduction

In all fields, research must give form to data and insights. Visualizations serve as cognitive extensions that assist researchers not only in exploring their data, but in communicating findings to colleagues and broader audiences. Especially in data-intensive fields, widely used software tools define, and are defined by, research communities; you cannot fully participate in a community until you can wield its tools responsibly. In an emerging field like Quantitative Ethnography (QE), which is in part re-using current analysis and visualization tools, but also inventing new ones like Epistemic Network Analysis (ENA), how we model and map the world, and how we engage with stakeholders, are defining characteristics that merit critical reflection.

It is fair to say that QE's principles currently find fullest expression in ENA. In our view, the interest in QE is attributable not only to the power of ENA's data modelling and analysis, but also to the engaging, interactive visualizations it generates. Such diagrams are potentially more accessible to wider audiences, when introduced in empowering ways, which opens new possibilities for bringing voices into the research process which might otherwise not be heard.

In this symposium, we will argue that the participatory research tradition raises important questions and opportunities for QE as a field. Simply put, participatory research involves participants during the stages of research. The intent is to co-create knowledge with people who are affected by the phenomena being investigated. In many participatory design traditions, researchers confront traditional colonial approaches to research and engage in collective ways of knowing and doing with historically and currently oppressed populations [1, 2, 3]. In this sense, such approaches challenge existing power dynamics and roles among the "researcher" and "the researched" and articulate the "how," "for what," "for whom," and "with whom" during the research process [4]. This humanizing and democratic research paradigm reimages ethnography as the co-construction of knowledge between ethnographers and participants [5] with the goal of interpreting cultures and developing thick descriptions [6]. This co-construction process may result in uncertain goals and tensions between collaborators, but through commitment and transparency, such tensions can be acknowledged and potentially worked through [7].

In the remainder of the paper, the symposium's participants present brief summaries of aspects of PQE that motivates their work, before we draw together some of the key questions to help define a research agenda to advance this way of working.

2   Symposium position statements

2.1   Simon Buckingham Shum, PQE as a participatory representational practice

In my ICQE keynote talk last year [8], drawing on my background in human-computer interaction, hypermedia, visualization and educational technology, I proposed strategies that could help create more participatory, engaging representational artifacts in QE. Of those, I would like to reiterate here the challenge of cultivating researchers' skills to provide participants with a more participatory experience of QE's analytical representations. This is intended as a material practice aimed at giving participants a more active role in shaping QE research as it unfolds, rather than being informed of the results, as a *fait accompli.*

Our studies into what we termed "participatory representational practice" [9] were provoked in part by work in participatory design (PD). In our analysis of the literature, the specific skillset that the PD practitioner brings to design sessions, and the nature of their experience, had remained surprisingly under-examined. Thus, although PD efforts nearly always involve some level of facilitation, accounts of practice and research reports often left the concerns, dilemmas, and experiential aspects of the practice in the

background. Very little work examined PD facilitation at the move-by-move level or provided close analysis of the interactions of participants and practitioners with visual representations.

We developed a language for *participatory representational practices* in meetings, which we termed Knowledge Art [10]. "Knowledge Artistry" is the ability to *foster, sustain, or restore participant engagement with visualisations, in the service of assisting collective sensemaking.* Our analysis of this practice, from hours of video, was distilled into five interacting capabilities:

- *Aesthetics*. The choices we make for shaping a visualisation, e.g., what's included, what's foregrounded, what's excluded, how polished or unfinished the representation is, how editable we make it.
- *Ethics*. How our moves affect the other stakeholders, e.g., we can recognise or ignore a verbal contribution in a visual, change the meaning of what someone said in representing it, shift the topic of conversation by drawing attention to an aspect of the visual yet to be discussed.
- *Narrative*. The context for a session, e.g., the spoken/unspoken expectations of why we're here, how we should proceed, who sees representations we create.
- *Sensemaking*. How we interpret breakdowns, that is, unexpected events or anomalies that, e.g., disrupt the agenda, divert from the envisaged course of the conversation, question the validity of a representation.
- *Improvisation*. How well we make spontaneous, unplanned moves with the visualisation when such breakdowns occur, e.g., by inventing another on the fly, bringing up another view, handing the pen over to the participants and inviting them to lead.

As briefly illustrated in my ICQE20 talk, I propose that all of the above are relevant to what may happen when we sit down with participants and invite them to engage with an analytical representation in QE, such as an ENA diagram (but there will hopefully be many others in the future). It is therefore exciting to see examples in my colleagues' position statements in this paper, where they are closing the feedback loop to participants by inviting their engagement with ENA diagrams as works-in-progress and starting to think through the expressive implications for future software tools.

2.2   Mike Phillips, Using 'P' to amplify the 'E' in QE

The QE community has undergone notable growth in recent years resulting in increasing numbers of researchers using this new methodology to represent complex and often large data sets. The growth of the QE community has not only developed new tools but has also amplified consideration of associated methodological, philosophical and ethical issues such tools bring with them.

QE tools like ENA have been used by some researchers for a number of years; however, the growing use of this powerful visualisation instrument by an increasingly diverse range of researchers has resulted in new ways in which ENA visualisations can be used. Drawing on Pike's foundational work in linguistics which made the distinction

between etic and emic understandings of a phenomena, researchers using QE tools such as ENA develop *etic* visualisations of connections between tacit or ethereal concepts that have meaning in research parlance but are not commonplace in *emic* practitioner discourse; however, an increasing number of researchers have begun using ENA to amplify the 'E' in QE by using these etic visualisations as a tool to concretise and externalise these tacit, research oriented ideas with the participants - an approach we are proposing to call Participatory Quantitative Ethnography (PQE).

One such example from my own work [11] is taking various forms of theorised teacher knowledge and examining how different teachers use combinations of knowledge forms to make pedagogical decisions. In earlier work, I used these etic visualisations of teacher practice as the basis for conversations with the teachers who provided me with insights into their professional practice. Using the concretised visualisations helped the teachers put labels on elements of their practice that they would have otherwise described in less refined ways. This enabled them to not only discuss the visualisations with one another but importantly provide alternate perspectives on their practice that were not evident in the visualisations themselves. These emic ideas provided me with entirely new insights into the work of these teachers that were not contained in the data that I had originally collected.

This example of the translation of etic to emic provided me with incredible insights and now forms an important consideration when designing future QE studies. One of the potential challenges we have is that the powerful ENA representations that we are able to analyse are not always simple things for many participants to be able to understand. To avoid potential misunderstandings or misinterpretations, we need to consider new, simpler, yet equally powerful visualisations that are still grounded in the same empirical data but provide more opportunities for participants to make comments.

This use of *member checking* is an important ethnographic process [12] and in a QE context, the visual and interaction design principles, and researcher skill set, required to engage stakeholders with representations of their activity in ways that empower them requires new considerations. At the outset, I would argue these include as a minimum:

- *Develop a shared language:* Providing opportunities for participants to engage in the development of a shared repertoire [13] associated with the theoretical concepts or themes that interest us as researchers (for example, engaging in clarifying discussions associated with a video that is sent to / by participants to explain a definition of an idea or term prior to data collection);
- *Develop a data visualisation repertoire:* Considering different ways to represent data that enable participants to be generate their own network visualisations without the need for them to have any specialist skills (for example, being able to provide participants with a network map which has nodes but no weighted connections, or potentially to add labels to blank codes with the aim of providing alternate perspectives to a-priori codes provided by the researcher);
- *Provide opportunities for active participation:* Developing ways in which participants can interact with researchers and visualisations of their own data to engage them in the meaning-making process (for example, allowing participants to draw directly over visualisations to modify the connections that we

have generated from data, or to co-construct connections as Hazel Vega Quesada and colleagues have suggested [14]).

These considerations provide opportunities for our participants to research with us rather than be researched by us, but they come with methodological, philosophical and ethical issues that require careful consideration and debate by a range of contributors. I encourage you to join us in these important investigations and conversations in the hope of using 'P' to amplify the 'E' in QE.

2.3 Hollie Moots and Mamta Shah, Elevating clinical nursing education with PQE

Growing evidence from researchers in diverse disciplines and contexts affirms the affordances of QE for studying human behavior and modeling its complexities [15]. However, the strengths of this rapidly expanding community go beyond the tools and methods. The participatory culture of QE Society has democratized dialogue about engaging in QE and expanding access [16]. For instance, (a) the events designed to demonstrate worked examples, reflect on lessons learned, and foster new inquiries (e.g., webinar, data challenge), and (b) the resources designed for QE researchers to strengthen their understanding and application of methods and tools (e.g., tutorials, conference workshops) have enabled shared sense-making and acquiring a common language for doing QE research in our respective areas of work. It is time we expand the boundaries of this participatory community and transition our participants from being beneficiaries of our scholarship to stakeholders and co-contributors.

At Elsevier, we have adopted QE in the context of prelicensure clinical nursing education involving virtual reality simulations. To give you some context, recent advancements in virtual reality technology have positioned them as a promising simulation modality in nursing education, prompting researchers to assess its effectiveness [17, 18]. However, empirical investigations uncovering how nursing educators scaffold and sequence instruction using VR simulations, and tracing how learners progress before-during-after participating in VR simulations are hard to locate. We have used Epistemic Network Analysis (ENA) to examine audio discourse available from undergraduate nursing faculty and students using the Simulation Learning System with Virtual Reality (SLS with VR) [19]. ENA visualizations have enabled us to model how a nursing educator used her expertise in conjunction with SLS with VR to scaffold 'thickly authentic' experience for her students [20, 21]. We also modeled how students practiced key cognitive and social skills, visualizing connections and indicators of clinical competency development [22, 23].

By using ENA we have demonstrated that it is possible to capture and portray how VR simulations afford experiences that mimic what nursing students can expect in clinical settings. However, Simon's keynote address from the 2nd International Conference on Quantitative Ethnography [8] has inspired us to imagine greater involvement of participants for elevating clinical nursing education and research. We reflect on the participatory culture described above, examples from fellow quantitative ethnographers, and

on-going practices at Elsevier to outline possibilities and potentials of embracing participatory quantitative ethnography (PQE) at varying degrees:

- *Starting with Dissemination:* At Elsevier, nursing faculty, administrator, and students' needs, and feedback heavily impact product conception, development, delivery and management. We also publish infographics and white papers on an array of topics; we host webinars and training sessions guiding faculty on how to augment their instruction using our learning solutions. Perhaps, the first step towards adopting PQE could be the way in which we disseminate existing work to the nursing audience who may not be fluent with QE yet. For instance, we can release companion videos to our QE reports that translate the crux of the investigations in an accessible manner, highlight key findings, and emphasize on implications for them/their programs. A preliminary example of such a video might look like this [24]. Synchronous meetings can be scheduled thereafter, almost akin to a book club meeting, where all members can engage in joint sense making.

- *Spacing Participant Involvement:* QE research is time and labor intensive even with many automated tools readily available. Currently, this impacts the time that elapses between coding, code validation, model exploration, and member-checking after concrete models are generated. It also impacts the amount of synchronous time participants and researchers can commit to. Perhaps, spacing out participant involvement and member-checking over routine intervals might prove beneficial for practical purposes. For instance, we can debrief with participants during research sessions soon after they have ended, using recordings of activities. Debriefing is commonly adopted in simulation sessions to help students assimilate knowledge, skills and attitudes essential for patient care and well-being [25]. Nursing educators also use this time to dialogue with students about what happened, what went well/did not go well, and what can be improved in the future. We can expand this debriefing tradition to include ethnographic prompts that elicit participants' reflections on what happened in the distinct phases of pre-briefing-simulation-debriefing using a grounded approach or/and anchored in relevant theoretical concepts. These insights can be used by researchers to make decisions about coding and model exploration. The value of re-engaging with participants after concrete visualizations are generated to co-interpret the activities and re-frame the phenomena have been explored successfully and should continue to serve as the additional member-checking opportunities [11].

- *Incorporating Visualizations as Thinking Tools*: The layered storytelling approach used to help faculty and students make sense of multimodal data obtained from nursing simulations is compelling [26]. Scaling the technology and access to explanatory visualizations can vastly complement simulation experiences. For instance, in nursing, it is imperative that students be exposed to a wide variety of clinical situations, especially in ways that (a) reduce the complexities of clinical practice, (b) make implicit practices of expert nurses explicit, and (c) sequence learning activities according to a developmental progression. These strategies can make authentic practice accessible to learners [27]. Perhaps, generating a bank of explanatory and interactive visualizations

of expert and novice nurses engaging in simulations across multiple nursing domains can help students and faculty peel the layers, muddle with what-if situations, and reflect on transforming how we support clinical readiness.

We hope that this symposium resonates with you and energizes you to consider ways for expanding participatory approaches in your QE work. We have begun thinking of ways in which we can lower the floor, widen the walls, and heighten the ceiling so that we can engage with our participants more actively in our QE endeavors, and help them unleash the power of QE tools in their settings.

2.4 Golnaz Arastoopour Irgens and Hazel Vega, The relationship between PDR and QE: Implications for developing PQE tools

Participatory design, and related paradigms such as participatory design research, participatory action research, and community-based participatory research, challenge traditional colonized ways of constructing knowledge [1, 2, 3]. Instead, the people affected by the research co-construct knowledge with the researchers. In participatory ethnography, the participants' perspectives are central, just as in traditional ethnography, but there is also attention paid to power dynamics, historicity, and political action [5, 7].

Taking what we know from participatory ethnography, PQE combines the democratic notions of participatory research and the rigor of QE to provide new insights into QE. In particular, a participatory stance in QE suggests that researchers and participants close the interpretative loop together. This co-construction of knowledge helps us reach saturation of data and view validity in a way that is grounded in the data but involves participants in the analysis process and not just data collection. Relatedly, PQE privileges doing research with participants and welcomes multiple ways of knowing and doing. Such a multiplicity approach allows marginalized populations to be active participants in conversations and shape research paradigms in ways that benefit them and their cultures, which is a central tenet of participatory research. Thus, involving those who have traditionally not been involved in the research process beyond data collection will extend and challenge our definitions of QE and what it means to do QE work [16].

Similar to work conducted by Phillips and colleagues [11] with teachers, we have engaged with English as a Foreign Language (EFL) pre-service teachers in Costa Rica to explore processes of identity negotiation. During pre-service education, identity development is especially critical and currently under-researched. For native Spanish speakers teaching English, identity development is complicated by dominant notions of an inferior, non-White, non-native English speaker and an idealized, superior, native English speaker. In our studies, we have used QE and ENA to uncover how teachers negotiate their identities and confront existing tensions during their pre-service studies [14]. We discovered that the teachers in the study framed the native English speaker as an idealized figure in their identity formation process leading to feelings of frustration, linguistic insecurity, and inadequacy.

Building on this study, Vega [28] worked with teacher participants to collectively build an ethnographic understanding of their identity development. This initial exploration involved a pilot study in which ENA networks were simplified and shared with

participants. Using collected interview data, she coded the transcripts for evidence of cultural adoption, rejection, and tensions, and created ENA networks to explore connections among these components and the dominant discourse of the idealized native English speaker. She re-interviewed teachers, displayed an ENA network that was previously created, and used a tablet to annotate the network as she and the teacher re-examined the teachers' experiences in their education program. These discussions resulted in clarifications of the researcher's analysis of the interview data, as some participants added/removed connections, added/removed nodes, and/or wanted to change the thickness of the lines. This initial experiment involving shared representations to co-create a thick description with participants revealed implications and wonderings about the development and deployment of PQE tools:

- To work together with participants to co-interpret discourse, we must reimagine the roles of the researcher and the participant and determine what types of expertise can be leveraged to form a collective set of skills. When roles and responsibilities change, the power dynamics will also change and should be an aspect of the reflexive process of ethnography. For example, who will develop the codes, automate the codes, create discourse visualisations, and make annotations, and how do each of these choices influence the interpretations? And how can researchers be prepared to respond to these new participatory interpretations and developing tensions?
- The analysis and visualisation tools that are used to conduct research with participants must be designed such that all stakeholders have access and ability to use them to create thick descriptions. At the same time, tools need to be rich enough to be used meaningfully by those who have been practicing QE for a significant amount of time. How can we develop such "low threshold/high ceiling" PQE tools for all stakeholders?
- Affordances and features of the tools need to be carefully considered, including annotation, discussion, interactivity, and the externalization of the co-construction of knowledge. In other words, we must make choices about what is included (or not) in the tool, who will use the feature, and for what purpose. These choices will affect the roles, responsibilities, and power dynamics mentioned above. To this end, one interesting avenue is to use participatory methods to create the PQE tools themselves and co-design tools with participants.

Thinking about the ways in which participatory design and QE intersect and conflict will help shape this new notion of PQE and the subsequent tools. Moreover, the PQE tools we design will also influence how we conceptualize PQE and likely, how we conceptualize QE more broadly.

2.5 Abigail R. Wooldridge, Learning from participatory ergonomics

As noted by other panelists, while PQE represents an important advance in the QE field, participatory paradigms and approaches exist across other fields. Participatory ergonomics is another approach to engaging people other than researchers and scientists on

research or project teams. Specifically, participatory ergonomics is defined as "the involvement of people in planning and controlling a significant amount of their own [activities], with sufficient knowledge and power to influence both process and outcomes in order to achieve desirable goals" [29]. Traditional participatory ergonomics programs focus on involving workers in making changes to work settings (e.g., manufacturing, construction, health care) to improve outcomes for the workers, like health, well-being and stress, and for the company, like productivity and cost reduction [30]. However, the field has advanced to conceptualize work as goal-directed activities, with or without payment or recognition as employment, opening the door for approaches in other domains, for example, the work done by patients in pursuit of health [31]. Given the natural fit of ergonomics with QE, which I described in my keynote last year and is described elsewhere [32], we can use the well-developed frameworks for participatory ergonomics as a basis for characterizing PQE efforts, by adapting the nine dimensions to describe participatory ergonomics efforts [30] to fit QE more broadly, as follows:

- *Decision-making:* how decisions are made in the group involving individuals being studied; ranges from group delegation - group consultation - individual consultation.
- *Mix of participants:* who gets to participate; ranges from people doing the activities through direct managers/supervisors, representatives like union delegates and upper management.
- *Goal and scope:* what the participatory team is charged with accomplishing and what they can do.
- *Role of scientist:* can range from guide or facilitator (present continually or for consultation) through equal participation.
- *Involvement:* how many of the participants can participate (full to selected representatives).
- *Requirement:* if an individual can decline to participate; in research, this would always be voluntary, but in work settings participation may be required.
- *Permanence:* if the participatory effort has a clear end point or is ongoing.

Participatory ergonomics efforts result in more buy-in and ownership from workers who are asked to adopt changes, a more accurate understanding of the work situation and broader impact beyond the initial project [33]. However, they also involve managing group dynamics, including conflict, and usually involve extra time and resources to do well — these considerations likely carry for PQE efforts. Importantly, they require a fundamental shift to value the knowledge of frontline workers at least as much as, if not more than, the knowledge of ergonomists, who produce *etic* interpretations and assessments. The workers know the work better than consultant ergonomists — a fundamental tenet of the franco ergonomic tradition [33]. As PQE moves forward, we will have to determine — collectively as a field or individually as scientists — if we prioritize the emic or the etic, as they may indeed conflict.

As Arastoopour Irgens and Vega point out, participatory approaches tend to enhance equity and justice; indeed, Lusebrink and colleagues argue for genuine, rich participation to enhance equity and justice in ergonomics projects [34]. As a discipline, we may achieve broader, more lasting impact if we empower participants, allow the emic to

take priority, and give our knowledge and tools away; such was the case for ergonomics [35].

3   Towards a research agenda for PQE

We have sketched some opening arguments for adopting an explicitly participatory orientation in QE. This poses a range of interesting, important questions to the field, which we offer as the beginnings of a PQE research agenda:

- Can we differentiate degrees of participation? In fact, could participatory purposes and practices vary along multiple dimensions? Potential candidates include participant agency, how early participants are engaged, and which aspects of the QE analysis are contestable.
- Are there QE contexts where participant engagement will be particularly valuable, and others where this is less relevant?
- What are the advantages to researchers in making their QE analyses accessible to stakeholders? To make that case, what forms of evidence of the benefits are convincing warrants to justify this kind of ethnographic 'member checking'?
- What are the costs to researchers, e.g. in terms of time, training, funding, participant access? Are there ways to mitigate these?
- What are the visual and interaction design principles and researcher skills required to engage participants in ways that empower them?
- What are the methodological implications when, for instance, participants disagree with a researcher's analysis of their activity? In what ways, if any, does permitting participants to change the results of a representation (e.g. an ENA network) change the meaning or validity of the analysis?
- Can both the emic and etic lenses be correct, serving distinctive purposes, or is such a view untenable?
- What new software requirements does a commitment to participant engagement raise for QE tools? Can we learn from related fields that have longer track records in creating flexible software tools to support participatory processes, and research into emerging forms of narrative generation?
- How can we, in the process of bridging the emic and etic worlds, strive for greater research and practice integration?
- What kind of pedagogical practices can we introduce by empowering participants to use QE tools?

In closing, we propose that *Participatory Quantitative Ethnography* is a promising new direction for the QE community to pursue, and that engaging with questions such as those above will advance this. Might this become a hallmark of the field's values, methods and tools? We hope these questions excite you, and we look forward to hearing your thoughts on questions we have missed, seeing the shape of possible answers, and forging the new collaborations required to tackle such a transdisciplinary challenge.

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