

PROBLEM

Creating equitable learning environments is a critical issue for teachers with diverse classrooms, whose students come from a wide range of backgrounds and cultures.

BACKGROUND

- Enabling all students to contribute equitably to knowledge-building activities focused on explaining real-world phenomena (Penuel & Watkins, 2019).
- Need for providing teachers with effective strategies for productively engaging diverse students and providing equitable opportunities to learn (Garcia & Guerra, 2004).

STUDY GOALS

- We are studying how visual analytics can help teachers reflect on the degree to which all students in their classroom feel welcome and able to contribute; we define equitable classrooms where students' quality of experience cannot be predicted by their gender, race or home language.
- We engaged seven middle school science teachers in a design process to create a visual analytic tool - the Student Electronic Exit Ticket (SEET) system. To understand their sense-making of classroom equity data.

Scaffolding Teachers Sense-making for Classroom Equity using Visual Analytics

Ali Raza^{1,2}, William R. Penuel², Jennifer Jacobs², Tamara Sumner^{1,2}

Department of Computer Science¹, Institute of Cognitive Science²
University of Colorado Boulder

{a.raza, william.penuel, jennifer.jacobs, sumner}@colorado.edu

ADOPTED APPROACH

The importance of incorporating human centered methods is emphasized in the field of LA (Buckingham Shum et al. 2019). In our two design studies, we used think aloud and cognitive interviews. We presented teachers with a total of thirty different visualizations of SEET data that displayed data on gender and race disaggregation. From design sessions we found visualizations in figure 1 below aligned with the sense-making of teachers (Bertrand & Marsh, 2015): 'horizontal histogram' (a) and 'heat map' (b) for disaggregating gender and race data, and 'line graph' (c) for overtime investigation.

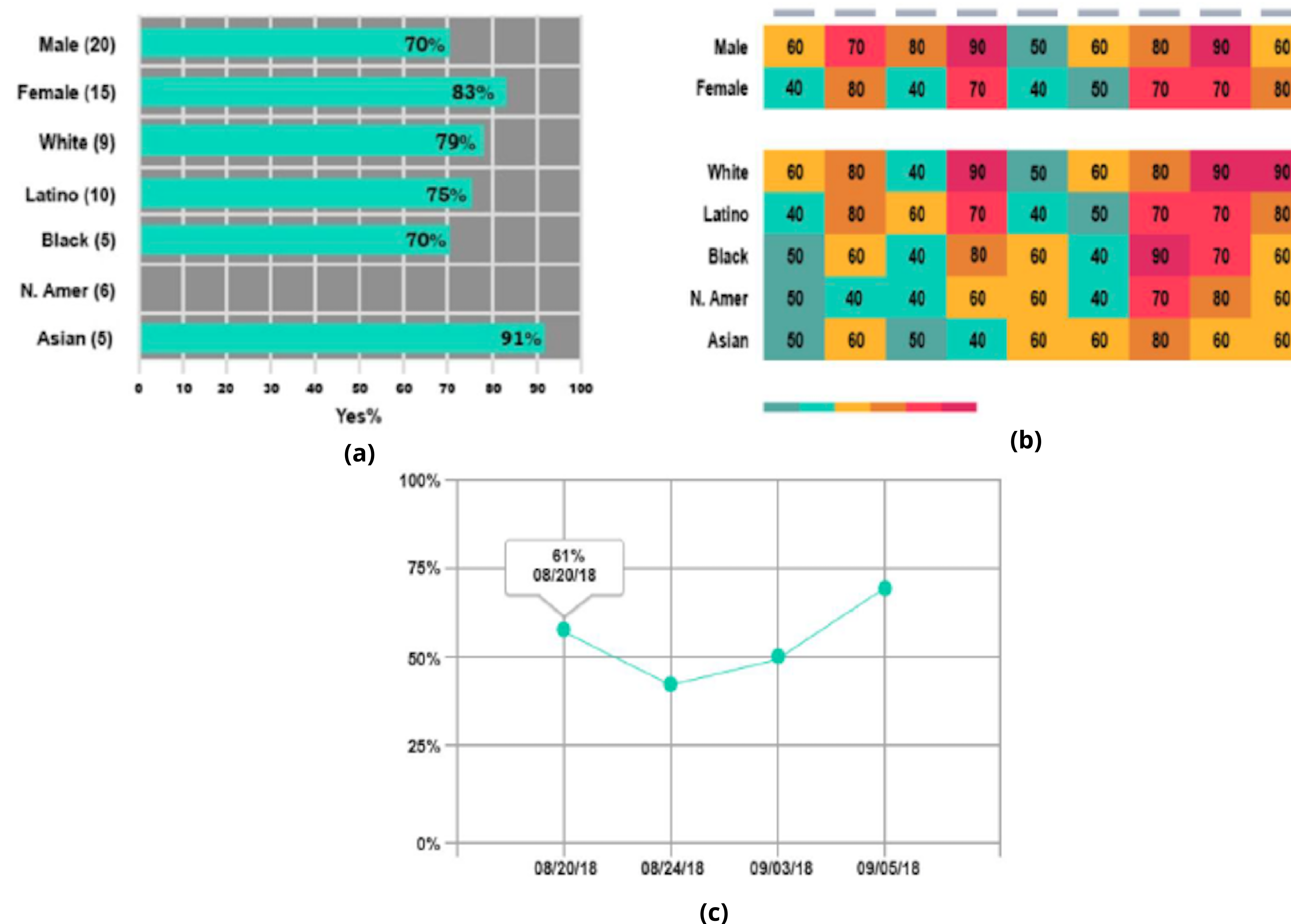


Figure 1: Visualizations preferred by teachers during the design sessions

DESIGN IMPLICATIONS

- Results from the design sessions provided initial insights into the teachers' sense-making process with different visualizations aimed at supporting equity. Also, it helped in the selection of the visualizations most aligned with the sense-making of teachers
- Working with teacher partners helped in gathering design recommendations.

FUTURE WORK

- Conduct more design sessions with the teachers from diverse classrooms
- Establish inter-rater reliability agreement of the findings from the design studies
- Evaluate the SEET system with the teachers implementing the selected visualizations from the design studies.

REFERENCES

- Bertrand, M., & Marsh, J. A. (2015). Teachers' sensemaking of data and implications for equity. *American Educational Research Journal*, 52(5), 861-893.
- Buckingham Shum, S., Ferguson, R., & Martinez-Maldonado, R. (2019). Human-centred learning analytics. *Journal of Learning Analytics*, 6(2), 1-9
- Garcia, S. B., & Guerra, P. L. (2004). Deconstructing deficit thinking: Working with educators to create more equitable learning environments. *Education and urban society*, 36(2), 150-168.
- Penuel, W. R., & Watkins, D. A. (2019). Assessment to Promote Equity and Epistemic Justice: A Use-Case of a Research-Practice Partnership in Science Education. *The ANNALS of the American Academy of Political and Social Science*, 683(1), 201-216

Supported By:

