

Lessons Learned doing Secondary Data Analysis in Engineering Education Research (EER)

Jenni Case¹, Holly Matusovich¹, Marie Paretti¹, Lisa Benson², David Delaine³, Shawn Jordan⁴, Rachel Kajfez³, Susan Lord⁵, Rhonda Papp⁵, Tyler Young³, and Yevgeniya Zastavker⁶

¹Virginia Tech, ²Clemson, ³Ohio State, ⁴Arizona State, ⁵UC San Diego, and ⁶Olin



Introduction

Project Goals

This project has drawn together a team of researchers to explore ways to overcome obstacles for conducting secondary data analysis (SDA) in engineering education research (EER).

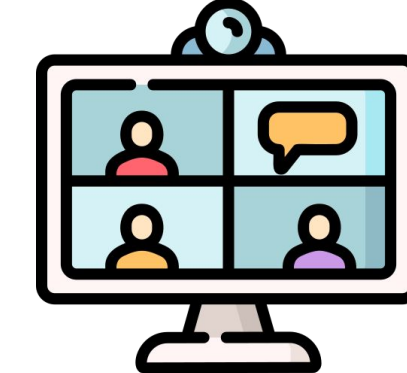


The project aims included:

- Sharing data both informally and formally,
- Putting datasets in the public domain,
- Creating combined datasets,
- Performing secondary analyses of both qualitative and quantitative data,
- Publishing and disseminating these analyses,
- Securing funding to support this work,
- Valuing and validating this work within the field.

Year 1: Generative Workshops

- Workshop 1- Exploring SDA
- Workshop 2- Generation of Potential Projects
- Workshop 3- Test Project Launch



Year 2: Dissemination and Reflection

- Virtual Gathering – September 2022: Interim reports from project teams
- In-person Writing Retreat – January 2023: Synthesizing individual and collective findings; writing for dissemination
- Wrap-up – May 2023: Lessons learned, next steps



Acknowledgements

Funding

This material is based upon work supported by the National Science Foundation under Award No. 2039864. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Icons

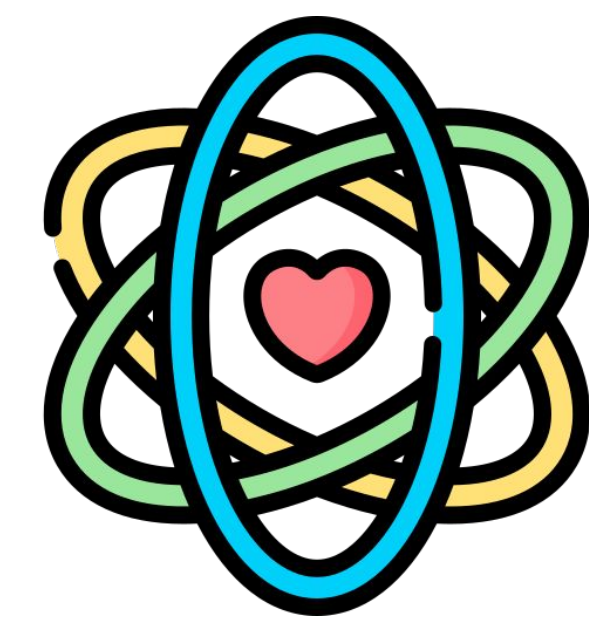
All icons sources from - [Flaticon.com](https://www.flaticon.com)
• Icons created by Freepik and Eucalyp

References

- [1] M. C. Paretti, J. M. Case, L. Benson, D. A. Delaine, S. Jordan, R. L. Kajfez, S. M. Lord, H. M. Matusovich, E. T. Young, Y. V. Zastavker (2023) "Building Capacity in Engineering Education Research Through Collaborative Secondary Data Analysis," *Australasian Journal of Engineering Education*, DOI: 10.1080/22054952.2023.2214462.
- [2] E. T. Young, R. Papp, D. A. Delaine, and S. S. Jordan, "Engineering for nation building: Piloting a framework for operationalizing tribal sovereignty in engineering education research," Poster presentation at the 2022 American Indian Science and Engineering Society National Conference & Exposition, Palm Springs, CA, October 2022.
- [3] E. T. Young, D. Delaine, S. S. Jordan, R. Papp, and S. M. Lord, "Pursuing equity and quality within research 'at a distance' through centering positionality," to be presented at the 2023 ASEE Annual Conference & Exposition, Baltimore, MD, June 2023.

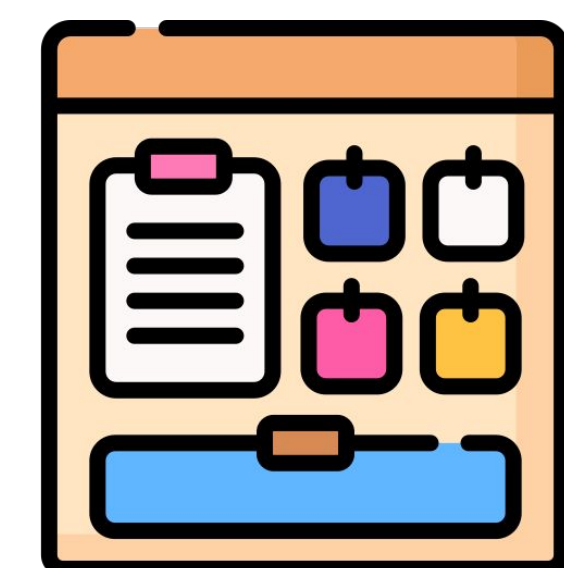
Year 2: Dissemination and Reflection

Lessons Learned from the Mini Projects



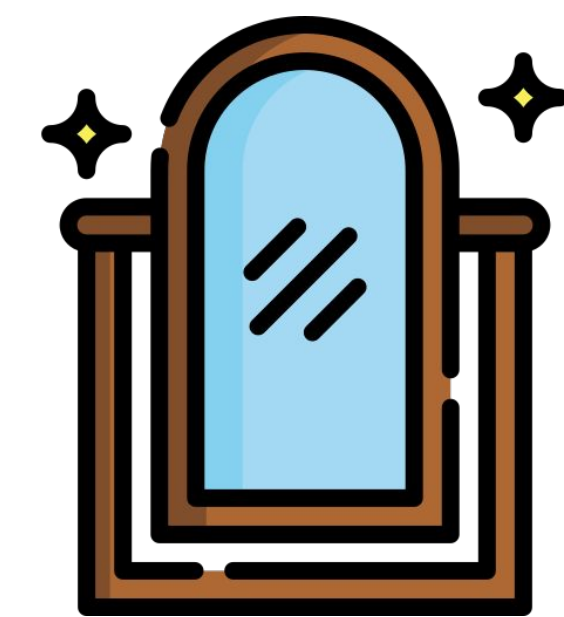
1. Ethical Considerations

- Research ethics should be at the forefront of any SDA work
- The projects we worked with were not initially created for SDA and required significant IRB negotiations
- In the planning stages, researchers could consider
 - Whether the data could and should be available for SDA
 - Defining scope and documentation
 - Participant consent of initial and secondary data usage



2. Sharing Contextual Information

- Qualitative data is shaped by tacit knowledge
- We found it important for emerging scholars to learn the complexity and nuances of the collection and analysis of their data set
- Trust is key in this process - qualitative data is often highly personal or participants and researchers



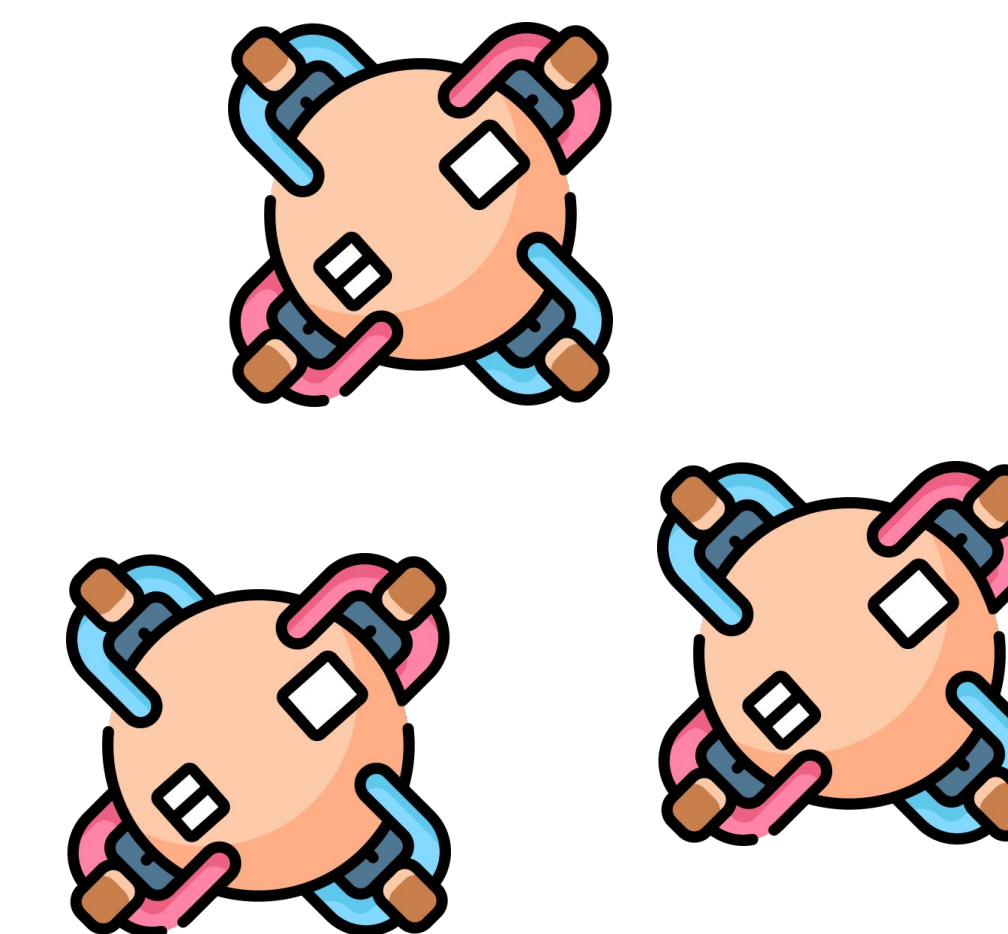
3. Reflective Practice in SDA

- Beyond memoing, the projects established structured reflection guidelines to reflect on the research process and learning
- For undergraduate researchers engaging in reflective SDA transformed their personal and professional identities

NSF EEC Grantees Conference Workshop Discussion

Key Issues and Questions that Surfaced:

- **Working with vulnerable populations** – *what is our duty to participants? What does it mean to "do no harm"? We were able to share the approaches we used in Mini-project 2.*
- **Data quality** – *Could this create vulnerability for the new researchers who had collected these original data?*
- **De-identification of data** – *How and by who should de-identification be conducted?*
- **Familiarity with context** – *What happens if researchers not familiar with the context of your project do things with the data that you don't agree with? Secondary researchers may not have familiarity with the context.*
- **Publishing SDA** – Participants felt that journal reviewers do not seem to like secondary data analysis and this may not be a popular choice for Ph.D. dissertations.



These challenges are common to qualitative data; continued work & discussion will be needed.

Mini Project 1

Secondary Data Analysis as a Mechanism for New Insights and Future Researcher Preparation

- **Goals:** Explore the potential of SDA for training of newer researchers to the field
- **Key Finding:** An unanticipated benefit for the undergraduate researchers, who derived personal as well as professional growth from conducting this work.

Mini Project 2

Diné Sovereignty

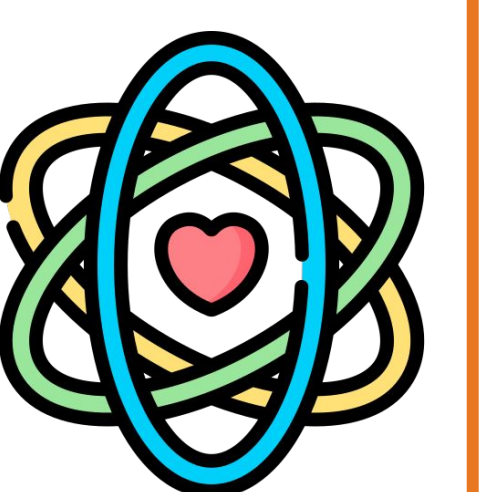
- **Goals:** Conduct SDA on a dataset that had involved the participation of marginalized populations, in this case American Indian engineers
- **Key Findings:** This project offers significant guidelines for conducting SDA with marginalized populations, and engages deeply with emerging ethical questions, such as those involved when choosing to return to participants for further consent. The research design of the SDA project was presented at the American Indian Science and Engineering Society (AISES) National Conference [2]. The importance of positionality of the researchers is further explored in [3].

Conclusion



SDA can be useful approach to **generate new insights** and **honor the efforts of the participants** who gave of their time for the original data

The mini-projects show the value of SDA and collaboration. However, there is need to explore the implications of posting qualitative data to public repositories.



With careful use, SDA has strong potential for strengthening EER capacity and the quality of our work.