

Editorial: Quantitative ethnography in education research and evaluation in low- and middle-income nations

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This special issue seeks to introduce education research and evaluation communities to emerging tools of quantitative ethnography (QE) (Arastoopour Irgens & Eagan, 2022; Shaffer, 2017), specifically in the efforts of those communities to build sustainable, high-quality education systems in low- and middle-income countries (LMICs).

QE refers to a research and evaluation methodology that interprets data computationally from what historically have been primarily qualitative approaches of ethnographic study. The publication of QE (Shaffer, 2017) spurred adoption of the methodology across a spectrum of social sciences, along with statistical tools such as epistemic network analysis (ENA) (Bowman *et al.*, 2021; Damşa & Barany, 2023) and ordered network analysis (ONA) (Tan *et al.*, 2022). Development of QE and these supporting statistical tools has been extensively funded by the US National Science Foundation, are freely available, and have been adopted by a global mix of researchers. QE, especially in conjunction with ENA, can interpret large datasets through the prism of ethnographic analysis, with levels of statistical precision and previously unavailable visual modeling of critical data patterns.

The methodology is one means to amplify ethnographic analysis through computational power. Researchers in a steadily increasing number of disciplines have applied QE as a methodology to build, visualize and warrant replicable claims about ethnographic patterns in educational settings (Arastoopour Irgens & Eagan, 2022). ENA works in a manner like social network analysis (SNA) (Shaffer, Collier, & Ruis, 2016), where individuals appear as nodes on a graph and edges between the nodes show social connections between the individuals.

In contrast to SNA, ENA depicts connections not between people but between the variables or constructs that comprise the ethnographic setting (Shaffer *et al.*, 2016). These variables can represent constructs relevant to the educational development community, including constructs associated with policy reforms (such as school governance or international cooperation) or constructs associated with regional or school levels (such as professional development, community engagement, and instructional or curriculum strategies) or constructs associated with the individual learners (such as socio-emotional development, academic progress, or social trust formation). As discussed below, this special issue includes examples from each of these categories. One of ENA's critical design features is that the existence of relationships between constructs is inferred from their proximity (e.g., in the same turn of conversation or in the same paragraph, in the case of policy documents). Emerging multimodal research designs incorporate other elements of discourse, such as gestures that accompany written or spoken words. ENA visual models show each node or construct in a study and connections between them. If two constructs appear in the same discourse utterance or in proximity to each other, ENA software will place an edge between the two constructs (represented by the endpoints, or nodes, that the edges connect) on its graph. The more often two constructs connect, the more

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saturated the edge becomes, giving a visual sense of the relative intensity of the connection. Each node on a graph represents a construct; the size of the node varies with the frequency with which the construct appears in the discourse.

Figures 1 and 2 provide a sample ENA application at the individual learner level. The figures depict the discourse patterns of a Kenyan female secondary student's participation in an international cooperation venture, whereby learners take on science or mathematics projects online with peers elsewhere in a Global South/Global North network (Hamilton *et al.*, 2016, 2022; Hamilton & Kallunki, 2020). ENA graphs in the two figures show constructs – in this design, at the individual student level – of social disposition, curiosity, interest in teaching others, willingness to share information, a focus on academic content and interest in media production (to produce instructional videos). The graphs also show relationships between those constructs. The network of relationships has been referred to as an epistemic frame (Kaliisa, Misiejuk, Irgens, & Misfeldt, 2021; Shaffer & Ruis, 2023) that is inferred from the student's discourse patterns. The graphs make visible changes over the course of a year, by which this student's interactions expanded and relationships between the constructs shifted and became richer as she became immersed in the cooperative experience.

Figure 1, representing Year 1, reflects anemic connections between constructs in her coded discourse. Figure 2 represents Year 2, after participation in the global network, when connections between the constructs became more robust and abundant; shifts inferred from her discourse took quite interesting turns. Over the course of the year, her emphasis on teaching peers became less pronounced and gave way to more curiosity in learning and sharing information, demonstrating more complex and robust engagement, as seen in the graph. ENA visualizations point to non-trivial and non-obvious changes in the learning of one individual. While ENA helps researchers and evaluators shape their interpretations with statistically derived models. Interpretations of those models, however, also require the researchers' grasp of the underlying context – in this case, knowledge about the student.

This limited example illustrates how ENA can help researchers tease out relationships between variables of interest to educators. Contributions to this special issue illustrate a wide range of applications in the education contexts of LMICs. For example, several papers

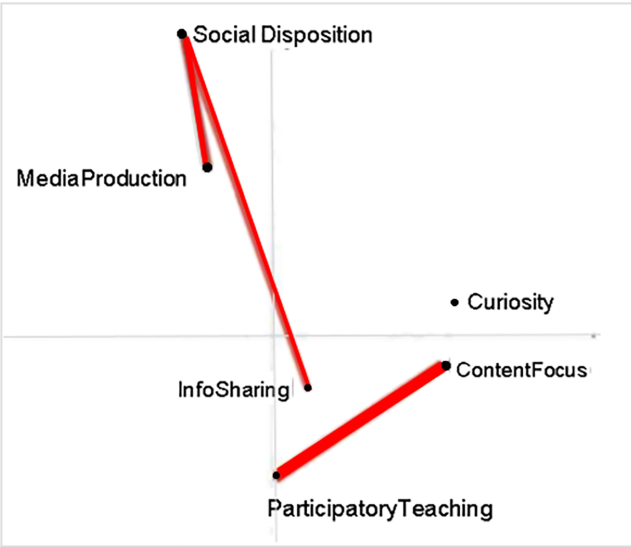


Figure 1. Sample ENA application at the individual learner level before intervention. Figure by authors

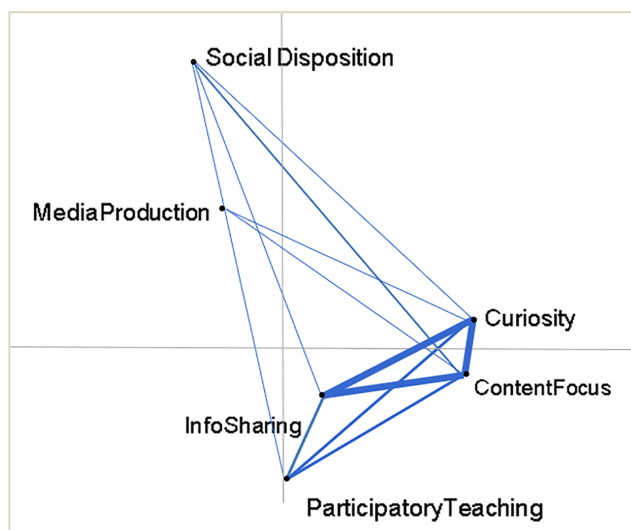


Figure 2. Sample ENA application at the individual learner level *after* intervention. Figure by authors

examine how ENA can facilitate comparisons of cognitive processing patterns and interventions in educational environments. Vega examines the shift of teacher identity for educators in Costa Rica. Using ENA, her paper explores how tensions and negotiations about the professional identity of teachers developed dynamically as they reflected on different temporalities of their experience. Jones, Wilson, Gaskin, Rayford, and Owusu (2025) compare adolescent identity perceptions among students in Ghana, Kenya and the USA who participated in an informal science, technology, engineering, and mathematics (STEM) learning program. ENA graphs model distinct ways students reflected on their abilities and their limitations. Galarza examines the computational thinking of learners in Mexico engaged in model-eliciting activities (MEAs) in an important pilot study that is the first to blend the use of unplugged activities, computational thinking and MEAs.

Other papers utilize existing data to identify meaningful patterns about policy and information sharing for educational systems. Nguyen, Dang, Hong, and Nguyen (2025) use ENA to examine and model policy documents underlying the digital transformation of Vietnam's higher education system, emphasizing shifts in digital priorities during and after the COVID-19 pandemic. Samsudin, Halim, Syukri, Tiew, and Putri (2025) analyze YouTube videos about the education systems in Malaysia and Indonesia to identify policy and practice issues that their respective citizenries consider most salient. In this analysis, ENA models also help to identify the differences in how curriculum is addressed and perceived between the countries.

Engaging research participants as partners is especially important when implementing educational approaches outside the researcher's cultural context (Vega & Irgens, 2022). Lux, Ochieng, Ogwel, and Hamilton (2025) apply ENA within a participatory evaluation process to assess a tertiary education model developed for economically vulnerable students in rural Kenya. The study's findings reveal overlooked issues and highlight areas for improvement, including funding and political challenges. Similarly, Akumbu (2025) emphasize the value of maintaining cultural relevance and narrative within the educational environment for children and adolescent students in Kisii, Kenya. This study's application of QE models the importance of preserving cultural artifacts such as proverbs, songs and stories to sustain cultural connections as learners advance academically, specifically identifying key variables in tribal mathematics learning.

While several papers directly involve global collaborations, all lend themselves to international cooperation in terms of exploring the possible reach of the QE methodology in advancing education development. In addition to a focus on LMIC educational settings, the common thread connecting this eclectic set of topics is the use of QE. Still in its early years, the contributors to this special issue present QE as a versatile methodology that offers analytic traction across multiple domains of inquiry representing priorities of this journal: field-level knowledge building, policy-making and education development strategies in the Global South.

The technical and technological advances that make it possible to mathematize intrinsically culturally grounded or emic ethnographic analysis run parallel to trends in the Western development community in recent years, from approaching LMICs as recipients of aid to working with them as autonomous partners in improving education – partners who devise, implement and own education reform in their own countries (Cummings *et al.*, 2023; Yoshida, 2023). This theme – and its many layers of moral, economic and programmatic logic – has been characteristic of non-Western approaches to development research and evaluation and is not belabored here. It is noteworthy in the context of QE, though, and in QE's emphasis on using sophisticated computational tools specifically to articulate cultural grounding and local perspective as its first research principle. QE helps create an analytic vector that not only places local culture as the primary consideration but also gives tools for warranted understanding of nuance, subtleties and levers for change.

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