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Preface

This volume represents the supplementary proceedings of the Sixth International Conference on Quantitative Ethnography (ICQE24). To foster an open community, the conference has consistently offered formal Springer-published proceedings and supplementary proceedings to accommodate various submission types, providing authors with multiple avenues to share their work. The conference and the broader community supported by the International Society for Quantitative Ethnography (ISQE) serve as a platform for dialogue on Quantitative Ethnography (QE), its data, methodologies, and applications, welcoming both returning and new scholars from diverse disciplines.

The supplementary proceedings include 7 Doctoral Consortium submissions, 27 Posters, 1 Workshop, 2 Symposia, and 10 Research Agenda Development proposals. These are presented alongside 31 accepted full papers and 10 accepted short papers. The diversity of authors, contexts, data, and topics reflects the interdisciplinary nature of the QE community. As described in the Springer Proceedings, and paralleled here, the submissions focus on a range of contexts and data types, broadly aligning with three themes: *theory and methodology*, *teaching and learning*, and *culture and discourse*.

We would like to thank all the authors and continue to invite new and returning researchers into the QE community. We also thank the reviewers, program committee members, and others in the QE community who have supported the conference. The program chairs acknowledge support from ISQE and the National Science Foundation. Finally, we are particularly grateful to the local chairs and organizers for their work in planning the conference and welcoming ICQE to Philadelphia.

September 2024

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Learning of technological competence in Classroom maker projects

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Abstract. The maker movement has been studied rigorously in recent years as it has been recognized as a strategic component of future-oriented education. In maker education, learning takes place through and around various digital and traditional technologies, which provide the means for students' making activities. However, it is still unclear what students learn during maker projects in compulsory education and how their learning is connected to the technological resources enabling their making activities at school. The thesis aims to identify the learning of technological competence, to examine how it is related to the tools and technologies used during maker projects, and to study how the learning of technology competence is manifested through students' verbal and embodied actions. Epistemic Network Analysis is used to model the learning of technological competence from transcribed discourse and embodied actions of students participating in collaborative, open-ended maker activities. The findings will inform the design, implementation, and research of maker projects in compulsory education.

Keywords: Technological Competence, Maker Education, Epistemic Network Analysis, Video Analysis.

1 Goals of the Research

The dissertation's overall goal is to explore the learning of technological competence in formal education maker projects, in particular electronic textile (e-textile) projects, and to examine how this learning is connected to the various maker technologies the students use. The aims of the study are: 1) to identify the technology dimensions present in maker projects and how these either enable or hinder the learning of technological competence, 2) to clarify what kind of tools and technologies are used in various phases of maker projects, and to examine their relation to the learning of technological competence, and 3) to discover how the various dimensions of technology competence are connected to the overall flow of the maker process, that is, the verbal and embodied actions.

2 Background of the Project

Implementing maker education in schools is on the rise, fueled by its potential to fundamentally change how people teach and learn and to move compulsory education

towards a creative, technology-driven 21st century learning culture [1]. Maker projects often involve a variety of technologies, ranging from low-tech arts and craft tools and traditional craft machinery to high-tech programmable robotics, microcontrollers, and fabrication technologies, such as 3D printers and laser cutters. For example, e-textiles are a type of maker activity in which electronics and computing are combined with fabric or other soft materials to produce, for example, wearables (clothes or accessories) or other textile products with sensors and actuators [2, 3]. However, there is very little research on what kind of overall technological skills and knowledge students use and learn in maker education and how their learning is connected to the different tools and technologies enabling their making activities.

3 Methodology

The data consists of classroom video data, in which five 7th-grade student teams were given an open-ended design challenge to invent a smart product or smart garment by relying on traditional and digital fabrication technologies. Firstly, the students' transcribed discourse was categorized into five technology dimensions: crafting, designing, engineering, programming, and documenting [1] and epistemic network analysis [4, 5] was used to model the co-occurrences of the dimensions. Secondly, the co-occurrences of the technology dimensions were modeled in the context of tools and technologies used in the various phases of the project. Thirdly, the discourse data will be enriched with embodied making to discern the technological competence manifested through both verbal and embodied actions.

4 Preliminary and Expected Findings

Preliminary findings indicated that collaborative open-ended maker projects enable comprehensive learning of technological competence, but the learning outcomes vary significantly between the student teams. Learning was promoted when technology was used as a tool in the creative process, but it was hindered when it served as a starting point for designing. Further, engineering-programming competence was gained mainly using exploration and fabrication technologies, while design competence was gained using information and communication technologies, pen and paper, and crafting tools and technologies. Embodied making is expected to be at least as central as verbal communication to the learning of technological competence.

5 Expected Contributions

The findings will provide new theoretical and methodological knowledge of technology learning taking place through open-ended maker projects. This knowledge can inform the systematical development of maker education in schools as part of regular educational activities, as well as in pre- and in-service teacher education.

References

1. Korhonen, T., Kangas, K., Davies, S., Sormunen, K., Salo, L., Packalén, M.: Framework for technological competence in invention projects. Invention Pedagogy - The Finnish Approach to Maker Education. 95–114 (2023). https://doi.org/10.4324/9781003287360-9.
2. Buechley, L.: Questioning invisibility. Computer (Long Beach Calif). 43, (2010). https://doi.org/10.1109/MC.2010.114.
3. Kafai, Y.B., Fields, D.A., Searle, K.A.: Electronic Textiles as Disruptive Designs: Supporting and Challenging Maker Activities in Schools. (2014).
4. Shaffer, D.W., Collier, W., Ruis, A.R.: A Tutorial on Epistemic Network Analysis: Analyzing the Structure of Connections in Cognitive, Social, and Interaction Data. Journal of Learning Analytics. 3, 9–45 (2016). https://doi.org/10.18608/jla.2016.33.3.
5. Shaffer, D.W., Ruis, A.R.: Epistemic Network Analysis: A Worked Example of Theory-Based Learning Analytics. Handbook of Learning Analytics. 175–187 (2017). https://doi.org/10.18608/HLA17.015.

Unveiling First-Year Engineering Students' Knowledge Integration: An Epistemic Network Analysis Study

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Abstract. This study addresses the urgent need to provide first-year engineering students with learning experiences that promote the integration of disciplinary knowledge and reflections on the social challenges facing engineering. Based on the Models and Modeling Perspective (MMP) and Appropriate Technology frameworks, this study focuses on analyzing students' model construction as they solve a Model Eliciting Activity (MEA) set in the critical context of selecting a pumping system to provide running water to marginalized communities along the Mexico-US border. Using Quantitative Ethnography (QE), this study aims to deepen the knowledge of the process of integration of mathematical ideas, engineering concepts and critical reflections of first-year engineering students.

2 Summary Research

2.1 Goals of the research

The objective of this dissertation study is to employ QE methods to explore, at a cognitive level, the process integration of mathematical ideas, engineering concepts, and socially critical reflections of first-year engineering students when participating in an integrated learning experience developed under the MMP and built within a real and socially critical engineering context.

2.2 Background of the Project

Engineering is fundamental to address present and future global challenges with responses that ensure respect for the environment and benefit of society [5]. However, engineering education often emphasizes "technical concepts leaving students ill-equipped to navigate the complex interplay between those same concepts, engineering design, and social contexts" [6]. Therefore, addressing future challenges will require a shift in engineering education towards an interdisciplinary approach "that combines societal and academic technical knowledge and solutions" [5]. Boix [7, 8] refers to this integration process as *interdisciplinary understanding,* which reflects "the capacity to integrate knowledge and modes of thinking in two or more disciplines to produce cognitive advancement" [7]. Understanding its development contributes to improving pedagogical guidance [9]. Therefore, given the significance of interdisciplinary understanding, researchers such as Borrego et al. [10] have utilized qualitative methods to explore and assess the interdisciplinary integration. Barber's [11, 12], used quantitative surveys to investigate the integrate knowledge and personal experiences. However,

knowledge of interdisciplinary understanding still remains limited [9, 11] particularly lacking in studies using QE. This method could lead to a deeper analysis of cognitive networks, providing valuable insights for engineering education.

2.3 Methodology

For this study, a group of first-year engineering students at a Hispanic-Serving Institution was selected. In order to elicit students' thoughts, a MEA was designed. This open-ended and complex activity was crafted in an adapted context from a real-life scenario of *las colonias* which often lack running water. Students delve into the context of las colonias and engage with a real water pump which operates without electricity. The MEA encourages students to collect data from the pump and construct a manual informing las colonias' residents about its efficiency.

Data Collection. Data will be gathered from participants' problem-solving process for the MEA. Audio recordings will capture conversations, discussions, and interactions, along with collected students' worksheets.

Data Analysis. This study will be conducted using QE. QE allows for a deeper understanding of phenomena by integrating an analysis that combines ethnography and statistics [4]. Given the relevance of identifying the interdisciplinary understanding that students develop, this research will employ Epistemic Network Analysis (ENA). "ENA is a method for the analysis of cognitive networks by modeling the association between elements of complex thinking. The connections among cognitive elements are more important than studying those elements in isolation" [3]. Therefore, this study will focus on analyzing cognitive networks by associating elements of thought related to mathematical ideas, engineering concepts, and critical reflections.

2.4 Preliminary Findings

The preliminary results of this study have been presented at AERA and ASEE. Montero et al. [13] report a qualitative case study detailing the construction of arguments during engineering students' decision-making, challenging narratives of using harmful technologies for society. Montero et al. [1] contribute to engineering education research by informing on the teaching methods for first-year engineering students when they engage in measurement activities. While these preliminary results based on qualitative analysis have been valuable in informing the field of engineering education, developing a QE-based analysis will be essential for examining cognitive networks and obtaining more robust evidence on engineering students' interdisciplinary understanding.

2.5 Expected Contributions

This study will contribute to expanding knowledge in engineering education research by incorporating QE as a method that informs the integration of disciplinary knowledge and critical reflections, which are essential for addressing global challenges [14, 15]. This study will also contribute to the mathematics education in engineering by informing about teaching methods that can be included within first-year engineering courses that break with traditional, decontextualized teaching methods [16] to include real and social critically experiences connected with the field of engineering [17].

References

1. Montero-Moguel, L.E., Mejia, J., Carmona, G.: Leveraging mathematical modeling to expand measurement process opportunities for engineering students. In: 2024 ASEE Annual Conference. pp. 1–11. American Society for Engineering Education, Portland (2024)
2. Montero-Moguel, L.E., Mejia, J.A., Carmona, G.: Enhancing decision-making in engineering education: Utilizing appropriate technology to integrate technical and social considerations. In: 2024 American Educational Research Association Annual Meeting. pp. 1–9. AERA, Philadelphia (2024)
3. Carmona, G., Galarza-Tohen, B., Martinez-Medina, G.: Exploring interactions between computational and critical thinking in model-eliciting activities through epistemic network analysis. In: Wasson, B. and Zörgő, S. (eds.) Advances in Quantitative Ethnography. pp. 346–361. Springer International Publishing, Cham (2022)
4. Carmona, G., Galarza-Tohen, B., Montero-Moguel, L.: Exploring collaborative computational thinking and critical thinking through Epistemic Network Analysis. In: 2022 Annual Meeting Of The American Educational Research Association. AERA, San Diego, CA. (2022)
5. UNESCO: Engineering for sustainable development: delivering on the Sustainable Development Goals. UNESCO, Paris France (2021)
6. Castaneda, D.I., Mejia, J.A.: Culturally relevant pedagogy: An approach to foster critical consciousness in civil engineering. Journal of Professional Issues in Engineering Education and Practice **144**(2), 1–8 (2018)
7. Boix, V.: Assessing student work at disciplinary crossroads. Change The magazine of higher learning **37**(1), 14–21 (2005)
8. Boix, V.: Interdisciplinary learning: A cognitive-epistemological foundation. In: Frodeman, R., Klein, J.T., and Pacheco, R. (eds.) The oxford handbook of interdisciplinarity. pp. 261–275. Oxford University Press, Oxford (2017)
9. Spelt, E.J.H., Luning, P.A., Van Boekel, M.A.J.S., Mulder, M.: A multidimensional approach to examine student interdisciplinary learning in science and engineering in higher education. European Journal of Engineering Education **42**(6), 761–774 (2017)
10. Borrego, M., Newswander, C.B., McNair, L.D., McGinnis, S., Paretti, M.C.: Using concept maps to assess interdisciplinary integration of green engineering knowledge. Advances in Engineering Education **1**(3), 1–26 (2009)
11. Barber, J.P.: Integration of learning: A grounded theory analysis of college students' learning. American Educational Research Journal **49**(3), 590–617 (2012)
12. Barber, J.P.: Integration of learning Model: How college students integrate learning. New Directions for Higher Education **165**, 7–17 (2014).
13. Montero-Moguel, L.E., Mejia, J.A., Carmona, G.: Enhancing decision-making in engineering education: Utilizing appropriate technology to integrate technical and social considerations. In: 2024 Annual Meeting Of The American Educational Research Association. pp. 1–9. AERA, Pennsylvania (2024)
14. ABET: 2022-2023 Criteria for accrediting engineering Programs. ABET (2021)
15. Crawley, E.F., Malmqvist, J., Östlund, S., Brodeur, D.R., Edström, K.: The CDIO Approach. In: Crawley, E.F., Malmqvist, J., Östlund, S., Brodeur, D.R., and Edström, K.

(eds.) Rethinking Engineering Education: The CDIO Approach. pp. 11–45. Springer, Cham (2014)
16. Moore, T., Selcen Guzey, S., Roehrig, G.H., Stohlmann, M., Sun Park, M., Rae Kim, Y., Callender, H.L., Jie Teo, H.: Changes in faculty members' instructional beliefs while implementing Model-eliciting activities. Journal of Engineering Education **104**(3) 279–302 (2015)
17. Diefes-Dux, H.A., Verleger, M.A.: Student reflections on peer reviewing solutions to Model-Eliciting Activities. In: 39 IEEE Frontiers in Education Conference. pp. 1–7. IEEE, Texas United States (2009)

Cultures of Silence: The Role of Social Contract Beliefs in Employees' Silence Responses to Injustice

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Abstract. Employee silence occurs when an employee intentionally withholds important information from others who may have otherwise acted for positive change. Past research suggests that employees may practice silence for motives such as self-protection. How ever, some research suggests that workers choose silence even when it appears detrimental and suppresses information that could help redress injustice. Drawing on philosophical social contract theories (SCTs) and lay belief approaches, this project develops a novel construct (implicit SCTs) to explain when silence may be systematically generated in response to injustice. US- and China-based employees will be interviewed to develop the construct and measurement items, and connections between employees' implicit SCTs, perceived norms, and silence as a response to injustice toward individual coworkers, their group, and organizational authorities will be explored.

1 Research Question and Goals

The overarching goal of this project is to examine how implicit SCTs can act as cultural lenses through which employees evaluate silence as a response to injustice. The project addresses three research questions: (1) What are the types of implicit SCTs? (2) What role do implicit SCTs play in employee silence responses to perceived injustice toward (a) individual employees, (b) one's group, and (c) organizational authorities, through perceived intersubjective morality of silence? (3) What cultural differences are there in employees' silence responses to perceived injustice, as a function of implicit SCTs?

2 Theoretical Background

2.1 Employee Silence and Injustice

Employee silence occurs when an employee intentionally withholds potentially important information (including ideas, opinions, suggestions, detrimental practices, grievances) from people (coworkers, organizational authorities) who could act on the information to improve the work-related situation [1-2]. Despite high costs, including burnout and reduced performance [3], silence is widespread: one survey found that over 90% of nurses remain silent even when patient safety

is at risk [3]. It is thus critical to examine what may systematically foster silence. Extant research differentiates types of silence by motives: for instance, self-protection motivates defensive silence, compassion for others motivates prosocial silence, and self-gain motivates opportunistic silence [4]. These antecedents seem to imply that employees seek some benefit from silence but appears at odds with the idea that silence suppresses information that could help to improve the situation. Some research suggests that employees may respond to behavior typically seen as unjust (e.g., abusive super vision, rights violations) with silence, given particular social dynamics (e.g., high power distance, gender biases) [5-6]. Whiteside and Barclay [7] examined silence as a response to injustice directly, but operationalized injustice as a general perception of the organization, without specifying *who* was unjustly treated. The proposed model (Fig. 1) considers three targets: individuals, the group as a whole, and group authorities.

2.2 Norms and Intersubjective Morality of Silence

Behavioral frameworks suggest that subjective norms are an important factor in intent and behavior [8]. In a social group, norms contain information about what will gain social (dis)approval based on members' mutual expectations for each other, tying norms to moral assessment [9]. Thus, the proposed model suggests that individuals embedded in cultural groups develop intersubjective representations (perceived collective agreement) of group norms, including to do with the morality of silence in different circumstances, impacting intent.

2.3 Social Contract Theories

Since intersubjective norms are socialized within cultural groups, they may vary as a function of culture. Drawing from political philosophy, the project proposes a new construct, implicit SCTs: the cultural lay beliefs that individuals have about implicit social agreements defining the rules that each individual member complies with, to gain individual and mutual benefits. Based on seminal works [10-12], three types of implicit SCTs are theorized: (1) Order and Authority SCTs, which emphasize authority will, individual compliance, and social order as a means to secure individual security; (2) Protection of Individual Interests SCTs, which emphasize individual interests, agency, and autonomy, and the preservation of these for each individual; and (3) General Will SCTs, which emphasize the common good as the group's will, over individuals' particular wills, with authorities answerable to the general will, as a means for individuals to collectively benefit. Given their contrasting priorities and approaches to the individual, collective, and authority's roles, it is expected that if SCTs are indeed lay beliefs, they will moderate silence evaluations and responses to injustice.

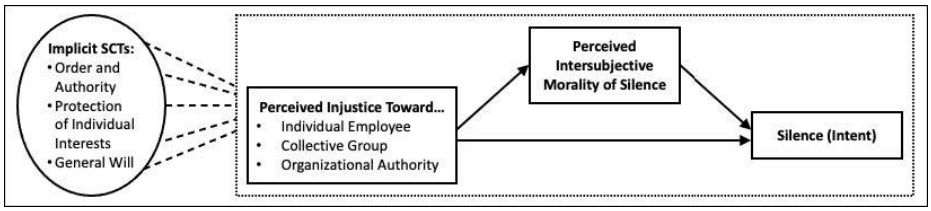

Fig. 1. Conceptual model for the interpretation of social phenomena (enclosed by the dotted-line box) through the lens of implicit SCTs. Silence intents are formed in response to perceived in justice, through intersubjective silence norms, as a function of implicit SCTs.

3 Methodology

Online text-based semi-structured interviews will be performed with 114 US and 114 Mainland Chinese employees recruited via Cloud Research Connect and Credamo. These two populations will be targeted as research consistently finds that they have contrasting beliefs and behavioral tendencies; together, they should generate a broad range of views. Participants will respond to anchoring questions about what should be the relations between individual employees, their coworker group, and organizational authorities (implicit SCTs), with follow-ups for further details. Participants will also describe times when they have perceived injustice towards different targets, and how they reasoned about and engaged in silence based on personal motives and norms.

4 Analysis Approach and Expected Findings

Responses will be coded for expressed ideas and meanings, and literature concepts. Codes will be aggregated into themes during iterative codebook development. Code absence/presence will be entered into a co-occurrence matrix for epistemic and ordered network analyses. Through dimensional reduction of codes on implicit SCTs, participants will be categorized by type of implicit SCT. These groups' representations of silence in response to injustice toward different targets will be compared using repeated measures ANOVAs. It is expected that the Target of Injustice (Within) X Implicit SCTs (Between) interaction effect on both perceived morality of silence and representations of silence will be statistically significant: silence responses to injustice toward different targets, through perceived intersubjective morality, vary as a function of implicit SCTs.

5 Expected Contributions

This project makes theoretical contributions to the silence literature by proposing a model for employee silence that considers previously neglected contextual factors: in justice targets, intersubjective morality of silence, and implicit SCTs. A new construct, implicit SCTs, is developed to study previously unexplored cross-cultural differences in silence responses. For practitioners, understanding contextual factors of silence is crucial to avoid widespread cultures of silence that allow unchecked injustice.

References

1. Morrison, E.W.: Employee voice and silence: taking stock a decade later. Annu. Rev. Organ. Psychol. Organ. Behav. **10**(1), 79-107 (2023)

2. Pinder, C.C., Harlos, K.: Employee silence: quiescence and acquiescence as responses to perceived injustice. In: Ferris, G.R., Martocchio, J.J. (eds.) Research in Personnel and Hu man Resources Management, vol. 2, pp. 331-369. Emerald Group Publishing (2001)
3. Maxfield, D.: How a culture of silence eats away at your company. Harv. Bus. Rev. **7**, 2-5 (2016)
4. Knoll, M., van Dick, R.: Do I hear the whistle…? A first attempt to measure four forms of employee silence and their correlates. J. Bus. Ethics **113**(2), 349–362 (2013)
5. Lam, L.W., Xu, A.J.: Power imbalance and employee silence: the role of abusive leadership, power distance orientation, and perceived organisational politics. Appl. Psychol. Int. Rev. **68**, 513–46 (2019)
6. An, F., Bramble, T.: Silence as a survival strategy: Will the silent be worse off? A study of Chinese migrant workers in Guangdong. Int. J. Hum. Resour. Manag. **29**, 915–40 (2018) 7.
7. Whiteside, D.B., Barclay, L.J.: Echoes of silence: employee silence as a mediator between
8. overall justice and employee outcomes. J. Bus. Ethics **116**, 251-266 (2013).
9. Fishbein, M., Ajzen, I.: Belief, attitude, intention and behavior: An introduction to theory and research. Addison-Wesley (1975)
10. Morris, M.W., Hong, Y., Chiu, C., Liu, Z.: Normology: integrating insights about social norms to understand cultural dynamics. Organ. Behav. Hum. Decis. Process **129**, 1-13 (2015)
11. 10. Hobbes, T.: Leviathan. In: Gaskin, J.C.A. (ed.) Oxford University Press (1651/2008) 11. Locke, J.: Two Treatises of Government. In: Laslett, P. (ed.) Cambridge University Press (1689/1988)
12. Rousseau, J.: The Social Contract. In: Gourevitch, V. (trans.) Cambridge University Press (1762/2018)

Enhancing Nursing Assistant Attitudes Towards Geriatric Caregiving through Transmodal Ordered Network Analysis

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Abstract. In my thesis, I am investigating the application of Transmodal Ordered Network Analysis (TONA) to analyze and visualize geriatric caregiving attitudes, aiming to enhance caregiver perceptions through an immersive VR simulation. Specifically, my research focuses on three main objectives: (1) identifying disparities between real-life caregiving experiences and previous training, (2) improving our VR training by integrating findings from the initial phase and (3) conducting a detailed TONA within the VR simulation. The first two objectives have been almost addressed, setting a strong foundation for the most crucial part of my research. The third objective involves a detailed analysis using TONA, utilizing gaze data, facial expressions, conversational dialogues, and embodiment data to monitor changes in caregiver attitudes within the immersive simulation featuring a virtual geriatric patient. Merging these diverse data types into a unified analysis presents challenges due to the complexities of multimodal data integration. Therefore, a key aspect of my thesis is enhancing methodologies to incorporate multichannel data analysis in TONA. The findings of this thesis are expected to make a significant contribution to the fields of nursing education, quantitative ethnography, and human-computer interaction.

Keywords: Epistemic Network Analysis · Nursing Education · Multimodal Data · Virtual Reality · Transmodal Ordered Network Analysis.

1 Background and Goals of the Research

An emergent challenge in geriatric care is improving the quality of care, which requires insights from stakeholders and comprehensive training. Caregivers play an enormous role in aging care, but inadequate training limits their effectiveness and affects their attitudes toward working with seniors. Experts recognize the need to develop practical skills and suggest creating learning environments to better prepare caregivers [4]. Simulation methods, on the other hand, may better prepare trainees for direct interactions in a realistic clinical setting [1].

In response to this need, the research seeks to: 1) identify and analyze the disparities between real-life caregiving experiences and the training caregivers previously received. This involves understanding how actual caregiving differs

from the scenarios and techniques taught during training. By analyzing healthcare expert interviews using Epistemic Network Analysis (ENA), we revealed the meaningful connections between key elements of care. 2) enhance our Virtual Reality (VR) training program by integrating insights gained from the initial analysis. This includes developing and adding new training modules that better reflect real caregiving situations and the complex needs of geriatric patients. 3) conduct a comprehensive Transmodal Ordered Network Analysis (TONA) within the VR simulation.

Recently, emerging data sources like embodiment, eye tracking, and facial expressions have gained significant attention. Analyses like ENA have been used with learning sciences data, including online discussions, interviews, and learner interactions focusing on single data types. To address this, TONA extends traditional ENA by integrating Ordered Network Analysis, which emphasizes the sequence and order of interactions [2], with Transmodal Analysis, which considers how different communicative modes interact and complement each other [3]. Thus, my research aims to develop a methodology that incorporates multiple data modalities into a unified TONA within the virtual training simulation.

2 Methodology

Previous research has identified key factors essential for effective caregiving and nursing responsibilities, which include Communication, Empathy, Flexibility, and Critical Thinking [4]. We conducted semi-structured interviews with ten trained caregivers. After transcribing and coding the data using aforementioned codes, we used ENA to examine the differences between their real-life caregiving experiences and what they learned in training. The analysis highlighted a significant deficit in empathy within the formal training compared to the actual experiences of caregivers. A more detailed analysis will be presented in the following section. These findings underscore the necessity of incorporating more empathetic training scenarios in our geriatric care simulation.

The next phase of my research will involve a group of certified nursing assistants participating as caregivers in the VR training simulation, which is almost complete. This iteration aims to enhance the training by incorporating scenarios that foster empathy, thus better prepare trainees for realistic clinical interactions. We will collect data using an integrated eye-tracking system within the VR setup, as well as embodied data, facial expressions, and dialogues with the virtual patient. This data will subsequently be analyzed using TONA, where we will strategically employ each training session as stanzas. This approach will enable us to examine the nuanced impact of empathetic training on the performance of caregivers in a controlled VR environment. Fig 1 shows an overview of the study design:

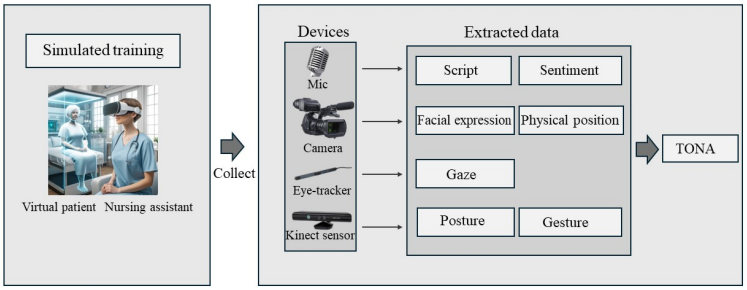

Fig. 1: Overview of the proposed study design for enhancing geriatric caregiving training through Virtual Reality and Transmodal Ordered Network Analysis.

3 Preliminary Findings

We applied ENA to our healthcare expert interview data to analyze caregivers' behavior in their real-life, daily work settings and compared it with the guidelines provided during their training. A two-sample t-test with unequal variances revealed a statistically significant difference between the Real and Training response categories along the X-axis, demonstrating a large effect size. We also separately analyzed each network diagram to determine why this statistically different result was found. The individual diagrams for Real and Training responses are presented in Fig 2.

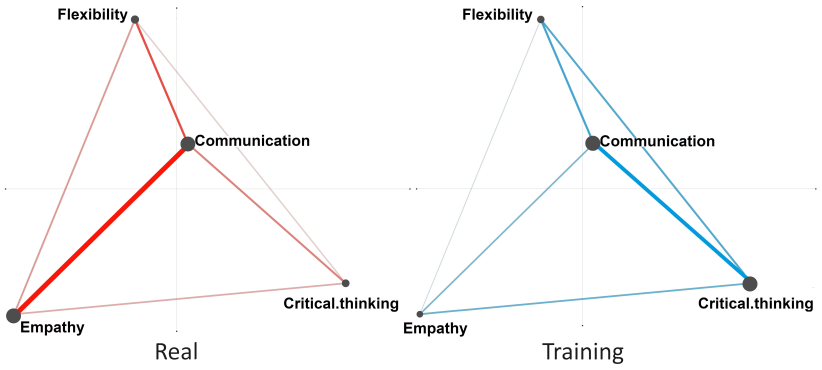

Fig. 2: Epistemic network representations of participant responses in an expert interview process based on Real (red) and Training (blue) categories.

4 Expected Contributions

The anticipated outcomes of this study have the potential to significantly contribute to the fields of nursing education, healthcare, and QE research in several ways:

1) By utilizing quantitative analysis techniques to examine the networks of cognitive skills, the study will provide valuable insights and deepen our understanding of the cognitive processes involved in interacting with older adults. This is crucial for developing training that more accurately reflects the complexities and demands of real-world caregiving.

2) Additionally, by focusing on incorporating underrepresented scenarios in training, the research aims to bridge the gaps often found in caregiver training. This could lead to better patient outcomes and more satisfying caregiver-patient interactions in real settings.

3) This approach of integrating multiple data types into Transmodal Ordered Network Analysis represents a novel contribution to the field. This multimodal methodology could potentially be applied in other domains where understanding complex human interactions is crucial.

References

1. Ashiq, M., Eagan, B., Shaffer, D.W.: Developing nursing students' practice readiness with shadow health@ r digital clinical experiencestm: A transmodal analysis. In: Advances in Quantitative Ethnography: 5th International Conference, ICQE 2023, Melbourne, VIC, Australia, October 8–12, 2023, Proceedings. p. 365. Springer Nature (2023)
2. Tan, Y., Ruis, A.R., Marquart, C., Cai, Z., Knowles, M.A., Shaffer, D.W.: Ordered network analysis. In: International Conference on Quantitative Ethnography. pp. 101–116. Springer (2022)
3. Wang, Y., Shah, M., Jimenez, F.A., Wilson, C., Ashiq, M., Eagan, B., Williamson Shaffer, D.: Developing nursing students' practice readiness with shadow health® digital clinical experiences tm: A transmodal analysis. In: International Conference on Quantitative Ethnography. pp. 365–380. Springer (2023)
4. Wueste, E.L.P.: How to collaborate and not just coexist: an explanatory sequential mixed methods study on the impact of a physician and nurse interprofessional education program on the development of early career pediatrician communication skills and collaborative behaviors once in practice. Ph.D. thesis, University of the Incarnate Word (2023)

Teacher Well-Being: Understanding Teacher & Leader Perspectives and Related Practices

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Abstract. Extant research on teacher well-being (TWB) has largely been conducted via quantitative methods of analysis that involve the application of various psychological and sociological constructs onto teachers' experiences. This presents an important gap in TWB-focused educational research, as less is known about how teachers experience, conceptualize, and engage in practices related to teacher well-being. The primary purpose of this dissertation study is to investigate how teachers conceptualize and engage in practices related to teacher well-being. The secondary focus is to understand how educational leaders understand teacher well-being and their possible impact on teacher well-being as leaders.

The study's primary data source will be qualitative interviews with classroom teachers and educational leaders in both public and private school contexts. Data analysis will follow a quantitative ethnography-epistemic network analysis (QE-ENA) approach to identify and visualize connections between prominent aspects of TWB as foregrounded and described by participants. This dissertation study aims to suggest new understandings of how teachers and leaders understand and engage in practices related to teacher well-being through foregrounding their emic perspectives.

Keywords: Teacher Well-being, Epistemic Network Analysis, K-12 Education

1 Goals of Research

My dissertation research primarily seeks to understand how teachers and leaders understand, experience, and engage in practices related to TWB via their own qualitative, emic perspectives. It aims to conceptually retreat from mapping deductive theories onto TWB to explore inductively: How do teachers themselves define TWB? Accordingly, this study aims to center the teacher voice by including teachers as the primary participant group with perspectival triangulation from educational leaders to understand the mediating influences of leadership on TWB. Accordingly, the guiding research questions for this study are:

1. How do teachers define and conceptualize teacher well-being?
2. How do teachers experience and enact practices related to well-being?
3. How do educational leaders conceptualize teacher well-being and enact leadership practices related to teacher well-being?

2 Project Background

Teacher well-being is epistemologically descended from Diener's theory of subjective well-being, which conceptualizes well-being as being a unique, intrinsic phenomenon residing within individuals [3]. Contemporarily, TWB is predominantly characterized in the literature by its lack of any single definition [4]. However, common definitions and conceptual models of TWB do offer evidence that TWB is a multidimensional construct composed of a teacher's inner psychological states and external mediating factors, such as professional identity, job resources, and others.

TWB holds great relevance when placed alongside the broader context of teachers' lived experiences. The work of teaching often subjects individuals to stressful conditions both inside and outside of the classroom [5]; such conditions include long hours, unsupportive colleagues and leaders, and relatively low pay for the work of teaching [6]. At a macro level, neoliberal influences at the societal level perpetuate the commodification and dehumanization of education; these influences, while often presented as benevolent reform initiatives, permeate educational institutions and increase negative working factors and conditions for teachers at the individual level [7, 8]. Thus, there is a pressing need for educational research to consider issues related to TWB as a way of offering data-based frameworks and approaches that are primarily informed by teachers' lived experiences, perspectives, and suggestions regarding their well-being. Unfortunately, current TWB-focused literature is often limited by an overreliance on deductive applications of external frameworks in conjunction with an overabundance of positivist study designs and quantitative methods of data collection and analysis that effectively serve to reduce TWB to a set of metrics.

3 Methodology

This study aims to investigate TWB through qualitative methods of data collection in combination with QE-ENA, both of which are established as valuable methods for understanding the emic perspectives and contextual richness of a given phenomenon [1,9]. Accordingly, the primary method of data collection for this study will be the usage of semi-structured interview protocols with participants. Along with the interview data itself, I will engage in extensive reflexive memos. These memos will serve as additional artifacts that will help reflexively inform the approach to data analysis and serve to identify and manage my own biases as the primary researcher of this study and a former teacher through ongoing dialogic engagement [9]. The approach of QE-ENA will then be employed to guide the analytic process via codebook generation and procedures, ENA model generation, and closing of the interpretive loop.

4 Preliminary or Expected Findings

Firstly, through coding and thematic analysis, I expect to generate a robust array of teachers' emic definitions of TWB. Simultaneously, through the usage of ENA, I will

generate ENA models that allow for comparisons of these definitions across different cross-sections of my participant population; for example, I will aim to understand if and how definitions of TWB differ between public and private school contexts via ENA model generation. Similar ENA analysis will be done on the leader interview data. Secondly, I will employ ENA to similarly analyze if and how teachers' TWB-related practices are similar or differ across educational contexts, and to analyze if and how leaders' TWB-related policies differ across educational contexts. I will then use the models in combination with my own thematic understanding of the data to make note of relevant trends to inform my conclusions and implications.

5 Expected Contributions

This study will be a novel contribution to the field of research on TWB by centering teachers' emic and inductive perspectives on TWB. As the field of TWB-focused research is predominantly one where theories are deductively overlayed onto quantitative data points to maximize generalizability of findings, this study will deeply explore TWB in a more highly contextualized manner than is possible through a purely quantitative approach due to the use of qualitative data collection methods in combination with QE-ENA. Furthermore, the usage of ENA in analysis allows for contextually-sensitive cross-comparisons and will thus provide valuable insights for how teachers in different education contexts both define and experience TWB. This, in turn, will inform both the field of TWB research at-large as well as educational decisionmakers who may have agency to impact TWB in their school contexts.

References

1. Shaffer, D.W.: Quantitative ethnography, 1st edn. Cathcart Press, Madison (2017)
2. Shaffer, D.W., Collier, W., Ruis, A.R.: A tutorial on epistemic network analysis: analyzing the structure of connections in cognitive, social, and interaction data. J. Learn. Anal. **3**(3), 9–45 (2016)
3. Diener, E.: Subjective well-being. Psychological bulletin, **95**(3), 542-575 (1984)
4. Hascher, T., & Waber, J.: Teacher well-being: A systematic review of the research literature from the year 2000–2019. Educational Research Review, **34**, 100411 (2021)
5. Carroll, A., Flynn, L., O'Connor, E.S., Forrest, K., Bower, J., Fynes-Clinton, S., York, A., & Ziaei, M.: In their words: Listening to teachers' perceptions about stress in the workplace and how to address it. Asia-Pacific Journal of Teacher Education, **49**(4), 420–434 (2021)
6. Corcoran, R.P., & O'Flaherty, J.: Social and emotional learning in teacher preparation: Pre-service teacher well-being. Teaching and Teacher Education, **110**, 103563 (2022)
7. Acton, R. & Glasgow, P.: Teacher wellbeing in neoliberal contexts: A review of the literature. Australian Journal of Teacher Education, **40**(40), 99-114 (2015)
8. McLaren, P.: Life in schools: An introduction to critical pedagogy in the foundations of education. 6th edn. Routledge, New York, NY (2015)
9. Ravitch, S.M., Carl, N.M.: Qualitative research: Bridging the conceptual, theoretical, and methodological. 2nd edn. SAGE Publications, Thousand Oaks (2021)

Deconstructing the Impact of U.S. Education Policy on Marshallese Communities: A Postcolonial Exploration of the Compact of Free Association (COFA)

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Abstract. This doctoral consortium proposal highlights the critical discourse analysis of the unique Compact of Free Association (COFA) -- an international agreement between the U.S. and Republic of the Marshall Islands (RMI) renewed on March 8, 2024 for an additional twenty years -- to understand the various impacts of the fiscal and political relationship between the U.S. and the RMI. Grounded in postcolonial theory, this research is part of a critical ethnographic study that seeks to advocate for multilingual communities like the Marshallese to help improve contemporary efforts toward educational equity and proposes an epistemic network analysis (ENA) as the next step in deconstructing the broader educational impact of U.S. policy on indigenous communities.

Keywords: Quantitative Ethnography, Compact of Free Association (COFA), Epistemic Network Analysis, Marshall Islands

1 Goals of the Research

The purpose of this study is to demonstrate the urgency of increasing support for Marshallese communities by reviewing the COFA treaty to understand the educational implications of the law. In order to remove barriers while creating and retaining space for the inclusion of Marshallese communities, this qualitative ethnographic research project includes policy discourse as part of a larger critical ethnographic study. The discursive patterns that this dissertation focuses on include utilizing postcolonial theory to collect, analyze, synthesize, evaluate, and employ critical discourse analysis to analyze a policy that poses challenges and opportunities for Marshallese students to engage in education equitably.

2 Background of the Project

Recently, the dehumanizing language used to describe immigrants in the U.S. has received considerable attention in the media, as former President Donald Trump has made repeated incendiary comments about immigrants, labeling them as violent and

undocumented criminals in ongoing presidential debates. Despite these efforts, Marshallese students – who live and travel freely to the U.S. under a unique bilateral treaty called the Compact of Free Association – continue to suffer low graduation rates, high behavior referrals, and racism. Given the disparaging impact of the word “alien” to describe humanity, the current Biden Administration has proclaimed to stop using the term “illegal aliens” to describe individuals who do not have the appropriate documents to travel to the U.S., yet the recent renewal of the COFA in March of 2024 continues to refer to people from the Marshall Islands as legal nonimmigrant aliens. Using a postcolonial theoretical framework, researchers have demonstrated that despite the complexity of treaty discourse, indigenous communities can use the colonial contracts to mobilize change [1]. This study seeks to mobilize change by advocating for an equitable distribution of power between the U.S. and Marshall Islands and opening a dialogue to study the relationships between texts and social practices in education.

3 Methodology

Critical ethnographic research offered an opportunity to examine complex systems and people. This qualitative critical ethnographic design was particularly well-suited for this study because it is in line with the study’s indigenous research agenda of self-determination by providing a holistic view of the authentic experiences and realities of Marshallese students in the context of political renegotiations and transnational population flows. I will apply ENA to document and characterize the unique categories of social actors and develop networks across the social agents included in the discussion of education within the treaty. By using discourse that both befriends the audience and exerts authority by class, the COFA treaty embodies ideologies which perpetuate societal relations between the U.S. and RMI that reinforce western thought of social order and ways of knowing. The use of informal discourse in the COFA revealed modern techniques of the U.S. exercising power by using vocabulary terms that most readers would also use to express themselves. The simulation of equalization through discursive choices was considered in the context of postcolonial theory [2]. While choices of informal discourse were a tool to appear on equal ground with the audience in the COFA treaty, the delegitimization of non-western values was also conveyed through a countervailing discourse of legal authority in order to position the U.S. as dominant. The simulation of equalization through the use of an informal and lexical field can be further interrogated using ENA visuals in order to understand how the COFA includes strategic patterns of discourse to convey an artificial illusion of connection with the audience while reinforcing notions of western imperialism and colonization.

4 Expected Findings

The expected outcomes of this proposal include increased interest in using ENA to examine international policies, as the study will create a space to critique the

distribution of power attributed through policy. The network visualizations from ENA will convey specific aspects of education equity that impact U.S. classrooms. This dissertation aims to produce new methods to broaden participation in policy analysis and postcolonial critique by cultivating environments that analyze data sets of legal documents to engage in a positive educational experience – ENA can increase the accountability and equity within U.S. education systems and policies using dynamic network models.

5 Expected Contributions

One of the constructs of postcolonial theory is to disrupt the norms of methods, data collection, and analytical approaches. ENA will serve as one of the ways to disrupt traditional approaches to policy and critical discourse analysis at the intersection of education while documenting the international relations between the United States and the Republic of the Marshall Islands [3]. Educators can leverage the findings from this research to develop culturally responsive policies that support the diverse backgrounds and languages of students.

References

1. C. Allen, “Postcolonial theory and the discourse of treaties,” American Quarterly, (2000).
2. M. Agyepong, “Discourse, representation, and “othering”: Postcolonial analysis of Donald Trump’s education reform,” Critical Theory and Data Analysis in Education, (2019).
3. T. A. van Dijk, “Ideology: A multidisciplinary approach,” Sage, (1998).

Understanding Students' Development of Transferable Skills Through Co-Designing Middle School Educational Materials

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Abstract. Through utilizing Quantitative Ethnography (QE) principles, this study aims to investigate students majoring in a science discipline's development of transferable skills as a result of engaging in co-designing life science educational materials for middle school classrooms and teachers. Utilizing a case study design approach, qualitative data will be collected and analyzed through network analysis tools. Preliminary findings suggest that students perceive the development of transferable skills through participating in the co-design process. However, future research will focus on uncovering transferable skills development and the interactions between transferable skills.

Keywords: Science Outreach; Transferable Skills; Undergraduate Education

1 Goals

This research aims to uncover how participating in the co-design process of designing educational materials with more knowledgeable others can facilitate the development of transferable skills. Network analysis tools can facilitate the identification of patterns or relationships between science outreach, the co-design process and transferable skills. By uncovering these relationships through network analysis, this research can contribute to our understanding of how instructional practices and environment could contribute to the development of transferable skills.

2 Background

Historically, science education in academia has prioritized developing academic and discipline-specific skills over transferable skills, such as creativity, leadership, communication, and collaboration [1]. However, these skills are vital for academic success and cultivating students who can successfully navigate the transition from higher education into the rapidly changing workforce [2, 3, 4]. Encouraging the development of transferable skills can be accomplished by providing science undergraduate students with community outreach opportunities to co-design middle school science resources with outreach professionals.

3 Methodology

The proposed study will utilize a case study design and employ Quantitative Ethnography (QE) principles. Participants will include undergraduate students majoring in a science program who are enrolled in a science outreach program, “SciQuest”, where students co-design science educational materials for middle school classrooms with other science students and outreach professionals. Data for analysis will include researcher observations, observational recordings, artifacts, such as pictures or products created by the group of students and outreach professionals, pre- and post-participation interviews, and discourse during the co-design process. Currently, the proposed study will employ Epistemic Network Analysis (ENA) to analyze data collected and observe connections between transferable skills. However, other QE analysis tools or techniques like Ordered Network Analysis (ONA) may be used.

4 Preliminary & Expected Findings

Pilot study data, end-of-semester reflections, and analysis, ENA, uncovered students' self-perceived development of transferable skills and the connections between these skills. The data showed that students perceived the development of different transferable skills through participating in the program; however, collectively, the students perceived a gain in leadership, communication, collaboration, creativity and teaching skills. Interestingly, one skill, teaching, was central in all of the ENA networks, providing an avenue for future analysis. The proposed study will focus on investigating students' actual transferable skills development over perceived development through enhanced data collection, as well as focus on the role of teaching skills in facilitating the development of other transferable skills.

5 Contributions

The proposed study will expand upon current literature as a gap persists in the literature regarding how non-educators develop transferable skills through co-designing educational materials with outreach professionals. Additionally, findings could explore how certain skills, like teaching, can facilitate the development of other transferable skills and aid in our understanding of learning environments that enhance transferable skills development for non-education science majors.

References

1. Bancino, R., & Zevalkink, C. (2007). Soft Skills: The New Curriculum for Hard-Core Technical Professionals. Techniques: Connecting Education and Careers *(J1), 82*(5), 20-22.
2. Carter, L. (2011, March 9). Ideas for adding soft skills education to service learning and capstone courses for computer science students. Proceedings of the 42nd ACM Technical Symposium on Computer Science Education. https://doi.org/10.1145/1953163.1953312

3. Chinoy, N., Stoub, H., Ogrodzinski, Y., Smith, K., Bahal, D., & Zubek, J. (2022, March 1). Assessing student desire for professional skills development within the undergraduate science curriculum: a focus on teamwork. Advances in Physiology Education, *46*(1), 179–189. https://doi.org/10.1152/advan.00051.2021
4. McKee, F., Wolf, J. D., Simon, S., & Floyd, J. H. (2023). Teaching transferable skills in teamwork, accountability, goal setting, writing, and problem-solving in a non-major microbiology lab: the unknown bacteria experiment redefined. *Journal of Microbiology & Biology Education*, 24(3). https://doi.org/10.1128/jmbe.00135-23

The Impact of Workshop Process and Rule Interventions on Data Collection in QE

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Abstract. The author is involved in design education and wants to use QE for analyzing the effects of education to more effectively develop design mindsets and promote attitude change. Currently, data on cognition is being collected and analyzed from individual statements in experimental design education projects in two companies. Originally, teams were asked to engage in free discussions on specific issues and themes, but in some cases the discussions became so heated that the voices could not be captured clearly when analyzing them later, or there were many directive words and pronouns that were difficult to analyze. The author therefore decided to adopt a workshop process that encouraged more careful dialogue rather than discussion, drawing on his own experience as a service designer. The workshop has several rules and is structured in such a way that people listen carefully to what others have to say and do not interrupt others. The application of this workshop method made the data easier to analyze than when free discussion data was collected. However, is this really an appropriate way to proceed with QE, and if so, to what extent is the intervention of the instructor or facilitator appropriate, and to what extent does this depend on the relationship and situation of the participants? These are the main topics of this RAD.

Keywords: Design, Education, Dialogue, Workshop.

1 Area and Domain of Research

─ The use of QE to analyse design education and its effectiveness. ─ Research on the pros and cons of processual and environmental interventions by designers or lecturers in ethnographic data collection for QE.

2 Context

Currently, the author conducts regular design training at a pharmaceutical company and an automotive company. The sample size is basically 4-5 people in 5-6 teams, i.e. 20 or 30 people. The duration of the training is approximately 10-12 weeks. The aim of design education is to develop human resources with the creativity and innovative mind-set to meet the challenges of today's companies and society. Companies expect education outcomes not only in terms of design skills and methodologies, but also in terms of the ability to deal with complex and uncertain situations, to draw on the creativity not only of themselves but also of their teams and stakeholders, and to lead groups towards goals in an exploratory, iterative and goal-oriented manner. Although the educational outcomes have been highly praised by various companies, there are also challenges. These expected changes in mindset are often analysed by means of

things like psychological tests and evaluations from surrounding stakeholders. However, methods such as psychological tests have the problem that there is a large blurring between the timing of implementation. There is also a concern that the method of evaluation by surrounding stakeholders may result in the axis of evaluation being off in the first place if the people around them do not have an understanding of the creative approach. Furthermore, in recent years, design is often carried out in a co-creative environment with teams and stakeholders, and individual verification evaluations do not provide sufficient information on what they want to know. Therefore, we decided to introduce a method of collecting QE data through group work, discussions with stake holders and dialogue within teams.

3 Research Objectives

In brief, the aim of the research agenda is to investigate to what extent group interaction for data collection in QE is appropriate to design and intervene, and how this varies according to objectives, participants, etc. The authors hypothesize that this research agenda will have variations from three main perspectives. First, the gradations of influence due to the degree of intervention (free discussion ⇔ semi-structured workshop ⇔ structured workshop) by rules, processes and props (including the lecturers themselves) in the dialogue and discussion. Secondly, the diversity and uniformity of expertise, experience, career and organisational culture of the target participant group and the biases arising from them. And finally, what is the subject matter of the QE.

4 Background

The author is usually engaged in research in a postgraduate doctoral programme in art and design. The author is still involved as a service designer in a design agency in pro jects supporting customer experience innovation and in training projects to introduce service design and design thinking in organisations. In these projects, she has designed and facilitated numerous co-creative workshops as a service designer. In this context, she uses QE to analyse the experience from the customer's perspective and the change in awareness of the design training participants using epistemological networks.

Epistemic Network Analysis of Social Security Fund

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Abstract. Social Security Fund separated by the government through their annual budget plays an important role in fulfilling the needs of elderly adults. In spite of the fact that the total proportion of people living under poverty has decreased significantly in the past few decades. There are still many elderly adults who depend upon social security schemes provided by the government to meet their needs. Through this research using Epistemic Network analysis (ENA) of ethnographic data retrieved from suitable databases such as SSA, will be carried out to find the various strengths of the nodes and determine which node plays an important role in determining social security fund dispersed for elderly adults.

1 Area and Domain of Research

Epistemic Network Analysis of Social Security Fund
Macroeconomics of Ageing
Macroeconomics of Social Security Fund
Ethnography of Ageing in Place

2 Background

In 2024 nearly $1.5 trillion is separated for elderly adults by the US government through the annual budget (SSA, 2023). The total amount is separated to cover annual retirement schemes, which usually cover elderly adult health care facilities, monthly pension schemes, and easy mobility services through free transportation (SSA, 2023). Recent statistics show that nearly 90 percent of elderly adults benefit from the social security schemes supported by the government. The same report claims that nearly 31 percent of adults do not subscribe to private pension schemes and nearly 16 percent of adults do not have any retirement savings (SSA, 2023). From the figures, I can infer that nearly 29.4 million adults might face severe challenges in their latter part of life. Therefore, it is important to find suitable schemes for those adults who might not live a comfortable life during their 60s or 70s. Using ethnographic approach and ENA, I will try to find how various relationships and statistics of nodes and edges can be useful to assist underprivileged elderly adults.

2.1 What problem are you trying to solve?

Using both ethnographic and epistemic network analysis (ENA) approaches, I will find various important features such as which stakeholders are prioritized in budget allocation to cover the expenses of elderly adults, which is achieved by utilizing the power of ENA tools in appropriate software by finding out various descriptive statistics and degree of centrality. If appropriate data are available, through this research, I will try to find which node, here in this case whether the need of the elderly adults weigh more than the government capacity for expenditure of the budget. Likewise, other different forces are influential in the budget allocation for the elderly adults will also be evaluated.

2.2 Why is this area of study important?

Besides retirement plans and personal savings, which most of the elderly adults already have social security schemes for elderly adults provide additional support to live a comfortable life (Dushi, 2017). However, all elderly adults do not have retirement plans and personal savings enough to support their latter part of life. Therefore, social security schemes play an important role in supporting elderly people (Dushi, 2023). Several statistical reports have shown that there are millions of elderly people who are deprived due to lack of proper retirement plans and enough savings, and solely depend upon social security schemes supported by the government (SSA, 2023). Therefore, through this study, I will find out various nudges that play an important role in allocating social security funds for elderly adults who are deprived of better facilities.

2.3 What is the conceptual, theoretical, or analytical framework guiding this proposed study?

An ethnographic approach helps to find the view, experiences, first-hand features of the respondents who are interviewed for the specific purposes either by using semi-structured questionnaires, interviews, focus group discussions, in a covert or overt way. In this research, an ethnographic approach will be used, statistics related to the interview will be collected from secondary sources which will be used for further analysis.

2.4 Research objectives

Through this research whether the elderly adults who receive social security fund are satisfied with what they receive to cover up their day-to-day expenses and health coverage will be covered. I will use ethnographic approach to collect data from elderly adults and concerned stakeholders to understand how they perceive about the monthly allowances they receive every month and whether the amount they receive suffice to cover up their monthly expenses. The major aim of the research includes following:

- To find the strengths of nodes and how they interact with each other using ENA.

- To find the strengths of nodes using descriptive statistics and measures of centrality using ENA in an appropriate software which are compatible on my laptop.

2.5 Prior experience and expectations

I want to hone on my skills to use ENA for both qualitative and quantitative data. Although, I have experience of using ethnographic approach and have published a couple of newspaper articles and research papers. I want to gain insights and first-hand experiences of using ENA for qualitative research and leverage the power of computation to bring precise insights on various pressing socio-economic issues.

References

1. Dushi, Irena, Howard M. Iams, and Brad Trenkamp. "The importance of social security benefits to the income of the aged population." *Soc. Sec. Bull.* 77 (2017): 1.
2. “Improving the Measurement of Retirement Income of the Aged Population.” *Social Security Administration Research, Statistics, and Policy Analysis*, www.ssa.gov/policy/docs/workingpapers/wp116.html.

Understanding the Discourse and Bodies of Knowledge within "Science of Reading" TikTok Communities

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1 Background and Framing

The Science of Reading (SOR) movement has become a significant talking point within literacy research and a common vernacular with educational stakeholders: parents, administrators, and politicians. Misinformation from social media accounts and journalists have inaccurately portrayed the tenets of SOR as primarily code-based, skewing the public's perceptions of effective reading instruction for students [2]. In many states, this discourse has influenced legislative policy [3] and deeply impacted reading content, curricula, and pedagogy at the state and school district level [6]. Further, media coverage has prompted practicing educators to engage in social media spaces outside of traditional professional learning routes "to ask questions about the tools and decisions" resulting from SOR reading policy [7]. Considering the potential impact of SOR [4] on policy, this study examines public engagement around the patterns and trends on the popular platform TikTok of #ScienceofReading to better understand the bodies of knowledge being used to validate and verify the SOR conversation in a social media space.

We draw on authoritative discourse [1] and source credibility theory [5] to frame this work. Authoritative discourse relies on communicating ideas and information through a level of authority that is imbued with political power or institution and hinges on its ability to dominate [1]. We also draw on the Source Credibility Model [5] to examine the discourse on TikTok. We utilize frameworks of expertise and trustworthiness in combination with the power of authoritative discourse to examine the public engagement patterns and bodies of knowledge displayed in TikTok SOR content.

2 Research Objectives

2.1 Population

This research examines the content that has been produced by TikTok influencers or content creators who focus on SOR topics to inform, demonstrate, or communicate ideas about SOR to the viewing public. Viewers of this TikTok content might include parents, school leaders, or teachers who may or may not align their pedagogical views

with this literacy movement. We see this research informing teacher educators within higher education institutions and educational leaders who determine which policies will be mandated for K-3 classrooms.

2.2 Research Aim and Questions

We intend to examine the following research questions: (1) What are the patterns and trends of discourse across TikTok content creators, viewers, and bodies of knowledge? (2) What is the relationship between multimodal components (aural, visual, textual) in TikTok videos and the SOR conversation? and (3) How are content creators and viewers of SOR TikTok content aligning with the messaging of the SOR movement?

2.3 Stage of Study and Data Collection

Currently, this study is in the data analysis phase. We have collected 157 TikTok videos, including the following metadata: date collected, video link, video caption, video creator, number of followers (of the account), hashtags used, number of video likes, number of bookmarks, number of video views, and number of video saves. We have completed initial coding of the data set describing the thematic emphasis of the video, which included the following codes: direct demonstrations (videos where the creator engaged in a teaching/learning activity), resources/materials (videos that emphasize a material or point audience to a material), identity formation (videos where the emphasis was on the creator's beliefs, knowledge, or personal experiences), or professional content knowledge (video emphasis conveyed knowledge, definitions, or research claims). For QE analysis, we intend to build a data corpus using Epistemic Network Analysis software (ENA) and collect textual transcripts of spoken audio, captions, hashtags, and links in the previously collected SOR-related TikToks. Since we aim to understand the multimodal units of meaning that are applied to construct a video, we also intend to include the linguistic, visual, gestural, spatial, and auditory modes of communication within each TikTok video. Lastly, we seek to understand the strength and connection between the content creator's messaging and the response of the viewer community. We intend to include in our ENA corpus transcripts of the comments and replies posted within each video.

3 Prior QE Experience and Expectations

All members of the research team are novice QE scholars, and this will be our first study to apply the methodology. Our backgrounds are mostly situated within qualitative research (e.g., case study, multimodal content analysis, discourse analysis, etc.) and mixed methods. We see great value in the methodology to examine significantly large coded data sets to determine lines of "conversation" across populations. We hypothesize that there is a significant and strong correlation between what is being created, distributed, and discussed in TikTok and the misinformation around research-based understandings about early reading development in K-3 students. Our primary

goal for this RAD proposal is to be paired with an expert QE scholar to help us take our ENA data corpus and understand the methodological tools that can be applied to draw conclusions on the relationships, connections, and discourse within our TikTok data set.

References

1. Bakhtin, M. (1981). The dialogic imagination: Four essays (C. Emerson, & M. Holquist, Trans.). Austin: University of Texas Press.
2. Compton-Lilly, C., Spence, L.K., Thomas, P.L., & Decker, S.L. (2023). Stories grounded in decades of research: What we truly know about the teaching of reading. *The Reading Teacher*, *77*(3), 392-400.
3. Hanford, E. (2022). *Sold A Story* [Audio podcast]. APM Reports. https://features.apmreports.org/sold-a-story/
4. Handsfield, L. J., MacPhee, D., & Paugh, P. C. (2024). Misrecognition, the "Science of Reading," and the ongoing struggle for the legitimate discourse of the field of reading education. *The Bloomsbury Handbook of Bourdieu and Educational Research*, 192.
5. Hovland, C. I., & Weiss, W. (1951). The influence of source credibility on communication effectiveness. *Public Opinion Quarterly*, *15*(4), 635–650.
6. Woulfin, S., & Gabriel, R. E. (2020). Interconnected infrastructure for improving reading instruction. *Reading Research Quarterly*, *55*(1), S109-S117.
7. Woulfin, S. L., & Gabriel, R. (2022). Big waves on the rocky shore: A discussion of reading policy, infrastructure, and implementation in the era of science of reading. *The Reading Teacher*, *76*(3), 326-332

Connecting Quantitative Ethnography Tools with In-Class Analysis Methods

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Abstract. This research proposes a new approach using Quantitative Ethnography (QE) tools to integrate observers' perspectives in lesson study with researchers' analyses. To identify driving factors of discussion in collaborative learning, we analyze data from Japanese schools using Ordered Network Analysis (ONA). This study contributes to learning environment design research and QE application to support educational practitioners in improving daily lessons.

Keywords: Learning Analytics, Collaborative Learning, Jigsaw Instruction, Lesson Study.

1 Area and Domain of Research

This research is in the area of Learning Sciences and the domain of Learning Analytics.

2 Background

Effectively utilizing observational data from classroom research has become crucial for educational analysis [1]. Therefore, this study integrates the perspectives of observers from lesson studies into the analysis of learning, connecting Quantitative Ethnography (QE) tools to analysis methods for lesson study in a public school. By comparing researchers' and practitioners' interpretations, we seek to inform future learning environment design. This study focuses on the theory of project-based learning, specifically the concept of driving question [2]. To visualize discussion sequences, we analyze students' interactions using QE tools, namely Ordered Network Analysis (ONA) [3], and reveal how questions drive learning.

3 Research Objectives

This study aims to identify the factors driving collaborative learning discussions and their alignment with teachers' design, focusing on integrating practitioners' interpretations with research analysis at this stage.

This study primarily focuses on the use of observation records obtained from “lesson study” in Japanese public elementary schools. Lesson study is a common professional training scheme conducted in more than 90% of schools in Japan [4]. The integration of lesson study and analysis by researchers will significantly contribute to future educational research.

For data collection, the “observation sheet” developed in a previous study [5] is used, and the observers count and record students’ thinking activities during a lesson on the sheet. This observation sheet provides 13 simple categories, such as “comparing information” and “answering the main question”, to interpret students’ thinking, and the approach is subject- and grade-independent, making it applicable to all educational practices. Data on students’ interactions in class (transcriptions) will also be collected for detailed analysis by researchers.

The research is in the trial phase. First, the efficacy of the observation sheet was confirmed throughout the entire process of lesson study, including lesson design, observation in class, and a review meeting at a public elementary school. Furthermore, to examine our concept, we collected observation data in class and transcripts of collaborative learning, which was designed as a jigsaw classroom in a teacher education class at a Japanese university.

4 Prior Experience and Expectations

The first author has worked on developing analytical approaches and QE education in higher education. This study presents a new challenge for the authors as it provides practitioners with perspectives and tools to improve their daily lessons using QE tools. In the research agenda development session, we expect to exchange information on practices using QE tools in public schools, not laboratory schools, as well as educational and training programs and tools for use by researchers and practitioners.

References

1. Shaffer, D. W.: Quantitative Ethnography, Cathcart, Madison, (2017).
2. Krajcik J. S., Shin N.: Project-Based Learning, In: Sawyer R. K.(ed) The Cambridge Handbook of the Learning Sciences (pp.275-297), Cambridge University Press, NY (2014)
3. Tan, Y., Ruis, A.R., Marquart, C., Cai, Z., Knowles, M.A., Shaffer, D.W.: Ordered Network Analysis. In: Damşa, C., Barany, A. (eds) Advances in Quantitative Ethnography. ICQE 2022. **1785**, Springer, Cham. https://doi.org/10.1007/978-3-031-31726-2_8 (2023).
4. Lewis, C., Friedkin, S., Emerson, K., Henn, L., Goldsmith, L.: How Does Lesson Study Work? Toward a Theory of Lesson Study Process and Impact. In: Huang, R., Takahashi, A., da Ponte, J.P. (eds) Theory and Practice of Lesson Study in Mathematics. Advances in Mathematics Education. Springer, Cham. https://doi.org/10.1007/978-3-030-04031-4_2, (2019).
5. Kasai, T., Ohsaki, A., Hayashi, Y., Masukawa, H.: Practice of Teacher Training Program for Reviewing the Lesson, JSiSE Research Report, Japanese Society for Information and Systems in Education, **34**(4), 41-48 (2019). (In Japanese)

Bridging Gaps: Advancing Multilingual Quantitative Ethnography to Unveil Latinx Socioeconomic and Educational Disparities

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Abstract. The Latin American and Caribbean populations are expected to reach 752 million by 2056, necessitating a shift from an English-centered research approach to a bilingual one. This study aims to form a multidisciplinary group of scholars to engage Spanish-dominant bilingual Latinx participants. The research explores the intersection of urban planning and education by examining critical urban areas with growing Latinx populations, aiming to understand why entrepreneurship is often prioritized over education. This study will use tools like WebENA and rENA to enhance insights into the Latinx community's socioeconomic and educational disparities.

Keywords: Spanish, Education, Entrepreneurship, Latinx, Population Growth

1 Area and Domain of Research

The proposed research is in Urban Planning, Economic Development, Entrepreneurship, and Education.

2 Background

The rapidly growing Latin American and Caribbean populations, projected to reach 752 million by 2056, present significant opportunities for cross-cultural engagement [1]. While the Latinx community is heterogeneous and multilingual, quantitative ethnography (QE), urban planning, entrepreneurship, and education research approach the community through an English-centered lens. Across the Latinx communities, Spanish is spoken in 19 sovereign states [2] and ranks as the second most spoken language globally by the number of native speakers and the fourth most spoken language in the total number of speakers. Given the Latinx community’s heterogeneity, there are innumerable opportunities to engage communities across the United States (U.S.), Latin America, and the Caribbean.

3 Research Objectives

This research aims to establish a network of multidisciplinary scholars who engage bilingual Latinx participants, specifically participants who speak Spanish as a dominant language and English as a secondary language, while also streamlining processes to enhance the production of QE scholarship, including participatory quantitative ethnography [3] about Latinx and Spanish-speaking populations. These scholars will collaborate to identify key urban areas experiencing Latinx population growth, exploring urban planning and education themes that can shed light on the dynamics of Latinx networks and critical decision-making. For instance, in the U.S., the Latinx entrepreneurial community has grown 34 percent in the last decade [4] but continues to experience an educational gap for certain nationalities [5]. Disparities in educational attainment and entrepreneurship across Latinx groups may have long-term economic consequences for future generations. Therefore, my primary research question is: Which discrete factors influence the pursuit of entrepreneurship over education, and how might these factors shape future economic and educational outcomes in the Latinx community?

4 Prior Experience and Expectations

Since October 2022, I have conducted numerous interviews primarily in Spanish, with some incorporating a mix of English and Spanish, and have analyzed them using the WebENA tool and the rENA package in R. The discourse collected in the interviews encompasses numerous disciplines. Based on these experiences and the growing Latinx population, the Latinx community can benefit from more multidisciplinary scholars trained to analyze quantitative ethnography data in Spanish and illustrate nuanced connections through epistemic network analysis. Increasing knowledge about this population can enhance our ability to understand and support the Latinx community's diverse socioeconomic and educational backgrounds and create new research opportunities.

References

1. Caribbean, E.C. for L.A. and the: The World Has 8 Billion People, 662 Million of Whom Live in Latin America and the Caribbean, https://www.cepal.org/en/news/world-has-8-billion-people-662-million-whom-live-latin-america-and-caribbean, last accessed 2024/05/25.
2. Hispanic Countries 2024, https://worldpopulationreview.com/country-rankings/hispanic-countries, last accessed 2024/05/26.
3. Vega, H., Irgens, G.A.: Constructing Interpretations with Participants Through Epistemic Network Analysis: Towards Participatory Approaches in Quantitative Ethnography. In: Wasson, B. and Zörgő, S. (eds.) Advances in Quantitative Ethnography. pp. 3–16. Springer International Publishing, Cham (2022).

4. Weinstein, L.: Research Guides: Hispanic Americans in Business and Entrepreneurship: A Resource Guide: Entrepreneurship, https://guides.loc.gov/hispanic-americans-in-business/entrepreneurship, last accessed 2024/05/26.
5. A Mosaic, Not a Monolith: A Profile of the U.S. Latino Population, 2000-2020, https://latino.ucla.edu/research/latino-population-2000-2020/, last accessed 2024/05/26.

Culture, Heritage, and Community for Development: An Autoethnographic Reflection

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Abstract. This proposed autoethnographic study will utilize Quantitative Ethnography (QE) to introduce connections between the researcher's experiences of cultural capital through a cultural heritage autoethnographic project involving education-based travel. The autoethnographic study will be utilized as a reflection to encourage the development of the author's research agenda. The author plans to continue examining the role of cultural capital in the learning experiences of minority learners. Journal entries will be analyzed as a data collection source. Anticipated network connections will be utilized to identify further themes for exploration in cultural, assets-based studies about minority learner development.

Keywords: Cultural Capital, Community Cultural Wealth, Ethnicity, Heritage, Museum Studies.

1 Area and Domain of Research

The proposed research is in the domain of Education and Cultural Studies.

2 Background

Key findings of the researcher's dissertation study indicated the most prominent connections between the navigational and social capital aspects of the Community Cultural Wealth (CCW) model [1]. Participants in the study further described how culture shaped their navigation of educational systems and social support networks among members of the same cultural group [2].

The researcher is curious to explore this phenomenon by reflecting on her own experiences through domestic and international education-based travel, with a focus on the cultural aspect. Specifically, the author's reflections on African and African American museums and historical site visits will guide her writings on how historical figures, events, and sites have influenced her educational and professional development experiences. Autoethnography was selected for the purposes of critical reflection with the researcher as a subject.

Existing research on heritage and reflexive practice in connection with museums and historical sites emphasizes secondary school learning and cultural awareness [3, 4]. Studies involving cultural heritage exploration through study-abroad experiences were apparent in the literature but central to higher education [5, 6, 7]. Research in which the researcher is the subject of the reflection in these contexts was limited. A QE study will offer the researcher a unique reflexive approach for developing her research agenda.

3 Research Objectives and Proposed Methods

1. Further reflect upon the cultural aspect of the researcher's dissertation study to continue developing a research agenda for professional advancement.
2. Explore the impact of cultural capital and heritage.
3. Collect qualitative autoethnographic data through journal entries.

4 Prior Experience and Expectations

The researcher previously utilized QE in various co-authored research projects. Most recently, the author conducted a dissertation study on female learners in C-STEM in which QE was the methodology. The study explored the impact of cultural capital on equity and access in their educational experiences. Furthermore, the researcher plans to continue utilizing QE methodology in her post-doctoral work.

References

1. Yosso, T.J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. Race Ethnicity and Education, 8(1), 69-91. https://doi.org/10.1080/1361332052000341006
2. Wright, T. (2024). *Examining the role of cultural capital in access and equity for female C-STEM learners of color*. (Publication No. 31237038) [Doctoral dissertation, Pepperdine University]. ProQuest Dissertations and Theses Global.
3. Savenije, G. M., van Boxtel, C., & Grever, M. (2014). Learning about Sensitive History: "Heritage" of Slavery as a Resource. *Theory and Research in Social Education, 42*(4), 516–547. https://doi.org/10.1080/00933104.2014.966877
4. Walton, J., Paradies, Y., & Mansouri, F. (2016). Towards Reflexive Ethnicity: Museums as Sites of Intercultural Encounter. British Educational Research Journal, 42(5), 871–889. https://bera-journals.onlinelibrary.wiley.com/doi/10.1002/berj.3241
5. Brown, S. M. (2022). Black HBCU students' perceptions of a short-term heritage-seeking immersive study abroad program: Journey to the first Black republic. (Publication No. 29165235) [Doctoral Dissertation, University of North Carolina at Charlotte]. ProQuest Dissertations & Theses Global.
6. Yeboah, A. (2019). Reconceptualizing Black students going abroad: Heritage experiences in theory and practice. *International Journal of Multidisciplinary Perspectives in Higher Education, 4*(1), 1–21. https://www.ojed.org/index.php/jimphe

7. Hemmer, L. M., Robertson, P. M., & Sanders, J. M. (2021). The seduction of study abroad experiences: Three university educators' search for personal & professional meaning. *Multicultural Education, 28*(1-2), 26–30.

Incorporating ENA and CDA in International Policy to Examine U.S. Ties with the Marshall Islands

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Abstract. This RAD proposal presents a study examining the bilateral treaty entitled the Compact of Free Association to critique the relationship between the U.S. and the Republic of the Marshall Islands using critical discourse analysis (CDA) and epistemic network analysis (ENA). The proposal is part of a larger critical ethnographic study, and data includes discourse from two legal documents known as Public Law 108-188. At the time of the proposal's submission, the critical discourse analysis has already been completed. The final thematic code structure and code descriptions must undergo inter-rater reliability (IRR) over June and July 2024. The researchers seek to bring the data and preliminary analysis to the RAD session to gain valuable insight and feedback on incorporating QE to the research using ENA.

Keywords: Quantitative Ethnography, Compact of Free Association (COFA), Epistemic Network Analysis, Marshall Islands, education policy

1 Area and Domain of Research

The research area for this proposed RAD is Social and Behavioral Sciences as well as Political Sciences and Policy.

2 Background

The year 2024 marks the 50th anniversary of the Lau v. Nichols U.S. Supreme Court case, which mandates that school districts support pupils of diverse linguistic and cultural backgrounds. Despite this, many multilingual students in the U.S. face discrimination. This study seeks to examine the impact of Public Law 108-188, known as the Compact of Free Association (COFA) – a treaty between the U.S. and the Republic of the Marshall Islands (RMI) – using CDA and ENA methods to promote equitable outcomes for all, including indigenous nations. This research responds to the

urgent need to examine how bilateral treaties with the U.S. translates to both language rights and educational equity to effectively support students navigating contexts with traumatic histories of colonization both in the U.S. and abroad.

3 Research Objectives

The objectives of the current research study are as follows:

1. Examine the relationship between the United States and Republic of the Marshall Islands based on the discourse in the Compact of Free Association (COFA) treaty
2. Identify the specific power relations and ideologies based on the named social actors in the COFA policy to assess the opaque and transparent structural relationships as manifested in the language of international policy
3. Propose recommendations to targeted stakeholders to increase advocacy and support for indigenous Pacific communities with traumatic histories of colonization

Grounded in postcolonial theory, this research advocates for multilingual communities in education to support Marshallese multilingual learners and improve efforts toward educational equity by analyzing lexical choices made in the treaty in order to reveal underlying beliefs of power and oppression [1]. The researchers intend to expand this research by applying ENA to crystallize the cognitive models between the social actors involved in the formation of the treaty and utilizing ENA to visualize the connections between the parties involved in the formation of the treaty. Through ENA, this study seeks to provide a deeper understanding of the intricate hidden power imbalances and structures that perpetuate the inequities that exist within treaties. Two policy documents of Public Law 108-188 comprise a total of 321 pages, and 54 pages will be analyzed for informal and formal lexical choices. Data analyses involve an inductive approach to analyze emerging themes in the policy incorporating methods employed by CDA scholars since the 1990s [2].

4 Prior Experience and Expectations

After participating in the Data Challenge with a design focused on policy discourse, two of the three authors are graduate students proposing their first QE study by expanding new methods of ENA at the intersection of education and policy under the mentorship of an early-career ENA scholar from Wilkes University. The first author, Karena Escalante, has used critical ethnography for her dissertation and participated in the ICQE 24 Kick-off Event where she learned QE fundamentals and hopes to apply ENA to her dissertation findings. The second author, Dr. Monique Woodard, employed QE and ENA methods in her dissertation, and hopes to continue to develop her expertise in ENA to teach her students. The third author, Monet Harbison, participated in the 2024 Data Challenge and expects to increase her knowledge of ENA that she can incorporate into her dissertation proposal.

References

1. M. Agyepong, “Discourse, representation, and “othering”: Postcolonial analysis of Donald Trump’s education reform,” Critical Theory and Data Analysis in Education, (2019).
2. T. A. van Dijk, “Ideology: A multidisciplinary approach,” Sage, (1998).

Diversity and Mental Health in Collegiate Esports

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Abstract. This RAD presents a study examining the mental health of minoritized Esports athletes at Division 3 colleges. This three-part study includes semi-structured interviews, surveys, and an experimental study with a mental health intervention tailored to the games competitively played by Wilkes University's Esports program. At the time of the proposal's submission, the study has not yet begun. The semi-structured interviews are scheduled for August and September. The researchers aim to bring the data and proprietary analysis to the RAD session to gain valuable insight and feedback on applying epistemic network to the data.

Keywords: Esports, Student Athletes, Mental Health, Intersectionality

1 Area and Domain of Research

The research area for this proposed RAD is Social and Behavioral Sciences and the domain is Mental Health in Educational Settings and Digital Cultures (specifically Esports in higher education).

2 Background

This study seeks to understand the mental health challenges that minoritized students may experience while participating in Esports programs at Division 3 colleges in the United States. As Esports continues to grow in popularity [1], [2], several Division 3 colleges have developed Esports programs to increase enrollment from students with diverse cultural backgrounds. Despite the increased attention to competitive gaming, the mental health of Esports student athletes from minoritized backgrounds remains under-researched. This three-part study aims to investigate the intersectionality of race and gender in Division 3 Esports program and the impact on the student athletes' mental health.

3 Research Objectives

The proposed research study aims to achieve the four following objectives:

1. Examine how racial and gender identities influence the mental health outcomes of collegiate Esports athletes.
2. Identify the specific stressors and mental health challenges faced by athletes from diverse racial and gender backgrounds in Esports programs.
3. Assess the adequacy of existing support systems within academic institutions to address the unique needs of these athletes.
4. Propose actionable strategies to enhance inclusivity and mental health support for athletes of all races and genders in collegiate Esports programs.

The target population of this study is Division 3 collegiate Esports athletes. At the time of the proposal submission, the study has not started. We received a grant from Wilkes University, which starts in June 2024. Interviews will be conducted in August and September, and the online survey will be launched for the second study. The third study, involving mental health interventions for athletes who compete in games played at Wilkes University (*Super Smash Bros., League of Legends,* and *Overwatch),* will be conducted in November with a post-test assessment in January. If accepted to ICQE24, we will have the data from the interview protocols to discuss with more knowledgeable peers to receive feedback and suggestions on how to analyze using qualitative ethnographic (QE) methods.

The data which will be collected in this study include forty semi-structured interviews with Division 3 Esports student athletics, a survey, and a post-test assessment regarding the mental health interventions tailed to the video games offered at Wilkes University. The post-tests assessment will be implemented at the conclusion of the third study.

4 Prior Experience and Expectations

Monique Woodard has researched and used QE and epistemic network analysis (ENA) for her dissertation, participated in two ICQE Data Challenges, and is currently collaborating with other researchers using this research method. She seeks further guidance using this method since she has not taken a formal class. She hopes to better understand ENA model analysis and gain hands-on experience with the online ENA webtool for developing and analyzing complex models and tests.

This is Umer Hussain's first QE study and he seeks to increase his general knowledge on the methodology. He has been given resources and an explanation from Woodard, however, through participating in a discussion, he can gain further insight into how to utilize ENA in this and future studies.

References

1. U. Hussain and G. B. Cunningham, "The Muslim community and sport scholarship: A scoping review," European Sport Management Quarterly, 2022.
2. G. Rothwell and M. Shaffer, "eSports in K-12 and Post-Secondary schools," Education Sciences, vol. 9, no. 2, p. 105, 2019.

Mathematics Teaching Identity and Teachers' Instructional Enactment

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Abstract. This research aims to explore how QE techniques can be used to analyze the complex factors of that influence teachers' mathematics instruction. Building on prior research looking at mathematics teaching identity, I would like to design future studies that examine how individual factors relate to teachers' instructional enactment. To do this, I would like to explore the utility of using different rubrics to evaluate teachers' instructional decision-making as it relates to teachers' self-described mathematics teaching identity (MTI). This work serves to provide opportunities to evaluate the efficacy of professional learning opportunities while taking into consideration the complexity of individual teachers' identity and experience.

Keywords: Teacher Learning, Mathematics Teaching Identity, Teacher Education.

1 Area and Domain of Research

This proposed research study is in the domain of Teacher Learning and Instructional Evaluation.

2 Background

As mathematics continues to be viewed as a "gatekeeper" to many careers and opportunities, research puts a great deal of focus on improving mathematics instruction and addressing inequities in access to high-quality mathematics learning experiences. This research often examines what makes instruction high-quality [1] or how to prepare pre-service teachers to support student learning through responsive teaching practices and implementing student-based learning opportunities [2]. How teachers view mathematics and their role in teaching mathematics to students constitutes a distinct *mathematics teaching identity* (MTI).

Based on the wide range of research on teachers' professional identity [3] and the mathematics identity development of early career teachers [4], the primary components that seemingly comprise MTI are one's own *math identity, mathematical knowledge for and in teaching (MKT), mathematics teaching self-efficacy* and *visions of high-quality math instruction.* Each of these components of mathematics teaching identity influence and are influenced by one another, creating a complex dynamic system [5] that

drives how an individual acts in their role as a mathematics teacher. Additionally, the individual's emotion intersects across all components and serves as another mechanism that determines action in a given context. This action includes instructional practices within the classroom, as well as the decisions teachers make in relation to what professional learning opportunities they pursue related to their mathematics teaching. Research is needed to explore the validity of this conceptualization as it relates to teachers' instructional enactment.

3 Objectives

The aim of this proposed research is to explore how the potential of adopting a dynamic systems model of mathematics teaching identity can help support strategies for teacher learning. Rather than taking an objective stance on how a single dimension of teachers' influences instruction, looking at how those elements of individuals guide their decision-making and action can help researchers and practitioners to seek appropriate supports for learning both in teacher education and professional learning environments. Further, being cognizant of how different school environments support or constrain an individual's mathematics teaching identity can help teachers to select appropriate environments in which to work, or to take actions to develop and change their own learning community to better support their mathematics teaching identity. Based on this, potential research questions include: (1) How do elementary educators' mathematics teaching identities relate to their approaches to mathematics instruction? and (2) How does organizational context impact teachers' ability to enact their mathematics teaching identity? Though this study is still in the conceptualization phase, data collection would include teacher interviews and video data of classroom instruction.

4 Prior Experience and Expectations

Over the last two years, my initial exploration into quantitative ethnography and epistemic network analysis has helped me to further see how the affordances of a quantitative ethnographic approach can support this work in mapping the complexities of mathematics teaching identity in early career teachers. I feel my research could benefit from learning more about visualizing and modeling connections between the mathematics teaching identity and classroom instruction. To do this, I would like to know how to best collect and analyze classroom observation data in a way that is appropriate for QE analyses, as well as to discuss ways to look for alignments and misalignments across individuals' mathematics teaching identity and classroom instruction.

5 References

1. Munter, C. Developing Visions of High-Quality Mathematics Instruction. Journal for Research in Mathematics Education, 45(5), 584-635 (2014).

2. McDonald, M., Kazemi, E., & Kavanagh, S. S. Core practices and pedagogies of teacher education: a call for a common language and collective activity. Journal of Teacher Education, 64(5), 378-386 (2013).
3. Skott, J. Changing experiences of being, becoming, and belonging: Teachers' professional identity revisited. ZDM, 51(3), 469–480 (2019).
4. Machalow, R., Goldsmith-Markey, L. T., & Remillard, J. T. Critical moments: Pre-service mathematics teachers' narrative arcs and mathematical orientations over 20 years. Journal of Mathematics Teacher Education*, 25*(1)*,* 35-61 2(022).
5. Kaplan, A., & Garner, J.K.: A complex dynamic systems perspective on identity and its development: The dynamic systems model of role identity. Developmental Psychology 53(11), 2036-2051 (2017).

Workshop: Which Rotation to Choose? Exploring ENA Rotations with jENA

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Abstract. Epistemic Network Analysis has become a flexible modeling tool allowing scholars to make decisions that complement their data, context, and participants. For Quantitative Ethnography scholars, the tool enables understanding high-dimensional qualitative data, in part by providing researchers multiple "rotations" for highlighting features of interest in one's data. We propose a tutorial workshop for participants to play with their own data, exploring the impact that different structural features of their data have when using them as parameters in varied model parameters. Learners at all levels welcome.

Keywords: Epistemic Network Analysis · Julia Programming Language · Dimension Reduction · Workshop

1 Introduction

The Epistemic Network Analysis (ENA) approach is, generally, a process involving five steps [1–6]. First, one accumulates connection counts between qualitative codes over a sliding window, resulting in a high dimensional representation of the discourse one's units of analysis engaged in. Second, one embeds a network representation into that space as a way to approximately understand the accumulated model's dynamics in terms of connections between qualitative codes. Third, one reduces the dimensionality of that space to highlight one's features of interest by using multidimensional scaling, colloquially referred to as rigid body "rotations" in the Quantitative Ethnography (QE) community. Most commonly, ENA-users choose between SVD or means rotation, to show the dimensions which highlight overall variance or frame the groups for comparison, respectively. Knowles has explored alternatives where SVD and means rotation can mislead or be uninsightful, such as when one has several groups to compare (eg., schools), continuous features (eg., grades), or complex temporal data (eg., life transitions) [7–9]. Fourth, one visualizes the lower dimensional space resulting from that rotation, to make clear its stand out features, illustrate the dynamics of the space, show comparisons between groups, and so on. And finally, one interprets the results.

QE researchers use analysis tools to manage the workflow through these steps; the most common options include user interfaces like WebENA and application programming interfaces (APIs) like rENA. However, as the QE community broadens, there are likely scholars who would benefit from alternative implementations both methodically and conceptually. EpistemicNetworkAnaly-

sis.jl ("jENA") is an ENA API created with two aims in mind to complement its rENA counterpart: (1) jENA is designed to allow researchers to painlessly create custom ENA models and rotations, and (2) it is designed to allow researchers to painlessly adjust ("reconstruct") model configurations, without having to recompute information more than once when possible. These two features are important when exploring new QE methods, iterating one's models in interactive programming sessions, and working on prohibitively large datasets.

2 Julia and jENA

jENA is a package for the Julia programming language [10]. Julia is a high performance scientific programming language with (i) a robust, parametric type system, (ii) a multiple dispatch function design, and (iii) a syntax similar to other popular languages, such as Python and R. Julia offers jENA two main affordances: (1) Open source development of Julia packages like jENA allow for communal documentation, issue reporting (and solving), and (2) Julia's multiple dispatch and type system features allows for jENA to offer users streamlined parameterization of their models and plots. Combined with community support, the flexbility of jENA allows it to serve as a veritable playground for modeling for users with varying levels of familiarity with ENA.

To give an example, the jENA interface allows one to quickly define one's models and their configurations,

```
model = ENAModel(data, codes, conversations, units, windowSize=10,
↪  rotateBy=MeansRotation(:Play, "Romeo and Juliet", "Hamlet"))
```

as well as to quickly perform common tasks with those models, such as exporting, running statistical tests, and plotting.

```
to_xlsx("model.xlsx", model)
display(summary(model))
display(plot(model))
```

Moreover, jENA's flexible rotation options allows one to perform cross validation tests, by taking the embedding of a model based on a training dataset, and reusing it in a model based on a test dataset.

```
train_model = ENAModel(...omitted...)
test_model = ENAModel(...omitted...,
↪  rotateBy=TrainedRotation(train_model))
display(summary(test_model))
```

More importantly, jENA allows one to reconstruct a model from one configuration to another without performing unnecessary extra computation, such as changing one's rotation, one's model type, and both simultaneously.

```
model2 = ENAModel(model, rotateBy=LDARotation(:Act))
model3 = DigraphENAModel(model)
model4 = DigraphENAModel(model, rotateBy=LDARotation(:Act))
```

For more advanced users in this workshop, jENA allows one to define custom rotations. This involves, at minimum, defining a rotation type and its fields, defining a rotation function for that type, and using that rotation type in one's model configuration. Moving participants towards a level of understanding where they may see the utility in customizing the rotation within their model is the primary goal of this workshop. In short, we aim to support scholars in better understanding the inner workings of the ENA modeling process.

3 Workshop

We propose a half day jENA tutorial workshop. Our goal is to provide QE researchers with options in terms of which tools they utilize for their analysis based on the vision they have for their model. We recognize that while many questions are supported by the current toolkits in webENA and rENA, the addition of jENA can unlock workflows for individuals seeking simple, but customizable, modeling workflows. As such, we anticipate the workshop being appropriate for QE researchers who already have familiarity with ENA, a beginner's understanding of at least one programming language, and who want to deepen their understanding of the ENA model itself whilst also gaining a new perspective on their data. The learning objectives and benefits to the QE community are: Learners will be able to (a) create and interpret ENA models that have rotations beyond SVD and means rotation; (b) understand the steps of the ENA algorithm and the connections between rotation choice and research aims; and (c) use Github issues to get assistance, troubleshoot problems, and contribute to ENA API development.

Prior to the conference, registered participants will be sent directions to setup VS Code, Julia, and the jENA package on their machines. Participants will also be instructed to bring a dataset to the workshop which they have already conducted a standard means rotation or SVD analysis on. During the workshop, participants will engage with the model parameters and their data through four short, focused activities. First, the workshop team will support participants in troubleshooting any errors from setup. Participants will be provided with a zip file which will include documentation and the worked examples which they can run on their machines. This will ground the participants and help the establishing a file structure to work in for the day. Second, the team will introduce the participants to the various rotations and their uses by showing worked examples. This allows for a concrete, albeit short dive into jENA showing real results as soon as possible. It also allows participants to walk away with something repeatable. Participants will then test their understanding of the rotations through an activity where they will receive either a model parameter or a research question on a slip of paper and move about the room to find their match with another participant. Third, the instructor will demonstrate how participants can add their

own data to the folder and open table discussions for brainstorming. Each learner will introduce their dataset to the group alongside a question they are hoping to ask. Participants will use a cheatsheet of how different rotation choices connect to different research aims—in particular beyond SVD and means rotation–while receiving feedback from other participants. Finally, in the remaining time, the instructor will introduce and lead a discussion on open source development of ENA tools and community building.

The expected outcome of this workshops is that members of the QE community will have been introduced to rotations beyond SVD and means rotation, which will deepen their existing understanding of ENA and connect that understanding to broader developments in machine learning techniques for multidimensional scaling and high-dimensional analysis. To help translate these understandings into practice, learners will schedule a post-conference check-in with workshop instructional staff, and learners will be invited to form working groups for post-conference ENA API development (in potential collaboration with the Open Science QE SIG).

References

1. David Williamson Shaffer. *Quantitative ethnography*. Lulu. com, 2017.
2. CL Marquart, C Hinojosa, Z Swiecki, B Eagan, and DW Shaffer. Epistemic network analysis, 2018.
3. D Shaffer and A Ruis. Epistemic network analysis: A worked example of theory-based learning analytics. *Handbook of learning analytics*, 2017.
4. David Williamson Shaffer, Wesley Collier, and A R Ruis. A tutorial on epistemic network analysis: Analyzing the structure of connections in cognitive, social, and interaction data. *Learning Analytics*, 3(3):9–45, December 2016.
5. Dale Bowman, Zachari Swiecki, Zhiqiang Cai, Yeyu Wang, Brendan Eagan, Jeff Linderoth, and David Williamson Shaffer. The mathematical foundations of epistemic network analysis. In *Advances in Quantitative Ethnography*, pages 91–105. Springer International Publishing, 2021.
6. Yuanru Tan, Cesar Hinojosa, Cody Marquart, Andrew R Ruis, and David Williamson Shaffer. Epistemic network analysis visualization. In *Advances in Quantitative Ethnography*, pages 129–143. Springer International Publishing, 2022.
7. M Knowles and David Williamson Shaffer. Hierarchical epistemic network analysis. In *Second International Conference on Quantitative Ethnography: Conference Proceedings Supplement. ICQE*, page 31, 2021.
8. Mariah A Knowles. Telling stories of transitions: A demonstration of nonlinear epistemic network analysis. In *Advances in Quantitative Ethnography*, pages 114–128. Springer International Publishing, 2022.
9. Mariah A Knowles, Amanda Barany, Zhiqiang Cai, and David Williamson Shaffer. Multiclass rotations in epistemic network analysis. In *Communications in Computer and Information Science*, Communications in computer and information science, pages 58–70. Springer Nature Switzerland, Cham, 2023.
10. Jeff Bezanson, Alan Edelman, Stefan Karpinski, and Viral B Shah. Julia: A fresh approach to numerical computing. *SIAM Rev.*, 59(1):65–98, 2017.

Methodological Code Switching: Using Criticality to Expand Quantitative Ethnography's Bounds

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Abstract. The primary objective of our symposium is to open the space for the varied ways critical scholars engage with Quantitative Ethnography (QE) and draw from their other methodological and disciplinary training, epistemologies, and knowledge to expand the bounds of QE. The session will explore how and in what ways QE counters and/or supports critical research approaches by discussing: (1) the demarcations of QE and areas for theoretical, methodological, and disciplinary growth; (2) how we expand QE's demarcations via our own theoretical, methodological, and disciplinary perspectives; (3) how our engagement with "criticality" is tied to our disciplinary backgrounds; and (4) the spectrum of ways we bridge QE and other methods and analytical tools. Through interactive presentation and active participant engagement, attendees will participate in an enriching solution-oriented discussion about QE's future. By discussing and critiquing the potential limits of QE methodology and analytical tools, we aim to reimagine the ways to apply QE in our research and the communities we engage with.

Keywords: Critical Theory, Quantitative Ethnography, Epistemology, Methodological Code Switching, Critical Reflexivity

1 Background

This symposium focuses on interrogating and expanding the bounds of Quantitative Ethnography (QE) [1-6] by forefronting various methodological, disciplinary, and critical perspectives. Doing so would afford the space to discuss and critique not only the potential limits of QE (e.g., methodology and analytical tools) as it pertains to the work we do [1, 4-6], the populations with whom we work within, and beyond our scholarship, but also *how* we may envision and (re)imagine the meaningful and critical integration of QE with our other methods and tools as a possible transdisciplinary and transmethodological solution [3,4,6].

The concept of *Critical Theory* [7-9], associated with the Frankfurt School, did not originate from any single individual within the school but rather emerged through the collaborative efforts of its members. The Frankfurt School's contributions to social research and theoretical development are often delineated into two generational phases. The first, commencing in the late 1920s, was spearheaded by intellectuals such as Theodor Adorno, Max Horkheimer, Erich Fromm, and Herbert Marcuse. The second generation emerged in the 1960s under the leadership of Jurgen Habermas.

Their collective endeavors aimed to scrutinize and contest the underlying ideologies and mechanisms through which institutions mold and regulate societal structures, thereby constructing a methodological framework for social investigation and critique [7-11]. Critical Theory entails systematically examining and contesting institutional dynamics that engender detrimental social formations [7-9]. In contrast with positivist notions concerning objectivity, Critical Theory fosters an ethos of critical analysis and self-reflection with respect to one's own role in contemporary social arrangements [7,9]. Critical inquiry or theory, has an intellectual genealogy emerging from schools of thought that entire academic disciplines are dedicated to examining [7-11]. Toward this end, "critical" cannot be treated as nonchalant or detached from the research process or social processes that perpetuate power and domination. Instead, linking critical epistemologies with QE signifies an articulation of critical and reflexive theoretical, methodological, and disciplinary processes.

In this symposium, we explore the intersection of criticality and QE, examining how QE can both counter and support critical research arguments. We introduce the concept of *methodological code-switching*, operationalizing it as the strategic adaptation and adoption of other research methodologies and tools to complement QE research. Our varied disciplinary backgrounds, shaped by experiences in diverse fields (e.g., education, dance, computing, medicine, psychology, identity development) and the 2023 QE Fellows Institute, have enriched our understanding and application of QE. Throughout the week-long institute, ongoing conversations among our group, the "Critical Cranes," were pivotal in beginning to push the boundaries of QE. These discussions have allowed us to collectively and individually navigate and challenge the limitations of the use of QE in our research, fostering a deeper integration of critical perspectives within QE. Our proposal highlights these dynamic exchanges and their role in advancing QE as a field, methodology, and tool for addressing complex social issues.

2 Symposium Aims and Contributions

The aims of this symposium are to:

1. Discuss the demarcations of QE (e.g., methodology, methods, and analytical tools) and potential areas of growth, based on our theoretical, methodological, and disciplinary perspectives;
2. Focus on expanding the demarcations of QE via each of our theoretical, methodological, and disciplinary perspectives;
3. Explore how our engagement with "criticality" is tied to our disciplinary backgrounds;
4. Highlight the spectrum of critical and disciplinary perspectives across symposium contributors; and
5. Discuss how we might bridge/incorporate QE into these diverse critical perspectives and other methods and tools as a possible transdisciplinary and transmethodological solution.

We anticipate that the following benefits and contributions will emerge from the symposium discussion and subsequent research outputs:

1. Documentation of key tensions and gaps identified between QE and other theoretical, methodological, and disciplinary perspectives;
2. An open-access summary of key points and discussions during the symposium, highlighting directions for future engagement and research on expanding QE within and beyond the disciplinary perspectives covered during the symposium;
3. Cultivation of new thought-partners and research collaborations that could result in:
    a. Creation of a resource list of best practices for bridging QE gaps with other methodological and disciplinary methods and tools
    b. Development of a scoping review of criticality and QE
    c. Other publications and grant submissions to continue research exploration in criticality and QE

3 Proposed Symposium Structure

The chair of the symposium will begin by providing a 5-minute overview of the QE Institute and QE Fellows program, how the Critical Cranes came to be, and their year-long conversations about criticality and QE. Next, the four QE Fellows will each have five to seven minutes to discuss how they engage with criticality within their disciplines and the affordances and constraints of QE techniques for their research. They will do this by addressing the following questions: (1) What is your disciplinary, methodological, and epistemological training or background? (2) How did you come to QE? (3) What QE approaches and techniques do you use? (4) What are 3 to 4 constraints or limitations of QE techniques and approaches that you have faced? (5) How do you integrate your disciplinary, methodological, and epistemological training or background to address the constraints of QE?

Our goal is to open the space for the different ways critical scholars engage with QE and draw from their other methodological and disciplinary training and knowledge to expand the bounds of QE. Next, our two discussants will summarize and elaborate further on the similarities and differences in how the four QE Fellows are expanding QE's bounds while also proposing next steps and best practices for pushing QE's boundaries further. This will function as a segue into a whole-group discussion with session attendees.

The symposium will be structured as follows:

1. A 5-minute introduction of how we came to this during QE Fellows training, and our ongoing conversations throughout the year,
2. 25 minutes for QE Institute Fellows to discuss their research, with emphasis on the following topics:
    a. A brief overview of their disciplinary, methodological, and epistemological training/background

   b. A brief overview of how they came to QE and the QE techniques and approaches that they use
   c. An overview of the constraints of QE techniques and approaches they have faced
   d. An explanation of how they integrate their disciplinary, methodological, and epistemological training/background to address QE constraints
3. A 5-minute summary of critical ways to expand QE's bounds
4. A 5-minute summary of proposed next steps
5. 20 minutes of open discussion with attendees with an emphasis on questions, ideas, collaborations, and future contributions to the QE and disciplinary communities.

4 Symposium Contributors

The symposium brings together a panel of seven contributors, each coming from different disciplinary, community, and epistemological backgrounds and practices and making significant contributions to the conversation of criticality and QE.

Dr. Francisco Castro, one of the QE Fellows, is a Computing Innovation Research Fellow at New York University. His work investigates and interrogates the ways that computing and sociotechnical systems impact and interact with people and communities. He uses human-centered, community-oriented, and participatory approaches to design computing and AI systems and environments for social good and social justice, education, and community empowerment. Among others, his research has led to the development of interactive learning technologies for creative computing with dance, art, and game design, and the creation of curricula and communities that critically interrogate the intersections of computing ethics, data, AI literacy, community values and identity, and justice-centered computing.

Dr. Brendan Eagan, the symposium chair, is Associate Director for Partnerships and Community Engagement in the Epistemic Analytics lab at the University of Wisconsin - Madison and principal investigator for the NSF-funded Quantitative Ethnography Institute (NSF Awards #2225240). He has contributed to the fields of language learning, cultural exchange, learning sciences, computer-supported collaborative learning, learning analytics, health care, serving people with disabilities, ethics in education, child development, as well as professional development in a range of domains. He is a bridge-builder within the QE community and has experience connecting research and practice in these different domains.

Dr. Danielle Espino, one of the discussants, is a co-principal investigator at Pepperdine University for NSF-funded research examining the impact of cross-boundary collaboration in informal STEM learning on adolescent identity development (NSF Awards #2215613), utilizing quantitative ethnography (QE) as a primary methodological approach. Papers she has authored highlight different ways epistemic network analysis (a QE tool) has been used to discover findings on

cross-cultural community building, global competencies, connections between affect and discourse, group dynamics and advancing conversations on justice, equity, diversity, and inclusion (JEDI). Her previous professional experiences include project management roles with the arts nonprofit sector and various higher education institutions in California, New York, and Virginia.

Dr. Nichole M. Garcia, one of the QE Fellows, is an associate professor of higher education at Rutgers University, New Brunswick. She is a critical race and feminist mixed methodologist who focuses on the differences and similarities between Latinx sub-ethnic groups, students, and families regarding their college readiness, retention, and completion. Known for her scholarship on QuantCrit, Garcia will discuss her positionality as a QuantCrit (Gillborn et al., 2018; Garcia et al., 2018) and Chicana/Latina feminista entering and deciphering the emerging field of Quantitative Ethnography. Through an epistolary offering, she will groundtruth the use of story, fairness, and community through a Critical Race and Chicana/Latina Feminist lens.

Dr. YJ Kim, one of the discussants, is an assistant professor in the Department of Curriculum and Instruction at the University of Wisconsin-Madison, where she leads the PLAI (Playful Learning and Assessment for Impact) lab. Previously she was the founder and director of MIT Playful Journey Lab where she led an interdisciplinary team of game designers, developers, and researchers to create playful assessment tools for K12 education. Her work centers on the topic of innovative assessment and re-imaging what and how we measure learning across formal and informal contexts. YJ's work on playful assessment merges a principled assessment design framework with justice-oriented design practices in playful learning environments. Central to her work is close collaboration with practitioners, as she empowers teachers to utilize playful and authentic assessment tools that align with their values and address the challenges specific to their contexts.

Dr. Adaurennaya "Ada" C. Onyewuenyi, one of the QE Fellows, is an Associate Professor of Psychology and Affiliate Faculty of African American Studies at The College of New Jersey. She leads the Identity Development across the African Diaspora (IDAD) Lab. As an applied developmental and educational psychologist with an emphasis in diversity science, her mixed methodological research program focuses on social inequity in educational attainment, access, and mental health of racially marginalized and immigrant youth and young adults. Her work is guided by three primary questions: 1. How are racial and ethnic identities constructed, constrained, expanded, and/or maintained across varying conditions and contexts? 2. How does racial discrimination affect academic performance and mental health for Black American and Black immigrant (African, Afro-Latinx, and Caribbean) youth and young adults? 3. How do culture and peer relationships influence ethnically diverse adolescents' conflict management skills?

Dr. Susan B. Trinidad, one of the QE Fellows, is an assistant professor in the Department of Bioethics and Humanities at the University of Washington School of Medicine. As a white settler engaged in research with Alaska Native and American Indian communities, Dr. Trinidad works to develop participatory, strengths-based

approaches to health research and research ethics that respect Tribal sovereignty and the right of Indigenous peoples to self-determination. Her primary research interest is the dynamics, ethics, and evaluation of equitable collaboration across difference.

5 Summary

Through this symposium, we aim to create space toward imagining new possibilities and futures for QE and critical inquiry. This session would be valuable for newcomers and seasoned QE scholars to gain a more critical understanding of how to navigate and synthesize methods of convergence research and a set of associated tools that integrate qualitative, quantitative, and computational approaches.

References

1. Arastoopour Irgens, G. (2018). Quantitative ethnography across domains: where we are and where we are going. In: 1st International Conference of Quantitative Ethnography (ICQE). University of Wisconsin
2. Arastoopour Irgens, G., & Eagan, B. (2023, April). The Foundations and Fundamentals of Quantitative Ethnography. In Advances in Quantitative Ethnography: 4th International Conference, ICQE 2022, Copenhagen, Denmark, October 15–19, 2022, Proceedings (pp. 3-16). Cham: Springer Nature Switzerland.
3. Shaffer, D. (2017). Quantitative Ethnography. Cathcart Press, Madison, WI (2017).
4. Shah, M, Jackowska, M, Barany, A, Moraes, M., Swiecki, Z., & Zörgő, A. (2021, January). Future of Qualitative Ethnography: Promises and Challenges. In Advances in Quantitative Ethnography: 2nd International Conference, ICQE 2020, Malibu, CA, USA, February 1-3, 2021, Proceedings (pp. 112). Cham: Springer Nature Switzerland.
5. Kaliisa, R., Misiejuk, K, Arastoopour Irgens, G., & Misfeldt, M. (2021, January). Scoping the Emerging Field of Quantitative Ethnography: Opportunities, Challenges, and Future Directions. In Advances in Quantitative Ethnography: 2nd International Conference, ICQE 2020, Malibu, CA, USA, February 1-3, 2021, Proceedings (pp. 3-17). Cham: Springer Nature Switzerland.
6. Shaffer, D., Ruis, A.R. (2023). Is QE Just ENA? In Advances in Quantitative Ethnography: 4th International Conference, ICQE 2022, Copenhagen, Denmark, October 15–19, 2022, Proceedings (pp. 71-86). Cham: Springer Nature Switzerland.
7. Lynn, M., Yosso, T. J., Solórzano, D. G., & Parker, L. (2002). Critical race theory and education: Qualitative research in the new millennium. Qualitative Inquiry, 8(1), 3-6.
8. Ladson-Billings, G., & Tate, W. F. (1995). Toward a critical race theory of education. Teachers CollegeRrecord, 97(1), 47-68

9. Garcia, N. M., & Mayorga, O. J. (2018). The threat of unexamined secondary data: a critical race transformative convergent mixed methods. Race Ethnicity and Education, 21(2),231–252. https://doi.org/10.1080/13613324.2017.1377415
10. Garcia, N. M., López, N., & Vélez, V. N. (2018). QuantCrit: rectifying quantitative methods through critical race theory. Race Ethnicity and Education, 21(2), 149–157. https://doi.org/10.1080/13613324.2017.1377675
11. Garcia, N. M., Vélez, V. N., & Huber, L. P. (2023). Can Numbers Be Gender and Race Conscious? Advocating for a Critical Race Feminista Quantitative Praxis in Education. Equity & Excellence in Education, 56(1–2), 190–205. https://doi.org/10.1080/10665684.2022.2047413
12. Zuberi, T., & Bonilla-Silva, E. (Eds.). (2008). White logic, white methods: Racism and methodology. Rowman & Littlefield.

Symposium on Next Steps in Quantitative Approaches to Building an Applied Science of Discourse Analysis in Political Polarization

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Abstract. The 2024 US presidential election season parallels that of other countries in reflecting profound rancor and divisiveness. This discord threatens the underlying fabric of global society and the capacity of individual nations to address complex challenges they face. The advent of social media and rapid communication systems more generally have dramatically intensified some of the most destructive aspects of political polarization. The proposed symposium contributes to building that part of a growing applied science of political polarization that examines discourse patterns - and in so doing, to channeling that science into practical steps that convert political differences into discourse with greater emphasis on problem-solving than on acrimony and attack. Quantitative ethnography has already contributed to earlier efforts to building applied science with frameworks that help parse acrimonious discourse and that help to assess or evaluate the efficacy of interventions to reduce polarization. These efforts have also recognized that they are only beginning to frame the application of quantitative tools to make sense both of polarization and of such potential interventions. The symposium convenes individuals who have contributed to current and prior ICQE proceedings, along with the broader QE community, a) to highlight current work, questions, insights, and issues relevant to significantly advancing the use of discourse analysis to advance the science of polarization and b) an agenda that proposes the use of that science to formulate, inform, assess, and evaluate interventions that reduce the destructive aspects of polarization.

Keywords: political discourse, political polarization, quantitative ethnography , QE, epistemic network analysis, ENA, ordered network analysis, ONA, complex adaptive systems, neural networks.

1 Introduction

1.1 Political Polarization

Political polarization is an increasing societal problem in many parts of the world [1]. The most prominent feature of polarization is a widening partisan gap characterized by acrimonious and uncivil rhetoric [2]. Perhaps the only topic of agreement between ideological rivals today is their mutual dislike and distrust of each other, along with growing convictions that rivals represent increasingly existential threats to national survival. It is quite arguable that the deepening polarization itself is its own existential threat. Discourse via social media exacerbates the breakdown in in-person communication. It accelerates, intensifies, and normalizes aggressive and uncivil rhetoric [3] and leads to algorithms that limit the dissemination of diverse perspectives [4]. Consequently, rancorous and divisive discourse has become a pervasive presence - either directly or by indirect effect - in virtually every person's life.

1.2 Framing Polarization Study in a Quantitative Ethnography (QE) Context

Polarization in any domain follows self-intensifying patterns. Self-intensifying polarization in political discourse, especially as it unfolds in social media, is uniquely suited to the analytic approach of quantitative ethnography (QE) because QE and its supporting tools can more precisely trace and facilitate better understanding of deterioration patterns. QE and its supporting tools can also offer ways to assess or measure the impact of initiatives to neutralize uncivil discourse in group or individual settings or to create norms in policy discourse. Although numerous efforts are underway globally to improve both digital and in-person political discourse, there is a significant gap in research focused on developing an applied science aimed at reshaping cultural norms to promote healthy discourse patterns. QE can exert a central role in such a science.

This symposium of QE researchers specifically seeks to build theory and data collection practices to frame telling or explanatory ethnographies of dysfunctional discourse and to highlight strategies to de-escalate rhetoric and repair polarization. As the respectful, solution-oriented exchange of ideas becomes increasingly rare in civic life globally, social science scholars are seeking ways to understand the problem and repair public discourse. The symposium aims to advance strategies to address and remedy such limitations, doing so in the form of a research agenda as outcome of the session.

2 Symposium Aim and Organization

This symposium will explore the benefits and challenges of using complementary quantitative approaches to study and develop interventions addressing polarization, especially in current intensive social media contexts. The structure will ask attendees to contribute to five interrelated tasks that will shape the symposium agenda.

1. The first will be to agree on working definitions for polarization in political discourse and how those vary globally. That discussion will focus primarily on how polarization appears in social media, in ways that lend themselves to quantitative analytic tools.
2. The second and third tasks will summarize published efforts to apply quantitative tools to serve ethnographic analysis of polarization. Along with potential quantitative tools. In addition to a slate of papers published in ICQE proceedings, other publications and papers will round out a landscape view of the literature base and help to shape a research agenda the symposium will produce. This landscape view will allow comparison of different types of quantitative tools to create ethnographies of polarizing discourse. These primarily include ENA, as well as political network analyses that employ different polarization metrics [27–29].
3. The third task will also include discussion of tools that have been suggested but not yet incorporated in the literature, including complex adaptive systems and neural network analysis. It will include ENA-related tools that, to the best of our knowledge, have not been incorporated in quantitative ethnography in political polarization, including multi-modal analysis, ordered network analysis, 3D ENA modeling, and participant modeling. Each presents unique potential advantages not afforded by the other approaches, and each presents tradeoffs compared to others.
4. Like the first task, the fourth task will be definitional - in this case, it will define or frame the "What next" question in practical terms, during heated and rapidly deteriorating polarization in national settings globally. The current body of work already includes application of quantitative tools for interventions to help neutralize or reverse hostility in political polarization. One foundational ingredient for effective application of QE is an underlying premise that the political polarization analytics may uncover patterns and practices that lend themselves to interventions that can help shift conversational norms beyond current practices. That is, analysis may produce recommendations and evaluations with potential for broader societal uptake. This portion of the symposium will frame potential future studies.
5. One of the most crucial aspects to use of quantitative tools for ethnographic application to political polarization is also definitional in terms of discourse coding. The symposium will devote a portion of the session to standardized codebook development for different analytic contexts (for example, along generational, cultural, or media type dimensions).

The symposium will conclude with an open discussion with attendees focusing on questions, feedback, and next steps for scholarship and consideration by the QE community. **An overall planned output of the symposium is development and publication of a research agenda for the application of quantitative ethnography to addressing dysfunctional political discourse.**

2.1 Issues Relevant to the Proposed Symposium

Critical issues that the symposium will raise in completing these tasks appear here to give a sense of the breadth of the planned session.

Advantages of Quantifying Political Discourse with Varied Approaches

In order to assess the usefulness of providing quantified, explanatory conclusions regarding the nature of a given discourse network and its discursive grammars, researchers will benefit from comparing the type of insights obtained through use of single tools such as ENA, versus deployment other quantitative research tools, such as ordered network analysis (ONA), complex adaptive system (CAS) theory, and artificial neural networks (ANN) [6]. Shaffer and Ruis [8] explained that QE should not be limited to ENA as its sole research tool of choice. "We conclude that ENA is used in QE, but not exclusively; and that QE uses ENA, but not exclusively; but that the answer to this question is less important than the reflexive thinking about methodology that has been a key focus of the QE community" [8]. Maintenance of this level of scientific vigilance is critical for ongoing reflexivity and transparency in QE research before, during, and after data collection [9]. Such due diligence surrounding optimization of methodologies can serve to further validate QE tools in the expanding field of implementation science [10, 11]. In a Big Data scientific environment, intentional inclusion of a QE toolkit enhances the likelihood that researchers will effectively code and measure data points, ascertain data patterns, formulate meaningful predictions, and test causal connections [12–14].

Some Limitations and Considerations to QE Applied to Discourse: Coder Perspectives, Subjectivity, and Biases

While coding qualitative data, there is always a possibility of subjectivity and bias, as researchers' perspectives and interpretations can influence how data is categorized and understood [17]. The codebook aims to adequately define and describe each theme and construct, but it is essential to be aware of these potential biases and implement strategies such as triangulation, inter-coder reliability checks, and reflexivity to mitigate their impact and enhance the validity and reliability of the findings. This challenge is especially pronounced when coding nuanced concepts that deal with emotional dimensions such as those that can intensify rhetorical polarization. The emotions that fuel such discourse are complex and can be expressed in subtle, varied ways. This makes it particularly difficult to capture the full depth and meaning through coding alone.

Furthermore, cultural factors may further complicate coders' appreciation of the nuances embedded within the data [18]. Cultural factors play a significant role in shaping individuals' perceptions, values, and linguistic expressions. Thus, coders must remain cognizant of cultural differences that could influence their interpretation of qualitative data. This awareness extends beyond language barriers to encompass deeper cultural norms, beliefs, and historical contexts that may subtly influence the manifestation and interpretation of emotions within discourse. As such, employing a diverse team in robust social moderation can enrich coding and help mitigate cultural bias risk [19]. Additional strategies such as *in vivo* coding and contextual coding may help preserve the sociocultural meaning in the data [20]. However, blind spots related to culture or other factors may still make it difficult to rely on coders to fully appreciate the tone and tenor of discursive data. When coded data is uploaded to the ENA software, the web tool processes each code in binary terms: either the construct is present, or it is

not present. This creates the risk that nuances within the data may be oversimplified or lost. The binary nature of the ENA software's processing can lead to a reductionist view of complex constructs. For example, varying intensities or shades of a particular emotion or rhetorical strategy–if not coded as distinct themes–might be treated as identical, although their impacts and implications could differ significantly. This risk is particularly pronounced in studies involving intricate human behaviors and interactions, where the richness of the data lies in its detailed and contextualized expression. To address this limitation, researchers should consider supplementing ENA analysis with additional quantitative and/or qualitative methods that can capture and preserve the depth and complexity of the data [22]. This might include thematic analysis, in-depth case studies, or narrative analysis, providing more comprehensive construct.

Big-D and Little-d Discourse.

In *Quantitative Ethnography*, *Big-D Discourse* refers to the culture that an ethnographer attempts to explain and s*mall-d discourse* refers to things that people in the culture actually said and did [5]. *Big-D Discourse* refers to the big picture that is not directly observable, a particular way of talking, feeling, acting, valuing, and believing in a particular culture. In contrast, small-d *discourse* consists of the observable actions that make up the *Discourse*. Field notes, a subset of discourse made by observers, are inevitably affected by their biases and the method of observations. There is always a gap between observations and culture. Relying solely on transcripts for event documentation overlooks subtleties like tones and micro expressions. Transcripts could fail to capture the humor perceived during a meeting, impacting the coding process. What one coder present finds humorous may not be apparent to coders reviewing only the transcripts. This is critical, since the code is exactly what establishes the connections between Discourse and discourse.

Concerning social media comments, platform algorithms significantly influence the visibility and prioritization of content [26], thereby shaping the discourse available for analysis. Moreover, there is often a disparity between the intended meaning of commenters and the perceptions of readers. For instance, in our analysis of political discourse on PTT (the Taiwanese equivalent of the Reddit platform), we identified discrepancies between users' intentions and readers' interpretations of comments. Comments that appeared oppositional and were coded as based on their sarcastic tone were, in fact, supportive as indicated by positive votes (thumbs up). Directly observable *discourse* does not always accurately reflect the underlying *Discourse* cultural context.

Divergent Cultural Lenses

Cultural and individual differences play a role in shaping the interpretation and utilization of sarcasm [23]. For example, in the research of Taiwanese political discourse on social media, Chinese and Taiwanese coders achieved low level agreement on the code `Acrimony` and `Sarcasm`. Sarcastic comments are often culturally subtle and require cultural knowledge to understand its subtlety. Internet slang, such as “dried mango” which is used in Taiwan social media as a sarcastic alternative to “the impression of national collapse”, required cultural familiarity in the online community

to capture its subtlety. Therefore, it is crucial to include coders with specific cultural background to improve “Fairness to the community” in coding [24]. In addition, different individuals may possess varying degrees of perception regarding incivility [25].

3 Contributors

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4 Summary

The self-fueling escalation of political polarization has especially metastasized in social media. Such polarization severely compromises any country's efforts to address the complex challenges it faces. This symposium seeks to contribute to addressing one aspect of this challenge: a deeper, quantifiable understanding of how forms of political discourse structurally intensify animus and mistrust. In so doing, the symposium seeks to contribute to viable, testable theory to support fresh, non-obvious, and actionable norms for political discourse in social media.

Disclosure of Interests. The authors have no relevant competing interests to declare.

5 References

1. Iyengar, S., Lelkes, Y., Levendusky, M., Malhotra, N., Westwood, S.J.: The Origins and Consequences of Affective Polarization in the United States. Annu. Rev. Polit. Sci. 22, 129–146 (2019). https://doi.org/10.1146/annurev-polisci-051117-073034.
2. Axelrod, R., Daymude, J.J., Forrest, S.: Preventing extreme polarization of political attitudes. Proc. Natl. Acad. Sci. 118, e2102139118 (2021). https://doi.org/10.1073/pnas.2102139118.
3. Rossini, P.: Beyond Incivility: Understanding Patterns of Uncivil and Intolerant Discourse in Online Political Talk. Commun. Res. 49, 399–425 (2022). https://doi.org/10.1177/0093650220921314.
4. Harel, T.O., Jameson, J.K., Maoz, I.: The Normalization of Hatred: Identity, Affective Polarization, and Dehumanization on Facebook in the Context of Intractable Political Conflict. Soc. Media Soc. 6, 2056305120913983 (2020). https://doi.org/10.1177/2056305120913983.
5. Shaffer, D.W.: Quantitative Ethnography. Cathcart Press (2017).
6. Hamilton, E., Williamson, M., Hurford, A.: Theory-Building and Tool-Building for a Science of Dysfunctional Political Discourse. In: Arastoopour Irgens, G. and Knight, S. (eds.) Advances in Quantitative Ethnography. pp. 275–289. Springer Switzerland, Cham (2023).
7. Bormann, M.: Perceptions and Evaluations of Incivility in Public Online Discussions—Insights From Focus Groups With Different Online Actors. Front. Polit. Sci. 4, (2022). https://doi.org/10.3389/fpos.2022.812145.
8. Shaffer, D.W., Ruis, A.R.: Is QE Just ENA? In: Damşa, C. and Barany, A. (eds.) Advances in Quantitative Ethnography. pp. 71–86. Springer Nature Switzerland, Cham (2023). https://doi.org/10.1007/978-3-031-31726-2_6.
9. Sirris, S.: Researchers' Role Reflexivity When Studying Values Work. In: Espedal, G., Jelstad Løvaas, B., Sirris, S., and Wæraas, A. (eds.) Researching Values. pp. 205–224. Springer International Publishing, Cham (2022). https://doi.org/10.1007/978-3-030-90769-3_12.
10. Babones, S.: Interpretive Quantitative Methods for the Social Sciences. Sociology. 50, 453–469 (2016). https://doi.org/10.1177/0038038515583637.

11. Kilbourne, A.M., Glasgow, R.E., Chambers, D.A.: What Can Implementation Science Do for You? Key Success Stories from the Field. J. Gen. Intern. Med. 35, 783–787 (2020). https://doi.org/10.1007/s11606-020-06174-6.
12. Rana, J., Gutierrez, P.L., Oldroyd, J.C.: Quantitative Methods. In: Farazmand, A. (ed.) Global Encyclopedia of Public Administration, Public Policy, and Governance. pp. 1–6. Springer International Publishing, Cham (2020). https://doi.org/10.1007/978-3-319-31816-5_460-1.
13. Favaretto, M., De Clercq, E., Schneble, C.O., Elger, B.S.: What is your definition of Big Data? Researchers' understanding of the phenomenon of the decade. PLoS ONE. 15, e0228987 (2020). https://doi.org/10.1371/journal.pone.0228987.
14. Picciotto, R.: Evaluation and the Big Data Challenge. Am. J. Eval. 41, 166–181 (2020). https://doi.org/10.1177/1098214019850334.
15. Vujičić Stanković, S., Mladenović, M.: An approach to automatic classification of hate speech in sports domain on social media. J. Big Data. 10, 109 (2023). https://doi.org/10.1186/s40537-023-00766-9.
16. Arnaboldi, M., Azzone, G.: Data science in the design of public policies: dispelling the obscurity in matching policy demand and data offer. Heliyon. 6, e04300 (2020). https://doi.org/10.1016/j.heliyon.2020.e04300.
17. Chowdhury, M.F.: Coding, sorting and sifting of qualitative data analysis: debates and discussion. Qual. Quant. 49, 1135–1143 (2015). https://doi.org/10.1007/s11135-014-0039-2.
18. Troman, G., Jeffrey, B.: Qualitative Data Analysis in Cross-Cultural Projects. Comp. Educ. 43, 511–525 (2007).
19. Church, S., Dunn, M., Prokopy, L.: Benefits to Qualitative Data Quality with Multiple Coders: Two Case Studies in Multi-coder Data Analysis. J. Rural Soc. Sci. 34, (2019).
20. Manning, J.: In Vivo Coding. In: The International Encyclopedia of Communication Research Methods. pp. 1–2. John Wiley & Sons, Ltd (2017). https://doi.org/10.1002/9781118901731.iecrm0270.
21. Younas, A., Cuoco, A., Vellone, E., Fàbregues, S., Barrios, E.E., Durante, A.: Contextual Coding in Qualitative Research Involving Participants with Diverse Sociocultural Backgrounds. Qual. Rep. 27, 2509–2527 (2022). https://doi.org/10.46743/2160-3715/2022.5702.
22. St. Pierre, E.A., Jackson, A.Y.: Qualitative Data Analysis After Coding. Qual. Inq. 20, 715–719 (2014). https://doi.org/10.1177/1077800414532435.
23. Zhu, N., Filik, R.: Individual differences in sarcasm interpretation and use: Evidence from the UK and China. J. Exp. Psychol. Learn. Mem. Cogn. 49, 445–463 (2023). https://doi.org/10.1037/xlm0001227.
24. Shaffer, D.W., Ruis, A.R.: How We Code. In: Ruis, A.R. and Lee, S.B. (eds.) Advances in Quantitative Ethnography. pp. 62–77. Springer International Publishing, Cham (2021). https://doi.org/10.1007/978-3-030-67788-6_5.
25. Sliter, M., Withrow, S., Jex, S.M.: It happened, or you thought it happened? Examining the perception of workplace incivility based on personality characteristics. Int. J. Stress Manag. 22, 24–45 (2015). https://doi.org/10.1037/a0038329.
26. Levy, R.: Social Media, News Consumption, and Polarization: Evidence from a Field Experiment. Am. Econ. Rev. 111, 831–870 (2021). https://doi.org/10.1257/aer.20191777.

27. Takikawa, H., Sakamoto, T.: The moral–emotional foundations of political discourse: a comparative analysis of the speech records of the U.S. and the Japanese legislatures. Qual. Quant. 54, 547–566 (2020).
28. Ingram, M., Ingram, H., Lejano, R.: Environmental Action in the Anthropocene: The Power of Narrative Networks. J. Environ. Policy Plan. 21, 492–503 (2019). https://doi.org/10.1080/1523908X.2015.1113513.
29. Leifeld, P.: Discourse network analysis: policy debates as dynamic networks. Presented at the (2017).

Investigating the Identity of Science Education Leaders

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Abstract. District Science Coordinators (DSCs) play crucial roles in science education, yet their professional identity remains unexplored in the literature. This study addresses this gap by investigating the professional identity of DSCs, building upon existing frameworks from the science and teacher leadership domains. Data included interviews with DSCs in various districts and contexts to gain insight to the diversity of this role. Quantitative Ethnography is used to visualize the competence, performance, and recognition of participants to understand how DSCs perceive themselves and are perceived by others in their professional roles.

Keywords: Science Education, Identity, Leadership

1 Introduction

District science coordinators (DSCs) are an under-researched position within the science education community [1,2]. DSCs are leaders within the science education community responsible for curriculum development and alignment to standards, creating and facilitating teacher professional development, and working with administrators [2]. These practices are also essential to being a science teacher leader (STL). A STL is a science teacher who has leadership responsibilities both inside and outside the classroom, influences colleagues' practice, and advocates for science instruction [3,4].

Research on identity in education, specifically teacher identity, has increased significantly in the last twenty years [5]. Other identity explorations in the education realm involve students [6], teacher leadership roles [7,8] and teacher preparation [9]. After situating this study in identity theory [10], we look to literature on science identity and, more specifically, science teacher leader (STL) identity. Although we argue that STLs and DSCs occupy distinct roles, we utilize previous literature about STL identity to view DSCs identity, given the dearth of research in this area.

The identity framework described by Carlone and Johnson [11] serves as the foundational framework for this study. The model describes three tenets of the "kind" of person [10] an individual is: competence, performance, and recognition. This research seeks to understand the identity tenets of these science leaders and look for similarities or differences. Table 1 defines each tenet with respect to the DSC participants.

Table 1. Tenets of Identity

Tenet of Identity	**Meaning for DSCs**
Competence	*Knowledge and understanding of science content, curriculum, pedagogy, and science professional learning (Ex: understanding how curriculum aligns to state standards)*
Performance	*Social performances of relevant science leader practices (Ex: Leading professional development on curriculum alignment to state standards)*
Recognition	*Seeing oneself and being recognized as others as a science (Ex: "I see myself as a leader for the districts science education"*

2 Methods

By collecting thick ethnographic data [12], identity tenets and other codes grounded in the data will be used to create a visual representation of each DSC's identity. This study uses a quantitative ethnographic (QE) approach [13] to visually see connections between the DSC's identity tenets [11,14]. QE uses thick descriptions to blend emic data to create etic codes that describe the identity tenets of being a DSC within the culture, in this case, a school district. Five DSCs were selected using purposive sampling [15]. The participants are Blanche, Rose, Stan, Sophia and Dorothy shown in Table 2. Individuals were chosen based on holding the title of DSC or science specialist within their district.

Table 2. Participant Demographics

DSC Name	**Years in position**	**Years in Education (total)**	**Level**	**Location**[1]
Blanche	1	25	K-5	Rural (Fringe)
Rose	1	26	K-12	Rural (Fringe)
Stan	3	26	K-12	Suburban (midsize)
Sophia	5	27	9-12	Suburban (large)
Dorothy	1	15	9-12	Suburban (large)

Epistemic Network Analysis (ENA) was used to measure and model each DSC professional identity based on the data. The ENA Web Tool [16] creates a network model based on "mathematical representations of the patterns of connections among codes" [13]. A network was created for each participant where the nodes represent individual codes; in this study's case each node represents a subcode, and the lines represent connections between codes made by the participant. Codes used the identity framework (competence, performance, recognition) grounded in the data and found in Table 3. Thickness in the line represents a greater connection between codes. Lines of data were compared to each other using a moving stanza window set at five.

[1] *As defined by NCES: https://nces.ed.gov/ccd/commonfiles/glossary.asp*

Table 3. Codebook

Codes	Subcode	Subcode meaning
Competence	C.Edu	Background education
	C.Role	Previous/current roles
	C.PCK	Pedagogical Content Knowledge
	C.CK	Content Knowledge
	C.PK	Pedagogical Knowledge
	C.PD	Personal PL/PD
	C.Create	Creating assessments/curriculum
Performance	P.Lead	Leadership Roles
	P.Model	Modeling/Coaching
	P.PD	Leading/Creating/Facilitating PL
	P.Vision	Creating a vision
	P.Advo	Advocating
Recognition	R.Self	Self-recognition
	R.Cred	Credibility
	R.Collab	Collaboration

3 Findings

This study aimed to understand DSC professional identity using a framework for identity (competence, performance, recognition). The research employed a QE approach to data analysis. Each DSC will be presented with a qualitative synopsis followed by an ENA model and interpretation. Figure 1 displays each participants' network model.

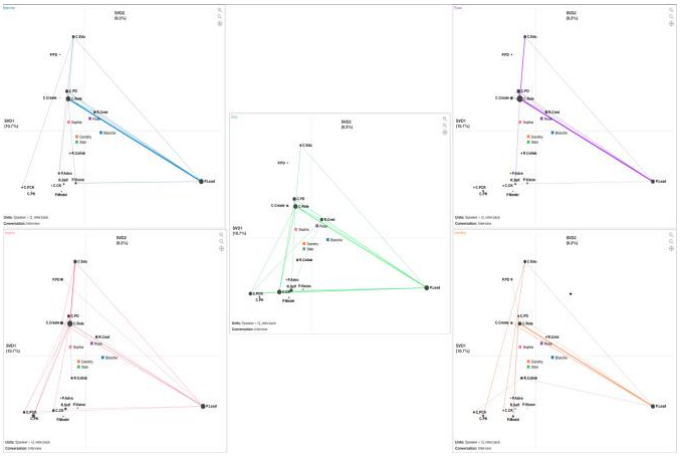

Fig. 1. Participant Models

All participants made strong connections between their performance as a leader and their competence in their role. They also all made connections between their

educational background and their competence in their role. Each had subtle differences with four of five participants having the strongest connections between competence in their role and performance as a leader.

4 Discussion

The findings here suggest each DSCs negotiation of their performance and competence may vary based on the contextual situation and their personal strengths and weaknesses. Interestingly, recognition was at times less mentioned based on the DSC professional title as an administrator. While not statistically significant, the location of the mean network also differentiates and suggests subtle differences among participants mainly tied to their background knowledge. Future research could investigate similarities in identity negotiation with other titled leadership positions such as department chair or principal. Patterns of identity tenets of an effective DSC could also be used as a guide to support career trajectories of others.

References

1. Author, 2015
2. Author, 2017
3. Wenner, J. A., Campbell, T.: The theoretical and empirical basis of teacher leadership: A review of the literature. Review of Educational Research, 87, 134-171 (2017)
4. Author, 2022
5. Rushton, E. A. C., Rawlings Smith, E., Steadman, S., et al.: Understanding teacher identity in teachers' professional lives: A systematic review of the literature. Review of Education, 11, e3417 (2023)
6. Hazari, Z., Sonnert, G., Sadler, P. M., et al.: Connecting high school physics experiences, outcome expectations, physics identity, and physics career choice: A gender study. J. Res. Sci. Teach., 47, 978–1003 (2010)
7. Hanuscin, D. L., Cheng, Y. W., Rebello, C., et al.: The affordances of blogging as a practice to support ninth-grade science teachers' identity development as leaders. Journal of Teacher Education, 65(3), 207-222 (2014)
8. Sinha, S., Hanuscin, D. L.: Development of teacher leadership identity: A multiple case study. Teaching and Teacher Education, 63, 356–371 (2017).
9. Luehmann, A. L.: Identity development as a lens to science teacher preparation. Sci. Educ., 91, 822–839 (2007)
10. Gee, J. P. (2000). Identity as an analytic lens for research in education. Review of Research in Education, 25, 99–125 (2000)
11. Carlone, H. B., & Johnson, A. (2007). Understanding the science experiences of successful women of color: Science identity as an analytic lens. J. Res. Sci. Teach., 44, 1187–1218 (2007)
12. Merriam, S., B., Tisdell, E., J.: Qualitative Research: A Guide to Design and Implementation. 4 ed. Wiley, Hoboken, NJ (2015)
13. Shaffer, D.: Quantitative ethnography. Cathcart Press, Madison, WI (2017)
14. Wenger, E.: Communities of practice and social learning systems. Organization, 7(2), 225-246 (2000)
15. Miles, M., Huberman, A., M., Saldana, J.: Qualitative Data Analysis: A Methods Sourcebook. 4 ed. Sage, Thousand Oaks, CA (2020).

16. Marquart, C. L., Hinojosa, C., Swiecki, Z., Eagan, B., & Shaffer, D. W. Epistemic network analysis. http://app.epistemicnetwork.org (2021). Accessed 30 May 2024

Assessing the Cultural Identity Development of U.S. and Kenyan Learners in a STEM Community

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Abstract. This study examines cultural influences that support positive identity development in an online global STEM community. Using epistemic network analysis, it highlights how cultural elements can be applied for the purpose of developing cultural identities in a global STEM environment. Key factors include heritage, cultural sensitivity, belonging, and local STEM integration into learning. The findings suggest that integrating cultural elements into STEM curricula can foster cultural identity development and enhance diversity in STEM education. Collaborations and insights from educators, researchers, and experts in cultural studies, educational psychology, technology-enhanced learning, and more are valuable for refining the epistemic network analysis and other methodologies used in this poster, thereby enhancing cultural identity in STEM education.

Keywords: Cultural identity, STEM, Online learning, Diversity, Kenya, USA

1 Introduction

This poster assesses the cultural influences and elements that might support positive identity development in an online and global science, technology, engineering, and math (STEM) community. Identity formation is a dynamic and continuous process where children experience identity crises and thresholds as they navigate their external and internal environments into early adulthood, significantly shaping their choices and behaviors [1]. Youth develop self-perceptions in relation to how they are perceived by others, emphasizing the importance of psychosocial relationships and time [1-3]. Research indicates that constructing national, ethnic, or racial identity is crucial for youth development, influencing behavior, academics, and psychosocial factors [4]. Studies on the psychosocial impact of ethnic diversity often focus on the majority's behavior and perspectives toward minorities [5] but understanding how minority group members maintain their culture within a larger, often biased group is also essential [5, 6].

Guided by cultural identity theory—which suggests that cultural elements from a learner's background can support identity development and belonging—this study explores how integrating diverse cultural factors into education fosters cultural identity formation [5]. Combining culturally responsive pedagogy (CRP) with cultural identity theory helps students from marginalized groups connect with their cultural roots [5, 7]. This research builds on studies that explore the role of multiple epistemologies in shaping student learning in science education and extends previous work by assessing the impact of cultural elements on identity development—an approach that diverges from traditional culturally relevant pedagogy and culturally responsive teaching [6-9]. This study also contributes to the understanding that STEM, often viewed as universal and acultural, is influenced by cultural factors.

2 Theory

This study is grounded in culturally relevant pedagogy, which aims to help learners appreciate their own culture while respecting others' [6]. It is supported by the Cultural Integration and Augmentation (CIA) framework, which promotes the integration of cultural elements such as language, heritage, values, and local STEM (LSTEM) into education [10, 11]. The Transfer and Adoption/Adaptation of Universal Principles (TAUP) model further supports the adaptation of knowledge across cultural contexts [11]. Using these frameworks, a codebook was created to examine cultural influences and identity formation in a STEM community, focusing on Beliefs, Values, Practices, Heritage, Oral Traditions, Language, Cultural Sensitivity, LSTEM, Sense of Belonging, and Identity Recognition, as shown in Table 1.

Table 1: *Codebook of Constructs Adapted from Akumbu, 2022) in the Analysis*

Code	**Description**	**Examples**
Beliefs	Beliefs connected to spirituality, taboos	*"Abagusii, we have a lot of beliefs that does not go with other tribes."*
Values	Respect, morality, unity, courage, trust	*"The child …should behave with uttermost respect."*
Practices	Practices are norms and customs, ways of being	*"Pupils need" as an incentive to "keep working hard…"*
Heritage	Food, location, names, clothing styles, history	*"I'm a Kisii because I eat the Ugali from millet."*
Oral Traditions	Songs, proverbs, stories, music, dance	*"At school, they should integrate the Kisii stories as a refreshment."*
Language	Speaking in a language other than English	*"You can use that language that a kid understands better."*
Sense of Belonging	Feeling of security, support, or sense of acceptance	*"I think we're here for food."*
Cultural Sensitivity	Awareness, knowledge, respect of the other	*"There are people who lack water."*
Recognition of Identity	Acceptance, validating identity, formalities.	*"If I can, Dr." "It looks pretty good. "Wow. That's awesome. Wow."*
Local STEM	Local ways of thinking about STEM or local resources and material,	*"In Kisii culture, you know we had people who were experts performing surgery."*

3 Methods

This quantitative ethnography study examines the impact of cultural elements on identity formation among learners in a global online STEM community, specifically focusing on participants from Kenya and the U.S. A sample of 39 individuals aged 12 and above, including 10 adults (Kenya: 2, U.S.: 8) and 29 students (Kenya: 6, U.S.: 23), were recruited through professional networks facilitated by ABLE leaders using emails, meetings, and phone calls. Epistemic Network Analysis (ENA) was employed to analyze cultural dynamics. Units of analysis were based on speakers' recorded conversations in 2023 virtual meetups, identified through file identifiers. Three raters individually coded and socially moderated transcriptions of these video recordings to ensure consistency [12]. The analysis utilized a moving stanza size of 8 lines to construct network models, triangulating data to enhance thematic capture [13, 14].

4 Results

The subtractive model, illustrated in Figure 1, visualizes the interactions between learners from Kenya (blue) and the U.S. (red). It highlights strong connections between Heritage, Language, Local STEM, values, and identity recognition. These constructs can be relevant to the cultural identity development of learners. The co-registration correlations were 0.98 (Pearson) and 0.98 (Spearman) for the first dimension and 0.95 (Pearson) and 0.95 (Spearman) for the second. These measures indicate that there is a strong goodness of fit between the visualization and the original model.

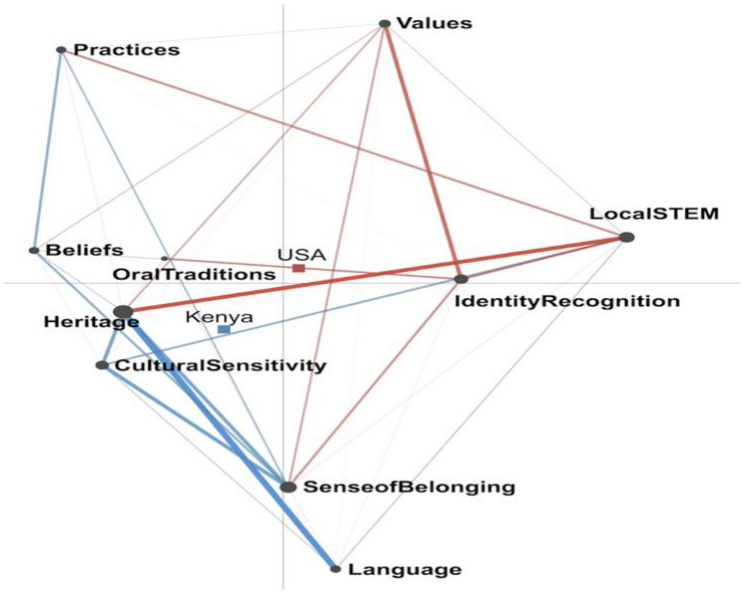

Fig. 1. Subtractive Graph Kenya (Blue) - USA (Red)

The subtractive graph in Figure 1, comparing the U.S. model (red) and the Kenya model (blue), highlights differences in the strengths of connections between cultural elements or codes. Kenyan students showed stronger connections between Heritage and Language, with a lesser connection between Cultural Sensitivity and Identity Recognition. U.S. students, on the other hand, exhibited stronger links between Heritage and Local STEM, as well as between Values and Identity Recognition. These connections underscore the role of cultural elements in identity formation, particularly how values are tied to identity in the U.S. context, while language plays a key role for Kenyan students, whose utterances were often translated for non-English language learners during meetups. All students are encouraged to translate sections of their presentations into Portuguese or Spanish.

The frequent mention of food and holiday festivities further supports the prominence of the heritage node in the analysis. For example, a U.S. adult participant highlighted the significance of local culture, saying, "Louisiana has a big culture of Mardi Gras, the gumbo, the hospitality," underscoring how STEM can be intertwined with cultural heritage. Similarly, a Kenyan student emphasized the importance of food in their cultural project, stating, "I think there's different cultures with different types of foods and different things that they enjoy. I think it's really important" to explore these culinary traditions across cultures. Weaker connections between Heritage, Cultural Sensitivity, Sense of Belonging, and Identity Recognition indicate interconnections, particularly in discussions about global food origins. An adult from the U.S. noted, "We have some people from Kenya, so we may want to look at the commonality of how we got the origins of some of these foods." This awareness and sensitivity towards Kenyan participants support the Cultural Sensitivity code and foster a sense of belonging, potentially contributing to identity development. A U.S. adult also reflected on culinary similarities across the globe, remarking, "I always find it interesting how people from around the world can use a lot of the same ingredients and have...similar tasting food." These exchanges highlight how the STEM community fosters cultural sensitivity and a sense of belonging by recognizing and appreciating diversity. The inclusion of food in STEM projects offers an accessible entry point for students to engage with both local and global cultures, strengthening their cultural identity and sense of inclusion within the learning environment.

5 Discussion

In assessing how students from the United States and Kenya develop and express their cultural identities within a shared STEM educational environment, this study identifies several key cultural factors that support cultural identity development: heritage, cultural sensitivity, sense of belonging, values, and local STEM. The eagerness observed among learners in the STEM makerspace to explore and understand the cultural backgrounds of their peers highlights the critical role these factors play in fostering a sense of belonging and cultural identity. It also underscores the importance for educators to actively integrate cultural elements into the STEM curriculum as a strategy to maintain student interest and promote diversity in STEM education [13]. This approach enhances learning outcomes and fosters a more inclusive and culturally aware learning community [6-8, 11].

Educators are encouraged to integrate heritage into STEM curricula by designing projects that allow students to explore scientific concepts through their own cultural practices or lens, following the TAUP, CIA, and CRP frameworks [7-9, 11]. For instance, students could study engineering principles behind traditional architectural methods in their communities or examine the environmental sustainability of past and present indigenous agricultural practices. Such projects can validate students' cultural identities while demonstrating the relevance of their heritage in contemporary STEM contexts. Although the integration of CRP with cultural identity theory is a novel approach that requires further research, preliminary suggestions for real-world application also include lesson plans that incorporate cultural narratives from students' backgrounds into STEM subjects, and project-based learning activities where students explore how traditional practices intersect with scientific principles labeled universal principles, fostering both cultural pride and academic engagement. In online meetups, fostering cultural exchange, such as students sharing cultural stories or discussing local STEM projects like addressing community environmental issues, strengthens their sense of belonging and cultural identity, enhancing learning outcomes and creating a more inclusive and culturally aware community.

6 **Conclusion**

This study emphasizes the importance of integrating cultural elements such as heritage, cultural sensitivity, and local STEM into STEM curricula to support the cultural identity development of U.S. and Kenyan learners within a global online community. By fostering a culturally responsive learning environment, educators can promote inclusivity, strengthen students' cultural identities, and contribute to a more diverse and aware STEM community. This approach not only addresses the unique cultural contexts of learners but also enhances their sense of belonging and engagement in STEM education.

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Reference

1. Erikson, E. H. (1968). Identity: Youth and crisis. Norton.

2. Schwartz, S. J., Luyckx, K., & Vignoles, V. L. (2011). *Handbook of identity theory and research.* Springer Science & Business Media. https://doi.org/10.1007/978-1-4419-7988-9

3. Rivas-Drake, D., Seaton, E. K., Markstrom, C., Quintana, S. M., Syed, M., Lee, R. M., Schwartz, S. J., Umana-Taylor, A. J., French, S., & Yip, T. (2014). Ethnic and racial identity in adolescence: Implications for psychosocial, academic, and health outcomes. *Child Development,* 85 (1), 40-57. https://doi.org/10.1111/cdev.12200

4. Phinney, J. S. (1990). Ethnic identity in adolescents and adults: *Review of research. Psychological Bulletin,* 108(3), 499–514. https://doi.org/10.1037/0033-2909.108.3.499

5. Konkel L. (2015). Racial and Ethnic Disparities in Research Studies: The Challenge of Creating More Diverse Cohorts. *Environmental health perspectives*, 123(12), A297–A302. https://doi.org/10.1289/ehp.123-A297

6. Ladson-Billings, G. (2014). Culturally relevant pedagogy 2.0: a.k.a. the remix. *Harvard Educational Review*, 84(1), 74–84. https://doi.org/10.17763/haer.84.1.p2rj131485484751

7. Bang, M., & Medin, D. (2010). Cultural processes in science education: Supporting the navigation of multiple epistemologies. *Science Education*, 94(6), 1008-1026. https://doi.org/10.1002/sce.20392

8. Gay, G. (2015). The what, why, and how of culturally responsive teaching: International mandates, challenges, and opportunities. *Multicultural Education Review*, 7(3), 123–139. https://doi.org/10.1080/2005615x.2015.1072079

9. Waterman, A. S. (1985). Identity in the context of adolescent psychology. *New directions for child development*, (30), 5–24. https://doi.org/10.1002/cd.23219853003

10. Akumbu, R. V. (2022). Culturally relevant elements for K–12 education in Kisii. (Order No. 29323485) [Doctoral dissertation, Pepperdine University]. ProQuest Dissertations Publishing.

11. Akumbu, R.V., Lux, K., Schulz, D., Espino, D., Hamilton, E. (2023). Cultural Impact on a Global Virtual STEM Project. In: Arastoopour Irgens, G., Knight, S. (eds) *Advances in Quantitative Ethnography*. ICQE 2023. Communications in Computer and Information Science, vol 1895. Springer, Cham. https://doi.org/10.1007/978-3-031-47014-1_7

12. Shaffer, D. W. (2017). Quantitative ethnography. Madison, WI: Cathcart Press.

13. Shaffer, D. W., Collier, W., & Ruis, A. R. (2016). A tutorial on epistemic network analysis: Analyzing the structure of connections in cognitive, social, and interaction data. *Journal of Learning Analytics*, 3(3), 9–45. https://doi.org/10.18608/jla.2016.33.3

14. Bowman, D., Swiecki, Z., Cai, Z., Wang, Y., Eagan, B., Linderoth, J., & Shaffer, D. W. (2021). The Mathematical Foundations of Epistemic Network Analysis. *Multimedia and Signal Processing* (pp. 91–105). https://doi.org/10.1007/978-3-030-67788-6_7

Improving the Transparency of Code Generation in ENA by Integrating SCAT

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Abstract. This study explores the integration of the Steps for Coding and Theorization (SCAT) into the code generation process in Epistemic Network Analysis (ENA) to improve its transparency. ENA, a key technique in Quantitative Ethnography (QE), quantifies and visualizes connections between Codes within Discourse through dynamic network models. However, the process of generating Codes often lacks transparency due to its complexity and interpretive nature. By employing SCAT, we developed a codebook for ENA tailored to our research context. The study involved analyzing interview data from a wind orchestra instructor who trialed a performance support system. Our findings suggest that using SCAT clarified the code generation process, resulting in more consistent and interpretable ENA results while enhancing "analyst reflectability" and "reader falsifiability."

Keywords: ENA, QE, SCAT, Transparency, Code Generation.

1 Background

Quantitative Ethnography (QE) weaves large-scale, detailed narratives by analyzing cultural contexts qualitatively and quantitatively using statistical methods. Epistemic Network Analysis (ENA), a key technique in QE, models how people connect [C]odes in their [D]iscourse by discovering and quantifying connections between Codes and representing them through dynamic network models [1].

Codes are generated based on data and theoretical perspectives (code generation) then checked for presence in segmented data (code assignment). When using inductively generated Codes, it must function not only as an interpretation, as in qualitative research, but also as a network node adaptable to interpreting utterances. However, coding methods vary, with many points requiring careful attention. For example, Shaffer et al. discuss the challenges of coding, emphasizing the complexity of balancing the data and theoretical frameworks [2]. It can be difficult to determine the best approach to take and clearly describe the specific methods of code generation in a paper. This makes the code generation process opaque and reduces the validity of the data analysis.

How can we ensure the validity of data analysis? The code generation process can be seen as qualitative research in its attempt to interpretively analyze data. Therefore, the validity of the data analysis must also be considered in the context of qualitative research. According to Otani [3], validity in analysis refers to the appropriateness of the data-derived analysis results. In quantitative research, this is the validity of the specified analysis method described in the Methods section. However, in qualitative research, analysis results vary depending on the conceptual and theoretical frameworks of the analysis and the researcher's background. It is thus necessary to ensure "analyst reflectability" and "reader falsifiability" regarding the results of analysis. "Analyst reflectability" means that the analyst can review and examine whether the analysis results are valid by reflecting on the analysis process. "Reader falsifiability" allows readers who doubt the validity of the results to question and point out possible analysis errors [3]. To guarantee this during analysis, ensuring transparency of code generation process is essential, but it can be difficult to achieve transparency due to the complex nature of code generation and the interpretive analysis involved.

To address these challenges, it is necessary to adopt a method that improves transparency in the coding process, thereby enhancing the overall validity of the data analysis. This study investigates the use of a qualitative data analysis method, Steps for Coding and Theorization (SCAT), to develop a codebook for ENA. By employing SCAT, we aim to visualize the process of code generation, ensuring that it is transparent and thereby contributing to the validity of the analysis.

The research question of this study is how SCAT can enhance the validity of data analysis through improved transparency in generating Codes for ENA.

2 Method

SCAT is designed with an explicit and formalized procedure, making it suitable for beginners and useful for analyzing relatively small datasets. SCAT involves a four-step inductive coding process, wherein segmented data are described within a matrix and codes are assigned in the following order: Step 1: Extract noteworthy words or phrases from the text. Step 2: Paraphrase 1. Step 3: Insert extra-textual concepts that account for 2. Step 4: Identify the emergent themes or concepts considering the context. Subsequently, create a "story-line" using 4, and finally derive a "theory" from the story-line [3, 4].

Since SCAT aims to generate "theory," we will use it to develop a codebook for ENA. Specifically, we assign multiple codes to each theory derived from SCAT, considering the overall flow of the analysis. Each assigned code will be accompanied by a definition, which will be compiled into a coding book. For ENA analysis, the presence or absence of these codes was assigned to the original utterance data, which enabled us to analyze the data using ENA.

For this study, the data analyzed consisted of interviews conducted with an experienced wind orchestra instructor at a higher education institution. We are developing a system to support wind instrument performance and requested that the instructor try out the system. The system trial was conducted with one student through

the instructor. While the trial faced various issues and was unsuccessful, we conducted interviews with the instructor before and after the trial. These text records were analyzed using the method described above. The interviewer and analyst served as first author. During analysis, careful attention was paid to uncovering the instructor's underlying thoughts on music, interactions with students, teaching methods, and perceptions of technology.

3 Results and Discussions

The transcripts of the pre-interview and post-interview were basically segmented by speaker, but when the utterances were long or when the content clearly changed, the segments were divided. The pre-interview with the instructor comprised 361 segments, while the post-interview contained 212. Analyzing all segments via SCAT yielded 12 theories from the pre-interview and 17 from the post-interview. We assigned codes to each theory, yielding a total of 11 codes. Table 1 presents a sample of the SCAT analysis results and codes for one theory. We described the definition for each code and created a codebook (Table 2). Using this codebook, ENA was undertaken to compare the pre-interview and post-interview characteristics (Fig. 1).

Both the pre- and post-interviews maintained strong connections between [Student Perspective (SP)] & [Instruction], and between [SP] & [Issue], indicating that in both interviews, the instructor talked more about students, their instruction, and issues related to the students. However, differences in connections between the pre- and post-interviews were found (e.g., stronger connections in the pre-interview between [Instruction] & [Skill Development], [Instruction] & [Issue]). The pre-interview frequently discussed the instructor's teaching strategies and thoughts behind them, while the post-interview focused more on the failure of the system trial. These differences likely explain the observed variances.

When interpreting the results of the ENA analysis, the results of the SCAT can also be used to make the interpretation more convincing. For instance, both the pre- and post-interviews showed strong connections between [SP] and [Issue]. This indicates that the instructor had a high level of concern for students' challenges and difficulties and frequently mentioned approaches to address and support these issues. The results of SCAT also yielded theories related to support for musically unmotivated students and the instructor's interventions prompted by consultations with students.

In this study, we proposed a method to improve transparency in code generation by integrating SCAT, thereby enhancing the "analyst reflexivity" and "reader falsifiability" of the results. By applying this method to real interview data, we demonstrated how transparency can contribute to ensuring the validity of the data analysis. However, despite the effectiveness of this approach, challenges remain, particularly in defining and applying codes when integrating SCAT, which aims to describe theories, with ENA, which aims to visualize data. Addressing these challenges will be crucial in future research to further refine the methodology and enhance the robustness of the analysis.

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Table 1. Sample results from pre-interview analysis using SCAT and coding for theories.

No	Speaker	Text (English)	Step 1	Step 2	Step 3	Step 4
62	Instructor	Well, basically, it's not so much about telling them what to do, but rather having the students try things out for themselves.	having the students try things out	Student-Led Approach	Student-Entrusted Practice Methods/ Self-Authority in Practice	Perception of Students as Autonomous Learners
63	INT	I see.				
64	Instructor	And, of course, there are beginners who just can't do it, so for those students, I'll show them, like, "Try playing it this way," and guide them one-on-one instruction. But after that, the seniors take over and I mostly leave it to them.	beginners/one-on-one instruction/ seniors/ leave it	Beginner/Supportive Coaching Method/Initially Only/Senior Students' Autonomy/ Apprenticeship-style/Delegating	Detailed Guidance from Instructors for Instrument Beginners/Autonomous Instruction by Seniors/Shift in Instructional Responsibility	Transition of Instructional Responsibility to Experienced Senior Instrumentalists
Story-Line	In practice sessions led by instructors who view students as "Perception of Students as Autonomous Learners," there is an observed "Transition of Instructional Responsibility to Experienced …" (snip)					
Theory	(1) In practice sessions led by instructors who view students as "Perception of Students as Autonomous Learners," there is an observed "Transition of Instructional Responsibility to Experienced Senior Instrumentalists." **[Instruction/Agency/Skill Development]** (2) There remains …(snip)					

Table 2. Sample of coding book.

Code	Definition
Instruction	Matters related to the instructor's teaching history, strategies, and policies, including specific methods of instruction and the instructor's perspectives on teaching. It also covers concrete training methods such as basic exercises and individual practice.
Skill Development	The growth and improvement of instrumental performance skills and abilities. It includes references to beginners and experienced players, discussions on advancing proficiency, and aspects related to performance skills themselves, but does not include specific practice methods.

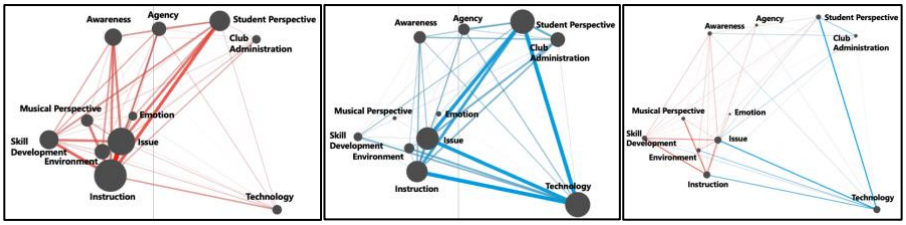

Fig. 1. Network diagram resulting from ENA analysis, pre (left), post (middle), both (right).

References

1. Shaffer, D. W.: Quantitative Ethnography. Cathcart Press, Edinburgh (2017)
2. Shaffer, D. W., Ruis, A.R.: How we code. In: Ruis, A.R., Lee, S.B. (eds) Advances in Quantitative Ethnography: Second International Conference, ICQE 2020, CCIS 1312, pp. 62–77. Springer, Cham (2021)

3. Otani, T.: Paradigm and Design of Qualitative Study: From Research Methodology to SCAT. The University of Nagoya Press, Nagoya, Japan (2019) (in Japanese)
4. SCAT: Steps for Coding and Theorization, https://www.educa.nagoya-u.ac.jp/~otani/scat/index-e.html, last accessed 2024/6/1.

Tracing Identity Research in the QE community: A Meta-Synthesis of ICQE Research

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Abstract. This study analyzes 146 ICQE papers (2019-2023) on identity characterization, measurement, and context. ChatGPT-assisted analysis identified four frameworks: developmental, interactionist, sociocultural, and neo-Vygotskian. Methods like ENA visualized identity trajectories, supplemented by qualitative data. Findings highlight the need for culturally sensitive methodologies and future research in diverse populations, prioritizing direct identity exploration, critical reflexivity, and systemic issues.

Keywords: Identity, Systematic Review, ChatGPT

1 Introduction and Related Work

Identity in education research serves as both a conceptual and analytical lens for investigating how researchers and individuals think about changes within the self over time [1, 2]. Identity research often examines individual and group behaviors and their complex social interactions [e.g., 3], which positions QE as a valuable methodology [4]. Examining students' identities facilitates their interest and participation in learning activities and promotes more personalized support [5]. Despite the alignment between methodology and theory, and the value of the topic for learners and society, examinations of identity in QE have not been unified in context, method, theoretical framing, or approach. This opens the door for unaddressed areas of need and inconsistent and unequal representation in identity work.

This study builds on the symposium "Identifying Identity," which involved a manual review of over 30 submissions that referenced or applied identity constructs in QE [6]. Expansion of this analysis, such as leveraging the benefits of LLMs such as ChatGPT for automating data processing [7], can improve the rigor and comprehensiveness of findings. We present a GPT-assisted meta-synthesis to guide future research directions and surface gaps and limitations in how identity is currently studied. The guiding research questions of the study to examine identity are as follows: (1) How do ICQE submissions characterize identity? (2) Which methods are used to measure identity? (3) What contexts are represented in identity research?

2 Methods

The study used all the accepted papers (N = 146) scraped from the ICQE conference proceedings from 2019 - 2023, using R and the package pdftools. Next, documents were cleaned and segmented. Supplementary proceedings were excluded from this study to focus on mature work. A keyword search on “identity” and “self” was run using a regular expression (RegEx) to filter the papers mentioning identity. The remaining papers were manually analyzed to remove papers with keywords unrelated to identity (e.g. self-reflection), leaving 42 papers for further analysis.

ChatGPT was used for an initial preliminary analysis to analyze the data from papers on the characterization of identity, its measurement, and the context and focus of the study. A prompt was developed based on the best practices from [7], and tested in 3 sessions in different browsers to establish stability in results using the same prompt. The final prompt was used for ChatGPT to analyze each paper year-wise across the three main focus of research questions. ChatGPT produced a preliminary thematic analysis, which was then synthesized by human experts to draw broader themes from the text inductively, following the best qualitative practices from [8].

3 Results

3.1 Characterization of Identity

From 2019-2023, based on the 42 papers examined, identity was characterized using four main frameworks: developmental, interactionist, sociocultural and neo-Vygotskian approaches. Frameworks were either employed explicitly (14 out of the 42 papers) or not in characterizing identity. When researchers explicitly referenced identity, they either leveraged theoretical frameworks for identity (e.g., [2,5]), or theories for which identity is a construct or element (e.g., self-regulation, cognitive apprenticeship). Works that did not connect explicitly to known theories often discussed identity in terms of how individuals, whether in groups or not, reframe their identities over time through social or professional practices, such as a researcher documenting their transition using an autoethnographic technique and QE [9].

3.2 Measuring Identity

ENA was frequently used to visualize identity trajectories: 4 studies on varying knowledge, values, and goals in 2019, 6 studies on political discourse, socioemotional communication, and collaborative interactions in 2020, 7 studies on shifts in teachers' beliefs and practices in 2021, and 10 studies in 2022 on online feedback, social media posts, and political discourse. Qualitative data from interviews, reflections, and observations complemented ENA findings each year. Unique methods for each year included role-playing and simulations in 2019 exploring identity in virtual environments, assessments in 2020 capturing shifts in STEM fields, nonlinear ENA in 2021 for modeling identity transitions over time, and Ordered Network Analysis (ONA) in 2022 examining collaborative problem-solving in military scenarios.

3.3 Identity in Context

From 2019 to 2023, identity was the main focus in 37 studies and a secondary focus in 5 studies. A rising trend in studies primarily focused on identity (blue), with a decrease in those with an auxiliary focus (red) after 2020 (See Fig. 1).

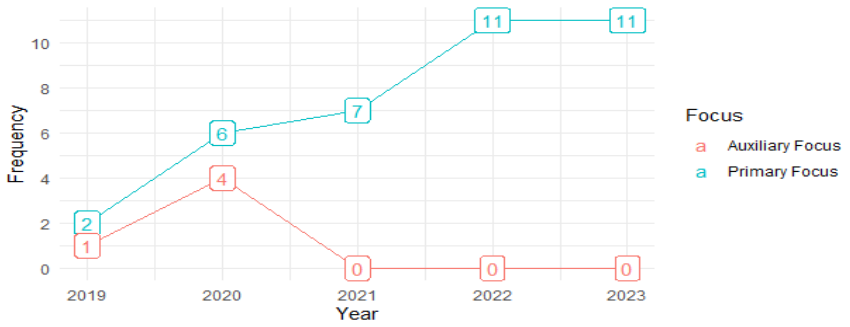

Fig. 1. Focus on identity studies by year

In 2019, identity was primarily explored through role-playing. Moral and self-evaluative dimensions were highlighted, focusing on the role of goals and values in shaping adolescents' identities, reflecting early interest in identity formation within educational contexts. In 2020, identity research expanded into STEM career paths, political epistemic frames, and teacher decision-making. Early childhood curiosity and EFL teacher identity formation were also key areas, showcasing a growing interest in professional development, political commitments, and family influences on identity development. In 2021, the focus is centered around professional development, and its influences on teachers' beliefs and practices, with gender transition emerging as another significant area emphasizing nonlinear and dynamic aspects of identity transitions. 2022 saw a broad exploration of identity across diverse contexts, including researcher reflexivity, student loan debt, early-career teachers' identities, and systemic issues faced by BIPOC staff. As of last year, 2023, researchers continued to explore diverse contexts with a strong emphasis on critical reflexivity, collaboration, and systemic workplace issues. The studies highlighted reflective practices, methodological considerations, and political discourse, indicating a maturation of identity research in ICQE.

4 Discussion & Conclusions

Our meta-synthesis of identity-focused research within the QE community from 2019 to 2023 reveals an evolving landscape that increasingly prioritizes direct identity exploration, critical reflexivity, and systemic issues. Integrating diverse theoretical frameworks demonstrates the depth and breadth of identity research. A notable trend is the shift towards a primary focus on identity, reflecting its central role in understanding educational processes and advocating for equitable practices. This work also highlights the utility of ChatGPT-supported thematic analysis.

While this work has attempted to capture trends in identity from ICQE, there are gaps related to the multitude of ways that identity can be framed from various fields, given the nature of ICQE as an interdisciplinary conference. For example, among the authors, there were different ways that identity could be understood by field and even within the field. Furthermore, there were a variety of ways to frame identity. While this is a gap in the study, this gap also provides an exciting opportunity for further research and to provide opportunities to further explore identities through QE methods. Future research should continue to refine these approaches and explore identity in diverse and underrepresented populations, guiding the development of fair and inclusive educational practices. Methodologically, this project hopes to expand upon using ENA to visualize literature reviews and compare the efficacy of utilizing abstracts to represent a full article compared to using entire bodies of text. Past studies that have used ENA for literature reviews have only utilized abstracts [10].

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References

1. Gee, J. P. (2000). Chapter 3: Identity as an analytic lens for research in education. Review of research in education, 25(1), 99-125.
2. Kaplan, A., & Flum, H. (2009). Motivation and identity: The relations of action and development in educational contexts—An introduction to the special issue. Educational Psychologist, 44(2), 73-77.
3. Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Cambridge, MA: Harvard University Press.
4. Shaffer, D. W. (2006). How computer games help children learn. New York, NY: Macmillan Publishers.
5. Shah, M., Foster, A., Talafian, H., Barany, A., & Petrovich, M. E. (2024). Facilitating and interpreting high school students' identity exploration trajectories in STEM. In Virtual Learning Environments, 105-124. Routledge.
6. Barany, A., Condon, L., Espino, D., Hamilton, E., Lee, S., Lux, K., Vega, H., & Foster, A. (2023). Identifying Identity: A Symposium Discussion on Identity Theory and Practice in QE. In Fifth International Conference on Quantitative Ethnography: Conference Proceedings.
7. Barany, A., Nasiar, N., Porter, C., Zambrano, A. F., Andres, A. L., Bright, D., ... & Baker, R. S. (2024). ChatGPT for Education Research: Exploring the Potential of Large Language Models for Qualitative Codebook Development. In International Conference on Artificial Intelligence in Education, 134-149). Cham: Springer Nature Switzerland.
8. Saldaña, J., & Omasta, M.: Qualitative Research: Analyzing Life. Sage Publications (2016).
9. Poulos, C. N. (2021). Essentials of autoethnography. American Psychological Association.
10. Sun, J., Nguyen, C. (2023).Asian American Education Literature Before and After Covid-19. In: Arastoopour Irgens, G. and Knight, S. (eds.) Advances in Quantitative Ethnography, 202–214.

Career Choice and the Experiences of College Students in an Urban Teacher Pipeline Program

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Abstract. In the U.S., the public-school student population increasingly consists of students of color, while the teacher workforce remains predominantly white. This study uses participant observation, interviews, and epistemic network analysis to understand the career aspirations of four college students of color in an Afrocentric, culturally responsive teacher pipeline program during summer 2023. We found that people who were already education majors, expressed a greater, more positive attitude toward classroom work, pedagogy and curriculum, and becoming a teacher compared to the non-education majors who emphasized mentorship and positive relationships in their assessment of the program. To rebuild the teacher pipeline and make the profession appealing, innovative methods must be used to identify and address the specific needs of potential educators.

Keywords: Epistemic network analysis, teacher development, race

1 Introduction

In the United States, the public-school student population increasingly consists of students of color, while the teacher workforce remains predominantly white. This discrepancy underscores the need to recruit more teachers, particularly teachers of color, given the positive impact on student achievement when teachers are culturally and racially aligned with their students (Muller 2001, Jennings and Greenberg 2009, Dee 2004 Egalite et al 2015). Existing research covers the design of Grow Your Own and other alternative teacher recruitment initiatives, but stakeholders lack ethnographic studies that assess the long-term effectiveness of these programs (Lac 2002, Sleeter and Milner 2011). Therefore, this research represents the initial phase of a longitudinal study that explores the evolving interests and career paths of four college students who participated in an Afrocentric, culturally responsive teacher pipeline program in an urban, northeastern city during the summer of 2023. By integrating participant observation, interviews, and epistemic network analysis, this study aims to provide a comprehensive understanding of how such programs influence the career trajectories of potential educators of color. This research is guided by the FIT-Choice model by Watt and Richardson (2007), which identifies the main factors influencing teacher choice among pre-service candidates. This study is also supported by culturally responsive pedagogy (CRP) and teaching (CRT) frameworks that aim to integrate students' cultural backgrounds into education (Gay, 2015; Ladson-Billings, 2014).

Collectively, these frameworks and context helped to establish this project's guiding questions: What aspects of the summer teaching experience are most prominent in students' discourse? How do differences manifest across students with different declared majors? How effective was the teacher pipeline program in encouraging college aged students to become certified educators?

2 Methods

We conducted participant observation (during morning assembly, classroom instruction, playground, etc.) for 4 weeks at the elementary school where the summer program was being held. We also conducted semi-structured interviews with the four pre-service teachers near the conclusion of the summer program. Two of them were already declared education majors, three identified as Black/African American and one participant was Latinx. Interviews were held in a private setting virtually and in a closed space at the school site and lasted anywhere between 20 to 45 minutes. Some questions included: What was your level of exposure to teachers of color during your K-12 and postsecondary schooling? Do you have any interest in becoming a teacher? For this poster, we only focused on the interviews. Informed by the instructional strands developed by the non-profit that hosted the teacher pipeline program and literature on the characteristics of grow your own initiatives [11], we constructed 11 codes, some of which included: mentorship, positive relationships and teaching aspiration.

Prior to coding, all identifying information of participants was anonymized and pseudonyms applied. Between the two researchers, the process of social moderation was used throughout the coding phase to ensure consistency and minimize bias (Schaffer 2017). The coded transcripts were later uploaded to the epistemic network analysis (ENA) web tool to compare various units of analysis and identify patterns across the individual networks (Schaffer et al 2016).

3 Results

After the coding process, a model was generated using the ENA webtool (Figure 1). For this analysis, there were 1262 lines of data, and each sentence served as the analysis unit in the ENA model. aggregated by major to create the mean networks for each group. A moving window size of 4 within a case was the conversations in which connections were limited. The edge weights were scaled to 2 to better visualize the connections in the data. A means rotation was utilized to maximize the key differences between the two along the X axis, where a two sample t test assuming unequal variance showed Non-Education majors (mean=-0.06, SD=0.17, N=602 was statistically significantly different at the alpha=0.05 level from Education majors (mean=0.06, SD=0.17, N=645; t (1238.27)= -12.06, p=0.00, Cohen's d=0.68).

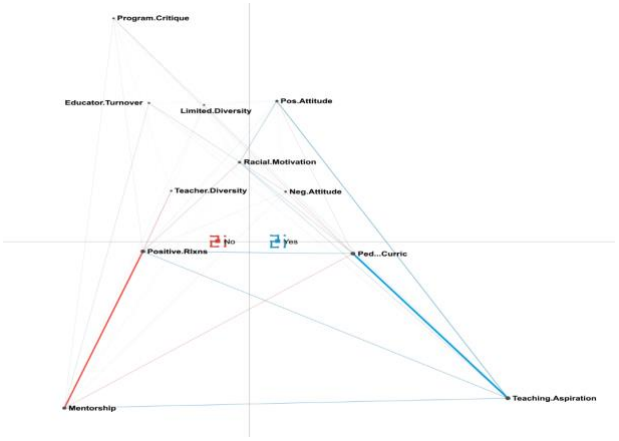

Fig. 1. Subtracted ENA network model of non-education majors (red, left) and education majors (blue, right).

4 Discussion

We found that people who were already education majors (right, blue), expressed a greater, more positive attitude toward classroom work, pedagogy and curriculum, and becoming a teacher when reflecting on their work that summer. In comparison, the non-education majors (left, red) emphasized mentorship and positive relationships in their assessment of the program. They did not indicate a desire to change college majors or to become teachers. In this study, college students may be interested in teacher pipeline programs, but for reasons that differ from the explicit aims of the program—like a desire to work with children but not to become certified teachers. If non-education majors are to be considered viable candidates for the teacher pipeline, it seems that they would benefit from additional supports related to pedagogy and curriculum, which was a major point of tension for the non-education majors in this study.

The findings from this research are significant because, in a time of teacher shortages and the expressed need for more racially diverse teachers, it is important to think critically about what it will take to get more people interested in the profession. Researchers can lend a critical eye to examining the effectiveness of different recruitment strategies and the importance of differentiating those strategies depending on the population in question. This longitudinal study also responds to the need for research evaluating the long-term impact of programs aimed at bolstering the teacher pipeline.

Acknowledgments. A third level heading in 9-point font size at the end of the paper is used for general acknowledgments, for example: This study was funded by X (grant number Y).

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

References

1. Muller, C. The role of caring in the teacher-student relationship for at-risk students. Sociological Inquiry, 71(2), 241–255 (2001); Jennings, P.A., & Greenberg, M.T. (2009). The Prosocial Classroom: Teacher Social and Emotional Competence in Relation to Student and Classroom Outcomes. Review of Educational Research, 79(1), 491 - 525 (2009); Dee, T. S. . Teachers, Race, and Student Achievement in a Randomized Experiment. *The Review of Economics and Statistics*, *86*(1), 195-210 (2004); Egalite, A. J., Kisida, B., & Winters, M. A. Representation in the classroom: The effect of own-race teachers on student achievement. Economics of Education Review, 45, 44-52 (2015).
2. Lac, V. T. A Teacher Action Research Study on Critical Hope in a Teacher Pipeline Program for Minoritized Youth. In C. Gist & T. Bristol (Eds.), *Handbook of Research on Teachers of Color and Indigenous Teachers* (pp. 67–77). American Education Research Association (2022); Sleeter, C. E., & Milner, H. R. Researching successful efforts in teacher education to diversify teachers. In A. F. Ball & C. A. Tyson (Eds.), *Studying diversity in teacher education* (pp. 81–104). Rowman & Littlefield (2011).
3. Watt, H., and Richardson, P. "Motivational Factors Influencing Teaching as a Career Choice: Development and Validation of the FIT-Choice Scale." *The Journal of Experimental Education* 75(3), 167–202(2007).
4. Gay, G. The what, why, and how of culturally responsive teaching: International mandates, challenges, and opportunities. Multicultural Education Review, 7(3), 123–139 (2015); Ladson-Billings, G. Culturally relevant pedagogy 2.0: a.k.a. the remix. Harvard Educational Review, 84(1), 74–84 (2014).
5. Gist, C. "Shifting Dominant Narratives of Teacher Development: New Directions for Expanding Access to the Educator Workforce Through Grow Your Own Programs." *Educational Researcher* 51 (1): 51–57. (2022).
6. Schaffer, D. W. *Quantitative ethnography*. Cathcart Press. (2017).
7. Schaffer, D. W., Collier, W., & Ruis, A. R. A tutorial on epistemic network analysis: Analyzing the structure of connections in cognitive, social, and interaction data. *Journal of Learning Analytics*, *3*(3), 9–45. (2016).

Inquiry-based discussion with ChatGPT: Preliminary insights from epistemic network analysis

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Abstract. This study investigated the potential of using ChatGPT to support inquiry-based discussions (IBD) in educational settings. Conducted with 108 students from a Chinese public university, the study employed epistemic network analysis to compare discussion patterns between groups with and without ChatGPT assistance. Preliminary findings suggest that while ChatGPT enhanced participation and idea generation, it was primarily used for lower-order thinking tasks. The study highlights the need for improved feedback mechanisms to leverage ChatGPT's full potential in fostering higher-order thinking in IBD.

Keywords: Inquiry-based discussion, Community of Inquiry, Generative Artificial Intelligence, Epistemic Network Analysis.

1 Introduction

Inquiry-based discussion (IBD) is widely adopted by educators across levels. Participants in IBD exchange ideas, negotiate opinions, and establish shared understandings through continuous communication. Building upon Vygotsky's concept of social constructivism, the community of inquiry (CoI) model identifies three essential elements that constitute meaningful IBD experience: cognitive presence, social presence, and teaching presence [1]. Cognitive presence describes cyclic phases through which ideas are proposed, evaluated, and integrated in order to generate new knowledge. Social presence concerns creating a trusted and respectful environment for students to express themselves freely. Teaching presence consists of actions and measures for supporting and adjusting IBD's cognitive and social processes.

The CoI model has been a seminal theoretical framework that guides the complete process of IBD, including design, implementation, assessment, and feedback. Studies indicated that fostering the three CoI presences was significantly associated with the enhancement of diverse learning outcomes, such as both perceived and actual performance, learner satisfaction, and empowerment [2]. Moreover, engaging in the CoI-guided IBD could inherently train and develop participants' communication, reflective thinking, and critical thinking skills [3]. Therefore, researchers and educators have explored extensively to enhance online, face-to-face, and blended learning expe-

riences by adapting CoI-guided IBDs. While the benefits of IBD were widely supported, studies indicated that the expected outcomes or skills were not always achievable without external support [4]. Specifically, learners with little IBD experience may struggle with complex cognitive activities such as critically evaluating ideas and integrating diverse information. The role of instructors becomes critically important in monitoring and moderating the IBD process and dynamic. However, instructors face a predicament where they strive to provide IBD with adaptive and immediate support but are incapable of doing so due to the increasing class size and the dynamic nature of IBD.

With the recent development of modern large language models (LLMs) and applications powered by those LLMs, visions and concerns have been proposed and discussed regarding their educational usage [5]. Given ChatGPT's particular affordance in natural language processing, it is worthwhile to explore whether ChatGPT may assist with the current challenge in IBD. As a part of a larger project, this study aimed to offer preliminary evidence on the potential usage and impact of ChatGPT in IBD. Specifically, the following research questions (RQs) were examined:

RQ1: What types of input do university students seek from ChatGPT in IBD?

RQ2: To what extent does ChatGPT impact IBD dynamics?

2 Method

A quasi-experiment was conducted with 108 university students from a Chinese public university. The students majored in biological sciences and were preassigned to two fixed classes by the university (n class A = 53, n class B = 55). Both classes had similar academic performance in previous semesters, and students shared a similar experience of using generative artificial intelligence (GAI) tools. In this quasi-experiment, both classes attended a course (in different timeslots) titled "Artificial Intelligence and Applications in Education" taught by the same instructor. The course followed a "lecture + IBD" mode primarily. In each session, students had around 30 minutes to conduct small group discussions (six to eight students per group). The goal was for them to come up with a solution or integrated idea by the end of the session.

The discussions were hosted on an instant messaging tool, QQ, to facilitate discussion continuity and resource sharing. Groups in class A were each assigned a chatbot powered by OpenAI's GPT-4 model hosted on Chatbox (https://chatboxai.app/en). One student in each group was designated to control the chatbot.

With consent from all students, this study collected their discussion messages and their interactions with the chatbot. Three researchers manually coded the messages based on the CoI coding scheme (Table 1). Besides, messages input to or generated by the chatbot were further labeled with the code "GAI". The three coders first established a consensus using 10% of the data. They then individually coded 20% of the data and achieved a satisfactory inter-rater reliability of 0.81 measured by Krippendorff's Alpha. Afterwards, they each coded one third of the remaining data.

This study performed descriptive analyses to reveal the number and type of messages sent to and generated by ChatGPT. In addition, we conducted epistemic net-

work analyses to explore how ChatGPT influenced group discussions in the two classes [7]. Specifically, groups were adopted as units of analysis. The moving stanza size was set to seven to capture the code co-occurrences. The adjacency matrix corresponding to each unit was transformed into a high-dimensional vector and then compressed into two dimensions using singular value decomposition. The coordinates of the codes were determined through an optimization process. For each group, its discussion pattern was represented by a network, where thicker edges reflect more frequent co-occurrences. We compared the two classes' overall connection structures to identify the influence of ChatGPT.

3 Preliminary findings

As presented in Table 1, students in the experimental class predominantly used messages coded as "facilitating discourse" when prompting ChatGPT, followed by "design and organization" and "open communication". Meanwhile, the responses from ChatGPT were mainly labeled as "exploration", with a few coded as "integration", "design and organization", and "facilitating discourse". These results suggest a prominent pattern of using ChatGPT to generate ideas. Compared to a human instructor, students might feel freer to engage ChatGPT in IBD and ask for opinions. However, the usage of ChatGPT for other purposes was limited.

Table 1. ChatGPT prompts and responses

	Cognitive Presence: triggering event (TE), exploration (EX), integration (IN), resolution (RE)				**Teaching Presence:** design and Organization (DO), facilitating discourse (FD), direct instruction (DI)			**Social Presence:** affective expression (AE), open communication (OC), cohesion (CO)		
	TE	EX	IN	RE	DO	FD	DI	AE	OC	CO
Prompt	0	1	1	0	4	34	0	0	4	0
Response	0	43	6	4	6	6	0	0	0	1

In Figure 1, this study showed the connections between GAI messages and other messages in the experimental class. Three connections, including "GAI – open communication", "GAI – exploration", and "GAI – facilitating discourse" stood out. These connections suggest that ChatGPT was more often involved in lower-order thinking or social interactions. Students did not critically assess the content provided by ChatGPT enough or build upon existing ideas to create new knowledge.

Moreover, Figure 2 presents the comparison between the two classes' networks. The GAI code was removed from the comparison since it was only applicable to the experimental class and could bias the comparison. As a result, the experimental class exhibited thicker connections between "open communication", "exploration", and "facilitating discourse", while the control class displayed more co-occurrence between "design and organization" and "exploration". The differences indicate that the incorporation of ChatGPT increased the dynamics of IBD and promoted students to express their thoughts and try to include their peers. Nevertheless, by simply allowing students to use ChatGPT did not significantly develop higher-order thinking.

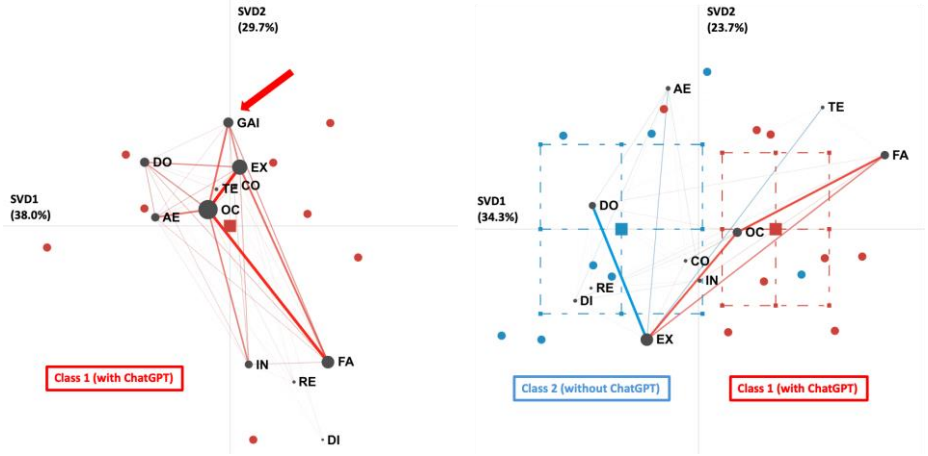

Fig. 2. ENA for conditions without and with text annotations and their differences

To summarize, focusing on one of the pressing issues in IBD, this study explored the possibility of utilizing LLM chatbots to interact with students and provide feedback. The preliminary findings supported that while the chatbot could enhance participation and interaction, it was primarily used for generating ideas. To better leverage the advantage of LLM chatbots, it may be necessary to improve the feedback mechanism through approaches such as prompt design and engineering.

References

1. Garrison, D. R., Anderson, T., & Archer, W.: Critical inquiry in a text-based environment: Computer conferencing in higher education. Internet Higher Education 2(2), 87–105 (1999).
2. Martin, F., Wu, T., Wan, L., & Xie, K.: A meta-analysis on the community of inquiry presences and learning outcomes in online and blended learning environments. Online Learning. 26(1), (2022).
3. Kaczkó, É., & Ostendorf, A.: Critical thinking in the community of inquiry framework: An analysis of the theoretical model and cognitive presence coding schemes. Computers & Education. 193, 104662 (2023).
4. Ba, S., Hu, X., Stein, D., & Liu, Q.: Assessing cognitive presence in online inquiry-based discussion through text classification and epistemic network analysis. British Journal of Educational Technology. 54(1), 247–266 (2023).
5. Adeshola, I., & Adepoju, A. P.: The opportunities and challenges of ChatGPT in education. Interact. Learn. Environ. 0(0), 1–14 (2023).
6. Shaffer, D. W., Collier, W., & Ruis, A. R.: A Tutorial on epistemic network analysis: Analyzing the structure of connections in cognitive, social, and interaction data. Journal of Learning. Analytics. 3(3), (2016).

Examining Nursing Students' Communication and Collaboration Patterns in Manikin-Based Simulations

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Abstract. In this paper, we report how two pre-licensure undergraduate nursing student dyads engaged in INTRAPROFESSIONAL COMMUNICATION, INTERPROFESSIONAL COMMUNICATION, THERAPEUTIC COMMUNICATION, and TOOL AND DATA USE while participating in a simulated pediatric scenario using high-fidelity manikins. Chronologically Ordered Representations of Discourse and Tool-Related Activity (CORDTRA) and Epistemic Network Analysis (ENA) for each dyad revealed distinct approaches (strengths and gaps) and progressions in providing effective patient care. This study *contributes* to research on evaluating student performance of clinical competencies, *illustrates* the role of manikin-based simulations for communications skills training, and *recommends* the use of data visualizations for enhancing debriefing sessions.

Keywords: Epistemic Network Analysis, CORDTRA, Nursing Simulation, Practice Readiness, Data Visualization, Collaboration, Communication

1 Introduction and Relevant Literature

Pre-licensure nursing education strives to prepare students for entry-level practice, as defined by The Essentials: Core Competencies for Professional Nursing Education Framework with 10 domains of competency and sub-competencies [1]. We investigated students' practice of competencies related to domains 2 (person-centered care), 6 (interprofessional partnerships), 8 (informatics and healthcare technologies) and 9 (professionalism) in high-fidelity simulations.

Communication and collaboration are crucial for nursing students' practice-readiness. Tarhan et al. [2] found a correlation between nurse collaboration and work-readiness in new graduates. Effective teamwork in nursing also involves communication among nurses and other healthcare team members [3]. Furthermore, in pediatric care, competency requires balancing dyadic (nurse-child) and triadic (nurse-parent-child) communication, along with effective verbal and nonverbal approaches [4]. Simulation-based learning holds promise for competency-based education, with manikin-based simulation helping students practice and develop relational, communicative, and collaborative skills [5]. However, more studies focus on evaluating student satisfaction than on assessing student performance [6].

Methods like CORDTRA and ENA can provide a nuanced understanding of students' activities in simulations. CORDTRA [7] analyzes interactions sequentially, capturing data such as speech, gestures, and tool use, to illustrate classroom dynamics

and learning progression. ENA [8] models connections among coded data elements in discourse, visualizing relationships and quantifying their strength, offering insights into knowledge structure and reasoning processes. While ENA is increasingly used in nursing simulations, no known study has applied both methods in nursing education.

2 Methods

2.1 Participants and Settings

This paper is situated in a larger quasi-experimental study from Fall 2022 at a private institution in southwestern US. It examines pre-licensure student activity in a pediatric scenario using manikins; namely, PED12 from Elsevier's Simulation Learning System. In PED12, students cared for Mandy Rhodes, a 4-year-old admitted with a fever and possible bacterial meningitis. During the scenario, eight students in their respective pairs, had the opportunity to conduct a focused neurological assessment, administer antibiotics, educate parents, and ensure patient safety by preventing a medication error.

2.2 Transcript, Codebook, and Analysis

A 140-minute video was transcribed using manual and automated methods, segmenting utterances at natural pauses and capturing each action as a unique utterance. The 1466-line dataset included metadata for speaker (e.g., student name), modality (dialog, action), phase (nurse hand-off and orientation, scenario), and student pair (e.g., Jacqlyn & Ivanka). Pseudonyms were assigned to all students. Codes for the data were informed by the AACN Essentials and binary coding was applied using social moderation (see Table 1).

Table 1. Codebook.

Code	Definition	Example
INTRAPROFESSIONAL COMMUNICATION (ITC)	Function as communicate as a team in executing plan of care	*Jacqlyn, would you mind calling the lab for me and seeing if the blood culture came back …*
INTERPROFESSIONAL COMMUNICATION (IPC)	Communicate with members of the healthcare team in executing plan of care	*So right now her fever is at 103.5, so we wanted to get that down, but I only have orders for an ibuprofen tablet.*
THERAPEUTIC COMMUNICATION (TC)	Engaging with the individual in establishing a caring relationship. Employing a participatory approach to nursing care	*OK, we'll turn off the big lights and we can use the dim lights in here, so that helps with the headache.*
TOOL AND DATA USE (T&D)	Use/refer to appropriate tools and/or generate data throughout the care process	*Tom is referring to the Medical Administration Record as he continues to calculate the dosage*

The data was analyzed qualitatively to examine students' INTRAPROFESSIONAL COMMUNICATION (ITC), INTERPROFESSIONAL COMMUNICATION (IPC), THERAPEUTIC COMMUNICATION (TC), and TOOL AND DATA USE (T&D). CORDTRA diagrams visualized a granular timeline of communication and collaboration processes across utterances recorded during the simulation (X-Axis), allowing us to count activity frequency, identify patterns, and compare dyads for each construct (Y-Axis). An ENA model was constructed with students in each dyad as units of analysis, conversations defined by simulation phase and student pair, and a moving stanza window of 10. The ENA model represented aggregated connections between codes in each line of the data to other lines in its stanza window (i.e., 10) and summed the connections for all lines within each dyad. We report findings for Alicia-Jessica (Dyad 1) and Tom-Nina (Dyad 2). Dyad 1 successfully prevented a medication error, while both dyads performed necessary assessments for PED12. These differences and similarities in meeting scenario objectives led us to investigate, *'How do nursing students communicate and collaborate in a manikin-based simulation?'* Results are complemented by Figure 1.

3 Results, Discussion and Implications

In both dyads, one student focused on assessing the patient and caring for her needs, while the other addressed the parent's need for information. Despite this role division, students leaned on each other's support [ITC] to (a) confirm assessment procedures ("I did the light. She followed the light. She gave full strength"), (b) calculate dosage (Tom is going over his calculation with Nina), and (c) troubleshoot while setting up the IV bag (Jessica walks up to Alicia to inspect the tubing).

Dyad 1, who caught the medication error early, promptly communicated it to the parent ("I do have an antibiotic for her, but they sent me the wrong one") and informed the pharmacist ("...OK, so she has an order for cefotaxime 850 mg IV. But you sent me Cefa...cefa...Ceftriaxone?") to ensure the correct medication was brought for the patient. In contrast, Dyad 2 only expressed an intention to call the doctor towards the end of their simulation to confirm the dosage ("I don't know if I'm just doing math wrong, but it says here on our dosage range 150 to 180, so maybe we should call the doctor just to clarify the order.") practicing IPC less often than Dyad 1.

Dyad 2 spent more time explaining their care process ("We're going to be monitoring her and assessing her and seeing.. if we need to kind of adjust our course.."), acknowledging concern ("I know there's a wealth of information online and some of it can lead you down a pathway, but it's good to ask those questions just for clarification.."), seeking consent ("I'm gonna move your Barbie over, is that OK?"), acknowledging medical history ("I know she does have the allergy to azithromycin. But Ceftriaxone should be good because it's a different type of antibiotic") and reducing discomfort (Nina raises the back of Mandy's bed). As a result, Dyad 2 had 64 instances of TC compared to Dyad 1's 38.

Students in both dyads reviewed the patient's electronic health record, referenced her medical administration record, documented data from patient assessments, and relied on the medication book equally [T&D]. Dyad 1's activity faded after addressing the medication error, whereas Dyad 2 continued referring to these resources until the end of the simulation to confirm their dosage calculation.

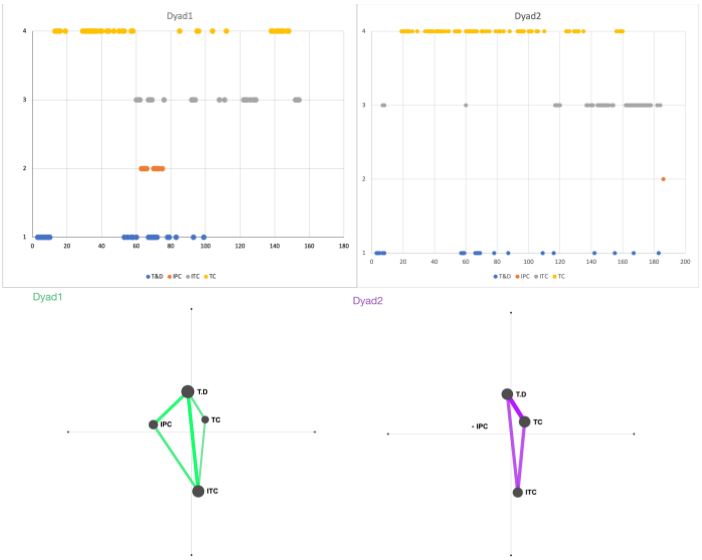

Figure 1. CORDTRA and ENA visualizations of Dyad 1 and Dyad 2

These results underscore that manikin-based simulations provide valuable environments for students to practice, and for researchers to study communication and collaboration competencies that are broadly defined for entry-level nurses and specifically for pediatric situations [3-5]. Practitioners can use methods like CORDTRA [7] and ENA [8] to gain deeper insights into student performance, enabling them to either concentrate on specific skills needing development, to assess the overall process, and to foster student reflection during simulation debriefing.

Reference

[1] American Association of Colleges of Nursing. (2021). The essentials: Core competencies for professional nursing education.

[2] Tarhan, M., Doğan, P., & Kürklü, A. (2022, November). The relationship between nurse–nurse collaboration and work readiness among new graduate nurses. In *Nursing Forum*(Vol. 57, No. 6, pp. 1104-1110).

[3] Souza, G. C. D., Peduzzi, M., Silva, J. A. M. D., & Carvalho, B. G. (2016). Teamwork in nursing: Restricted to nursing professionals or an interprofessional collaboration?. Revista da Escola de Enfermagem da USP, 50, 0642-0649.

[4] Sabetsarvestani, R., & Geçkil, E. (2024). A meta-synthesis of the experience of pediatric nurses in communication with children. *Journal of Advanced Nursing*, 1-16

[5] Handeland, J. A., Prinz, A., Ekra, E. M. R., & Fossum, M. (2021). The role of manikins in nursing students' learning: A systematic review and thematic metasynthesis. *Nurse Education Today*, *98*, 104661

[6] Cole, H. S. (2023). Competency-based evaluations in undergraduate nursing simulation: A state of the literature. *Clinical Simulation in Nursing*, *76*, 1-16.

[7] Hmelo-Silver, C. E., Chernobilsky, E., & Jordan, R. (2008). Understanding collaborative learning processes in new learning environments. *Instructional Science*, *36*, 409-430

[8] Shaffer, D. W. (2017). Quantitative ethnography. Madison, WI: Cathcart Press.

The Impacts of COVID-19 on Student Interaction in a Massive Open Online Course

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Abstract. The COVID-19 pandemic accelerated the adoption of online education platforms like Coursera and other MOOCs, emphasizing their flexibility and accessibility. This led to increased usage, showcasing their adaptability to the changing educational landscape. This research examines student interactions in an online course on designing societal artifacts across three periods: 2019 (pre-pandemic), 2020 (during the pandemic), and 2022 (post-pandemic). By analyzing 4,254 forum posts from these iterations, the study aims to understand the evolution of student engagement and interactions. Findings indicate that while the importance of lecture videos and course logistics increased during and after the pandemic, expressions of gratitude and discussions about evaluations methods became less frequent post-pandemic. These insights contribute to understanding how the pandemic has influenced student interactions and highlight the potential challenges and opportunities for online learning environments moving forward.

Keywords: Quantitative Ethnography, Massive Open Online Courses, COVID-19, Student Interaction

1 Introduction and Relevant Work

The COVID-19 pandemic significantly impacted society, notably the education sector, forcing a rapid transition from face-to-face instruction to online learning [1]. This transition highlighted both the effectiveness and challenges of online learning, while accelerating the adoption of innovative educational technologies [2-4]. Platforms like Coursera and other Massive Open Online Courses (MOOCs) saw increased use, demonstrating advantages in availability and versatility [5]. This research aims to analyze the Coursera course "Course Design: Creation of Artifacts in Society" [6] across three periods: 2019 (pre-pandemic), 2020 (during the pandemic), and 2022 (post-pandemic), focusing on how student interactions in online forums evolved in this time scale. Additionally, this project marks the first use of a new ENA analysis tool developed to code and analyze MOOCs. Previously, this new ENA tool created a dataset of a total of 3,503 forum posts from 2,882 students, collected across four years (2012 - 2015) from nine MOOCs offered at the University of Pennsylvania [7].

Researchers collaborated with tool developers and identified a course of interest and the desired time frame for data processing and model development.

2 Methods

The data consists of forum posts across three iterations of the Coursera Design course, which has 61,992 enrollees, a 4.6-star rating, and is available in 22 languages. It requires 14 hours to complete six modules over three weeks, offering a flexible, self-paced schedule. This research includes 113 posts from the 2019 version of the course (pre-pandemic), 4093 posts from 2020 (during pandemic) and 105 posts from 2022 (post-pandemic). This resulted in 4, 254 posts, each used as a line of data. The R program [8] was used to extract forum post titles and content into a single variable for coding. Coding was performed on each complete forum post because forum posts often contain interconnected ideas that rely on the full context of the post for accurate interpretation. An R program was then used to code for 10 constructs identified through a systematic review of the posts conducted by three expert researchers, who selected keywords with guidance from ChatGPT (GPT-4) [9] on potentially relevant themes.

Recent work explored ChatGPT's role in deductive coding [10] with some testing its reliability compared to humans or other automated coding tools [11]. To validate the R program's coding accuracy, two researchers coded a sample of 100 lines with $\kappa > 0.80$ for all constructs, indicating strong agreement. After resolving discrepancies through social moderation [12], the R program coded the same 100 lines. Results were then compared to the human coding, with $\kappa > 0.65$. This suggests that while the program performed reasonably well, further refinement is needed to improve its accuracy.

Table 1. Codebook 1.

Code	Definition	Hum-Hum κ	Hum-R κ
Apologies	Apologies for statements and misunderstandings.	0.95	0.87
Liking	Students' compliments and positive comments.	0.90	0.65
Gratitude	Appreciation to professors, TA's and classmates	0.80	0.73
Introduction	Student introductions, providing details such as their names, backgrounds and current locations.	0.81	0.76
Course Logistics	Discussion of course logistics, topics related to the course content, syllabus and requirements.	0.82	0.77
External Resource Sharing	Sharing additional resources through external links, including readings, websites and personal pages	0.96	0.85
Positive Expressions	Stating positive emotions experienced during the course or acknowledgement towards others.	0.86	0.75

Negative Expressions	Stating negative emotions experienced during the course, stating their emotions.	0.84	0.70
Evaluation	Mention of different types of assignments as well as the grading criteria for the course.	0.89	0.85
Lecture Videos	Student discussion posts focused on lecture videos.	0.96	0.89

Data was qualitatively analyzed using the rENA package [13] to generate ordered epistemic networks for visual clarity. Difference models were created to compare forum post patterns before, during, and after the pandemic. The conversation variable was set to the forum post order, reflecting the weeks since the course started, as new weekly content could significantly change forum discussions. An infinite moving stanza window size was used, considering all posts made in a week as related.

3 Results

Three ONA difference models were generated to explore student interactions in the Design course over the three iterations of the course (2019, 2020 and 2022).

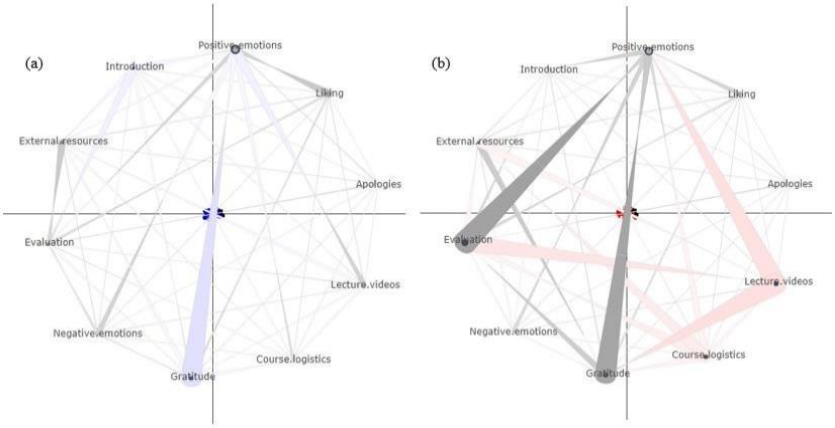

Fig. 1. ONA difference network graph, mean and points for (a) 2019 pre pandemic (blue) and 2020 during pandemic (gray); (b) 2020 during pandemic (gray) and 2022 post-pandemic (red).

Figure 1a compares 2019 (pre-pandemic) and 2020 (pandemic) ordered networks. In 2019, stronger associations emerged between emotions and gratitude, lecture videos, and introduction and evaluation. In 2020, stronger associations appeared for evaluation with external resources, positive emotions, and liking, with new links between positive and negative emotions. Figure 1b contrasts 2020 and 2022, showing that by 2022, ties to lecture videos, positive emotions, evaluation, and gratitude strengthened, with stronger associations between course logistics and external resources. A Mann-Whitney test showed statistically significant differences in forum post patterns between the pandemic and both pre-pandemic ($U=87.50$, $p=0.04$, $r=-0.46$) and post-pandemic ($U=36.50$, $p=0.05$, $r=0.55$).

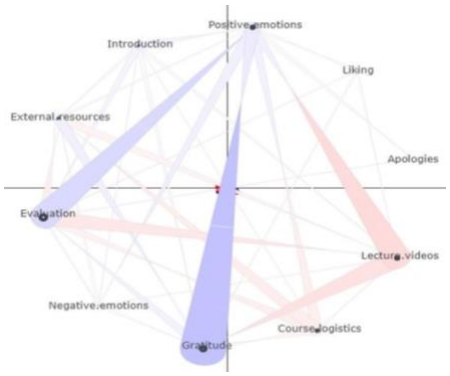

Fig. 2. ONA difference model for 2019 pre-pandemic (blue) and 2022 post-pandemic (red).

Figure 2 compares pre-pandemic (2019) and post-pandemic (2022). In 2019, positive emotions had stronger associations to evaluation and gratitude. In 2022, lecture videos had stronger associations to positive emotions, external resources, evaluation, and gratitude. Course logistics emerged as a central theme in 2022, connecting to positive emotions, external resources, and evaluation. Pre-pandemic and post-pandemic models were different to a degree of statistical significance (U=66.00, p=0.04, r=0.38).

A researcher manually de-identified all identifiable information in the data before sharing it with the team for subsequent analysis. The 2020 course iteration was larger with over 39 times more forum posts (4093) compared to pre-pandemic (113) and post-pandemic (105). Given the unchanged course requirements during this time frame, the increase in number of posts suggests an enrollment surge during the pandemic. Across all three courses, many student responses tended to be short and often included requests for other students to evaluate their work. In comparing the course forum posts from 2019 and 2020, positive emotion and negative emotions were discussed in tandem pre-pandemic. For example, one student responded:

> *…the subject and its development and explanation I liked. On the other hand, I've been waiting for more than [redacted] to be able to correct tasks…* (2019)

During the pandemic, students were more likely to connect discussions of lecture videos and positive emotions. One example is:

> *The Gathering Needs video is great especially when [redacted] interviews his son. The son is clearly annoyed…hilarious!* (2020)

A student in the 2020 iteration of the course highlighted the connection between gratitude and positive emotion directed towards the professor:

> *Thanks a lot professor for sharing useful information about analysing social about new products with categories.* (2020)

In 2019, positive emotion and evaluation are concurrent themes. One course participant responded: “Good exercise on how to attain information on artifact design.” Post-pandemic responses show a strong connection between course logistics and evaluation:

If you need any further reviews on any upcoming assignments just drop the link in this thread. (2022)

4 Discussion

Gratitude remained closely linked to positive emotions throughout the course. By 2020 and 2022, lecture videos and course logistics gained prominence. Comparing pre-pandemic (2019) and post-pandemic (2022), gratitude and evaluation were less frequently connected in 2022. These differences suggest varying student groups each year. Future research could explore other MOOCs or conduct multi-course comparisons to assess student engagement. The COVID-19 crisis has driven educational institutions to improve online curricula, highlighting challenges and opportunities that will shape future education with increased flexibility and technology integration. Ongoing research should address disparities and improve online learning effectiveness.

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References

1. Onyema, E. M., Eucheria, N. C., Obafemi, F. A., Sen, S., Atonye, F. G., Sharma, A., Alsayed, A. O.: Impact of Coronavirus pandemic on education. Journal of Education and Practice, 11(13), 108-121 (2020).
2. Adedoyin, O. B., Soykan, E.: Covid-19 pandemic and online learning: the challenges and opportunities. Interactive learning environments, 31(2), 863-875. (2023).
3. Castro, M., Tumibay, G.: A literature review: efficacy of online learning courses for higher education institution using meta-analysis. Educ & Info Tech, 26(2), 1367-1385 (2021).
4. Paudel, P.: Online education: Benefits, challenges and strategies during and after COVID-19 in higher education. International Journal on Studies in Education, 3(2). (2021).
5. Means B, Neisler J.: Suddenly online: A national survey of undergraduates during the COVID-19 pandemic. Digital Promise (2020).
6. University of Pennsylvania: Courses and specializations. www.coursera.org/penn (2024).
7. Coursera. Design: Creation of artifacts in society. Coursera Inc. www.coursera.org/learn/design?authType=google&completeMode=existingCourseraAccount#testimonials (2024).
8. R Core Team. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria. www.R-project.org/. (2022)
9. OpenAI. ChatGPT (Mar 14 version). chat.openai.com/chat. (2023).
10. Tai, R. H., Bentley, L. R., Xia, X., Sitt, J. M., Fankhauser, S. C., Chicas-Mosier, A. M., Monteith, B. G.: An Examination of the Use of Large Language Models to Aid Analysis of Textual Data. bioRxiv, 2023-07 (2023).
11. Xiao, Z., Yuan, X., Liao, Q. V., Abdelghani, R., Oudeyer, P. Y.: Supporting Qualitative Analysis with Large Language Models: Combining Codebook with GPT-3 for Deductive Coding. In: Proceedings of the Conference on Intelligent UI, pp. 75-78 (2023).

12. Shaffer, D.: Quantitative Ethnography. Cathcart, Madison WI (2017)
13. Marquart, L. C, Swiecki, Z., Collier, W., Eagan, B., Woodward, R., Shaffer, W. D.: rENA: Epistemic Network Analysis. 0.2.7, cran.r-project.org/package=rENA. (2023).

Understanding Economic and Transnational Networks: A Quantitative Ethnography of Latinx Immigrant Connections

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Abstract. Philadelphia is recognized as a certified Welcoming City, with immigrants comprising approximately 15 percent of its population, and is a vibrant example of urban demographic integration. Among these immigrants, the Latinx community contributes to the labor force in the service, domestic, and manufacturing sectors. This poster employs quantitative ethnography to understand the economic and transnational connections of 11 multinational Latina immigrants who are entrepreneurs, food industry workers, and factory employees. This research aims to uncover the complex networks and transnational dynamics driving Latinx economic development in Philadelphia. Central to this study is the research question: How do QE and ENA convey the economic and transnational networks of multinational Latina immigrants in Philadelphia?

Keywords: Urban Planning, Economic Development, Entrepreneurship, Immigration, Transnationalism

1 Introduction

Philadelphia, a city of neighborhoods, is recognized as a certified Welcoming City [1], where immigrants comprise approximately 15 percent of the city's population. The Latinx population constitutes 15 percent of the city's population across all nationalities [2]. The city relies on Latinx immigrant labor for many of its service industry, domestic, and manufacturing positions. This poster employs quantitative ethnography (QE) and epistemic network analysis (ENA) to analyze 11 semi-structured interview interviews with multinational Latina immigrant entrepreneurs, food industry workers, and factory employees. This work aims to uncover the complex networks and transnational dynamics driving Latinx economic development in Philadelphia. The central question is: How do QE and ENA convey the economic and transnational networks of multinational Latina immigrants in Philadelphia?

2 Relevant Literature

Urban planning is a critical field that examines various aspects of urban development, including migration, Latinx communities, economic growth, entrepreneurship, community dynamics, and ethnicity [3]. For example, research on Latinx communities often investigates the relationships between migration patterns and urban development, as well as the impact of these patterns on local economies and receiving communities [4] —those that serve as destinations for immigrants—and entrepreneurship [5]. Within community and ethnicity contexts, urban planning examines how different ethnic groups interact with, influence, and are shaped by their urban environments [6]. Despite the broad scope, there is a notable scarcity of data and literature on Latina entrepreneurs and their roles in establishing transnational networks [7].

3 Methods

3.1 Context and data

A population of immigrant workers in restaurants, homes, and factories is integral to Philadelphia's labor. This poster's participants are Latina immigrants residing in Philadelphia of Mexican, Honduran, and Ecuadoran nationalities recruited through a snowball sampling method [8]. The data collection consisted of 11 semi-structured interviews, primarily conducted in Spanish, ranging from one hour to 90 minutes, conducted over six months. The participants were recruited with the assistance of a community advocate who was not part of the interviewing process. Eleven interviews were analyzed; eight participants were from Mexico, two from Honduras, and one from Ecuador.

The codes shown in Table 1 were developed through inductive thematic analysis [9]. Inductive codes were defined and connected to existing theoretical concepts in relevant disciplines, such as urban planning, economic development, immigration, and transnationalism literature, to create the overarching theoretical framework for understanding the dimensions of the participants' discussions in the poster's context.

Table 1. Codebook for Interviews with Latina Immigrants in Philadelphia

Code	Definition
Community	Represents interviewees' associations with one another, support of each other's activities, and descriptions of other groups.
Family	Refers to the mention of family members.
Precarity	Refers to any reference to a destabilizing situation that may personally affect them and their immediate families.
Ethnicity	Introduces interviewees' awareness, communication, and references to their Latinx identities.
Migration	Specifically captures interviewees' mentions of their positive and negative experiences from their sending communities to Philadelphia.

Transnationalism	Represents all references to the activities or behaviors that connect interviewees to their sending communities outside of the United States.
Entrepreneurship	Indicates the interviewees' references to establishing businesses.
Urban Area	Refers to the mention of a geographic area located in a city.

3.2 Epistemic Network Analysis

Comparative ENA models were created to interpret the connections of the codes within the discourse among the participants. This poster defines its units of analysis as all lines of data associated with a single value of Sending Community, or country of origin, subsetted by Neighborhood. The Sending Community was either Mexico, Honduras, or Ecuador, and the Neighborhood refers to North Philadelphia, South Philadelphia, or West Philadelphia. The ENA models were constructed using the ENA algorithm, and this poster's moving window size was set to four, meaning that a line plus the three previous lines of conversation are assessed for their connections to one another [10].

4 Preliminary Findings

The networks shown in Fig. 1 reflect eight codes: *Community*, *Family*, *Precarity*, *Ethnicity*, *Migration*, *Transnationalism*, *Entrepreneurship*, and *Urban Area*. The codes represent the Latina immigrants' descriptions of the precarious experiences and steps taken to establish community networks and connections that, in turn, aided them in both migrating alone and with family members from Mexico, Honduras, and Ecuador, crossing parts of Mexico and various regions of the United States and eventually settling in Philadelphia. The participants also expressed differences in their immigration statuses and connections to established communities, influencing the ENA plots. For instance, there is a high rate of co-occurrence for *Precarity* and *Community* for participants from Mexico, a strong connection between *Precarity* and *Migration* for participants from Honduras, but a weaker connection between *Precarity* and *Migration* and a strong connection between *Entrepreneurship* and *Family* for the participant from Ecuador.

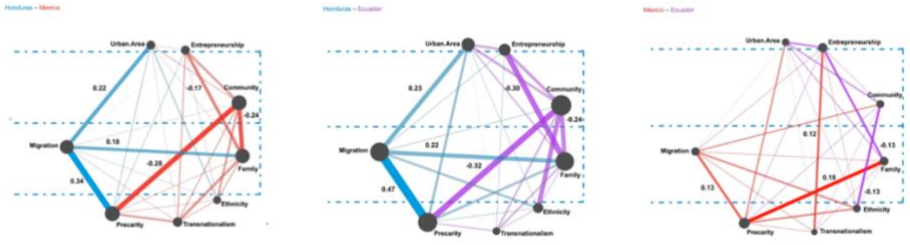

Fig. 1. Comparative ENA plots of participant interviews. The Mexican participants are shown in the red network, the blue network represents Honduran participants, and the purple network illustrates the Ecuadoran participant.

5 Discussion and Next Steps

Understanding the experiences of immigrant groups is often navigated in disciplinary silos. Employing QE and ENA allows for exploring and integrating urban planning topics such as migration, transnationalism, and entrepreneurship by visualizing their networks and representing cultural nuances that are known but not visually represented in multidisciplinary literature. For instance, in their discourse, the participants described their migration experiences, arriving in Philadelphia and working odd hours, receiving low wages and limited assistance, and their efforts in establishing informal and formal businesses to achieve economic stability. Thus, this poster emphasizes the efficient application of QE and ENA in analyzing data gathered in Spanish, which enhances public understanding of Latinx immigrant concerns and raises awareness for the increasing Latinx community in Philadelphia. Although this work's limitations include the reliance on data from only eleven interviews, future analyses and ENA models will be based on a larger sample of multinational immigrants.

In conclusion, these preliminary ENA models demonstrate how Latina immigrants establish economic and transnational connections in Philadelphia and exhibit a high tolerance for uncertainty by migrating to a new country and starting new businesses [7]. The participants also demonstrate how they are navigating financial and environmental limitations while continuing to nurture a supportive community for new immigrants through their networks. Moving forward, ENA models can be a tool for urban planners to gain insights into how a critical labor force component, immigrants, are settling into new urban environments and fostering transnational networks.

References

1. City of Philadelphia Earns Certified Welcoming Designation | Office of Immigrant Affairs, https://www.phila.gov/2023-02-09-city-of-philadelphia-earns-certified-welcoming-designation/
2. File, N.: 85 languages, thousands of translations: City's new dashboard highlights services to a polyglot Philly, https://www.inquirer.com/news/philadelphia-languages-spoken-services-dashboard-20221220.html
3. Pendall, R.: Local Land Use Regulation and the Chain of Exclusion. Journal of the American Planning Association. 66, 125–142 (2000).
4. Jones-Correa, M., De Graauw, E.: Looking Back to See Ahead: Unanticipated Changes in Immigration from 1986 to the Present and Their Implications for American Politics Today. Annu. Rev. Polit. Sci. 16, 209–230 (2013). https://doi.org/10.1146/annurev-polisci-051211-164644
5. Huang, X., Liu, C.Y.: Immigrant Entrepreneurship and Economic Development. Journal of the American Planning Association. 85, 564–584 (2019). https://doi.org/10.1080/01944363.2019.1634485
6. Li, W.: Anatomy of a New Ethnic Settlement: The Chinese Ethnoburb in Los Angeles. Urban Studies. 35, 479–501 (1998). https://doi.org/10.1080/0042098984871
7. Carpenter, C.W., Loveridge, S.: Business, Owner, and Regional Characteristics in Latino-owned Business Growth: An Empirical Analysis Using Confidential Census Microdata.

International Regional Science Review. 43, 254–285 (2020). https://doi.org/10.1177/0160017619826278
8. Parker, C., Scott, S., Geddes, A.: Snowball Sampling. SAGE Research Methods Foundations. (2019)
9. Thomas, D.R.: A General Inductive Approach for Analyzing Qualitative Evaluation Data. American Journal of Evaluation. 27, 237–246 (2006). https://doi.org/10.1177/1098214005283748
10. Siebert-Evenstone, A.L., Arastoopour Irgens, G., Collier, W., Swiecki, Z., Ruis, A.R., Williamson Shaffer, D.: In Search of Conversational Grain Size: Modeling Semantic Structure

Problematizing Intra-Black Racial Dynamics and Solidarity: An Exploratory QE Analysis

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Abstract. This poster explores intra-Black racial solidarity and unity among 375 Black American and Black immigrant college students at a PWI. Using ENA to analyze qualitative data from 375 students, the research highlights distinct connections between solidarity sub-codes, such as understanding and shared struggles for Black Americans, and community space and conditional responses to crises for African immigrants. Findings suggest that shared racial identity and experiences of discrimination foster resilience and proactive coping strategies. This research underscores the importance of solidarity in promoting psychological well-being, resilience, and social justice activism, emphasizing the strength of Black communities in their pursuit of justice and equality.

Keywords: Quantitative Ethnography, Epistemic Network Analysis, Intra-Black Racial Solidarity

1 Background

Much of the research on intra-Black racial dynamics focuses on tension, conflict, and division among Black American and Black immigrants as a result of colorism, differing historical experiences, perceptions of identity and belonging, cultural practices, language, and differing experiences of racism [1]. Unfortunately, this focus on intra-racial tension and has overshadowed the significant cultural overlaps and shared struggles against systemic racism that can foster unity, racial solidarity, and collective action.

Recent studies have begun to investigate how shared racial identity and experiences of racial discrimination contribute to a collective consciousness and solidarity [2,3]. Black immigrant and Black American racial solidarity and unity are complex and multifaceted, influenced by shared experiences of racial discrimination, cultural connections, and collective struggles for justice. While solidarity can emerge in response to tragedies, it is not solely based on them. The research addresses how factors such as gender, class, and nationality intersect with race to influence experiences and expressions of solidarity. Both Black immigrants and Black Americans face systemic and interpersonal racism, which can create a common ground for solidarity [2,4,5]. Shared experiences of marginalization can unite these groups in their fight against racial injustice. Research shows that collective action often stems from recognizing common adversities and working together to address them [6].

Gender differences significantly influence the dynamics of racial solidarity and unity within Black communities. Black men and women often experience and respond to racism in distinct ways, shaped by their unique social positions and roles [7]. The intersectionality framework is crucial for understanding these differences, as it highlights the compounded effects of race and gender [8,9]. Recognizing these gender-

specific experiences and contributions is essential for fostering a more inclusive and effective approach to racial solidarity and unity. Thus, the research question guiding this exploratory study is ***what are the patterns and connections between unity codes across different communities (Black Americans and Black immigrants) and social locations (gender)?***

2 Methods & Analysis

The sample (N = 375; 67.2% female; M_{age} = 19.81) is from a larger study focused on the impact of racial identity, racial discrimination, and racial solidarity on Black American and Black immigrant (African, Caribbean, or Afro-Latinx), college students' psychoeducational outcomes at a PWI in the Northeastern United States. Data was collected in Fall 2019 and Spring 2021. 55.2% identify as a Black immigrant and 40.5% identify as first-generation college students.

The data was analyzed qualitatively to understand the connections between the UNITY sub-codes: UNDERSTANDING, SUPPORT, COMMUNITY SPACE, CONDITIONAL RESPONSES TO CRISIS, and SHARED STRUGGLES. An ENA model was constructed with the units of analysis being the ethnicity of individual Black students (Black.Ethnicity & Speaker.ID). Conversations were defined by each students' response to an individual question (QTYPE & Speaker.ID), treating each response as a separate stanza. The ENA model illustrated the connections between codes for each response, summing these connections within each unit. The model normalized the connection counts and used a means rotation to project these normalized counts into an ENA space. We compared Black American and African students by examining their mean network graphs and performing an independent samples t-test.

3 Preliminary Findings

3.1 Qualitative Analysis

Our qualitative analysis suggests that Black American and African immigrant students connect the UNITY sub-codes in distinct ways. For example, a Black American student described solidarity as: "Yes, I feel like [B]lack people as a whole have a solidarity with one another because of our skin color and act as though we've known each other for years. The interaction between two [B]lack strangers is very comfortable, as if we understand each other's struggles and are nice to each other to give a sense of familiarity. This is especially common in situations with limited [B]lack people." The participant made a strong connection between understanding each other as individuals based on their similar experiences [UNDERSTANDING] and struggles [SHARED STRUGGLE], showing that they value the aspects of the Black Community which uplift feelings of support, safety, and comfortability.

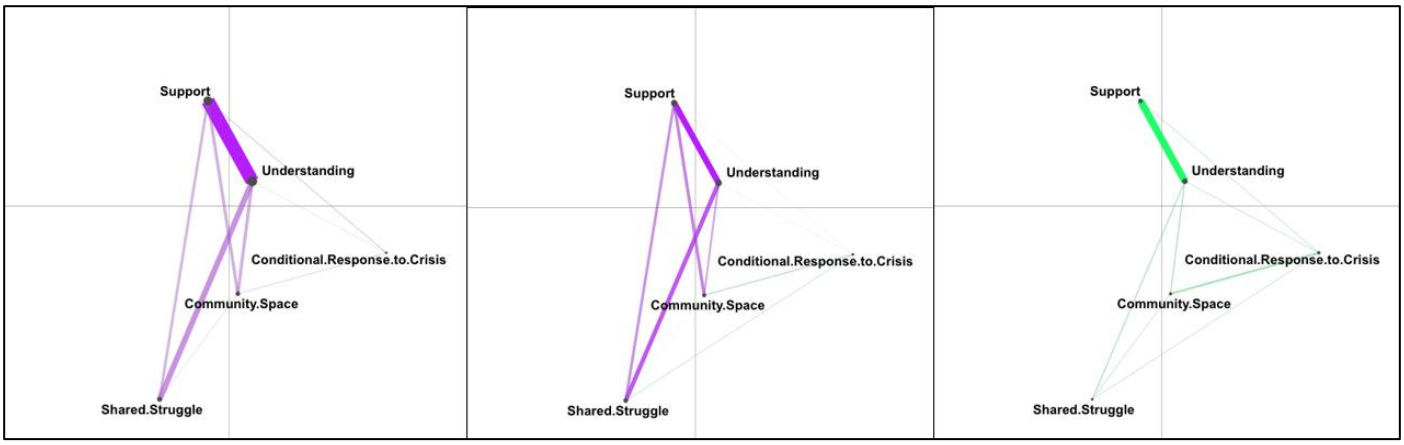
In contrast, an African immigrant noted: "Yes, on campus a lot of minority groups stick together. They formed a support group for one another and act as one to fulfill an agenda. One example is when [there] were several racial issues last year on campus. Almost everyone came together on campus and stood up for what is right."

This response demonstrates how the Black Community portrays strong messages of solidarity when they come together as a group [COMMUNITY SPACE] to fight against racial injustices [CONDITIONAL RESPONSE TO CRISIS]. The preliminary qualitative analysis suggests that Black American students UNITY responses focused on linking UNDERSTANDING and SHARED STRUGGLES, while African immigrant students made more associations between COMMUNITY SPACE and CONDITIONAL RESPONSES TO CRISIS when discussing solidarity amongst the Black Community.

3.2 ENA Analysis

As shown in Figure 1, both mean networks show a strong connection between SUPPORT and UNDERSTANDING. The mean network graph for Black American students (Figure 1a) contains a strong connection between UNDERSTANDING and SHARED STRUGGLE. In contrast, the mean network graph for African immigrant students (Figure 1b) contains a strong connection between CONDITIONAL RESPONSE TO CRISIS and COMMUNITY SPACE. Using the difference network that compares the mean network graph between the two groups (Figure 1c), we identified the X-axis as characterizing the difference between focusing on UNDERSTANDING and SHARED STRUGGLE on the left versus CONDITIONAL RESPONSE TO CRISIS and COMMUNITY SPACE on the right. Along the X-axis, a two sample t-test assuming unequal variance showed African immigrant students (M = -0.04, SD = 0.14, N = 66) was statistically significant different from Black American (M = 0.01, SD=0.13, N = 155; t (110.12) = -2.23, p = 0.03, Cohen's d = 0.34).

Figure 1. ENA model showing (a) mean network graph, mean, and points for Black American students (purple), (b) mean network graph, mean, and points for African students (green), and (c) difference network.



4 Concluding Remarks

Research suggests that individuals with a strong sense of racial solidarity are more resilient in the face of adversity and more likely to engage in proactive coping strategies [7]. Black immigrant and Black American racial solidarity and unity are rooted in both shared struggles and cultural connections. While responses to tragedy can galvanize unity, there are numerous other factors and contexts that foster solidarity, such as cultural celebrations, social and political movements, and community initiatives. Psychological research on intra-Black racial solidarity and unity reveals a complex interplay between individual identity, collective experiences, and socio-cultural practices. This body of work underscores the importance of solidarity in promoting psychological well-being, resilience, and social justice activism among Black individuals, highlighting the strength of Black communities in their pursuit of justice, equality, and collective well-being.

References

1. Pierre, J. (2004). Black Immigrants in the United States and the "Cultural Narratives" of Ethnicity. *Identities*, *11*(2), 141–170. https://doi.org/10.1080/10702890490451929
2. Hunter, C. D., Case, A. D., Joseph, N., Mekawi, Y., & Bokhari, E. (2017). The roles of shared racial fate and a sense of belonging with African Americans in Black immigrants' race-related stress and depression. Journal of Black Psychology, 43(2), 135-158.
3. Jones, C., & Erving, C. L. (2015). Structural constraints and lived realities: Negotiating racial and ethnic identities for African Caribbeans in the United States. Journal of Black Studies, 46(5), 521-546.
4. Williams, D. R., & Mohammed, S. A. (2013). Racism and health I: Pathways and scientific evidence. American Behavioral Scientist, 57(8), 1152-1173.
5. Robnett, B. (2000). How long? How long?: African American women in the struggle for civil rights. Oxford University Press.
6. Sellers, R. M., Caldwell, C. H., Schmeelk-Cone, K. H., & Zimmerman, M. A. (2003). Racial identity, racial discrimination, perceived stress, and psychological distress among African American young adults. Journal of Health and Social Behavior, 44(3), 302-317. https://doi.org/10.2307/1519781
7. Szymanski, D. M., & Lewis, J. A. (2016). Gendered racism, coping, identity centrality, and African American college women's psychological distress. Psychology of Women Quarterly, 40(2), 229–243. https://doi.org/10.1177/0361684315616113
8. Collins, P. H. (2022). Black feminist thought: Knowledge, consciousness, and the politics of empowerment. Routledge.
9. Crenshaw, K. (2013). Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. In Feminist legal theories (pp. 23-51). Routledge.

Exploring Long-Term Detriments of School Bullying

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Abstract. Bullying victimization is a dire issue that remains unresolved. We examined the difference in long-term effects of school bullying (collected from Reddit posts) between those self-described as mostly recovered and those self-described as mostly not recovered using ENA. We found vengefulness was the main theme for Redditors who have mostly recovered whereas mistrust was for those who have mostly not recovered. The present study contributed to the existing research on school bullying from its long-term effects, but needed to investigate more forums and add surveys or interviews to bear out our findings.

Keywords: School bullying, Psychological symptoms, Reddit, ENA

1 Introduction and Literature

Bullying victimization is a grave issue that requires urgent resolution. Across the globe, from 5.3% to 50% of children have been victimized in school (Hansen et al., 2012). Although it has been widely reported as a risk factor for childhood academic development and mental health, its long-term detrimental effects on adulthood have received little attention. Our research question is: what is the difference in long-term effects of school bullying (described in Reddit posts) between those who have mostly recovered and those who have mostly not recovered?

School bullying induces varying psychological symptoms that chronically affect victims (Vanderbilt & Augustyn, 2010). Vengefulness, anxiety, depression, and low self-esteem were some common chronic symptoms (Carlisle & Rofes, 2007). Codes for psychological symptoms were constructed and defined using such terms from literature.

2 Methods

2.1 Participants and Data Collection

Our data was collected from a publicly available forum on Reddit. Participants were all Redditors in the forum with a primary thread about participants' self-disclosure of long-term effects of school bullying they experienced in childhood. The forum had been locked, which means no further edits or posts were allowed. There has been no contact between the researchers and participants. We collected the first 200 lines of data that

have high interactivity among Redditors, and each line represents one post of Redditors in the forum. The data was chronologically arranged, as it was displayed in the forum.

The selection of codes (See **Table 1**) includes "suicidal behavior" and "internalizing problems" as two parent codes. The way we decided the levels of state of recovery for each Redditor was based on (1) whether they clearly claimed they have overcome the effects of school bullying, and (2) whether their posts reflected they have actually mostly overcome the effects, which was guided by our codes (as our codes represented the effects of school bullying) to check whether the positive effects far outweighed the negative ones in their current status. The unit variable state of recovery was coded using social moderation by two coders. Codes were either applied by a single coder once inter-rater reliability had been established, or through social moderation.

Table 1. Codebook.

Code	Definition	Cohen's κ (ρ)
SUICIDAL BEHAVIOR	The poster described instances involving any suicidal thought or action, regardless of intent to die at any time in their life, including self-harm, suicidal ideation, suicidal attempt.	Social Moderation
INTERNALIZING PROBLEMS	The poster described feelings of distress that were steered inwards, resulting in mental problems such as low self-esteem, low self-confidence, self-blame, depression, and social anxiety.	0.95 (0.00); 0.88 (0.00); 0.89 (0.00); 0.86 (0.02); 0.94 (0.00)
LONELINESS	The poster described negative feelings about the lack of interpersonal relationships and the difficulty in building relationships.	0.94 (0.00)
VENGEFULNESS	The poster described a desire for vengeance on the perceived perpetrator of school bullying, which could be passively reached by seeing, hearing, or knowing the misery of the perpetrator or actively inflicting the misery on the perpetrator. Curses and other emotionally intense verbal offenses are also considered as a desire, albeit implicitly, for vengeance.	0.93 (0.00)
MISTRUST	The poster described instances in which they have had trust issues or actively placed suspicion on other people or relationship with them, but without making any actual decisions.	0.90 (0.00)

2.2 Analysis

The data was analyzed using ENA to examine the difference in long-term effects of school bullying (discerned from Reddit posts) between those who have most recovered and those who have mostly not recovered. The primary stanza/conversation variable is forum, and the secondary is primary comment thread, the first-level comment thread. The stanza window choice is infinite stanza window as each primary comment thread

should be a unit within the same context, where each post is temporarily connected with any other post in the comment thread. Further, the primary unit variable is state of recovery with three levels: those who have mostly recovered, those who have mostly not recovered, and not indicated (i.e., the state of recovery is unclear or not expressed). The secondary unit variable is post, namely each line of the data.

We rotated the means to maximize the differences between two groups, Redditors who have mostly recovered and who have mostly not recovered, followed by a singular value decomposition. As lines of data were not normally distributed, a Mann-Whitney test was utilized to measure the difference between two groups. We closed the interpretive loop by sharing examples from the data to support that ENA models were grounded in the original data.

3 Results

Figure 1 presented three epistemic network models (two individual network models for two groups of Redditors and a comparison network model highlighting the major difference).

Redditors who have mostly recovered (See **Figure 1a**) had strong connections (LW >= 0.08) between vengefulness and other variables, including low self-confidence (LW = 0.08), self-blame (LW = 0.08), and low self-esteem (LW = 0.08); between mistrust and social anxiety (LW = 0.09); between mistrust and self-confidence (LW = 0.08); and between social anxiety and low self-confidence (LW = 0.09). On the other hand, Redditors who have mostly not recovered (See **Figure 1b**) had strong connections (LW >= 0.08) between mistrust and other variables, including low self-confidence (LW = 0.14), social anxiety (LW = 0.11), self-blame (LW = 0.08), and low self-esteem (LW = 0.08).

The comparison network model was unbalanced (See **Figure 1c)**, revealing that vengefulness was the main theme for Redditors who have recovered whereas mistrust was the main theme for those who have mostly not recovered. Along the *x*-axis, a Mann-Whitney test revealed that Redditors who have mostly not recovered (Mdn=0, N=126) were statistically significantly different from those who have mostly recovered (Mdn=0, N=34, U=2976.00, p=0.00, r=-0.39).

Interpretive examination of data confirmed patterns of the long-term effects of school bullying for Redditors who have mostly recovered. In their discourse, vengefulness was a frequent mental reaction to school bullying. For example, in one comment thread:

> *Line 1: I was bullied earlier in life and like you say it leaves you with shattered confidence (low self-confidence), which in my case manifested itself as a fear of many activities - particularly ones involving social interaction (social anxiety)…*
>
> *Line 2: … If the shit hits the fan one day (zombies!), know that you are going to be the one that keeps your shit together while they are going to be the ones that run away to cry somewhere alone (vengefulness).*

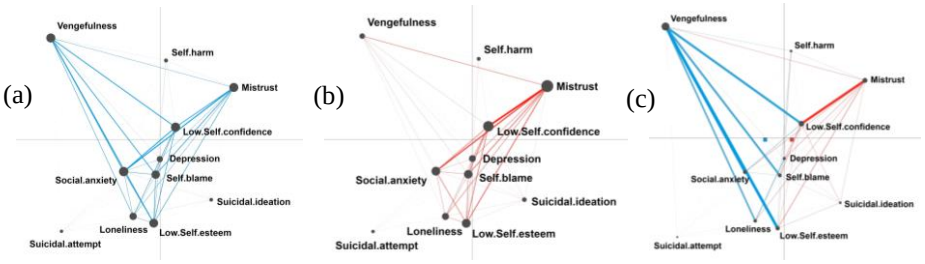

Figure 1. ENA displayed three epistemic network models.

Contextually, vengefulness had strong connections with low self-confidence, low self-esteem, self-blame, loneliness, and social anxiety. In sum, Redditors who self-described as mostly recovered frequently recounted their early negative experiences with bullies. and their current vengefulness toward the bullies.

In contrast, for the Redditors who have mostly not recovered, mistrust was a frequent feeling. For example, in one comment thread:

> *Line 1: I trust no one (mistrust). I can't seem to bond with people. I hate leaving my house for anything. I panic when I meet new people (social anxiety).. I used to think I was awesome once upon a time (low self-esteem).*

Contextually mistrust had strong connections with low self-confidence, low self-esteem, social anxiety, and self-blame. To sum up, Redditors who self-described as mostly not recovered frequently referred to their trust issues and internalizing problems that somehow contributed to their dysfunctional interpersonal relationships.

4 Discussion

We found that vengefulness was a key theme for Redditors who have mostly recovered whereas mistrust was for those who have mostly not recovered. Consistent with Carlisle and Rofes (2007)'s work, varying psychological symptoms grew out from the long effects of school bullying. Although the present study contributed to the existing research on school bullying, it has the limitation in which we used the data from only one forum on Reddit. Moreover, we didn't triangulate the data from analysis of multiple sources. In the future, we will collect data from other forums with the same topic and conduct interviews or give surveys to the victims of school bullying.

References

1. Carlisle, N., & Rofes, E. (2007). School bullying: Do adult survivors perceive long-term effects? Traumatology, 13(1), 16–26. https://doi.org/10.1177/1534765607299911
2. Hansen, T. B., Steenberg, L. M., Palić, S., & Elklit, A. (2012). A review of psychological factors related to bullying victimization in schools. *Aggression and Violent Behavior*, *17*(4), 383–387. https://doi.org/10.1016/j.avb.2012.03.008
3. Vanderbilt, D., & Augustyn, M. (2010). The effects of bullying. *Paediatrics and Child Health*, *20*(7), 315–320. https://doi.org/10.1016/j.paed.2010.03.008

Using the Question Formulation Technique in an Information Ethics Class to Meet Japanese Moral Education and Information Literacy Curriculum Goals

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Abstract. The purpose of this study is to verify whether the Question Formulation Technique (QFT), in which students (instead of the teacher) have the power to direct their learning experiences, can foster their moral character and agency. In this case, the authors created a QFT-based lesson on cyberbullying for a joint information ethics class, developed a morality matrix (rubric) based on the students' written reflections on the lesson, added the perspective of agency, and coded the data. In addition, a network model was generated by using the Epistemic Network Analysis (ENA) Web Tool. Based on the findings, the students in the joint class described their impressions related to cyberbullying and morality, with many students making statements related to agency. Their responses were then visualized and confirmed by the network model.

Keywords: Question Formulation Technique, Well-Being, Agency, Information Ethics, Moral Education, Information Literacy, Educational method

1 Background and Purpose

In 2019, the Organization for Economic Cooperation and Development (OECD) [1] published the OECD Learning Compass 2030, which examined "the competencies that children will need in the near future" and "the curriculum, teaching methods, and learning assessments that will lead to the development of such competencies." It not only defined agency as "the capacity to set a goal, reflect, and act responsibly to effect change," but it also presented the "Sun Model of Co-agency," which classified eight degrees of co-agency: 0. Silence; 1. Manipulation; 2. Decoration; 3. Tokenism; 4. Assigned, but informed; 5. Adult led with student input; 6. Shared decision making, adult led; 7. Young people-initiated and directed; and 8. Young people-initiated, shared

decisions with adults. Moreover, it stated, “The stronger the degree of co-agency, the better the well-being of both students and adults.”

In this regard, in a future society with more advanced information technology, it will be important for people to acquire the ability to use information (including information ethics) and demonstrate agency. In order for students to acquire agency, they must learn to ask questions, collect information, and make judgments on their own, as well as demonstrate what they have learned for themselves and others, instead of simply being taught by teachers. Thus, the purpose of this study is to determine whether the Question Formulation Technique (QFT) [2] can enable students to ask questions and deepen their thinking on their own, without the aid of a teacher. In this case, we created a QFT-based lesson on cyberbullying in a joint information ethics class, developed a morality matrix (rubric) based on the students’ written reflections on the lesson, added the perspective of agency (see Table 1), and coded the data.

The research questions are as follows:

RQ1: Can a QFT-based lesson/class contribute to the development of students’ morality and agency?

RQ2: Can a network model created by the Epistemic Network Analysis (ENA) Web Tool [3] be used to help students visualize their reflections on morality and agency?

Table 1. Morality matrix (rubric) with the added perspective of agency

	A. Understanding moral values	B. Formation of unique moral standards of judgment and choice	C. Moral emotions
3 (Agency) Develop a plan of action to create a good situation for oneself and others.	A3: Understand the necessary conditions to improve the situation for oneself and others.	B3: Make judgments based on the impact on others and the group.	C3: Attempt to act in a way that creates a positive situation for oneself and others.
2 Reflect on one’s own behavior and act responsibly.	A2: Metacognize one’s own behavior.	B2: Reflect on one’s own behavior and determine how to act.	C2: Reflects on one’s own behavior and attempt to act responsibly.
1 Develop a plan of action to avoid problems.	A1: Know the necessary conditions to avoid problems.	B1: Determine how to act in order to avoid problems.	C1: Attempt to take action to avoid causing problems.

2 Research Methods

2.1 Target class

On February 19, 2019, the first author led a QFT-based lesson on cyberbullying for a joint information ethics class at C Junior High School in City B, Prefecture A. The participants consisted of 123 first-year students from four different classes.

2.2 Analysis Methodology

In this study, we developed a morality matrix (rubric) with the added perspective of agency (see Table 1) to outline the three elements of morality defined in the Japanese Courses of Study (National Curriculum). Level 3 was based on the OECD definition of agency as "thoughts and actions that have a positive impact on oneself and others." Based on this rubric, we coded the students' written reflections on their own learning after the class (see Table 2) and generated a network model by using the ENA Web Tool.

Table 2. Example of the coding results

No.	Class	Sex	Data	A1	A2	A3	B1	B2	B3	C1	C2	C3
102	1	Female	I realized that using social networking sites has many advantages, but it also has disadvantages that can lead to cyberbullying. I was surprised to see that the person in the movie was laughed at because of a picture on a social networking site. For example, I posted some information as a joke and it was spread all over the school. Therefore, I would like to take care of other people and continue my education without any trouble.	1	0	0	1	0	0	0	0	1

3 Results and Discussion

The network model diagram for each class is shown in Fig. 1. In this case, the codes related to the students' agency are A3, B3, and C3, which are included as nodes in all four network models for Class 1, Class 3, Class 4, and Class 5. Based on the text data, the students' reflections on their learning contained agency-related morality. However, although this was a joint class, differences among the four classes of students emerged according to the development of agency.

4 Conclusion

This study examined whether the QFT, in which students (instead of the teacher) have the power to direct their learning experiences, can foster their moral character and agency. For this purpose, the authors created a QFT-based lesson on cyberbullying for a joint information ethics class, developed a morality matrix (rubric) based on the students' written reflections on the lesson, added the perspective of agency, and coded the data. Moreover, a network model was created by using the ENA Web Tool. Based on the findings, the students in the joint class described their impressions related to cyberbullying and morality, with many students making statements related to agency. Their responses were then visualized and confirmed by the network model.

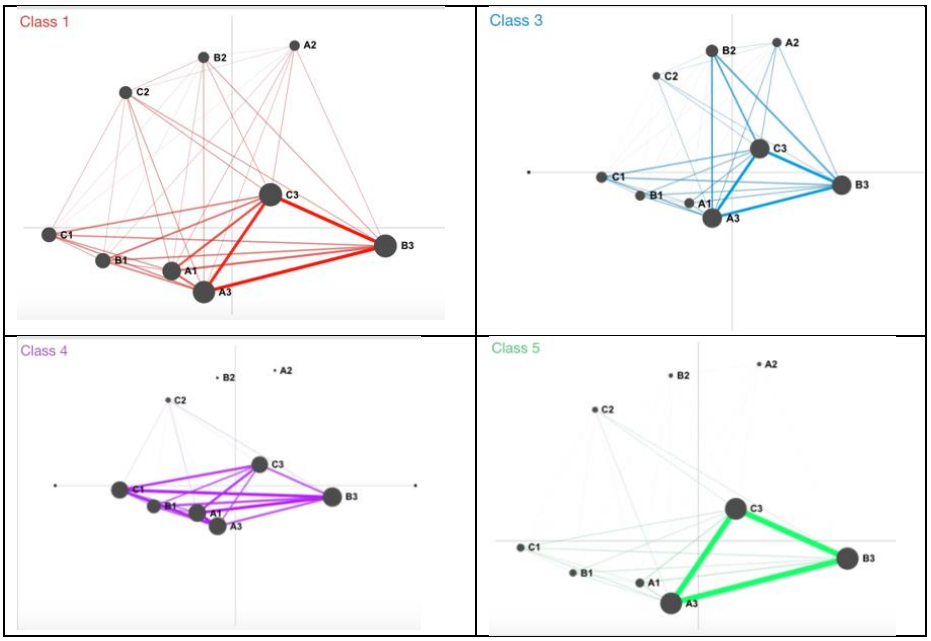

Fig. 1. Network diagram for each class

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References

1. OECD. OECD future of education and skills 2030 OECD learning compass 2030 a series of concept notes. 2019. https://www.oecd.org/en/about/projects/future-of-education-and-skills-2030.html, last accessed 2024/08/11

2. Rothstein, D. & Santana, L. Make Just One Change: Teach Students to Ask Their Own Questions. Harvard Education Press, Massachusetts, 2011
3. ENA. ENA official website. https://app.epistemicnetwork.org/login.html, last accessed 2024/08/11

Application of Neural Network Topic Modeling in Codebook Creation

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Abstract. This study examines the use of BERTopic, a neural network topic modeling tool, in developing codebooks. We analyzed interview data from a STEM mentorship program with BERTopic, and the model identified 39 recurring topics. However, human refinement was crucial to address its contextual limitations. The findings highlight the benefits of leveraging neural network topic modeling to enhance efficient codebook development.

Keywords: Quantitative Ethnography, Codebook, Neural Network Topic Modeling.

1 Introduction

A codebook guides the analysis and interpretation of data for qualitative analysis [1]. It provides a structure to systematically analyze and interpret data [2]. Despite the importance of codebooks, they are not frequently discussed in research literature [3]. This echoes Hai-Jews's [2] argument that even though "much time, effort, and expertise go into the development of codebooks, the culmination of these efforts is often unshared and lost to history." Developing a codebook is a fundamental and critical aspect of Quantitative Ethnography (QE) [3, 4], but the process can be time-consuming and imprecise, especially when dealing with large datasets [5]. However, with recent advances in machine learning technologies and large language models, it may be possible to leverage these tools and improve the efficiency of developing codebooks. Machine learning algorithms can quickly read and discover patterns in large text datasets [5] but using these tools for developing codebooks is still widely unexplored. Therefore, in this research, we explored the process of using BERTopic, a neural network topic model, to identify codes and develop a codebook.

2 Background

A codebook is an essential tool in QE [4]. It is a list of codes or subcodes, along with the definition and descriptors of those codes and representative examples from the data [1]. The process of coding data is a fundamental part of qualitative analysis and a

significant aspect of quantitative ethnography [3]. According to Shaffer and Ruis [6], coding is a means of bridging the world of events and the world of interpretations, and codebooks play a vital role in making this systematic process visible. Reading through large datasets manually to create codebooks can be time-consuming for humans to identify codes that a machine algorithm could easily find [5]. Leveraging these techniques to develop codebooks more quickly without limiting accuracy and validity [2] may be a promising avenue for QE researchers.

To address this challenge, several studies have explored using technology to aid the process of developing codebooks. Hai-Jew's [3] research on the application of CAQDAS (Computer Assisted Qualitative Data Analysis Software) found that such software can significantly aid the creation and application of codebooks by automating the identification of topics and coding of data. Cai and colleagues' [5] study about the use of Topic Modeling for Code Discovery in Large Scale Text Data found that machine learning algorithms can effectively automate pattern detection within large datasets, but human refinement is needed to guarantee accuracy and contextual relevance. In this preliminary exploration, we investigate the use of neural topic modeling for assisting in codebook development for QE analyses.

3 Methodology

We collected interview data from all the 9 undergraduate students that participated in a STEM mentorship program. The interviews were conducted in two stages, pre and post participation. The interview questions asked about student experiences, radical healing, relationships developed, and STEM identity. The purpose of the STEM mentorship program was to foster critical consciousness, inspire environmental justice, and cultivate a sociopolitical awareness among African American youth [7]. Data were segmented into lines which were turns of talk. Thereafter, we used the BERTopic Python package to assist in finding codes. BERTopic was chosen for this study due to its ability to generate interpretable topics with minimal supervision. This algorithm generates document embeddings with pre-trained language models, reduces and clusters the embeddings, and uses class-based TF-IDF (Term Frequency - Inverse Document Frequency) to generate topics [8]. We reviewed the topics and refined them into a codebook. The refinement process was guided by the relevance of the topics to our research questions and their alignment with the theoretical framework of radical healing. We removed codes that were not relevant to our research question and theoretical stance [9] and created definitions for the acceptable codes from BERTopic.

4 Findings

In the process of analyzing over 1200 lines of interview data from undergraduate STEM mentorship program participants, BERTopic generated total of 39 topics, and ranked the topics by frequency of related utterances, that is, the topic with the most count of related lines was first on the list and the topic with the least count of related

utterances was last. BERTopic's output included the list of topics, the representative lines for each topic providing the probability of the line belonging to the topic.

For example, the line "I think of healing as like basically fixing or dealing with the trauma that you dealt with when you were little. As a psych major, there are a lot of things I am learning about like, that's why I act like that. So, once you start realizing those things and you can apply it to your own life, then that's what I would consider healing. I also probably would consider like, Prayer is healing because, I'm very into my religion" was assigned to topic number 3 titled "3_healing_define_radical" with a probability of 0.63089 for this utterance to be related to topic 3_healing_define_radical.

Although BERTopic had generated topics from the data, we still had to read through the topics, understand them, and rename them. Topic number 3, that BERTopic named "3_healing_define_radical" was later renamed as Radical Healing.

After reading through the topics that BERTopic generated, we found that several topics could be collapsed as one code. Examples are topic number 17 titled "17_community_possess_skills_contribute", topic number 25, titled "25_create_inspires_change_similar", topic number 30, titled "30_participate_documenting_empowerment", and topic number 34, titled "34_hopes_community_happiness." We categorized these topics as radical healing.

There were some topics that we identified in the data that BERTopic missed. An example is students talking about skills they have gained through the program, which we named in the codebook as skill development. One of the students said "My leadership. I think I'm now a really good leader. I kind of know how to take charge and kind of just say, hey, we need to do this. Hey, we need to do that." This utterance shows that the student thinks they have grown in leadership, but BERTopic identified it under the topic of "17_community_possess_skills_contribute", which the line had a high probability of association.

After going through all the 39 topics that BERTopic generated and reading through the representative utterances, we discarded some topics and merged some topics, and we were able to come up with 12 codes for the data. Our final codes were Radical healing, Relationships, Program Experiences, Program Influence, STEM Identity, Future Aspirations, Graphic Novel, Community Involvement, Safety, Program Qualities, Stressors and Constructive Feedback.

5 Discussion

The use of BERTopic in the creation of a codebook for the qualitative analysis of interview data from a STEM mentorship program suggests that neural network topic models may aid in the creation of codebooks. The use of neural network topic modeling in this study to facilitate the development of a codebook reflects the principles outlined by Arastoopour Irgens and Eagan [4], that the integration of computational tools when interpreting discourse or text data can improve the efficiency and validity of data analysis. The use of BERTopic drastically reduced the time needed for initial codebook generation from four days of manual coding to just two minutes with BERTopic, followed by human refinement. A tool, such as neural

network topic modeling can help speed up the time-consuming process of codebook creation [5].

However, BERTopic also has limitations, particularly in its inability to understand contexts. A human coder can more easily understand language use and phrases in the data that do not necessarily have any meaning, but the computational tool is less likely to do so. Also, BERTopic only assigns probabilities rather than definitive categorizations of the topics. It is, therefore, important to note that even though neural network topic modeling can facilitate the development of codebooks with this dataset quickly, human refinement is still needed [5].

Integrating neural network topic modeling into QE coding processes can help streamline the identification of broad topics and patterns in the data. Future research could explore the use of other machine learning tools and Large Language Models (LLMs) with humans in the loop to enhance and optimize coding processes. Additionally, testing the scalability of using BERTopic on larger datasets and in different qualitative research contexts would further validate its applicability and potential for broader adoption in Quantitative Ethnography.

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

References

1. Saldana, J. (2021). The coding manual for qualitative researchers. SAGE.
2. Hai-Jew, S. (2017). Creating inheritable digital codebooks for qualitative research data analysis. In Data analytics in digital humanities. Multimedia Systems and Applications. Springer, Cham. https://doi.org/10.1007/978-3-319-54499-1_11
3. Roberts, K., Dowell, A., & Nie, J. B. (2019). Attempting rigour and replicability in thematic analysis of qualitative research data; a case study of codebook development. BMC Medical Research Methodology. https://doi.org/10.1186/s12874-019-0707-y
4. Arastoopour Irgens, G., & Eagan, B. (2022). The foundations and fundamentals of quantitative ethnography. In Advances in Quantitative Ethnography: 4th International Conference, ICQE 2022, Proceedings (pp. 3-16). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-31726-2_1
5. Cai, Z., Siebert-Evenstone, A., Eagan, B., & Shaffer, D. W. (2021). Using topic modeling for code discovery in large scale text data. In Advances in Quantitative Ethnography. ICQE 2021. Communications in Computer and Information Science, vol 1312. Springer. https://doi.org/10.1007/978-3-030-67788-6_2
6. Shaffer, D. W., & Ruis, A. R. (2021). How we code. In Advances in Quantitative Ethnography: Second International Conference, ICQE 2020 (pp. 62–77). Springer.
7. Behboudi, A., & Adefisayo, A., & Arastoopour Irgens, G. (2024). Promoting critical consciousness in students through Artifacts Co-creation with GAI. Symposium on learning, Design and Technology (LDT 24), https://doi.org/10.1145/3663433.3663435
8. Grootendorst, M. (2022). BERTopic: Neural topic modeling with a class-based TF-IDF procedure. arXiv (Cornell University). https://doi.org/10.48550/arxiv.2203.05794
9. French, B. H., Lewis, J. A., Mosley, D. V., Adames, H. Y., Chavez-Dueñas, N. Y., Chen, G. A., & Neville, H. A. (2020). Toward a Psychological Framework of Radical Healing in Communities of Color. The Counseling Psychologist, 48(1), 14–46.

Empowering Excellence: A Dive into the Creative Minds of Black Girls through Epistemic Network Analysis

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Abstract. This poster examines Black girls' creativity as they learn to code virtual Chatbots during a 9-week after-school program. Guided by the culturally responsive computing framework, the after-school program was designed to encourage the students to incorporate their cultural experiences and backgrounds into the development of their chatbots. The data presented in this poster includes semi-structured interviews, which were conducted at the conclusion of the program, and the students' completed chatbots. The models developed with epistemic network analysis revealed that as the students discussed their future aspirations and developed their chatbots, they made strong connections to their cultural belonging. Epistemic network analysis captured the nuanced methods in which the students incorporated their cultural backgrounds as they developed the chatbots.

Keywords: Black girls, Creativity, Creative problem-solving, Computer science, Epistemic network analysis

1 Introduction and Related Work

This poster presents an analysis of data from a nine-week after-school program designed to support Black girls' creativity as they learned to code virtual chatbots. In this setting, the chatbot refers to a digital program that can converse with a human. The after-school program discussed in this study was guided by the culturally responsive computing (CRC) framework [1]. This framework provides instructional practices that educators can use in their computer science (CS) curricula as they encourage the students to integrate their social and cultural experiences [1]. Through leveraging the benefits of computing, CRC highlights the significance of cultural backgrounds and experiences as valuable contributions in increasing participation in STEM fields [2, 3]. This study examined the students' creativity while they learned to code virtual chatbots.

Black creativity has been utilized to develop agency in the technology field [3]. This poster uses the standard definition of creativity, which states that an outcome needs to be novel and effective [4]. More specifically, we examined the ways in which students operationalized their creative problem-solving skills, defined as the ability to identify a challenge and develop a novel and appropriate solution [4, 5].

We utilized ENA to understand the cognitive connections the students made between their semi-structured interviews and their chatbots. ENA allowed us to visualize these connections, capturing the nuanced ways the students operationalized creative problem-solving

2 Methods

The data was collected during a nine week after-school program designed to support Black girls' creativity as they learned to code virtual chatbots. The program was conducted in a computer lab on a college campus on two days, with a different group of participants on both days. While the program was designed for girls, it was open to all genders. This poster presents data from five students, who identified girls, who participated in the interview at the conclusion of the program. This poster examines the interview data and the chatbots as they relate to the students' creativity as they developed virtual chatbots.

The data combines with the interview transcripts and lines of code from the students' chatbots. Segmented by turn of talks and code sentences, the dataset results in 343 lines of data. All data consist of qualitative data from four units. "*ID*" and "*Role*" represents the participants and differentiates the interviewer and interviewees. "*Type*" differentiate the content of data as interview or chatbot text. The unit of "*Topic*" is developed through the shifts in subjects within students' conversations by assessing interview transcripts. More specifically, the divided data consist of their learning attitudes, habits, and the changes in their interests as the project progresses. This nuanced data provides us with a detailed understanding of how Black girls grow and express creativity in the computer science field during specific phases of the after-school program.

The codes were inductively generated and then deductively applied to the data using a binary technique based on the theoretical framework of culturally responsive computing [5, 6]. Through an iterative process, the codebook was developed to capture both the behavioral and psychological nuances of students' dialectic content and to examine how their creative problem-solving operations manifested in their work. All of the data was manually coded by two coders. Raters coded the interview separately after all codes Cohen's κ reached above 0.7 through social moderation [7]. The two coders coded the chatbot texts together to ensure a consistent interpretation of students' coding expressions.

Taking into account the temporality of the discourse, and given that the interviewees are relatively young, the interviewer typically asks follow-up questions to expand on the responses. The rotation of the turns of talk is structured around two lines. Therefore, we determined that the appropriate moving stanza window size should be set to two.[8]. "*ID* (individuals)" and "*Type* (of data, interview or chatbot)" were set as conversation variables to ensure the data accurately represents each student. Calculated with both Person and Spearman correlation indexes, the goodness of fit is higher than 0.92 for both axes. None of the statistical tests were conducted since the interest of research is not to compare the changing difference of students' creativity through the learning process but to examine the cognitive experiences the students displayed as they engaged in creative problem-solving [2].

The ENA model visualizes connections between critical factors in students' code development, providing a comprehensive comparison between their reflections and chatbot outcomes, and helps identify how they operationalize creativity and manifest cultural belonging at different creation stages.

3 Preliminary Findings

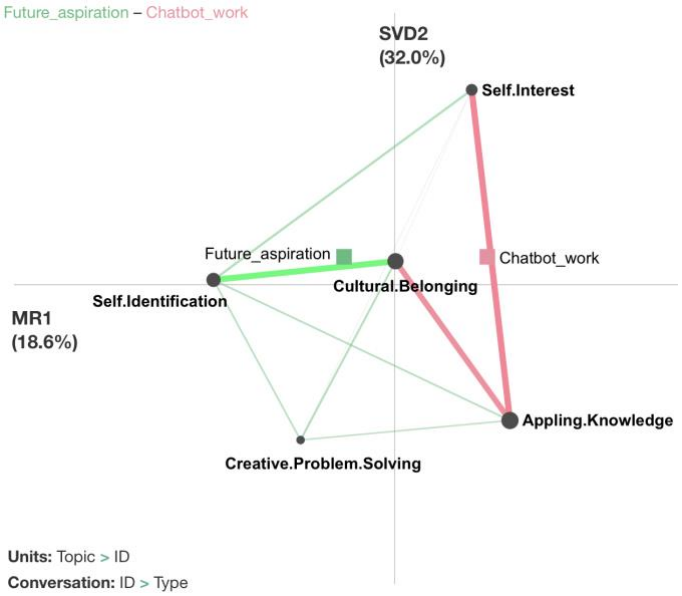

Figure 1. ENA model showing difference network between Future Aspiration discussion (Green) and Students' Chatbot (Pink)

Our qualitative analysis indicated that students expressed a stronger sense of *Self-identification* and *Cultural Belonging* in interviews, particularly when discussing their Future Aspirations. In contrast, the ability to *Apply Knowledge* and the focus on *Self-interests* were more prominently showcased in their final code work, suggesting a distinct connection to *Cultural Belonging* in a different context. As shown in Figure 1, the mean network graph of the Future Aspiration topic features a strong connection between *Self-identification* and *Cultural Belonging*, with an edge weight of 0.47. In contrast, Figure 1c illustrates the mean network graph of Students' Chatbot, which shows a strong connection between *Cultural Belonging* and *Self-Interests* with an edge weight of 0.54, and between *Cultural Belonging* and *Applying Knowledge* with an edge weight of 0.51.

In the Future aspiration topic shown as Figure 1, when students were asked how the computing program influenced their life or how they might utilize what they learned in other parts of their life, one of the participants replied: "*The different part is that you let us, is that you let us you know put music on and stuff. So it was like a good vibe. Also I like how we get to like, make our own things, not you telling us that we have to make something."* A deeper connection between students' reflection upon their learning experience and the class environment was reflected in this conversation. The phrase "*good vibe*" indicates that the program fostered a welcoming and culturally inclusive atmosphere. Yet, the appreciation of autonomy in creation highlights students' recognition of the value of coding and their aspiration to connect their knowledge further.

By contrast, students' Chatbot group indicated a stronger connection of *Cultural Belonging* to *Self-Interests* and *Applying Knowledge*. To note that, students' code work is objective which is designed to perform specific tasks without personal expression compared to interview data. For instance, one student coded: "*blackHistory = input ("Do you wanna learn some black history? (yes/no/maybe)").*" Foremost, the data implies students' capability of combining the knowledge of coding with their own interests, contributing to the connection between *Applying Knowledge* and *Self-Interests*. Nonetheless, the student's interests in Black history provides the connection between *Self-Interests* and *Cultural Belonging*, suggesting that they have comfortability in expressing curiosity.

5 Discussion and Conclusion

The researcher designed the after-school program to examine Black girls' creativity and engage them in computer science activities. At the conclusion of the program, the findings from the ENA models revealed that the students learned they can incorporate their cultural backgrounds and experiences into their desired career paths. As they learned about various coding methods, they applied their knowledge to the chatbots. This is noted as students used conditional statements to program the chatbot to discuss their interests and cultural backgrounds - such as ice cream or Black history. In a program guided by culturally responsive computing [5], students developed a sense of belonging in a field where they are underrepresented [1]. As such, this program bridged the digital divide in computer science through highlighting student experiences and cultures to encourage their engagement in computer science.

Epistemic Network Analysis has proven to be a valuable method for examining Black girls' creativity by capturing the nuances of their activities documented in their chatbots and interviews. Using this methodology, this poster revealed the opportunities the students in the after-school program seized to convey their cultural belongingness in a field where they are underrepresented. Future analysis conducted for this study will include an examination of the other topics to understand how the participants discuss their experience and implement it in their chatbots.

References

1. K. A. Scott, K. M. Sheridan, and K. Clark, "Culturally responsive computing: a theory revisited," *Learning, Media and Technology*, vol. 40, no. 4, pp. 412-436, 2015.
2. R. Fouché, "Say It Loud, I'm Black and I'm Proud: African Americans, American Artifactual Culture, and Black Vernacular Technological Creativity," *American Quarterly*, vol. 58, no. 3, pp. 639-661, 2006.
3. M. A. Runco, "Creativity research: Originality, utility, and integration," 1988.
4. Hoffman, L. R. (1961). Conditions for creative problem solving. *The Journal of Psychology*, 52(2), 429-444.
5. R. S. Nickerson, "Enhancing creativity," 1999.
6. Shaffer, D. W. (2017). Chapter 3: Grip. In *Quantitative ethnography* (pp.57 – 92).
7. Zörgő, S., Swiecki, Z., Ruis, AR. (2021) "Exploring Effects of Various Forms of Segmentation on Semi-Structured Interview Data with Epistemic Network Analysis. In: Advances in Quantitative Ethnography." *Communications in Computer and Information Science Series*. Vol. 1312. Eds. Ruis AR and Lee, SB., pp 78-90. Switzerland: Springer Nature.
8. Fischer, M., (2020). t Test, In P. Atkinson, S. Delamont, A. Cernat, J.W. Sakshaug, & R.A. Williams (Eds.), *SAGE Research Methods Foundations*. https://doi.org/10.4135/9781526421036931858

Epistemic Network Analysis of Professional Supports of Women and LGBTQ Physicists

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Abstract. Professional networks support careers through advice, advancement opportunities, and other resources. Research exists about the professional networks of women, but is lacking for lesbian, gay, bisexual, transgender, and queer (LGBTQ) people. Though the workplace challenges faced by women and LGBTQ scientists in physics and astronomy are increasingly documented, network scholars have not focused on these fields. This project addresses this gap by interviewing 100 physics or astronomy doctorate holders in the United States who identified as women, LGBTQ, or both. Participants were asked about how they developed their networks and the types of professional and personal support that they drew on. Our ongoing analysis finds that the types of support named by participants are more complex and entangled than the categories of instrumental and emotional support commonly discussed in workplace social support frameworks. We investigate these connections through epistemic network analysis, probing how different types of support interact with each other and whether significant differences appear across labor sectors. Quantitative ethnographic tools are a valuable way to look for large-scale patterns while respecting the fluidity and ambiguity in identities in our data.

Keywords: professional networks, social support, epistemic network analysis.

1 Introduction and Background

Part of a successful career in physics is building and maintaining a network of peers, collaborators, and mentors that can support finding new opportunities and professional growth. Such support is known to be challenging for groups such as women and LGBTQ (lesbian, gay, bisexual, transgender and queer) persons to find, and is one of the reasons that these groups remain underrepresented in physics [2].

Research on workplace networks has found that women often have less access to these networks than men or may need different kinds of contacts to succeed [5]. Studies of scientists from marginalized groups find that they often must seek mentoring and

support in “non-standard” places if they are excluded from majority-group networks. What is not known is how the research on LGBTQ exclusion or harassment intersects with research on gendered networks, or what professional networks look like for these physicists. There is a critical need for mentors, professional societies, and other organizations to better understand the career needs of women and LGBTQ scientists, because “one size fits all” mentoring and professional development often favors already over-represented groups. Our goal is to better understand these support needs and mechanisms and to inform departments and professional societies about how to provide more equitable resources.

2 Research Design and Data Collection

The primary research questions of the project are:

1. How are the professional support networks of women and LGBTQ physicists characterized in terms of size, tie type and strength, coherence vs. fragmentation, and the integration of advocacy and outreach connections?
2. What similarities and differences exist when comparing between academia, industry, and government job sectors?

Because our goal was to study marginalized groups and to explore narratives and mechanisms rather than predetermined categories of experience, we used a qualitative egocentric network design [6, 9]. We collected data through 45-90 minute semi-structured interviews with PhD-holding physicists and astronomers recruited through listservs, social media, and snowball sampling. We recruited 100 participants equally distributed across academia, industry, and government, though academia was overrepresented, as shown in Figure 1.

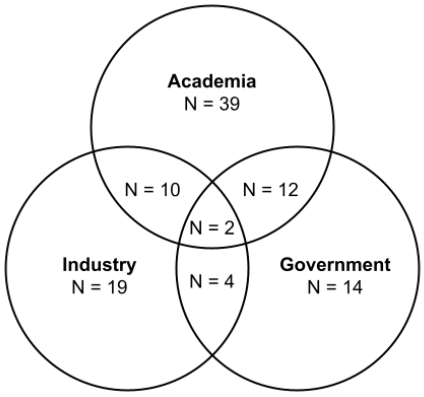

Fig. 1. Workplace sectors of participants, including overlaps.

The interview questions asked about participants’ current and previous jobs and how they found them. Subsequent questions probed dimensions of social support such as needing advice or help with work tasks, seeking emotional support for job-related

issues, and participation in identity- or advocacy-based groups (e.g., Out in STEM). During the interview, participants constructed a sociogram ("network diagram") [10] of their nodes and connections between them. Interviews were qualitatively coded using grounded theory [3] and inter-rater reliability was established among three primary coders, who then trained an additional coder. Code categories were refined and discussed throughout collection of the first 30 interviews. Table 1 gives the final major categories.

Table 1. Final structure of codebook. The "Nodal support" category will be the poster focus.

Top-level codes	Description	Number of subcodes
Connection nodes	People, groups, and institutions from sociograms and narratives	4 subcodes -> 19 sub-subcodes
Nodal support	How participants describe and use named nodes	10 subcodes
Career movement	How participants move within and between jobs and workforce sectors	2 subcodes -> 11 sub-subcodes
Individual values	Intrinsic values participants express as influencing their career trajectory	6 subcodes -> 18 sub-subcodes

3 First Findings and Framing the Epistemic Network Analysis

The interviews are a rich source of data about physicists' work experiences along many themes. Analysis of participants' graduate school experiences found very few positive experiences, with many reporting that their identities were ignored or denigrated, but that they drew on support from peers, select faculty, and affinity-based groups [4]. Another axis of ongoing analysis focuses on the Instrumental support code (a Nodal support subcode). Emerging themes from this analysis are participants' strategic selection of support givers, the importance of trust, and entanglement of instrumental and emotional support. We will explore this last aspect further through epistemic network analysis (ENA) of the subcodes in the Nodal support category.

Literature on workplace networks often distinguishes between instrumental support—help with e.g., work tasks, positive references—and emotional support [5]. Our grounded coding found a range of support subcodes: career advice, community-building, DEI initiatives, emotional, identity-based, instrumental, material, networking, physical closeness, and gaps in support. Rather than collapsing these into two predetermined categories, we explore their structure—how they co-occur, and how that differs by sector. This approach is rooted in both theory- and insight-based code selection [1].

One theoretical and methodological issue with research on gender in physics and astronomy is a tendency to impose binary categories [7, 8]. It was fundamental to this study that participants self-identified as women and/or LGBTQ, which are substantially overlapping groups in our sample. A related issue appears in dividing by work sector, because many participants fall into more than one category. In research areas where sorting people into neat categories is counterproductive, the tools of quantitative

ethnography are a valuable way to look for large-scale patterns that are nuanced but not predetermined by threads of identity in the data. ENA allows us to structure a conceptual space using all of the support codes, and then to ask how much variance in individual networks is explained by sector classification—and how this changes when accounting for participants who bridge sectors. We present findings from this analysis, including effects of segmentation choice with our interview data [11], and discuss them in context of our ongoing secondary coding of themes in the instrumental support data.

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References

1. Árva, D. et al.: Approaches to code selection for epistemic networks. In: Arastoopour Irgens, G. and Knight, S. (eds.) Advances in Quantitative Ethnography. pp. 409–425 Springer Nature Switzerland, Cham (2023). https://doi.org/10.1007/978-3-031-47014-1_28.
2. Cech, E., Waidzunas, T.: STEM Inclusion Study Report: AAPT. University of Michigan, Ann Arbor, MI (2017).
3. Charmaz, K.: Constructing Grounded Theory: A Practical Guide through Qualitative Analysis. SAGE (2006).
4. Gutzwa, J.A. et al.: Exploring how minoritized women and LGBTQ+ physics doctoral students navigate graduate education. Phys. Rev. Phys. Educ. Research. (in press).
5. Ibarra, H.: Homophily and differential returns: Sex differences in network structure and access in an advertising firm. Administrative Science Quarterly. 37, 3, 422–447 (1992). https://doi.org/10.2307/2393451.
6. Nimmon, L., Atherley, A.: Qualitative ego networks in health professions education: Capturing the self in relation to others. Medical Education. 56, 1, 71–81 (2022). https://doi.org/10.1111/medu.14663.
7. Rasmussen, K.C. et al.: The nonbinary fraction: Looking towards the future of gender equity in astronomy, http://arxiv.org/abs/1907.04893, (2019).
8. Traxler, A.L. et al.: Enriching gender in physics education research: A binary past and a complex future. Phys. Rev. Phys. Educ. Res. 12, 2, 020114 (2016). https://doi.org/10.1103/PhysRevPhysEducRes.12.020114.
9. Traxler, A.L. et al.: Person-centered and qualitative approaches to network analysis in physics education research. (under review).
10. Tubaro, P. et al.: The visual sociogram in qualitative and mixed-methods research. Soc. Res. Online. 21, 2, 180–197 (2016). https://doi.org/10.5153/sro.3864.
11. Zörgő, S. et al.: Exploring the effects of segmentation on semi-structured interview data with epistemic network analysis. In: Ruis, A.R. and Lee, S.B. (eds.) Advances

in Quantitative Ethnography. pp. 78–90 Springer International Publishing, Cham (2021). https://doi.org/10.1007/978-3-030-67788-6_6.

Exploring Communicative Acts in Diverse Software Engineering Student Teams

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Abstract. Literature on diverse teams uses varying definitions and reveals conflicting results of diversity on team outcomes. This study analyzes code review data from 22 student teams in a software engineering project context. By analyzing the communicative acts in this data, our results show significant differences in gender and performance diversity that align with the categorization-elaboration model.

Keywords: Gender-diverse student teams · Communicative acts

1 Introduction

Team-based activities are central to many educational settings that foster collaborative learning. In software engineering, research on diverse professional teams suggests a positive impact on team effectiveness. However, the majority of this work surrounds gender diversity rather than other aspects such as race, age, personality, etc. [4]. A recent survey shows that the benefits of diverse professional teams do not necessarily carry through in educational settings [2]. To better understand the dynamics in diverse student teams, we collect software engineering artifacts that shed light on team behaviors. Typically, a software engineering team works on a programming project in an online platform (e.g., GitHub) that allows members to work simultaneously by *pulling* the master version of the project, working on additional features locally, *pushing* the changes to the online repository, asking other team members to review their code, engaging in conversations as necessary until the code is accepted and merged to a new master version. In this context, we collected code review conversational data from 105 students split into 22 teams. We wish to explore which communicative acts exist in the data and how those patterns may vary when we consider the diversity of the teams. Our findings reveal significant differences in gender and performance diversity that align with the Categorization-Elaboration Model [7].

2 Theory

The Categorization-Elaboration Model (CEM) encompasses *social categorization* and *group information elaboration* processes to explain the relationship between

diversity and performance [7]. The model postulates information elaboration as a core process between diversity and performance, with member motivation, member ability, task complexity, and intergroup bias as moderators. Here, *intergroup* refers to potential subgroups that arise within a team due to social categorization. Although intergroup bias may arise in diverse teams, the exact determinants are not well established. The presence of intergroup bias may surface as conflict among group members due to *relationship conflict* - issues related to interpersonal differences in values - and *task conflict* - issues related to differences in the work approach [3]. From these perspectives, we view communication in the code review process as a mechanism to resolve conflict, and therefore minimize intergroup bias, to arrive at positive performance outcomes.

3 Method

3.1 Data

In total, 105 students enrolled in the course (86 males, 15 females, 1 non-binary, and 3 no answer; 63 racial minorities and 42 European descent; 11 racialized gender minorities). The students formed 22 teams. A team is *diverse* for a learner characteristic if at least two members differ in their values. In total, we had 12 gender-diverse teams, 16 racially diverse teams, and 8 teams with racialized gender minority members. Considering race only, 6 teams are racially homogeneous where 1 of these teams had members who are all white males. We further divided the teams based on performance and got 12 high-performing teams (those who scored higher or equal to the class mean) and 10 low-performing teams (those who scored lower than the class mean).

Students worked on a class project from September 2023 to April 2024. The code review data was collected between 30 September and 4 December 2023, providing insights into the initial team interactions. The data had 4,803 comments in total (averaging 218 comments per team and ranging between 40 and 1,328 comments per team). The data was segmented into individual review comments.

3.2 Analysis

We conducted content analysis by two raters on 29.79% of the data to establish intercoder reliability ($\alpha = 0.8564$); one round of inductive familiarization, followed by two rounds of deductive categorization [1] based on the codebook in Table 1, utilizing an action/process coding form of categorical labeling, and a non-exclusive approach to assigning labels [5]. These methods were adopted to collect as much context per line given the asynchronous nature of messages and replies in the code review process. The remaining text was labeled by one rater.

Epistemic network analysis (ENA) is a technique for modeling the structure of connections in qualitative data [6]. ENA is thus a useful technique for modeling the behavioral differences in diverse and homogeneous student teams because it can model the relationships among the communicative acts as they occur

Table 1: Codebook of communicative acts from the code review data.

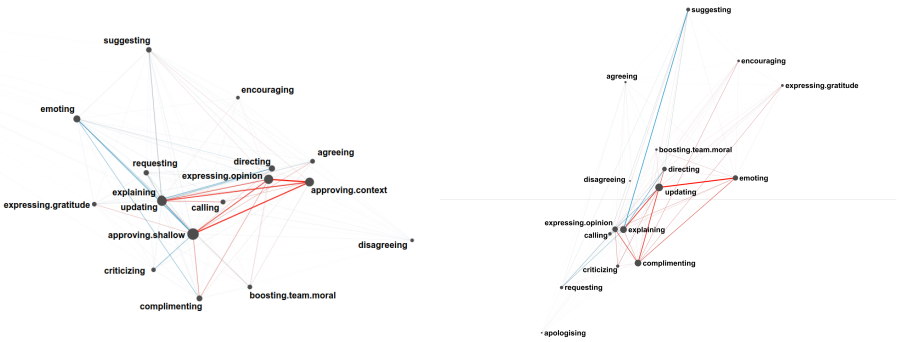
Code	**Definition**	**Example**
Agreeing	Say something in agreement	Alrite sounds good!
Apologizing	Recognize a mistake	My bad on this one.
Approving context	Approve with justification	Added templates, looks good!
Approving shallow	Approve, no justification	lgtm / Approved.
Boosting Team Morale	Encourage the team	This team is on fire
Calling	Reference a team member	jessica61 Any comments?
Complimenting	Praise something	Well done logs!
Criticizing	Criticize without solutions	Doesn't work on windows
Directing	Give specific instructions	Remove this. See above.
Disagreeing	Say something in opposition	Hmm actually, no.
Emoting	Express emotions	Yah what lol? / Haha odd :)
Encouraging	Encourage a teammate	Well done this week as always!
Explaining	Explain or clarify	Since we use Patternfly
Expressing Gratitude	Say thanks	Cool, thanks for doing this
Expressing Opinion	Give an opinion	It's my personal preference
Requesting	Ask a question	Are we using tailwind?
Suggesting	Give a suggestion	This could be just optional?
Updating	Provide a status update	Fixed bracket.

within the code review conversations. In what follows, we use ENA to explore the communicative differences between homogeneous and diverse teams, with respect to gender, race, and performance. We use teams as our unit of analysis. All statistical tests use the non-parametric Mann-Whitney U-test.

4 Results

Fig. 1(a) reveals that gender-homogeneous teams (all males, red) demonstrate predominantly task-oriented communication like contextual approval and updating, along with self-congratulatory behavior such as expressing opinions and complimenting. Conversely, gender-diverse teams (blue) engage in social relational communication like emoting and complimenting but less task-oriented communication such as shallow approval and criticizing ($U = 109, p < 0.001$). No statistical significance was detected for racially diverse and racially homogeneous teams. We also saw that teams with intersectional individuals echo similar communication patterns as gender-diverse teams ($U = 102, p < 0.001$).

Further explorations show that high-performing teams exhibit behavior for strong encouragement, detailed explanations, and context-rich communication. Conversely, low-performing teams engage in less-detailed communication, primarily offering shallow approvals and minimal explanation ($U = 103, p < 0.001$). When analyzing performance with gender and racial diversity, trends align with previous findings, with the notable distinction in Fig. 1(b) that low-performing gender-diverse teams (blue) display an increase in helpful collaboration ($U = 29, p < 0.05$) – a pattern not seen when looking at gender or performance alone.



(a) Gender diverse vs. all-male teams (b) Gender diverse high- vs. low-performing

Fig. 1: ENA difference graphs between two comparative groups.

5 Conclusions

According to CEM, gender-diverse teams demonstrate communicative acts to ameliorate potential relationship conflict whereas all-male teams mainly exhibit task-oriented behavior. The fact that we did not see such distinctions in the race condition suggests that race is not a salient social category for this cohort. Future work includes examining individual differences in diverse team contexts.

References

1. V. Braun and V. Clarke. *Thematic Analysis: A Practical Guide*. SAGE Publications Ltd, 2021.
2. I. Graßl, S. Krusche, and G. Fraser. Diversity and teamwork in student software teams. In *Proceedings of the 5th European Conference on Software Engineering Education (ECSEE)*, pages 110–119, 2023.
3. K. Jehn. A multimethod examination of the benefits and detriments of intragroup conflict. *Administrative Science Quarterly*, 40(2):256–282, 1995.
4. G. Rodríguez-Pérez, R. Nadri, and M. Nagappan. Perceived diversity in software engineering: a systematic literature review. *Empirical Software Engineering*, 26(102):1–38, 2021.
5. J. Saldana. *The coding manual for qualitative researchers*. SAGE Publications Ltd, 2009.
6. D. Shaffer, D. Hatfield, G. Svarovsky, P. Nash, A. Nulty, E. Bagley, K. Frank, A. Rupp, and R. Mislevy. Epistemic network analysis: A prototype for 21st century assessment of learning. *International Journal of Learning and Media*, 1(2):33–53, 2009.
7. D. van Knippenberg and W. van Ginkel. The categorization-elaboration model of work group diversity: Wielding the double-edged sword. In *The Psychology of Social and Cultural Diversity*. Blackwell Publishing Limited, 2010.

Gender Representation in Early Disney Princess Films

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Abstract. This work is a comparative study of gender representations in early Disney princess movies, specifically *Snow White and the Seven Dwarfs* (1937) and *Cinderella* (1950). By using Epistemic Network Analysis (ENA), the study looks at the stereotypes that are present in these stories and focuses on how princesses are portrayed, as seen by their interactions with other characters, mannerisms, and romantic goals. The type of character and gender are both strong indicators differentiating characters' representations. The plot also offers a nuanced perspective on the characters' personalities. The model presented in this poster only partially demonstrates the findings of the study. There are more comparisons to be made between characters and genders in terms of plot analysis and exploration.

Keywords: Quantitative Ethnography, Gender Representation, Disney Princess Movies

1 Introduction and Literature Review

Early Disney princess movies have profoundly impacted generations, serving as cultural touchstones while simultaneously igniting debates over their portrayal of gender roles and stereotypes [2]. Given the ways that media generates materials out of which we forge cultural notions of gender, race, and identity [1], it is imperative to explore how and what sociolinguistic messages people may perceive from those texts and images [3]. Numerous studies outside the Quantitative Ethnography (QE) field have focused on analyzing stereotypical female representation in early media [2], particularly in Disney princess films. Given the nuanced perspectives that Epistemic Network Analysis (ENA) provides through its discursive structure [3], this research aims to examine how early Disney princess movies, specifically *Snow White and the Seven Dwarfs* (1937) and *Cinderella* (1950), portray gender representation of characters by analyzing their interactions and romantic goals to identify prevalent gender stereotypes.

Unbound from reality, films deliberately employ specific events, character language, and nonverbal cues to craft narratives [4]. Analyzing these narratives requires attention to scenes, dialogues, and shots for a comprehensive understanding of discourse subtleties. This dataset's uniqueness lies in a close examination of both verbal and nonverbal elements to decode emotional expression via semiotics [4]. This approach integrates social semiotics with emotion cognition theories, enabling a detailed examination of characters' emotional interplay and behavior within films. This analysis accentuates the pivotal role of expression in narrative construction and character arcs.

Building on this semiotic analysis framework, the examination of gender representations in film extends these concepts into the realm of character development, particularly in the context of gender roles. Grounded in gender theories, extensive literature reveals that behavioral attributes and narrative resolutions in early Disney films serve as mirrors for gender roles [1], especially in the depiction of princesses [2]. Recently, the narrative of power has been scrutinized as a vehicle for unspoken gender norms, highlighting traditional traits like assertiveness, independence, and warmth [2]. Evolving debates on gender depiction in Disney classics now consider "power" in terms of characters facing obstacles and growing, thus deepening our comprehension of gender messaging within these narrative actions. Thus, the research question is: In what ways do the representations of the heroines in early Disney princess films, specifically Snow White and the Seven Dwarfs (1937) and Cinderella (1950), portray character traits and development within the narrative, including their attitudes towards challenges, romantic relationships, and personal growth?

2 Data Collection and Data analysis

Sourced from the JH Wiki website, the primary data comprises movie scripts, encompassing both dialogue and narration, along with descriptions of scenes. Data collection for this project was naturalistic, relying on the existing content of the films. The study examines the existing public material to extract relevant insights.

The unit variables are arranged in the order of gender, plot, then character. In terms of plot, this unit grouped the data by five-act storytelling structure, aligning the sequence of narrations. The sequence is dedicated to assessing the depiction of individual characters in each plot, thereby generalizing the gender representation under discourse of each movie. The data is segmented in lines by turns of talk, resulting in 845 lines of data. Different movies and scenes are set as the conversation variables, ensuring the independence within their own plot. Given the whole conversation method only captures the connection of elements under the same group, ENA visualizes the co-occurrence of codes within a single stanza, which better examines portrayal of individual gender representation within the story [8]. All models for the current stage applied the whole conversation method, with both Pearson and Spearman correlation indexes showing a goodness of fit higher than 0.93 for both axes.

All the codes are developed by an inductive approach [3]. First, the code "*Beauty*" is often portrayed as a defining trait of princesses, highlighted from the beginning of their tales. It also serves as a subtle catalyst for conflict, provoking hostility among other female characters and completing the storyline. Drawing upon social semiotic theories and cognitive theories of emotions in film studies [4], the codes also include "*Positive*" and "*Negative*" emotions, with sub-code as "*Happiness*," "*Dream*," "*Terrified/Sad*," and "*Envy/Jealousy*." The addition of "*Activeness*" and "*Passiveness*" codes aims to critically assess characters' engagement with challenges and their journey towards personal growth, based on the evolving discussions around gender portrayal in movies [2]. The selection of codes was not arbitrary but rather rooted in the existing literature on gender portrayal in early Disney films [2]. The development of the codes was grounded in a comprehensive analysis of the transcript texts, along with a detailed examination of the visual elements such as character actions, plot developments, and

expressions within the films. The iterative coding process involved simultaneous coding of the transcripts while viewing the films, allowing for continuous refinement of the codes. This approach ensured that the codes effectively encapsulated the messaging of gender representation, as well as the portrayal of romance, love, and the desirable qualities emphasized within the narrative discourse.

Coding in this study involved researcher interpretation of character actions and language. Yet, one's perception of characters and narratives in films is influenced by their social identities, backgrounds, and experiences [6]. To achieve the desired level of interrater reliability, social moderation was applied to reconcile and explore any discrepancies between the two coders' results [5].

Male and female characters were visually and statistically contrasted using epistemic networks (ENA). Hypothesizing the distinction between different gender role portrayals, the research will use the Mann-Whitney test to analyze the statistical significance of differences to determine. This non-parametric test, which is appropriate for comparing two independent samples, compares the median scores for the two characters thus confirming the portrayals of gender difference [7].

3 Preliminary Findings

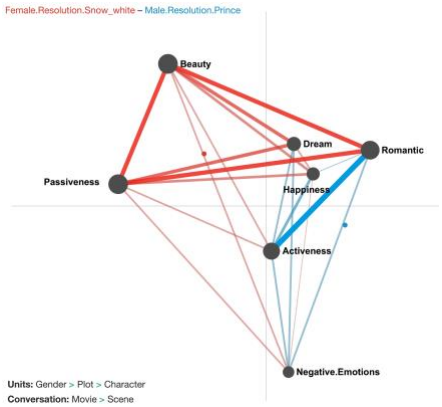

Figure 1. ENA difference model between Snow White (red) and Prince Charles (blue)within the plot of Exposition in *Snow White and the Seven Dwarfs* (1937).

The network shows a clear distinction between two clusters of topics associated with the characters. The connections between codes are not evenly distributed, implying the major driven force of certain codes in this discourse. "*Romantic*," "*Dream*," and "*Happiness*" are the major themes facilitating the storyline.

The node "*Activeness*" is more associated with the representation of the prince as it is positioned on the right side. In the scene, the prince mourns for the death of Snow White with sorrow and love, singing, ". *Of one love, only for youuuuu!*[*Romantic*]" and meanwhile, "*Charles goes over to Snow White and leans in for a kiss* [*Activeness*]." Yet, "*Passiveness*" is more associated with the portrayal of Snow White. As the receiver is being rescued, "*the princess' eyes flutter and she slowly stirs awake* [*Passiveness*]."

Qualitative review of the data suggests that the representation of the prince in the exposition were emphasized on his "*Activeness*" to "*Romantic*," "*Dream*," and "*Happiness;*" while the portray of Snow White were focused on her "*Passiveness*" with her "*Romantic*," "*Dream*," and "*Happiness,*" connecting to her "*Beauty*."

Figure 1 shows the epistemic network comparing how Prince Charles (blue) and Snow White (red) were both verbally and behaviorally depicted in the resolution part of the movie. The representation of Snow White (Mdn=-0.12, N=23) was statistically significantly different from the prince (Mdn=0.19, N=14 U=262.00, p=0.00, r=-0.63), indicated by a Mann-Whitney test along the X axis (MR1).

The mean network graph of Prince Charles contains a strong connection between "*Activeness*" and "*Romantic*" has an edge weight of -0.6. In contrast, Figure 1b shows the mean network graph of Snow White, which contains a strong connection between "*Passiveness*" and "*Romantic*," also "*Passiveness*" and "*Dream*" both with a line weight of 0.36.

4 Discussion and Conclusion

The model presented above only partially illustrates the study's findings. Given this poster's focus on gender representations, the comparison, analyzing the interaction between Snow White and Prince Charming within the same scene, aligns more closely with the poster's key theme. Aligning with the narratives, "*Romantic*" is the major topic of the plot as Exposition, as the prince saves Snow White from the curse with a kiss. This uneven balance indicates that the conversation about these characters is focused on certain attributes, potentially reflecting gender stereotypes within the discourse. The observed patterns in the network analysis, where the prince is associated with "*Activeness*" and the Princess with "*Passiveness*," may reflect entrenched cultural narratives that assign traditional gender roles in stories [1,2]. The imbalance in the network signifies a predominant discourse that emphasizes the male as proactive and the female as reactive, particularly in romantic contexts [2]. These stronger connections indicate a recurring association that may stem from long standing societal expectations and storytelling conventions. The contrasting models for the Prince and Princess mirrors the different roles and behaviors that society often expects of men and women, which are reinforced through repeated representation in various forms of discourse.

In addition, this study also conducted cross-comparisons between different characters in the two films, such as the comparison between Cinderella and Snow White similar scenes featuring and supporting characters (the Dwarfs and the Grant Duke) with the evil stepmother and stepsisters. Overall, the comparisons reveal that both character type and gender are significant factors in differentiating character representations, particularly in terms of power dynamics. The plot also provides a nuanced view of the characters' personalities, extending beyond just their romantic relationships. Given the complexity and structural diversity of the two movies, there are many opportunities for comparative analysis of characters and gender.

References

1. Dines, G., & Humez, J. M. (1995). Gender, race and class in media: A text reader. Sage Publications.
2. England, D., Descartes, L., & Collier-Meek, M. A. (2011). Gender role portrayal and the Disney Princesses. Sex Roles, 64(7-8), 555-567.
3. Shaffer, D. W. (2017). Chapter 3: Grip. In *Quantitative ethnography* (pp.57 – 92).
4. Feng, D., & O'Halloran, K. L. (2013). The multimodal representation of emotion in film: Integrating cognitive and semiotic approaches. Semiotica, 2013(197), 79-100.
5. Hoyt, W. T. (2018). Interrater reliability and agreement. In The reviewer's guide to quantitative methods in the social sciences (2nd ed., pp. 132-146). Routledge.
6. Loschky, L. C., Larson, A. M., Smith, T. J., & Magliano, J. P. (2020). The scene perception & event comprehension theory (SPECT) applied to visual narratives. Topics in Cognitive Science, 12(1), 311-351.
7. Knapp, H. (2016). Mann-Whitney U Test [Video]. Sage Research Methods. doi: https://doi.org/10.4135/9781506359120
8. Zörgő, S., Swiecki, Z., Ruis, AR. (2021) Exploring Effects of Various Forms of Segmentation on Semi-Structured Interview Data with Epistemic Network Analysis. In: Advances in Quantitative Ethnography. Communications in Computer and Information Science Series. Vol. 1312. Eds. Ruis AR and Lee, SB., pp 78-90. Switzerland: Springer Nature.

Identifying relevant parties in examining issues faced in the museum workplace context

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Abstract. Insight into issues faced in museum workplace contexts were documented in posts to the Change the Museum Instagram account, launched in June 2020 to document instances of unchecked racism in US museums. Post content was coded on identity categories of race, gender identity, sexual orientation, and positional categories, among other constructs. Epistemic network analysis (ENA) was used to visualize the relevant parties involved with workplace issues. Four ENA models on the workplace situations of (1) Existing Issues in an institution (2) Employment and Wages (3) Departure and (4) Intent for Plan, were generated to gain definitive awareness into which parties were usually involved or affiliated with these issues. These results can help inform who to include or address when tackling such topics.

Keywords: Museums, Workplace, Diversity, Racism, Microaggressions, Policy Change, Social Media

1 Introduction

Concerns around diversity, equity, inclusion, accessibility, anti-racism, and justice continue to be part of workplace experience conversations across the United States. Research indicates that policies and practices that foster an open, safe, and inclusive environment for employees from different backgrounds promotes a more successful organization [1]. Museums continue to be part of the conversation of these efforts of change, catalyzed by situations in 2020 that led to a refocus on antiracist actions and policies. This poster seeks to identify relevant parties involved with key issues in the museum workplace through an examination of anonymous testimonies posted on social media during a critical time period of 2020-2021 by past and current museum employees.

2 Methods

The dataset for this study involved one year (June 2020 – June 2021) of entries on the Change the Museum Instagram account, which covered the most active period of posts. This resulted in a dataset comprised of 641 posts total. Museum staff sent submissions anonymously, so neither submitters or account owners could be identified. Posts do not

require formal attribution to protect the submitter, however certain institutions, locations, or individuals in leadership roles are often included within the content of the post. The date posted was used as metadata to organize a review of the data. The text from each post was carefully transcribed, and a codebook was developed through a thorough iterative process that was outlined in previous work [2]. While the full list of constructs appears in the previous paper [2], the list in Table 1 includes the constructs most relevant to the results of this particular analysis.

Table 1. Codebook of constructs included in analysis.

Construct	Definition
Male	Directed toward or involves a person/people who are/identified as male.
Female	Directed toward or involves a person/people who are/identified as female.
LGBTQIA2+	Lesbian, gay, bisexual, transgender, queer, intersex, asexual (sometimes ally), two-spirit, and other gender non-conforming identities or expressions of sexual couplings.
Latinx	Directed toward or involves a person/people who are/identified as Latinx (Latino/a/e/x).
Black	Directed toward or involves a person/people who are/identified as Black.
AAPI	Directed toward or involves a person/people who are/identified as Asian American or Pacific Islander.
Donor, Board Member	Referring to donors, board members, VIPs, stakeholders.
Senior (Leadership)	Referring to senior level of leadership, including President, VPs, Directors, "higher-ups," and Chief (C)-suite staff.
Department Head, Supervisor	Referring to department heads, supervisors, managers, chief curators.
Peers, Colleagues	Referring to peers, colleagues, curators.
Front Facing	Referring to any front-of-house staff, security, visitor services, custodial, minimum-wage or entry-level position.

Data analysis involved the use of epistemic network analysis (ENA) to create visualizations of the connections between constructs in the data [3], which will aid in giving a sense of the parties usually involved with raised issues. Four models were generated, focused on issue oriented constructs including: (1) Existing Issues (acknowledgement of a history within the institution of specific, ongoing issues; calling out institutional culture), (2) Employment and Wages (hiring, advancement, recruitment, wage disparity, internships, fellowships, contractors, limited-term staff, career advancement, COVID-19 conditions of employment, unionizing, diversity hires), (3) Departure (leaving an organization/institution/field, usually because of the

experience at the institution; constructive discharge, leaving when issues were unresolved, or being laid-off), and (4) Intent for Plan (Intent for IDEA plan/committee etc., but not necessarily follow through; also, the conducting of related IDEA training). Edges were scaled to 2.5 to enhance the visibility of the most salient connections.

3 Results and Discussion

The ENA network models generated for (4) issues are seen below in Figure 1, followed by an interpretation of each. The dots (nodes) indicate the constructs included in the model, and the lines (edges) indicate the connections between constructs. The thicker the line, the stronger connection between the constructs, and opposite is the case for thinner lines, which indicate weaker connections between constructs.

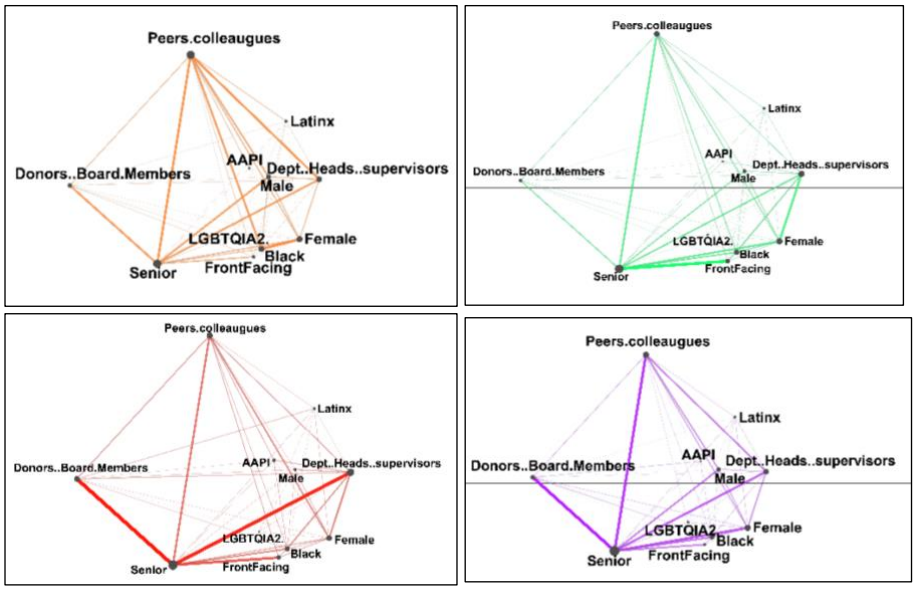

Fig. 1. ENA network models for Existing Issues (top left, orange), Employment & Wages (top right, green), Departure (bottom left, red), and Intent for Plan (bottom right, purple).

For **Existing Issues**, we see the strongest connections are between Black with Female and Peers/Colleagues. The context for this connection tended to indicate the ongoing challenge of black women (and women of color) in having administrative roles in the workplace:

> I've worked in a few large museums and a few more cultural institutions. All of them have the same problem. Percentage wise, their diversity quotas are all met. But it's only front of house (ticketing, security, tour guide) staff that are Black or PoC. I…finally got an office job at a museum. I was working with a large donor… [who] took the time to call me directly and let me know that 'after working with the museum for many years, she was so glad to finally meet a

young woman of color who was working in the actual administration, and doing good work…

In looking at **Employment and Wages**, the thickest line was between Senior and Front Facing, indicating the impact of Senior Leadership on making employment decisions for Front Facing employees. This was especially the case in Fall 2020, where several posts indicated the ongoing pandemic led to museum staffing cuts, where front facing staff were among the first to be let go due to the lack of in-person visitors. This reveals the vulnerable position front facing staff have, and the address the regard necessary for such positions.

For **Departure**, the strongest connections involve Senior leadership, with other positional roles such as Donors, Board Members and Department Heads. This is indicative of how issues of departure typically involve these parties, as seen in several posts, such as "When outgoing Executive Director shared that as a person of color I would be heading a museum leadership pipeline program for BIPOC that we co-developed and was funded by Ford and Walton Foundations, a board member ask "what color" and they and many of the other board members laughed. I resigned shortly thereafter."

In **Intent for Plan**, prominent connections include Senior leadership with Peers/Colleagues and Donors. This highlights how the intentions for change are discussed, especially among peers and colleagues, but tend to be thwarted by positional power. As stated in one post, "Along with a few other colleagues, I started an equity task force at my museum. After a few productive meetings, we were asked by the museum's director to stop meeting."

When examining several hundred posts of rich data, ENA helps to provide visualizations to help identify key trends to be addressed in institutional policy change. In the case of this study, such network models helped to indicate which individuals are most involved when four key issues are raised among posts Further examination on other issues will help to inform ongoing plans for change in museum workplace contexts.

References

1. Stevens, F. G., Plaut, V. C., & Sanchez-Burks, J. (2008). Unlocking the benefits of diversity: All-inclusive multiculturalism and positive organizational change. *The Journal of Applied Behavioral Science, 44*(1), 116-133.
2. Authors. (2022).
3. Shaffer, D.W.: Q*uantitative Ethnography*. Cathart Press, Madison, WI, 2017.

Multimodal Interaction in Transactive Discourse

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Abstract. Transactivity, which refers to reasoning based on each other's reasoning, is essential to collaborative problem solving (CPS). Quantitative analyses of CPS discourse have identified patterns of transactivity, which can be considered as different types of contributions toward CPS discourse. From an agency perspective, transactivity is a form of agency that focuses on verbal contribution, and other forms of agency would be observed as multimodal interactions, such as interactions with physical objects. To gain a deeper understanding of CPS, both transactivity and multimodal interactions must be considered. However, studies on transactivity have primarily focused on verbal contribution in CPS, so little attention has been paid to multimodal interactions. In this study, we use shared epistemic agency as an analytical lens and examine what types of multimodal interactions can be seen in different patterns of transactivity. Eight groups, each with three members, participated in a 45-minute collaborative problem-solving task. We conducted a quantitative analysis to identify the patterns of transactivity among the groups, followed by case studies of two groups exhibiting different patterns of transactivity. Shared epistemic agency and multimodal interactions were coded, and epistemic network analysis was applied. The results suggested that distributed and stable multimodal interaction was key to successful transactive discourse, while monopolistic and unstable multimodal interaction characterized the less successful group. Our proposed methodology illuminates both verbal and nonverbal contributions toward transactive discourse, offering more detailed explanations of CPS processes.

Keywords: Transactivity, Multimodal Interaction, Shared Epistemic Agency.

1 Introduction

This paper aims to explore patterns of multimodal interactions in transactive discourse. As collaborative problem-solving (CPS) skills become increasingly essential for 21st-century learners and workers, productive CPS processes have been actively studied. Various factors have been clarified and theorized, with one being transactivity [1].

Transactivity refers to reasoning that builds on the reasoning of others, and it is considered key for productive CPS [1]. This verbal trait was originally examined in a qualitative manner, but in recent years, quantitative analyses have been introduced [2, 3]. However, quantitative studies on transactivity have paid little attention to

multimodal interactions. Although transactivity is an essential verbal trait, participants often engage in multimodal interactions, especially with physical objects. Thus, participants often engage in multimodal interactions within transactive discourse. By reexamining transactive discourse from the perspective of multimodal interaction, we may gain a deeper understanding of the CPS process.

2 Background

Transactivity is a verbal contribution toward CPS. Within transactive discourse, reasoning is built on existing reasoning [1], and collective knowledge is co-constructed. Such collective effort can be seen as an expression of *agency* in CPS. In other words, transactivity is a form of *agency* toward collaborative, productive discussion.

Previous studies have identified three patterns of transactivity, namely *collective*, *fixed*, and *rotating* [2, 3]. *Collective* transactivity refers to distributed contribution toward transactive discourse. In *collective* transactivity, contributions are distributed among all group members, with each member actively participating in the discussion. In contrast, *fixed* transactivity is characterized by unbalanced contributions, where only specific member(s) contribute, leaving others less engaged. *Rotating* transactivity contains both aspects, with contributions not always evenly distributed, but the primary contributors rotate depending on the context, ensuring that all members participate at different times. From the perspective of collaboration, the *collective* and *rotating* transactivity are considered more successful than the *fixed* transactivity. These patterns indicate that successful transactivity occurs when all members of the group demonstrate their agency during CPS.

However, while transactivity is a crucial form of *agency*, another important form of *agency*—multimodal interaction—has been insufficiently discussed. *Agency* in CPS involves not only transactivity, an essential verbal trait, but also multimodal interactions, such as engagement with physical objects [4]. Quantitative analysis of transactivity can determine if the CPS process was successful but does not explain *why* specific patterns of transactivity emerged over others. We hypothesize that analyzing multimodal interactions within transactive discourse will provide deeper insights into the CPS process. Thus, our research question is: How do multimodal interactions differ among groups demonstrating different patterns of transactivity?

In this study, we use shared epistemic agency [5] as the theoretical framework. Shared epistemic agency refers to collective responsibility and effort toward successful collaboration, being theorized as seven types of activities.

3 Method

Twenty-four undergraduate students participated in a 45-minute CPS task called "Rescue at Boone's Meadow" [6]. Participants were divided into eight groups of three members each. Group composition was designed to minimize socio-emotional conflicts during CPS. The problem and related information were presented to participants through a 17-minute video. The video tells the story of a man named Jasper and his

friends who discover a wounded eagle in Boone's Meadow. Participants were asked to determine the fastest way to get the eagle to a hospital. They were given approximately 45 minutes to solve the problem. The video was played on a laptop, and participants were able to write down information using the whiteboard. Video and audio were recorded during the CPS.

Transactivity was quantified using socio-semantic network analysis (SSNA) [2, 3]. SSNA represents the use of words in transactive discourse as a co-occurrence network of words and calculates its temporal change. Greater transactivity results in more word clusters and an expanding co-occurrence network. SSNA uses the network metric degree centrality (DC) to measure transactivity: the temporal change in the sum of DC reflects the trajectory of transactivity over time. We employed the SSNA tool Knowledge Building Discourse Explorer (KBDeX) [7] to quantify transactivity and identify individual contributions to the group's discourse.

Based on the classification, two groups demonstrating roughly equivalent CPS outcomes but different patterns of transactivity (*collective* and *fixed*) were selected for case studies. The transcriptions were manually coded by three human coders. The coding framework was developed based on the definition of shared epistemic agency [5] (the average of Cohen's Kappa: 0.95). As for the multimodal interactions, we annotated interactions with physical objects, a laptop and a whiteboard (the average of Cohen's Kappa: 1.00). The ENA web tool was used to model the shared epistemic agency and multimodal interactions. The Stanza size was set to 4 because the interval between transcription lines was 3.82 seconds on average (*SD* = 3.98 sec) and the intended stanza size was 10 seconds. Each transcription was divided in half based on the elapsed time and labeled as the first and second half. This label was used as the parameter "scene".

4 Results and Discussion

Among the eight groups (A to E), groups D and E were selected for the case study. Although these two groups achieved similar CPS outcomes, group D demonstrated *collective* transactivity, while group E exhibited *fixed* transactivity. Member E2 from group E significantly contributed to the transactive discourse, essentially *monopolizing* it. In contrast, contributions in group D were more evenly *distributed* among members.

Epistemic Network Analysis (ENA) revealed a significant difference in shared epistemic agency and multimodal interactions between Groups D and E. **Fig. 1** indicates that Group D displayed high cohesion and coherency, reflecting *stable* group dynamics. Video recordings also suggested *stable* and *distributed* multimodal interactions, with member D3 primarily responsible for manipulating the laptop (N.PC.MNP) while others worked on the whiteboard. In contrast, Group E exhibited *unstable* and *monopolistic* multimodal interactions. Video recordings showed that member E1 *monopolized* both the laptop and the whiteboard, significantly disrupting group dynamics (**Fig. 1**).

Regarding the limitations, (1) we included limited modalities, and (2) many codes for a small sample size may cause overfitting. Despite these limitations, this study offers a more detailed analysis of transactive discourse from a multimodal perspective.

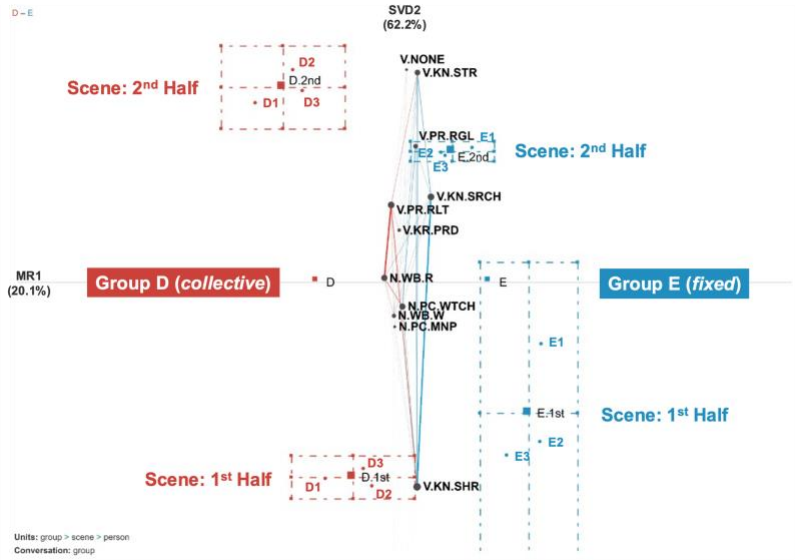

Fig. 1. The comparison plot for groups D and E.

References

1. Teasley, S. D.: Talking about reasoning: How important is the peer in peer collaboration? In: Lauren B. Resnick, Roger Säljö, Clotilde Pontecorvo, Barbara Burge (eds.), Discourse, tools and reasoning, pp. 1–20. Springer, Heidelberg (1997)
2. Oshima, J., Oshima, R., Yamashita, S., Lu, J.: Leadership of transactive discourse in collaborative problem solving. In: Damşa, C., Borge, M., Koh, E., Worsley, M. (eds.) COMPUTER-SUPPORTED COLLABORATIVE LEARNING - CSCL 2023, pp. 360–361. International Society of the Learning Sciences, Montreal (2023)
3. Lu, J., Yamaguchi, S., Oshima, J., Saruwatari, S., Oshima, R.: Multimodality in Transactive Discourse: Integration of MmLA and SSNA. In: Fifth International Conference on Quantitative Ethnography: Conference Proceedings Supplement, pp.162–165. International Society for Quantitative Ethnography, Melbourne (2023)
4. Damşa, C.: Networks, artifacts and agency: Examining engineering students' collaborative learning and agency. In: Damşa, C., Borge, M., Koh, E., Worsley, M. (eds.) COMPUTER-SUPPORTED COLLABORATIVE LEARNING - CSCL 2023, pp. 249–252. International Society of the Learning Sciences, Montreal (2023)
5. Damşa, C. I., Kirschner, P. A., Andriessen, J. E. B., Erkens, G., Sins, P. H. M.: Shared epistemic agency: An empirical study of an emergent construct. Journal of the Learning Sciences **19**(2), 143–186 (2010)
6. Cognition and Technology Group at Vanderbilt.: The Jasper Series as Example of Anchored Instruction: Theory, Program Description, and Assessment Data. Educational Psychologist **27**(3), 291–315 (1992)

7. Oshima, J., Oshima, R., Matsuzawa, Y.: Knowledge Building Discourse Explorer: A social network analysis application for knowledge building discourse. Educational Technology Research and Development **60**(5), 903–921 (2012)

Decoding Digital Emotions: An Epistemic Network Analysis of Social Media Use and Its Impacts

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Abstract: This poster examines the impact of social media usage and social comparisons on mental health among college students through three semi-structured interviews, utilizing Epistemic Network Analysis (ENA) to map discourse patterns. It explores how individual differences in social media engagement result in diverse emotional outcomes. Preliminary findings indicate that the emotional effects of online comparisons vary depending on the users' social media motives, comparison targets, and comparison directions. These insights provide a snapshot of the complexity of navigating the digital world and its implications for mental health.

Keywords: Social Media, Social Comparison, Mental Health, College Students

1 Introduction

The pervasive reach of social media, with 5.04 billion individuals or 62.3% of the global populace engaged [2], raises questions about its effect on mental well-being, especially among college students, who are heavy social media users. Social comparison has become a lens to understand the impact of this phenomenon [5, 6].

Using Epistemic Network Analysis (ENA), this study aims to visualize and quantify the relationships between social media behaviors, social comparisons, and mental health outcomes. Data were collected from three semi-structured interviews, guided by two research questions: How are the concepts of social media use, social comparison, and mental health interconnected within individual responses during interviews? How do patterns of connections vary among participants based on their individual responses?

2 Methods

Data were collected from three 30-45-minute' semi-structured interviews. Participants were three undergraduates, selected with purposeful and maximal variation sampling based on gender, academic and cultural backgrounds, and socioeconomic status. This study uses

individual sentences from interview responses as lines of data, to capture the complex information within each participant's statements. Unit variables are participants' ID and interview questions. The conversational variable is the participants' ID. This study employs a moving stanza window method with a window size of three, based on the observation that the data generally form coherent contexts within three consecutive sentences.

Table 1. Codebook.

Code	Definition	Example
Social Media Use (SMU)	Participant's social media behaviors, including the purpose, frequency, and patterns (active or passive) of usage.	*Scrolling these videos keeps me on top of trends and helps me fit in with my social circles.*
Social Comparison (SC)	Participant comparing their abilities and opinions to others on social media, both upward and downward.	*Yet, comparing myself to familiars—focusing on whether they're doing better—only makes me feel worse.*
Positive Emotional Impact	Mentioning positive feelings like joy, connectedness, or self-esteem boosts resulting from social media use.	*For instance, if I haven't connected with my family in a while, chatting and video calling them can offer mental relaxation and joy.*
Negative Emotional Impact	Mentioning distressing feelings such as sadness, envy, and anxiety resulting from social media use.	*I feel like I'm not doing well enough in any aspect.*

Deductive codes (shown in Table 1) were generated based on Social Comparison Theory (SCT), which suggests that individuals inherently engage in the assessment and evaluation of their own lives by comparing themselves with others [3]. Previous studies found that online social comparisons can impact mental health [5, 6]. To effectively analyze individuals' online behaviors, this study adopted generalized coding categories: "Social Media Use" and "Social Comparison." These broad categories were intentionally selected to explore the diverse and multifaceted ways individuals interact with and compare on social media—ranging from frequency of use to engagement levels (active and passive) and problematic patterns [1]. This study simplified mental health status codes into positive and negative categories, offering a broader perspective compared to previous studies that focused on specific emotions such as self-efficacy, self-esteem, depression, and anxiety [6].

Data was coded with ChatGPT as a second coder [7]. ChatGPT was given each code's name, definition, and examples, and then asked to refine or clarify the concepts. After training with the first 75 lines, I reviewed and adjusted discrepancies iteratively. Once ChatGPT and I fully agreed on these initial lines, the entire dataset (249 lines) was uploaded for coding [7]. The coding's accuracy was assessed using Kappa and Shaffer's rho statistics, revealing reliability scores for Social Media Use (0.86, 0.00), Social Comparison (0.86,

0.01), Positive Emotional Impact (0.77, 0.03), and Negative Emotional Impact (0.88, 0.01). For the Goodness of Fit of the model, the Pearson correlation coefficient for the X-axis/Y-axis is 1.00/0.98, and the Spearman correlation coefficient of 1.00/0.98 for the X-axis/Y-axis, suggesting a good model fit and demonstrates the fundamental relationships.

3 Preliminary Findings

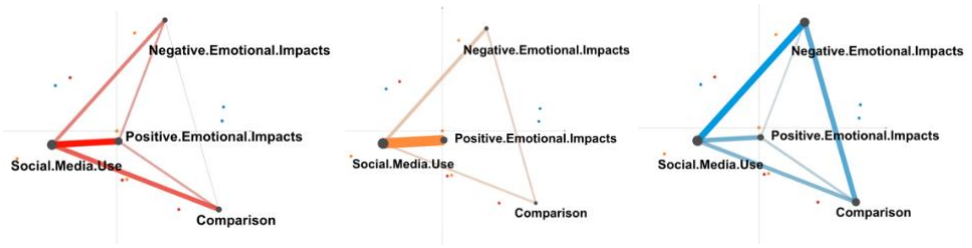

Figure 1. ENA model showing Participant 1 (red), Participant 2 (orange), and Participant 3 (blue)

Figure 1 reveals distinct patterns of association among participants. For Participant 1 (red), the strongest association observed is between SMU and Positive Emotions (lw=0.36), followed by SMU and SC (lw=0.27), and then SMU and Negative Emotions (lw=0.20). Comparison behaviors are associated more with positive emotions (lw=0.14) than negative (lw=0.04), nearly threefold. Although Participant 1 engages in both social media use and comparison with others, their experience is generally more positive, which likely stems from their SMU motives—primarily for information gathering. Even when comparing themselves to those they perceive as "better," they do not feel negatively impacted; instead, these comparisons serve as information and motivation for self-improvement and have minimal emotional effect. This is supported by Participant 1's narratives:

> *When I come across a fitness blogger with a far superior physique, it motivates me to push my limits and learn from them, aiming to gradually reach their level.*

Participant 2 (orange) shows the most positive model. The strongest association is between SMU and Positive Emotions (lw=0.62), likely due to their active media behaviors—favoring searching over passive scrolling—and purposeful engagement for socializing and information gathering. They also exhibit self-control over their SMU, staying vigilant against potential negative impacts through strategic avoidance:

> *When I notice negative emotions or encounter content I dislike, I click the 'not interested' button to prevent the app from showing me similar content.*

Participant 3's (blue) model is the most negative among three participants. The strongest association observed is between SMU and Negative Emotions (lw=0.38), significantly stronger than its association with Positive Emotions (lw=0.27). SC is also strongly linked with Negative Emotional Impacts (lw=0.30) and SMU (lw=0.28). These obvious negative feelings are exacerbated by their passive social media behaviors—predominantly scrolling

for entertainment—and their tendency to engage in negative comparisons, focusing on upward and ability comparisons such as wealth, popularity, and academic achievement, as well as comparisons within their social circles. This is supported by Participant 3's narratives:

> *While scrolling through WeChat, I saw that a friend had gotten into Brown University for her Ph.D. in Psychology, and her dad gave her a Porsche Panamera as a gift. It made me feel both anxious and jealous—how does she manage to have both brains and family wealth and why do I even know her?*

4 Discussion

This study finds different social media use patterns and comparison behaviors impact emotions variably. Key factors include the motivations for social media use, the active versus passive usage patterns, and the types of social comparisons made. While this study used general codes to identify overall trends and relationships, future research should focus on more specific codes. These may include different types of media use, as well as distinct comparison types such as upward, downward, ability, and opinion comparisons, and comparisons involving acquaintances versus strangers.

Despite the limitation of being coded by only one human and one AI, this study demonstrates that ENA can effectively facilitate qualitative analysis by visualizing how concepts in discourse data connect and support story-telling. The next step is to include another human coder for reliability and include a more diverse and larger participant base to explore whether factors like socioeconomic status, cultural background, gender, and self-concept may have a different influence on these relationships.

References

1. Basic, J., Erdelez, S.: Active and passive acquisition of health-related information on the Web by college students. Proceedings of the American Society for Information Science and Technology 51(1), 1–5 (2014).
2. DataReportal: Global Social Media Statistics. DataReportal – Global Digital Insights (2023). Retrieved October 15, 2023, from https://datareportal.com/social-media-users
3. Festinger, L.: A theory of social comparison processes. Human Relations 7(2), 117–140 (1954).
4. Robinson, A., Bonnette, A., Howard, K., Ceballos, N., Dailey, S., Lu, Y., Grimes, T.: Social comparisons, social media addiction, and social interaction: An examination of specific social media behaviors related to major depressive disorder in a millennial population. Journal of Applied Biobehavioral Research 24(1), e12158 (2019).
5. Vogel, E.A., Rose, J.P., Roberts, L.R., Eckles, K.: Social comparison, social media, and self-esteem. Psychology of Popular Media Culture 3(4), 206 (2014).
6. Zambrano, A.F., Liu, X., Barany, A., Baker, R.S., Kim, J., & Nasiar, N.: From ncoder to ChatGPT: From automated coding to refining human coding. In International Conference on Quantitative Ethnography (pp. 470-485). Cham: Springer Nature Switzerland (2023).

An Epistemic Network Analysis of Patient-Reported Experiences with Cannabis Among Cancer Survivors

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Abstract: The purpose of this study was to visualize the network of themes that arise within cancer survivor-reported descriptions of their experiences with cannabis. Analysis was completed using Epistemic Network Analysis (ENA). Common benefits experienced by cancer survivors included pain relief, emotional relief, and medication reduction, while common concerns included stigma and high cost. Cancer survivors using intoxicating cannabinoids (delta-9-tetrahydrocannabinol) were more concerned about stigma, whereas those using only non-intoxicating cannabinoids (cannabidiol) were more concerned about high cost. Knowledge of these findings will better equip providers who seek to guide their patients' use of cannabis amid existing barriers.

Keywords: cancer, cannabis, THC, CBD, patient-reported, network analysis

1 Introduction

Approximately one out of every five cancer survivors report past-month cannabis use [8]. Cannabis may alleviate symptoms associated with cancer and cancer treatment (e.g. pain, fatigue, anxiety, lack of appetite, nausea, and vomiting) and is generally considered safe with appropriate dosing [3, 1, 7]. The effects of cannabis are ascribed to the action of cannabinoids, such as cannabidiol (CBD) and delta-9-tetrahydrocannabinol (D-9-THC), which are found in cannabis plants [1]. Yet, only 30% of oncologists feel sufficiently informed to make recommendations on cannabis use [3]. Moreover, a high financial and social cost of cannabis use can pose additional barriers to cancer survivors who seek out cannabis [9, 12]. Considering that over two million new cancer cases are predicted for the year 2024 in the United States, it is important to investigate patient experiences with cannabis to inform the development of cannabis products and guidelines for efficacious

cannabis use [11]. This study aimed to visualize the themes that arise within patient-reported descriptions of cannabis use and its effects.

2 Theory

This study used codes derived from Leventhal's Common-Sense Model of Self-Regulation (CSM) [5]. CSM guided the development of a codebook that reflects aspects of cancer survivor experiences with cannabis supported by existing literature (as shown in Table 1) [1, 3, 4, 9, 12].

Table 1. Codebook.

Code	Definition	Example	Kappa
Pain Relief	Cannabis use alleviated pain.	*"Helps with severe pain"*	0.99
Emotional Relief	Cannabis use relieved negative emotions and improved positive emotions and life outlook.	*"CBD oil helps with sense of overall well-being."*	1.00
Sleep or Physical Relaxation	Cannabis use relaxed the body and improved sleep quality.	*"Helps me to sleep"*	1.00
Appetite Stimulation	Cannabis use reduced nausea or increased appetite.	*"Definitely reduced nausea."*	1.00
Condition Improvement	Cannabis use treated a disease or condition.	*"Help fight cancer and to keep me healthy."*	0.99
Medication Reduction	Cannabis use mitigated side effects and reduced the need for other medications.	*"I'm able to take a much lower dose of pharmaceuticals."*	1.00
Lack of Guidance	Uncertainty about how to use cannabis due to lack of professional medical advice.	*"Not sure of proper regimen to do."*	0.92
No Effect or Adverse Effect	Cannabis provided no benefit or caused negative effects.	*"Makes me feel slower than usual."*	0.97
Stigma	Perceived social, professional, or legal barriers to cannabis use.	*"Negative relationships with in-laws and friends."*	1.00
High Cost	The financial cost of cannabis was a barrier to use.	*"Cannot Afford it with my Disability Income."*	1.00

3 Methods

Data was collected from a subsample of 549 cancer survivors who reported cannabis use and completed at least one online survey as part of a larger study conducted by Johns Hopkins University School of Medicine and the Realm of Caring Foundation (RoC) [10]. Participants were recruited from the RoC patient registry and through social media [6]. ENA analyzed open-ended responses on the benefits and problems of therapeutic cannabis/cannabinoid use, reasons for starting, and reasons for stopping use. "Intoxicating cannabinoid exposure" refers to patients using products with D-9-THC or its precursor, tetrahydrocannabinolic acid. This categorization was of interest because roughly half of the sample had intoxicating cannabinoid exposure. Each survey question was a conversational variable, and each response was a unit of analysis. An infinite conversation window captured overall trends in themes across responses. Data was coded by two human coders with one annotation round, and coding congruence is reported using Kappa (Table 1).

4 Preliminary Findings

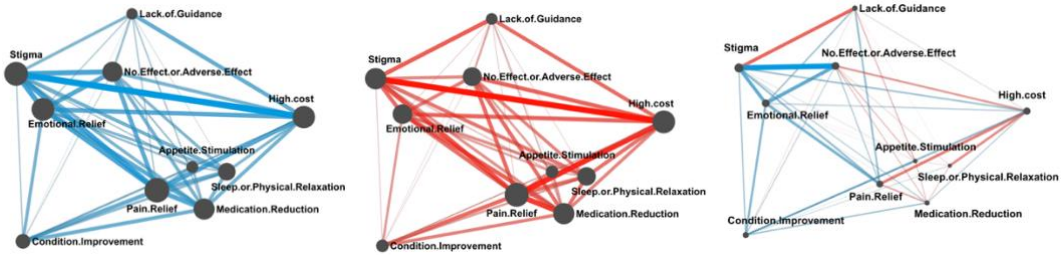

Figure 1. ENA models of intoxicating cannabinoid exposure (red), non-intoxicating cannabinoid exposure (blue), and a comparison (red and blue).

As shown in Figure 1, cancer survivors found cannabis helpful for pain relief. Strong relationships were identified between pain relief and medication reduction (lw=0.18 for red, 0.16 for blue), emotional relief (lw=0.13, 0.16), condition improvement (lw=0.13, 0.14), sleep or physical relaxation (lw=0.13, 0.13), and appetite stimulation (lw=0.10, 0.10).

> *"Helps me sleep; gets rid of actinic keratoses; alleviates pain; alleviates anxiety and helps promote good feelings of wellbeing." (intoxicating cannabinoid exposure)*

Regardless of intoxicating cannabinoid use, cancer survivors commonly reported concerns about high cost (lw=0.16 for red, 0.18 for blue) and stigma (lw=0.19, 0.16). They also worried about the lack of guidance, which was linked to stigma (lw=0.14, 0.13) and

high cost (lw=0.13, 0.17). Additionally, no effect or adverse effects from cannabis use were associated with stigma (lw=0.11, 0.17) and high cost (lw=0.14, 0.12).

"Can't use too much at once as it may upset stomach and/or put me to sleep...can only use it sparingly right now as have new job with drug testing and don't know if there is detectible THC in my products" (non-intoxicating cannabinoid exposure)

Non-intoxicating cannabinoid users linked stigma more to experiencing no effect or adverse effect (lw=0.06) and emotional relief (lw=0.04), while intoxicating cannabinoid users linked stigma more to lack of guidance (lw=0.04). Among those who experienced pain relief, non-intoxicating users were more concerned about stigma (lw=0.02), and intoxicating users were more concerned about high cost (lw=0.03).

"Have to limit use big time due to job and I cannot afford to buy it." (intoxicating cannabinoid exposure)

"Because the laws are getting ridiculous making it harder for the type of treatment needed for my kind of care!!!" (non-intoxicating cannabinoid exposure)

5 Discussion

Overall, by evaluating themes that arose in cancer-survivor-reported experiences with cannabis, this study delineated similarities and differences in effects of intoxicating and non-intoxicating forms of cannabis. An important takeaway for patient educators is that patient concerns (e.g.., stigma vs. high cost) differ based on type of cannabinoid used. Self-selection bias is a limitation of this study. Future studies should include a non-cannabis-using control group and with a larger, randomized sample size. Future research should also compare 1) current versus former cannabis users, 2) patients with different cancer types, and 3) patients with different cancer staging and treatment to identify differences in perceived effects of intoxicating and non-intoxicating forms of cannabis.

References

1. Abrams, D.I.: The therapeutic effects of cannabis and cannabinoids: an update from the National Academies of Sciences, Engineering and Medicine report. European journal of internal medicine 49, 7–11 (2018).
2. Arnold, J.C.: A primer on medicinal cannabis safety and potential adverse effects. Aust J Gen Pract 50(6), 345–350 (2021).
3. Braun, I.M., Wright, A., Peteet, J., et al.: Medical oncologists' beliefs, practices, and knowledge regarding marijuana used therapeutically: a nationally representative survey study. Journal of Clinical Oncology 36(19), 1957 (2018).

4. Kvamme, S.L., Pedersen, M.M., Rømer Thomsen, K., Thylstrup, B.: Exploring the use of cannabis as a substitute for prescription drugs in a convenience sample. Harm Reduct J 18(1), 72 (2021).
5. Leventhal, H., Phillips, L.A., Burns, E.: The Common-Sense Model of Self-Regulation (CSM): a dynamic framework for understanding illness self-management. J Behav Med 39(6), 935–946 (2016).
6. Martin, E.L., Strickland, J.C., Schlienz, N.J., et al.: Antidepressant and Anxiolytic Effects of Medicinal Cannabis Use in an Observational Trial. Front Psychiatry 12, 729800 (2021).
7. National Academies of Sciences, Engineering, and Medicine.: The health effects of cannabis and cannabinoids: the current state of evidence and recommendations for research. 2017.
8. Pergam, S.A., Woodfield, M.C., Lee, C.M., et al.: Cannabis use among patients at a comprehensive cancer center in a state with legalized medicinal and recreational use. Cancer 123(22), 4488–4497 (2017).
9. Philbrick, A.M.: Up in smoke: One state's perspective on the affordability of medical cannabis. J Am Pharm Assoc (2003) 60(1), 216–217 (2020).
10. Schlienz, N.J., Scalsky, R., Martin, E.L., et al.: A Cross-Sectional and Prospective Comparison of Medicinal Cannabis Users and Controls on Self-Reported Health. Cannabis Cannabinoid Res 6(6), 548–558 (2021).
11. Siegel, R.L., Giaquinto, A.N., Jemal, A.: Cancer statistics, 2024. CA Cancer J Clin 74(1), 12–49 (2024).
12. Valencia, C.I., Asaolu, I.O., Ehiri, J.E., Rosales, C.: Structural barriers in access to medical marijuana in the USA-a systematic review protocol. Syst Rev 6(1), 154 (2017).

The Mental Health Impacts and Moderation Responsibility of Social Media Use for US and Non-US Adolescents

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Abstract. This study examines adolescents' perspectives on social media's role in their mental health and the responsibilities for moderating social media use. Analyzing responses from the New York Times Learning Network prompt, Epistemic Network Analysis (ENA) compares US and non-US adolescent perceptions of social media impacts on mental health. This study also highlights US and other countries (non-US) adolescents' views on who should be responsible for social media use moderation. This research can inform the development of effective strategies for social media use regulation and mental health interventions tailored to the diverse needs of adolescents in the US and worldwide.

Keywords: Social Media, Mental Health, Adolescents, Quantitative Ethnography, Social Media Moderation

1 Introduction

Social media can benefit adolescents, but excessive use often harms mental health, causing issues like low self-esteem, depression, addiction, cyberbullying, and sleep problems [1-3]. This study analyzed adolescent reactions to a NYTimes Learning Network article on social media's mental health impacts, based on a US Surgeon General statement [4,5]. By using secondary data, the study avoids challenges in collecting data from minors and gathers opinions on social media's mental health effects and regulation responsibility. It compares responses from US and non-US adolescents, including those from Australia, China, Colombia, Germany, Israel, Japan, Morocco, and Taiwan, to explore mental health impacts and moderation roles.

2 Methods

Researchers independently coded the dataset and resolved discrepancies using social moderation to ensure consistency [6]. The final codebook, outlined in Table 1, includes

definitions and examples of codes for both mental health impacts and use moderation responsibility.

Table 1. Codebook of adolescents' perspectives on mental health impacts and use moderation responsibility for social media

Code	Definition	Example
Mental Health Problem	Anything that affects thinking, emotions, behaviors, or mood that damage mental health, like depression and anxiety.	*"Social media can harm young peoples mental health worldwide."*
Physical Health Consequences	Negative physiological consequences of social media use to individuals.	*"A common consequence of social media use, can lead to a sedentary lifestyle, contributing to issues like obesity and poor posture."*
Life Disruptions	Long term or short-term impact on lifestyle behaviors or outcomes; must explicitly state how it impacts life; includes interrupting dinner and family time.	*"Young individuals may spend unreasonable amounts of time on social media, ignoring other activities which are essential to their mental well-being"*
Cyberbullying	Experiencing direct bullying, aggressive online content, harassment, hate speech, where one feels a sense of danger, feels threatened or intimidated.	*"…cyberbully them by calling them ugly or a lot of other names and after a while that can get to the person…"*
Addiction	The inability to regulate time spent on social media usage.	*"I know quite a few people who are so addicted to social media that I've rarely seen them without their eyes glued to a social media platform…"*
Positive Use Behavior	The beneficial aspects of social media, which include connections, sharing information and entertainment.	*"My relationship to social media would be the humor and laughter it brings…"*
Social Connection	The ability of social media across the world and create connections easily and instantly.	*"Social media apps and websites can be used to spread awareness on events occurring all over the world, such as updates on politics."*
Personal Experience	Referring to one's own experience - sharing a personal story.	*"Social media such as Tik Tok allows me to stay up till twelve at midnight with ease causing detrimental sleep deprivation…"*
Social Comparison	Referring to people comparing themselves to others on social media.	*"…as people spend hours a day on social media, they start to see things and people they depict as "perfect."*
Fake Reality	Referring to false reality, exaggeration and deceptive image.	*"Social media is full of unrealistic images…"*
Personal Responsibility	The imposition of limits or controls on the use of social media by oneself.	*"Having responsibility, it is up to the user to blame for their prolonged use of social media…"*

Family Responsibility	The imposition of limits or controls on the use of social media by parents or family members.	*"…I think parents should make a greater effort to regulate their childrens' social media usage…"*
Government Responsibility	The imposition of limits, controls, policies, regulations, guidelines on the use of social media by government institutions.	*"…it is a terrible idea because it is our decision to use it and the government shouldn't hold the power over what we choose to do on our own devices…".*
Company Responsibility	The imposition of limits or controls on the use of social media via social responsibility by tech companies.	*"…I think the best way to help with this cause isn't to go to the people using the app but more like the people developing the app like straight to the companies…."*

Epistemic Network Analysis (ENA) was used to examine NYTimes posts by adolescents about social media use [7]. Researchers created two epistemic networks: one to compare health impacts on US and non-US adolescents, and another to contrast their views on who should moderate social media use. In both networks, variables included country and row id (individual post identifier). Each post was analyzed uniquely using a moving stanza (window width 1) for the conversation variable.

3 Results

Figure 1 compares the mental health impacts on non-US versus US adolescents. A two-sample t-test revealed a significant difference between non-US (mean=0.15, SD=0.21, N=33) and US adolescents (mean=-0.05, SD=0.18, N=102; t(48.18)=-4.78, p=0, Cohen's d=1.04).

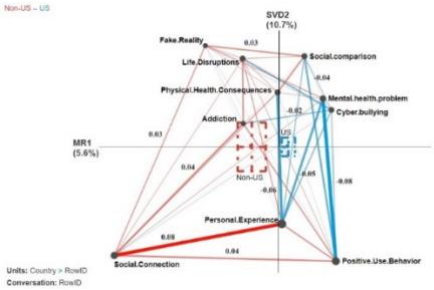

Fig. 1. The difference model between the non-US (red) and US (blue) adolescent beliefs about mental health impacts of social media.

US adolescents strongly connected positive use behavior with mental health problems and social comparison. Additionally, personal experience was connected to mental health impacts, physical health consequences and cyberbullying. For US adolescents, cyberbullying was also connected to addiction.

Social media in my opinion in a feeding ground for negativity if not properly monitored. For many, we tend to judge ourselves based off of what others are posting which can lead to low self esteem. For me personally and other adolescents, social media fueled my eating disorder. (Response 49, US)

Non-US adolescents strongly connected personal experiences of social media use for social connection. Social connection was also connected to experiences of positive use behavior but also addiction and social comparison.

Nowadays, young people use social media a lot, this has many negative impacts such as problems in their social lives and mental health. Teenagers pass most of their time in front of screens which leads to exclude themselves from the others and copy the famous people's personalities instead of developing their own. Another issue is comparing their lives to others' and become insecure. (Morocco, 41)

Figure 2 visualizes differences in non-US and US adolescents' views on social media moderation responsibilities. A two-sample t-test showed a significant difference between non-US (mean=-0.07, SD=0.17, N=33) and US adolescents (mean=0.02, SD=0.15, N=102; t(49.98)=2.67, p=0.01, Cohen's d=0.56).

Fig. 2. The difference model between the non-US (red) and US (blue) adolescent beliefs about responsibility for meditating and monitoring social media use.

Non-US adolescents strongly associate family and personal responsibility with moderating social media use. One respondent noted:

I believe responsibility should also ultimately lie in the families, and that they should decide what is best for their children. It's also important that each individual decide what's best for themselves. (Response 24, Japan)

US adolescents, conversely, oppose government and familial intervention but promote individual responsibility. One example of this perspective mentions that:

Addiction is a problem, but it's a problem that needs to be solved by the teens, not by the government, not by tech companies, and not by their families. (Response 99, US)

4 Discussion

This study reveals that adolescent views on social media's mental health impact are both positive and negative. In non-US countries, family-based moderation may work better due to strong community values, while in the US, digital literacy and personal responsibility are key. Self-reported data may not fully capture experiences, so future research should examine cultural differences and consider longitudinal studies to assess long-term effects. Understanding these evolving perspectives is crucial for crafting effective social media policies and interventions for adolescents.

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5 References

1. Kelly, Y., Zilanawala, A., Booker, C., Sacker, A.: Social Media Use and Adolescent Mental Health: Findings from the UK Millennium Cohort Study. EClinicalMedicine. 6, 59–68. https://doi.org/10.1016/j.eclinm.2018.12.005. (2018).
2. Frison, E., Eggermont, S.: Browsing, Posting, and Liking on Instagram: The Reciprocal Relationships Between Different Types of Instagram Use and Adolescents' Depressed Mood. Cyberpsychology, Behavior, and Social Networking. 20, 603–609 https://doi.org/10.1089/cyber.2017.0156. (2017).
3. Wike, R., Silver, L., Fetterolf, J., Huang, C., Austin, S., Clancy, L., Gubbala, L.: Views of social media and its impacts on society, https://www.pewresearch.org/global/2022/12/06/views-of-social-media-and-its-impacts-on-society-in-advanced-economies-2022/ (2022).
4. Proulx, N.: Does Social Media Harm Young People's Mental Health? https://www.nytimes.com/2023/05/25/learning/does-social-media-harm-young-peoples-mental-health.html (2023).
5. Murthy, V.: Social Media and Youth Mental Health., https://www.hhs.gov/sites/default/files/sg-youth-mental-health-social-media-advisory.pdf (2023).
6. Shaffer, D.W.: Quantitative Ethnography. Cathcart Press (2017)
7. Marquart, C.L., Hinojosa, C., Swiecki, Z., Eagan, B., Shaffer, D.W.: Epistemic Network Analysis, http://app.epistemicnetwork.org

Divergent Pedagogy: Unveiling Hidden Patterns in STEM vs. Non-STEM Course Evaluations using Natural Language Processing and Epistemic Network Analysis

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Abstract. *Rate My Professors*, a website where students can review their courses, is a supportive resource for students explore the instructor information and course content. Students often time have different learning experiences between STEM and non-STEM courses. Previous studies of course reviews focused on the sentiments classification of the review being negative or positive, failing to unveil the differences between how students rate the courses across two academic fields. This study compares teaching methodology and curriculum design applied in STEM and non-STEM instructions. The data used is Spring 2022 course reviews of 5C Colleges from *Rate My Professors*. Natural Language Processing (NLP) is used to code the reviews, and Epistemic Network Analysis (ENA) is applied to analyze the reviews for courses. The results show that there are statistically significant differences between the review of STEM and non-STEM courses in their ENA networks, especially in terms of engagement and teaching effectiveness.

Keywords: Curriculum Evaluation, Natural Language Processing, Epistemic Network Analysis, Automation, Machine Learning

1 Introduction

Evaluation of courses and instructors by students is a critical component of educational assessment for both the students and instructors. It influences curriculum design, faculty development, and college reputation. *Rate My Professors (RPM)*, a website where students can anonymously rate and review their instructors, has been used as a popular platform for students to share their experiences [1].

Course evaluations traditionally report quantitative measures of teaching difficulties and effectiveness. However, the complexity of teaching and learning demands a comprehensive analysis to uncover hidden insights [2]. This divergence between STEM and non-STEM teaching styles offers an opportunity to explore differences in perceptions of teaching effectiveness across fields.

STEM disciplines are characterized by their technical rigor and structured methodologies, emphasizing precise skills and logical problem-solving [3]. Conversely, non-STEM disciplines tend to prioritize creativity, stimulating

discussion, and critical thinkings, fostering a different type of intellectual engagement [4]. These fundamental differences suggest that student evaluations might vary between STEM and non-STEM fields, reflecting distinct pedagogical dynamics and student perceptions.

A previous study on the survey feedback of STEM courses [5] discussed the problems of STEM teaching methods, while neglecting courses in non-STEM field. Other studies on instructor reviews are mostly binary sentiment classifications [6]. In this study, utilizing Epistemic Network Analysis (ENA), a method for identifying connections among elements in coded data and representing them in dynamic network models [7], the goal is to fill the void of the comparing STEM teaching methods with that of non-STEM from RMP student reviews to unveil the current drawbacks and strengths for these two academic areas.

2 Methods

Data included reviews in text format posted on RMP from 5C colleges in Spring 2022. Course labels are extracted to categorize courses into two groups: STEM courses and non-STEM courses. Data used in this study sampled total of 1000 reviews, 500 reviews from each group.

Reviews are coded by NLP package spaCy, an open-source software library for advanced natural language processing, designed to handle large volumes of text [8]. Codes are determined based on research question. Definitions and examples are in Table1. Since popular language models, such as topic model, had limitation in detecting adjectives, the keywords for each Code are manually identified. spaCy tokenizes the review texts, where each token can be given an entity and dependency. spaCy is capable to identify the keywords as well as their variation. Beyond the simple keyword search, non-negative token dependency is also eliminated to accurately detect the keyword. For validation and spaCy performance evaluation, 100 review data—50 reviews from each group—were manually coded. Scikit-learn is applied to calculate the Cohen's kappa between the manual-labeled and spaCy-labeled Codes. The evaluation shows that NLP is able accurately code the reviews.

With the coded data, the ENA webtool was utilized to conduct the ENA comparative analysis between courses from two areas. The Unit was defined as instructors classified to be STEM and non-STEM. Conversation was STEM or not. Since each review is a holistic topic, the stanza size was set to whole conversation. All the 7 Codes were included in the ENA model. Lastly, a two-sample Mann-Whitney U test is conducted to test the significance of the difference between two groups.

Table 1. Code Book and Validation

Codes	Definition & Examples	kappa
Intelligence	Review the instructor has good knowledge of the course materials or topics e.g., "A little unclear and distracted but quite brilliant."	0.90

Organization	Review the course as organized and clear to understand e.g., “His lectures are really thorough and interesting”	0.70
Fair	Review the course or grading as fair and just e.g., “Tests are fair enough.”	0.66
Challenging	Review the course or instructor being challenging or hard e.g., “Concepts are hard, the textbook is way too unnecessarily hard to follow”	0.70
Approachable	Review the instructor as helpful, approachable, or caring e.g., “He really cares about his students and is extremely helpful”	0.78
Engaging	Review the course as interesting or engaging e.g., “Prof is kind and facilitates discussion well”	0.77
Teaching	Review mentioned complaints (negatives) about the instructor's teaching methods that aren't necessarily related to challenging e.g., “I learned more in tutoring then in class, office hours were very unhelpful”	0.76

3 Results

As shown in Fig. 1, STEM course reviews have strong connection between CHALLENGING and APPROACHABLE, indicating that while STEM courses are challenging, instructors are helpful. Whereas non-STEM course reviews have strong connection between APPROACHABLE and ENGAGING, indicating students find them caring and had more engaging experience during instructions than STEM courses. Additionally, having a fair grading scheme and organized structures are strength of STEM pedagogy. However, there are more complaints in original reviews about teaching methodologies of STEM courses than non-STEM ones, such as lectures are dull and confusing. The two-sample Mann-Whitney U test showed that STEM (Mdn=0.12, N=78) was statistically significantly different at the alpha=0.05 level from non-STEM (Mdn=-0.12, N=79 U=4682.50, p=0.00, r=-0.52) on the first dimension.

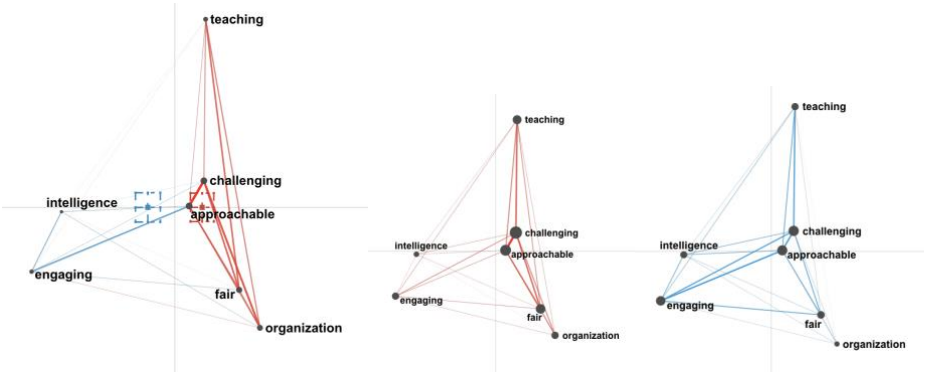

Fig. 1. ENA model of STEM vs. non-STEM instructor reviews and for STEM (red) and non-STEM (blue) instructor reviews respectively

4 Conclusion

This study analyzed course evaluations between STEM and non-STEM departments, highlighting differences in student experiences. Using Natural Language Processing and Epistemic Network Analysis, we were able to uncover intricate patterns in student reviews, revealing distinct pedagogical approaches in these academic fields. The findings indicate that students have different perception between STEM and non-STEM instructors. STEM courses are often conducted with more structured and technical instruction, which may lead to less perceived engagement compared to more interactive methods in non-STEM. These insights suggest a need for modifications in STEM teaching styles and course designs to enhance student engagement and learning outcomes. For example, connecting technical skills with real-life problems and implementing small group discussion to incent engagements. Creating an interactive learning environment for STEM courses can be challenging due to structures. It requires sustained efforts from institutions and educators to incorporate interactive into STEM education.

By bridging the gap between student feedback and instructional practices, this study offers valuable insights for educators to improve teaching effectiveness across disciplines. However, the study possesses data limitation. Future research with a larger and more diverse dataset, including reviews from multiple semesters and various types of institutions could address these limitations.

References

1. RC, T. Rate my professor reviews 5C colleges. Kaggle. https://www.kaggle.com/datasets/tilorc/rate-my-professor-reviews-5c-colleges (2023).
2. Ndukwe, I.G., Daniel, B.K. Teaching analytics, value and tools for teacher data literacy: a systematic and tripartite approach. *Int J Educ Technol High Educ* 17, 22 (2020).

3. Kelley, T.R., Knowles, J.G. A conceptual framework for integrated STEM education. *IJ STEM Ed 3*, 11 (2016).
4. Davenport Huyer, L., Callaghan, N.I., Dicks, S. *et al.* Enhancing senior high school student engagement and academic performance using an inclusive and scalable inquiry-based program. *npj Sci. Learn.* 5, 17 (2020).
5. Harper, R.P., Weston, T.J., Seymour, E.. Student Responses to Problematic STEM Teaching Methods. In: Seymour, E., Hunter, AB. (eds) Talking about Leaving Revisited. Springer, Cham (2019).
6. Aaditkapoor. Aaditkapoor/Rate-my-professor-sentiment-analysis. GitHub. https://github.com/aaditkapoor/Rate-My-Professor-Sentiment-Analysis (2020).
7. Shaffer, D. W., Collier, W., & Ruis, A. R.. A Tutorial on Epistemic Network Analysis: Analyzing the Structure of Connections in Cognitive, Social, and Interaction Data. *Journal of Learning Analytics*, *3*(3), 9-45 (2016).
8. Spacy · *industrial-strength natural language processing in python*. Industrial-strength Natural Language Processing in Python. (n.d.). https://spacy.io/ (2023).

Why not participate in a mixed-gender training program in STEM?

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Abstract. This paper investigates the impact of adopting gender-specific programming on participant engagement in Ceibal's "Jóvenes a Programar (JaP)" training program, which targets young people aged 18 to 30 in Uruguay to help them enter the information and computer technology (ICT) sector. We analyze survey responses from registrants to understand why some indicated they would not have registered for a mixed-gender program. Using quantitative ethnographic techniques, we explore the motivations behind these preferences and how they contribute to the ongoing gender dynamics within the ICT sector.

Keywords: Quantitative Ethnography, Women in STEM, Gender gap, ICT**,** NLP, ENA, Automation, Machine Learning

1 Introduction

Uruguay's Information and Computer Technology (ICT) sector is one of the strongest per-capita exporters of software in Latin America with 24% of national labor demand linked to ICT [1]. Despite the greatly unmet demand to fill vacancies, women are underemployed in ICT with a gender gap of 58%, leaving substantial talent on the table [2], a trend not unique to Uruguay. This gender gap is not limited to ICT: if women participated as men do in all industries, Uruguay's GDP could rise by up to 13% [3].

Ceibal's "Jóvenes a Programar (JaP)" training program has offered postsecondary support for thousands of young adults across Uruguay seeking employment in ICT. Candidates for the 2024 Women and Non-Binary edition of the JaP program were asked: "If this edition of JaP had been mixed would you have registered?" Out of 4,377 candidates, 178 respondents answered "No". Why did a gender-specific program attract applicants who would not have otherwise applied, or why would a mixed environment have turned them away? How can these insights shed light on mitigating the gender gap in a male-dominated industry? In this study, we propose to analyze these questions using Quantitative Ethnographic techniques to model tone-delineated rationale groups.

2 Theory

Collaborative environments are integral to computer science education and students' comfort in their environment directly impacts success and motivation. A corpus of literature highlights that a distinguished factor of the ICT employment gender gap in

Latin America is women's lack of comfort in male-dominated learning and work environments [4]. Accordingly, our data demonstrates that 4% of applicants' initial interest was contingent on gender-specific programming. Though the subjects of this study share discomfort in male-centric spaces, they are not monolithic and encompass diverse motivational profiles. We hope to underscore this and highlight the importance of spaces for underrepresented groups in learning environments by analyzing the social, emotional, and psychological reasons behind why a mixed-gender JaP may exclude some.

Epistemic Network Analysis (ENA) has been used to predict academic performance from communication in controlled collaborative learning environments [5] and identify the most efficacious educational interventions in trauma teams [6] by modeling discourse actions. By coding for cognitive patterns of interest in our data providers' open-ended responses, we hope to reveal a diversity of motivational profiles between groups.

3 Methods

3.1 Data

Data was collected via the JaP 2024 registration form which asked applicants whether and why they would or would not have registered if JaP 2024 had been mixed-gender.

As this study aims to model discourse among respondents who applied conditionally on JaP's diversity focus, we sought to model their decisions with the presence of emotional or experience-informed factors. Specifically, each response was coded for six constructs through social moderation with perfect agreement between three raters.

Table 1. Codebook

Construct	Definition	Examples
INEQUALITY	Social, cultural, and economic barriers, violence, and discrimination limiting women's access and opportunities due to their gender.	"...you encounter more hostility from men who believe in their intellectual superiority because they had the privilege of being encouraged to use technology as men…
EMOTIONS	Expression of psychological/emotional feelings and perceptions.	"Women always end up being displaced." "Discomfort, shame."
MALE-DOMINATED FIELD	References to male predominance in ICT and effects like underrepresentation and chauvinism.	"It is a field where men predominate, so as a woman, it's difficult to stand out due to various factors."
EXPERIENCES	References to how previous social and educational experiences inform the respondent's decision.	"...In class, I was always the only girl and felt uncomfortable because they made nasty comments (about women), sent

		inappropriate messages, stickers, or photos…."
MOTIVATION	Conditional motivations and encouragement due to a special JaP.	"Being only women motivated me to sign up and sparked an interest in learning."
PEER SPACE	Aspiration to share a space with similar people	"I'm interested in being surrounded by women; it generates greater confidence in myself and in group dynamics."

3.2 Analysis

Survey responses for JaP 2024 were qualitatively analyzed to identify patterns linking INEQUALITY, EMOTIONS, MALE-DOMINATED FIELD, EXPERIENCES, MOTIVATION, and PEER SPACE. Responses were then grouped into positive, neutral, and negative attitudes toward participation in JaP and the state of ICT with perfect agreement between three raters using social moderation. We constructed an Epistemic Network Analysis (ENA) model with these motivation profiles as the unit of analysis and the individual responses as one-line conversations. The model represents the normalized count of connections (the concurrence of pair(s) of codes in a response) for all individuals within each unit. We then used a means rotation to project the normalized connection counts into an ENA space and compared each tone profile using subtraction network graphs and a Mann-Whitney U test.

4 Results

Qualitative analysis revealed distinct connection patterns among three tone groups. A "Positive" group of applicants stated that they were motivated to join the program because it was aimed at women and enabled them to learn amongst like-minded people, including responses like*: "the fact that it was an edition for women and non-conforming individuals made me decide to give it a try."* A "Negative" group comprised most responses, who felt an aversion towards mixed programs due to a precedent of discrimination. Particularly concerning are those referring to negative experiences in JaP: *"I had several friends who suffered harassment from men in previous editions."* A third group of Neutral responses consists of mixed, relatively impersonal statements such as: *"I consider that women need to be more included in this field of technology."*

We hence demonstrate that applicants whose participation was conditional can be described as subgroups with different motivations. Positive-tone individuals tended to focus on the features of the special JaP edition, emphasizing connections between anticipation of PEER SPACE experiences, unique MOTIVATION from being the edition's target audience, and emotional reflection. Negative-tone individuals were characterized by a focus on negative EMOTIONS and past EXPERIENCES related to inequality and male predominance in ICT in general. The Neutral group indicates a less emotional preference, appearing to appreciate the theoretical and societal value of promoting gender equality, even if they do not feel strongly about personal experiences.

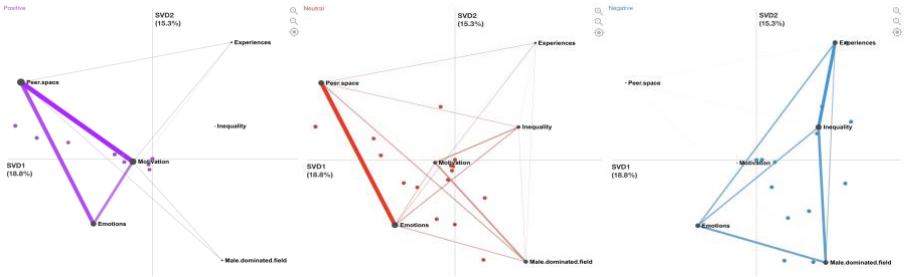

Fig. 1. Left to right: Positive, Neutral, and Negative tone ENA models.

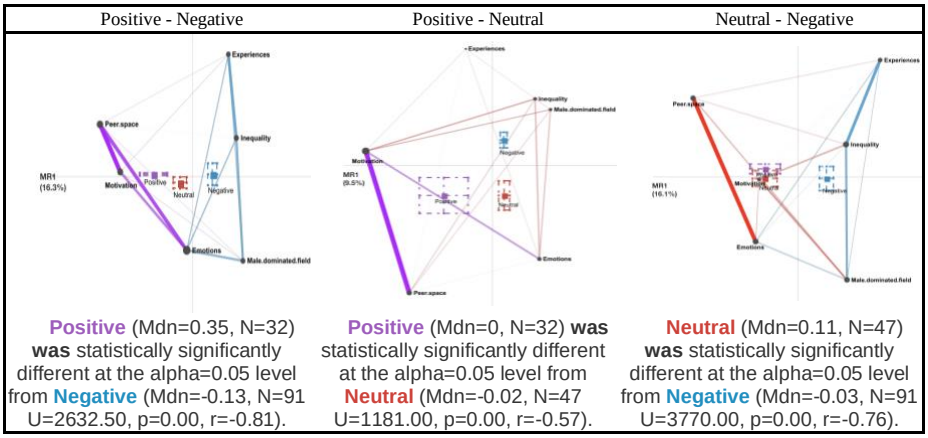

Fig. 2 Means-rotated comparison graphs and X-axis Mann-Whitney results for each comparison.

5 Discussion

All three response profiles indicate statistically significant differences from each other, reinforcing the distinctions identified during qualitative analysis and illuminating multifaceted emotional and societal dynamics that influence participation in programs like JaP. The Positive group express a direct benefit from an environment tailored to women and non-binary individuals. The Negative group provides insight into the effects of mixed environments that do not address gender dynamics and highlight systemic issues within ICT that can deter talented individuals from entering or persisting in the field.

Epistemic Network Analysis (ENA) provides a way to visualize and understand these complex interactions and their impact on program participation. The differences between tone groups highlight the impact of systemic issues in the ICT sector as well as the attraction value of specialized programs for underrepresented groups. The findings suggest that initiatives like the JaP program are not merely beneficial but necessary if the goal is to close the gender gap in ICT.

References

3. Observatorio TI, Advice. Monitor Laboral TI (2023)
4. Microsoft, CUTI. Uruguay: Talent Report on the IT Sector (2023)
5. Banco Mundial. Jugar un partido desigual; Diagnóstico de Género en Uruguay (2020)
6. Ancheta-Arrabal, A.; Pulido-Montes, C.; Carvajal-Mardones, V. Gender Digital Divide and Education in Latin America: A Literature Review. Educ. Sci. 2021, 11, 804. (2021)
7. Dragan Gašević, Srećko Joksimović, Brendan R. Eagan, David Williamson Shaffer, SENS: Network analytics to combine social and cognitive perspectives of collaborative learning, Computers in Human Behavior, Volume 92, 2019, Pages 562-577. (2019)
8. Sullivan, S., Warner-Hillard, C., Eagan, B., Thompson, R. J., Ruis, A. R., Haines, K., … Jung, H. S. Using epistemic network analysis to identify targets for educational interventions in trauma team communication. Surgery, 163(4), 938–943. (2018)

Ecological Factors Influencing Latino/a/x Community College Student Retention: A Quantitative Ethnographic Study

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Abstract. This study examines retention among Latino/a/x students at an urban minority-serving community college using a quantitative ethnographic single case study approach. Acknowledging the complexities and significant gaps in progression and attainment for Latino/a/x students compared to other ethnic groups [10], the study utilizes an adapted cultural ecological retention model [2, 12-14, 18]. The research explores how student's individual attributes, interactions with their environments, institutional practices of non-instructional support staff, and cultural dynamics affect student retention. Data will be collected through focus groups with support staff and interviews with Latino/a/x students from diverse backgrounds, including various countries of origin, enrollment statuses, and English proficiency levels. Field notes will document interactions to better understand the retention culture at the institution. By employing Epistemic Network Analysis, the study aims to provide empirical evidence to enhance local retention efforts for Latino/a/x students aspiring to transfer to four-year institutions.

Keywords: community college, retention, cultural ecology, Latino/a/x students, support staff, quantitative ethnography, single case study

1 Introduction

Community colleges are crucial for Latino/a/x students, yet significant gaps persist in their progression and attainment compared to other ethnic groups [10]. Key barriers include financial constraints [15], lack of academic capital [3], and balancing family and work responsibilities [1]. Institutional factors, such as lack of support and inconsistent information [9], further hinder retention. Existing research often focuses on students of Mexican descent, overlooking the diversity within Latino/a/x subgroups, [4, 5, 17]. Additionally, while most studies emphasize full-time students, it is essential to include part-time students who make up 66% of the community college population [20].

There is limited understanding of how interactions between Latino/a/x students and support staff impact retention rates. Non-instructional support staff, including those in areas such as financial aid and counseling, play a critical role in providing resources and fostering a supportive environment [8]. Discrepancies between student and staff perceptions of support services highlight the need for a comprehensive examination of both perspectives [16, 19]. This study, conducted at a minority-serving community college in a large northwestern city with a growing Latino population and high drug-

use and crime rates, explores the perspectives of Latino/a/x students and non-instructional support staff, focusing on psychosocial and contextual factors influencing retention.

2 Framework

The study's theoretical framework integrates cultural ecological theory [14] and the ecological retention model [12]. Cultural ecological theory explores how cultural factors (i.e., language and ethnic identity) influence educational pursuits among students from different countries and backgrounds. The ecological retention model merges Tinto's institutional conditions for student retention [18] with Bronfenbrenner's ecological systems theory [2]. Adapted to the college environment, this framework incorporates five nested systems with considerations for the digital age [13]. It encompasses individual attributes and identities, in-person and digital environments, interactions among these environments, institutional practices, and cultural dynamics in shaping student retention. This comprehensive framework examines how environmental conditions and person-environment processes shape retention and student success.

3 Methodology

Building on geographic methods that intersect geography, race, and access [6,7], this single case study employs a mixed methods approach by integrating quantitative data analysis with qualitative ethnographic insights, allowing for a more comprehensive understanding of Latino/a/x student retention. Quantitative Ethnography (QE) is particularly well-suited for this research, as it combines qualitative depth with quantitative rigor. Through QE, ethnographic data is infused with quantitative analysis, allowing for the systematic exploration of complex, interconnected factors influencing retention. This approach strengthens validity through triangulation and enhances reliability by quantifying qualitative insights, allowing for statistical analysis while maintaining credibility through rich, contextually rooted findings.

3.1 Research Questions

1) What psycho-social factors (i.e., cultural identities, self-efficacy, and sense of community) influence Latino/a/x students retention and their academic pursuit?
2) What are the contextual factors (i.e., institutional practices and non-institutional influences) that affect Latino/a/x students retention and their academic pursuit?

3.2 Data Collection and Analysis

Demographic surveys will stratify and sample diverse participants, including students and non-instructional staff. Student participants must identify as Latino/a/x, be 18 years or older, enrolled full-time or part-time, and either pursuing an associate

degree or planning to transfer to a four-year institution. Staff participants must be 18 years or older, employed full-time, and primarily engaged in student support services. Students will participate in ~60-minute semi-structured interviews, while staff will join focus groups. Open-ended questions will align with layers of the ecological framework. The study will have 20 students from various sub-groups and 10 support staff members from various offices/divisions. Field notes will also be collected to capture insights into the institution's retention culture. Data will be segmented and coded manually in Excel with code names, definitions, and examples. Coding will follow a hybrid method: top-down with predefined codes, and bottom-up with emerging data [11]. The dataset will then be uploaded to Epistemic Network Analysis (ENA) for interpretation.

4 Preliminary Constructs

While the study is still ongoing, preliminary review of transcripts has revealed constructs based on both pre-set and emerging themes identified across students and staff: 1) Cultural Identity: Both groups emphasize the importance of cultural identity linking it to their birthplace and most students expressing deeper connections with staff who share similar cultural backgrounds. Additionally, both groups expressed need for greater representation of Latino/a/x among staff and administration. 2) Language: Lack of Spanish speakers and translated materials is a barrier among staff in providing support and outreach. 3) Funding: There is a strong need for increased funding for the English Language Learners (ELL) program, with staff and students alike expressing concerns about financial support and scholarship opportunities. 4) Community: Sense of community is present among staff and students, with efforts across campus such as the Latin American Student Organization (LASO), slowly picking up after COVID. 5) Safety: Campus security is perceived as unwelcoming by some staff, while student reactions to the surrounding neighborhoods' crime vary from numbness to acceptance.

5 Expected Contributions

By introducing a novel methodological approach through QE, this study is expected to enhance the theoretical understanding of retention dynamics among Latino/a/x students. Employing ENA within QE enables the construction of dynamic network models that quantify the frequency and co-occurrences of coded elements, visualizing qualitative data. This approach reveals the strength of connections among themes while also compares patterns between students and non-support staff. By addressing both connections between themes and individual nuances, the study offers holistic insights into retention dynamics. The findings may inform strategies to improve retention among diverse Latino/a/x students by providing empirical, culturally informed evidence for local community college to foster more inclusive and supportive environments.

Disclosure of Interests. There are no conflicts of interest or financial ties to disclose regarding this research.

References

1. Braxton, J. M., Doyle, W. R., Hartley III, H. V., Hirschy, A. S., Jones, W. A., & McLendon, M. K. Rethinking college student retention. John Wiley & Sons (2013)
2. Bronfenbrenner.pdf. (n.d.) (1994)
3. Case, K. F., Hernandez, R., Case, K. F., & Hernandez, R.. "But still, I'm Latino and I'm proud": Ethnic identity exploration in the context of a collegiate cohort program. Christian Higher Education., 12(1–2) (2013)
4. Contreras, F., & Contreras, G. J. Raising the bar for Hispanic serving institutions: An analysis of college completion and success rates. Journal of Hispanic Higher Education (2015)
5. Cuellar, M. G., & Johnson-Ahorlu, R. N. Racialized experiences off and on campus: Contextualizing Latina/o students' perceptions of climate at an emerging Hispanic-Serving Institution (HSI). Urban Education, DOI: 10.1177/0042085920927772 (2020)
6. Dache, A., Stolper, H. Pickenpack, A., Sun, J. & Kearney, L. Neighborhood violence and Latino postsecondary access in "El Norte" Philadelphia (2024)
7. Dache-Gerbino, A. College desert and oasis: A critical geographic analysis of local college access. Journal of Diversity in Higher Education, 11(2), 97 (2018)
8. Garcia, G. A. Defining "servingness" at Hispanic-serving institutions (HSIs): Practical implications for HSI leaders. American Council on Education (2019)
9. Genthe, C. B., & Harrington, C. Low completion rates of Latinx community college students. Impacting Education: Journal on Transforming Professional Practice, 7(2), Article 2. DOI: 10.5195/ie.2022.205 (2022)
10. Gonzales, A. How many Latinos graduate college? Salud America. https://salud-america.org/how-many-latinos-graduate-college/ (2023)
11. Kaliisa, R., Misiejuk, K., Irgens, G. A., & Misfeldt, M. Scoping the emerging field of quantitative ethnography: Opportunities, challenges and future directions. In A. R. Ruis & S. B. Lee (Eds.), Advances in Quantitative Ethnography (pp. 3–17). Springer International Publishing. DOI: 10.1007/978-3-030-67788-6_1 (2021)
12. Mendoza, P., Malcolm, Z., & Parish, N. The ecology of student retention: Undergraduate students and the great recession. Journal of College Student Retention: Research, Theory & Practice, 16(4), 461–485 (2015)
13. Navarro, J. L., & Tudge, J. R. H. Technologizing Bronfenbrenner: Neo-ecological Theory. Current Psychology, 42(22), 19338–19354. DOI: 10.1007/s12144-022-02738-3 (2023)
14. Ogbu, J. U., & Simons, H. D. Voluntary and involuntary minorities: A cultural-ecological theory of school performance with some implications for education. Anthropology & Education Quarterly, 29(2), 155–188 (1998)
15. Perez, W., Espinoza, R., Ramos, K., Coronado, H. M., & Cortes, R. Academic resilience among undocumented Latino students. Hispanic Journal of Behavioral Sciences (2009)
16. Preuss, M., Sosa, E., Rodin, J., Ramos, J., Dorsett, C., & Burleson, C. Competence of faculty, staff, and administrators in Hispanic culture: Evidence from three surveys of personnel and students at Hispanic-Serving Institutions. International Journal of Research in Education and Science, 6(2), 202–230 (2020)
17. Sanchez, A., & Morgan, M. L. Community college transfer phenomena: Experiences of academically resilient Mexican and Mexican American students. Journal of Diversity in Higher Education, 15(4), 412–425. DOI: 10.1037/dhe0000295 (2022)
18. Tinto, V. From theory to action: Exploring the institutional conditions for student retention. In J. C. Smart (Ed.), Higher education: Handbook of theory and research, 25, 51-89. New York, NY: Springer (2010)
19. Tyton Partners. Driving toward a degree 2023: Awareness, belonging, and coordination. Tyton Partners. https://tytonpartners.com/driving-toward-a-degree-2023-awareness-belonging-and-coordination/ (2023)

20. Weiss, M. J., Ratledge, A., Sommo, C., & Gupta, H. Supporting community college students from start to degree completion: Long-term evidence from a randomized trial of CUNY's ASAP. American Economic Journal: Applied Economics, 11(3), 253–297 (2019)

Social Media Platforms and University Students: Activities, Sentiment, Time, and Management

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Abstract. Social media use is a complex activity in which users navigate different platforms and networks to engage in activities. These activities may lead to a wide range of sentiments, although users generally seek ways of managing their social media use to achieve desirable outcomes. The sentiments and approaches vary across platform. In this poster we explore Instagram and TikTok use, seeking to document how activities and management strategies vary based on sentiments related to time spent on a platform.

Keywords: Social media, time, sentiment

1 Introduction

Emerging adults spend a lot of time on social media. Social media use has been connected to negative life outcomes, such as depression and anxiety, for some users. From this, one might expect that higher levels of use would put users at greater risk of harm. However, the relationship between time on social media and well-being is weak (Huang, 2017), with some studies suggesting that social media users increase engagement when they have positive experiences and decrease it when they have negative ones (Stsiampkouskaya et al., 2021). This study is built on the premise that judging social media as a collective group of platforms and based on broad measures is counterproductive (Kross et al., 2021), and that most users will develop strategies for managing their social media use in ways that generate desired outcomes. This study focuses specifically on time spent on social media, inquiring about how individuals experience time spent on different platforms and, in turn, make choices about how to manage their platform use.

In this paper we focus specifically on two platforms: Instagram and TikTok. These platforms were chosen because they are among the most popular social platforms within the teenager and emerging adult age groups (Anderson & Jiang, 2018; Auxier & Anderson, 2021). The research questions guiding this study are: (1) How do university students' sentiments about Instagram and TikTok differ based on activity and time

spent on platform? (2) What strategies to university students use to manage their time and emotional experiences?

2 Method

Participants in this study are 24 university students (21 female; 22 undergraduates) recruited from a research study participation pool in which students can earn course points for engaging in research. The study was approved by the researchers' Institutional Review Board and all participants provided informed consent. Data were collected via online interviews which were recorded with the participants' permission. For qualitative data analysis, we used a thematic approach, with the following parent and child codes:

- Use (entertainment, information-news, social connection, learning, work)
- Time Amount (too little, just right, too much)
- Time Sentiment (positive, mixed, negative)
- Management (delete, limit, monitor, other)

Data was first segmented by platform, and then coded using the parent codes. Then an inductive process was used to identify child codes representing specific qualitative themes within the data. In this poster, Epistemic Network Analysis (ENA) was used to explore the relationships among platforms, activities, time-related sentiment (i.e., how users feel about time spent on platform), and time-related management strategies.

3 Results

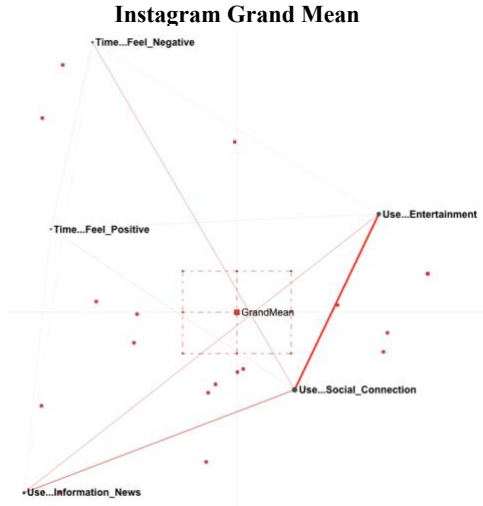
All 24 participants used Instagram to connect with friends and family, sharing content via direct messaging and private groups. Some managed multiple accounts for different audiences. Posting practices varied, with some linking posts to identity and others crafting specific personas. Emotions were mixed: positive experiences involved interaction and engagement, while negative ones related to body image, validation anxiety, and negative comparisons. Time spent on Instagram was generally moderate, with few specific time management strategies. For example, one participant shared, "I have a screen time limit on my phone, but it doesn't really do much." Some participants took breaks or curated their follow lists to improve their experience. Figure 1 presents the ENA findings for Instagram. The qualitative and ENA findings both suggest that Instagram yields negative sentiments when used socially.

Nineteen participants reported using TikTok, primarily for entertainment. Some used it regularly, such as during meals, and others occasionally to fill spare time. The source of entertaining content was their feeds and content shared or created by friends. Four participants also sought inspiring or educational content on TikTok. Scrolling was a common behavior, leading some to avoid TikTok due to its time-consuming nature which was described as "mindless watching," and "getting lost." Participants generally had positive experiences with content on TikTok, describing TikTok as happy and

funny, although concerns about information accuracy were noted. Time spent on TikTok varied, with some reporting over two hours daily. Time management strategies included setting time restrictions and making algorithmic adjustments. Some participants deleted the app to manage time better. Time was the most common source of negative feelings related to TikTok use. Only four participants created content, mainly for a small audience. Posting yielded mixed feelings, with positive feedback valued but negative feedback being a concern. Figure 1 describes the ENA findings for TikTok.

Instagram use for entertainment and social connection are highly connected. For each, the connection to informational use is less strong. with social connection and information also connected, but less strongly.

Positive sentiment about time spent on Instagram is not strongly linked to any particular use, but negative sentiment about time on Instagram is most strongly connected to using it for social connections, followed by using it for information.



On TikTok, use for social connection and entertainment are most strongly connected, followed by a moderation connection between social connection and information.

Negative sentiment about time spent on TikTok is connected both to use for social connection and entertainment. Positive sentiment is not strongly connected to any specific use.

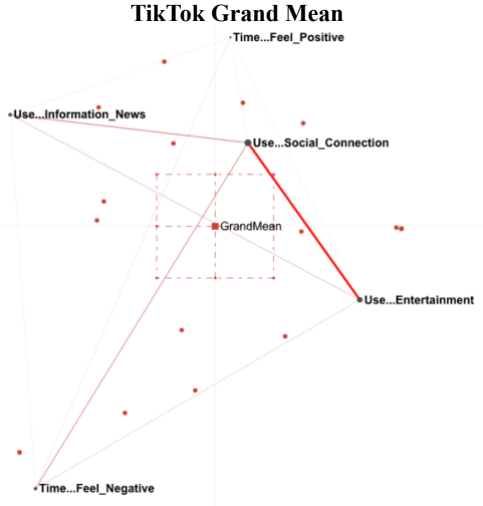


Fig. 1. Grand Mean for Instagram (top) and TikTok (bottom) with interpretation

In Figure 1, the connections between social connections and entertainment and, to a lesser degree, information, supports the way participants described their social networks on both Instagram and TikTok. Although Instagram was deemed more of a platform for actively maintaining social connections, those connections nonetheless exposed participants to both entertainment and informational content on both platforms. On TikTok, positive and negative sentiments about time spent on platform were more polarized than on Instagram. On both platforms, the individual user nodes spread around the grand mean suggest diverse ways in which the platforms are approached and experienced by individual users. Qualitative analysis of interview data supports this idea but suggests that individuals develop strategies to manage their time and activities on a platform in order to maximize a satisfactory – or at minimum, neutral – outcome.

4 Discussion

These preliminary findings support the notion that social media platforms, with their varied affordances, are used with different purpose and sentiment by emerging adults. Additionally, there are meaningful differences in how participants manage their social media use with respect to activities, and time. A limitation of these findings is the small sample size along with the skewed gender of the sample. Additional data has been collected for future analysis to help address these limitations. Our continued analysis has yielded different user approaches to platform use, with corresponding shifts in sentiment, time, and management. Next steps in this research include investigating other platforms about which we collected data and exploring learning-focused activities as well as other issues (e.g., anxiety, self-image).

References

Anderson, M., & Jiang, J. (2018). *Teens, social media & technology 2018*. Pew Research. http://www.pewinternet.org/2018/05/31/teens-social-media-technology-2018/

Auxier, B., & Anderson, M. (2021). *Social Media Use in 2021*. Pew Research Center. https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/

Huang, C. (2017). Time spent on social network sites and psychological well-being: A meta-analysis. *Cyberpsychology, Behavior, and Social Networking*, *20*(6), 346-354. https://doi.org/10.1089/cyber.2016.0758

Kross, E., Verduyn, P., Sheppes, G., Costello, C. K., Jonides, J., & Ybarra, O. (2021). Social media and well-being: Pitfalls, progress, and next steps. *Trends in Cognitive Sciences*, *25*(1), 55-66. https://doi.org/10.1016/j.tics.2020.10.005

Stsiampkouskaya, K., Joinson, A., Piwek, L., & Ahlbom, C.-P. (2021). Emotional responses to likes and comments regulate posting frequency and content change behaviour on social media: An experimental study and mediation model. *Computers in Human Behavior*, *124*. https://doi.org/10.1016/j.chb.2021.106940

Addressing Shared Reflective Persistence Through Three Different Lenses

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Abstract. In this poster, we discuss how a combination of multimodal data streams, ethnography and psychometrics can help us understand the qualities of group work in science education. We focus on student's ability to persist despite meeting difficulties – and refer to this group capacity as *shared reflective persistence (SRP)*. The main contribution of the poster is to define SRP, describe the need for empirical understanding of the phenomenon in science education and discuss the promise of multimodal data analytics to contribute to this. In order to explore SRP empirically we combine three methodological strands (ethnography, multimodal learning analytics and psychometrics). And address the question of how to combine these strands in a coherent QE analysis.

Keywords: group work, multimodal learning analytics, shared reflective persistence.

1 Introduction

Developing the ability to continue working, investigating, and discussing despite difficulties is a key aspect of STEM education [1, 4, 6], as is articulating and discussing problems—and seeking a different route towards solutions. Students' willingness and ability to jointly address challenges in a productive manner is important. However, the research in this area only partially connects psychological framings such as grit [4], and motivation [11] to group dynamics. To study this phenomenon empirically, we are collaborating with a science centre where school classes engage in day-long group-based explorations of complex scientific problems. This setting allows us to set up one of the laboratories for data collection and observe many iterations of the same activity with different students but the same instructors and physical setup.

In this poster, we introduce two connected concepts, Collaborative Courageous Science (CCS) and Shared Reflective Persistence (SRP), that can help us operationalise persistence and motivation in the context of activities in a science education centre. We will then address the question of how multimodal data streams can be analysed to uderstand what conditions support or hinder the development of SRP. To connect

multimodal data analytics with relevant theory, our analysis will be grounded in psychometrics and ethnography [12]. After a short description of the existing state of the art and our collaboration with the science education centre, we move forward to defining the two concepts and then discuss data generation, and analytical approach.

2 State of the art and theoretical development

A key inspiration for CCS and SRP is Kapur's notions of productive failure [6]—i.e. the importance of having students struggle and fail in complex problem-based learning environments as a stepping stone to reach deep understandings. We aim to study productive failure from a group perspective in the specific context of inquiry-based science learning. By adopting multimodal learning analytics, ethnography and psychometrics, we will explore how in-the-moment measurements can detect SRP. We are influenced by Gerry Stahl's work, who focuses on cognitive processes at a group level. He introduces three dimensions to social order in small group work: 1) the temporal sequence of events, 2) the problem space of shared knowledge artefacts, and 3) the interaction space of positioned actors [13]. We share Stahl's dedication to these three dimensions. In our methodological approach, we benefit from the combination of temporal segmentation and the coexistence of different "spaces" (e.g. problem space and interaction space), enabling us to map key aspects of group work.

From a psychometric perspective, much literature on persistence and motivation is grounded in a split between intrinsic and extrinsic motivation. Ryan and Deci [11] elaborate this dichotomy as a spectrum, where extrinsic motivation interacts differently with behaviour depending on the perceived salience of rewards and locus of causality. For schools, one implication of this model is the importance of supporting self-determined learning—that even in extrinsically motivated cases, such as the need to finish assignments, students' experience can improve if they engage with and endorse the activity.

Grit, defined as "perseverance and passion for long-term goals," [4] is theorised as a cross-domain individual trait. Though widely popularised, it has also been criticised as not being sufficiently distinct from conscientiousness [3]. We take inspiration from items on the Grit Scale (e.g., "Setbacks don't discourage me") [4] and literature on conscientiousness [5].

In a critical review on small-group collaboration [9], we found that studies focusing on developing quantitative data collection were weakly coupled to theory. Micro-ethnographical work was much more explicit in its relation to theory. Here, we build our framework supporting CCS by defining and measuring SRP from three perspectives 1) ethnographic, 2) multimodal and 3) psychometric.

3 Defining key concepts

Our investigation introduces two core concepts: CCS and SRP. We will first define these concepts and then outline our strategy for datafying and analysing students' activities in relation to them.

Collaborative Courageous Science is a normative concept that describes our pedagogical ideal. Engagement in *collaborative* work is a valuable skill and a vital tool for STEM learning. We highlight *courage* because we consider risk-taking and a playful attitude towards failure important. We want students to put their ideas at stake in exploring science. Typically, courage is seen as an individual trait (in a similar fashion to grit [4] and motivation [11]) . Still, with inspiration from Stahl [13], we propose that Collaborative Courage should be studied at the group level, focusing on group processes and micro-culture in the classroom and within groups.

We take the group's ability to keep working on solutions in the face of adversity as a critical measure and call this *Shared Reflective Persistence*, to highlight three dimensions of courageous science. *Shared* denotes that the reflections and associated social risks occur at the group level. *Reflective* denotes that the reflections are negotiated in the groups, with reference to their existing knowledge of the phenomena. *Persistence* acknowledges that the risk-taking process is ongoing even though it is challenging, both on an individual and a group level.

4 Studying *Shared Reflective Persistence*

We explore SRP through ethnographic observations with and without video, psychometrics, and multimodal data collection. We initially surveyed teaching activities at the science centre and chose focal activities based on students' age groups and physical setup constraints. As of May 2024, we have observed 14 schools visiting the centre. We first did ethnographic field observations in the laboratory, including interviews with teachers and students about their experiences in the lab. These observations theorised the relationship between group compositions, artefacts, and SRP [10]. Next, video ethnography allows for revisiting and applying the grounded theory to identify relevant multimodal indicators for situations with SRP.

We apply machine learning techniques and sensor technologies [2] in an analysis guided by learning theory [5] and ethnography. We designed and developed our Multimodal Learning Analytics (MMLA) platform [7] to capture the traces of SRP observed in the ethnography. The platform adopts IoT and wearable badges, leveraging sensors to collect multimodal data (audio, video, and radio). With the MMLA platform, we hope to observe SRP phenomena at a fine-grained level, enhance group work understanding in science education, and validate our proposed educational framework.

Finally, psychometric data from the survey gives insight into the perceived dimensions of SRP, providing an independent measurement while informing the ethnographic and sensor data. The survey will give an individual perspective on SRP and try to capture the small-group social dynamics. This allows for describing SRP variations in and between groups. The survey development is based on our theoretical understandings of SRP and CCS, operationalized to concrete representative actions that students carry out in the classroom. After pilot-testing a pool of items, responses will be analysed with observational pilot data to construct final scales for the constructs.

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References

1. Atabek-Yigit, E., Senoz, A.B.: Optimal learning moments in an undergraduate chemistry lab. Research in Science & Technological Education. 1–17 (2023). https://doi.org/10.1080/02635143.2023.2224241.
2. Blikstein, P., Worsley, M.: Multimodal Learning Analytics and Education Data Mining: using computational technologies to measure complex learning tasks. Learning Analytics. 3, 2, 220–238 (2016). https://doi.org/10.18608/jla.2016.32.11.
3. Credé, M.: What shall we do about grit? A critical review of what we know and what we don't know. Educational Researcher. 47, 9, 606–611 (2018). https://doi.org/10.3102/0013189X18801322.
4. Duckworth, A.L. et al.: Grit: Perseverance and passion for long-term goals. Journal of Personality and Social Psychology. 92, 6, 1087–1101 (2007). https://doi.org/10.1037/0022-3514.92.6.1087.
5. Giannakos, M., Cukurova, M.: The role of learning theory in multimodal learning analytics. British J of Educ Tech. 54, 5, 1246–1267 (2023). https://doi.org/10.1111/bjet.13320.
6. Kapur, M.: Examining Productive Failure, Productive Success, Unproductive Failure, and Unproductive Success in Learning. Educational Psychologist. 51, 2, 289–299 (2016). https://doi.org/10.1080/00461520.2016.1155457.
7. Li, Z. et al.: Field report for Platform mBox: Designing an Open MMLA Platform. In: Proceedings of the 14th Learning Analytics and Knowledge Conference. pp. 785–791 Association for Computing Machinery, New York, NY, USA (2024). https://doi.org/10.1145/3636555.3636872.
8. MacCann, C. et al.: Empirical identification of the major facets of Conscientiousness. Learning and Individual Differences. 19, 4, 451–458 (2009). https://doi.org/10.1016/j.lindif.2009.03.007.
9. Nøhr, L. et al.: Critical Reviews with Quantitative Ethnography: Theory use in MMLA literature on group work in educational settings. Presented at the Sixth International Conference on Quantitative Ethnography (submitted).
10. Nøhr, L.: Navigating Failure - Exploring the Influence of Artefacts in 8th-Grade Groups' Problem-Solving. Presented at the European Conference for Educational Research (ECER) August (2024).
11. Ryan, R.M., Deci, E.L.: Intrinsic and extrinsic motivations: Classic definitions and new directions. Contemporary Educational Psychology. 25, 1, 54–67 (2000). https://doi.org/10.1006/ceps.1999.1020.
12. Shaffer, D.W.: Quantitative ethnography. Cathcart Press, Madison, Wisconsin (2017).
13. Stahl, G.: How to Study Group Cognition. In: Puntambekar, S. et al. (eds.) Analyzing Interactions in CSCL: Methods, Approaches and Issues. pp. 107–130 Springer US, Boston, MA (2011). https://doi.org/10.1007/978-1-4419-7710-6_5.

AfroLatin Futurism: Weaving Magical Realism and Unveiling New Possibilities through Quantitative Ethnography

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Abstract. In this lecture, Dr. Amalia Daché introduces *Afro-Latin Futurism* as a framework for rethinking educational paradigms. Rooted in the cultural and historical experiences of Afro-Latin communities, this framework offers a powerful lens for exploring the intersections of tradition, innovation, and future technologies in education. Dr. Daché integrates *quantitative ethnography* as a key method for analyzing the complex cultural phenomena within these communities. Using quantitative models based on storytelling, this method analyzes how Cuban communities engage with diverse educational experiences, including their connections to West African mythologies. Together, *Afro-Latin Futurism* and *quantitative ethnography* provide a comprehensive approach for understanding and transforming educational paradigms through the lens of Afro-Latin experiences.

Quantitative Ethnography in the Age of Generative AI

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Abstract. The fast-moving advances of generative AI offers new opportunities and challenges to the practice of understanding individuals and groups. First, there are new data to be analyzed as millions of people have long conversations with generative AI tools. In education, these conversations range from tutoring conversations across domains to teachers' conversations around lesson plan creation. This presents us with new kinds of evidence about our constructs of interest and new ability to understand other kinds of evidence. Second, generative AI serves as a new research tool, for example, assisting with coding, if sufficient accuracy can be reached. Finally, it serves as a potential disruptor. For some purposes and some audiences, the kinds of narrative summaries generative AI can provide of large amounts of text may provide more insights than many of our visualizations and complex statistical summaries. At the very least, querying corpuses with generative AI tools may lead complementary insights to our existing methods.