DATA-TO-GRAPHS AND BACK: SECONDARY TEACHERS' REASONING ABOUT AESTHETIC MAPPINGS IN DATA VISUALIZATIONS

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INTRODUCTION

As ideas from data science become more prevalent in secondary curricula (e.g., IDSSP Curriculum Team, 2019), it is important to understand secondary teachers' reasoning about data attributes and how they are mapped to aesthetics in visualizations. The purpose of this case study is to explore how teachers make sense of aesthetic mappings between data and visualizations, especially depictions of multivariate relationships.

METHODS

The participants were 14 in-service secondary teachers who were video recorded as they worked through two separate sets of activities. One set had participants create a visualization (network graph) from data encoding different aspects of a multivariate relationship. The other gave participants a visualization encoding several attributes (scatterplots and network graph) and asked them to identify and organize the underlying data. Video recordings were analyzed using a social constructivist lens to gather evidence of participants' reasoning.

RESULTS

With minimal instruction, participants were able to create a visualization when given data representing multivariate relationships. Most were able to encode multiple sources of information by varying aesthetics in their visualization (e.g., color, location), with a few exceptions. Results from the second set of activities indicated that creating data tables, especially relational tables, was more challenging for the participants.

CONCLUSIONS

These results provide insight into the prior content knowledge used by secondary teachers to reason about modern data visualizations. Modern data visualizations that encode multiple attributes and relationships are not typically included in textbooks (e.g., Shreiner, 2018). While our participants exhibited some ability to create and reason about these types of visualizations, they appeared to struggle with transitioning from visualizations to the structure of the underlying data. As ideas from data science matriculate into the secondary curriculum, opportunities for professional development focused on knowledge and understanding about the data structures used in data science are needed. This also indicates the need for research on how to support secondary teachers' content knowledge for teaching about modern data visualizations.

REFERENCES

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