DESIGNING USABLE TECHNOLOGIES FOR PRACTICAL MEASUREMENT AND IMPROVEMENT EFFORTS

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How does the design of technologies for data collection and representation of practical measures support improvement efforts?

Context

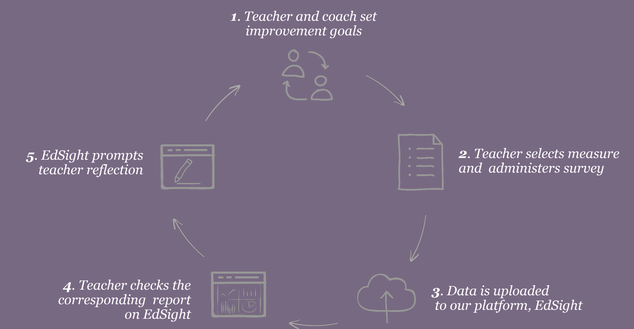
This work is part of Practical Measures, Routines, & Representations for Instructional Improvement (PMR²), a nation-wide research effort led by NYU, UC Riverside, Vanderbilt and the University of Washington. The goal of PMR² is to develop a system of practical measures, routines, and representations of the associated data to support instructional improvement strategies in middle-grade mathematics.

An integral part of PMR² is the development of a suite of dashboard tools allowing for the data visualization of student voice around specific middle-grade math practices.

This research project is being simultaneously conducted through Research Practitioner Partnerships (RPP) in five school districts across the country. The two practical measures being used have been developed by our research group. They are:

- **Small Group Discussion** – measures student perceptions of discourse practices during collaborative group work.
- **Whole Class Discussion** - measures student perceptions of discourse practices during whole-class discussion.

Our challenge: developing a platform that responds to our partner's evolving needs and fits their improvement cycle.



Key Design Considerations for PMR² Dashboard Tools

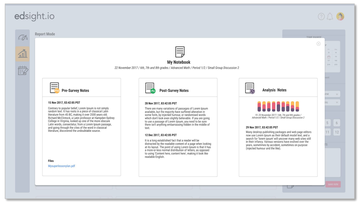
- Common problems of practice among RPPs
- Unique analytic needs for each RPP
- Adaptable and responsive to changing RPP needs
- Real-time data provisions to RPPs
- Sustainability and scalability
- Whole solution approach: measure, survey, dashboard and reflection tool

Challenges	Design Decisions
Common ontology of events, but inconsistent data structures and routines across partnerships. Multiple formats of data: pen and paper, Google Forms, Microsoft 360 and Scantron	Data structure and routines designed to be highly accommodating to inconsistencies and formats
Multiple needs across partnerships	Partner feedback drove design decisions (e.g. color choices and layout of data representations)
Usability	Chosen color scheme respects accessibility challenges; Limiting the dashboard to three chart types minimizes cognitive load
Current data representations privilege only certain narratives	Future iterations of the dashboard will aim to tell additional stories via other types of data representations

We created EdSight, a visual analytics platform for improvement and research efforts in teaching and learning

***Single Report Mode**: Teachers analyze the result of each survey administered to students. Different dates, measures, classes, and specific questions can be queried in the same screen. The bar on the right also allows teachers to write notes and reflections about the data. Note that the bar on the left allows for transitioning between various view modes (Overview, Report, and List views).*

***Longitudinal Reports**: Teachers can analyze multiple reports of a single measure (Whole Class or Small Group Discussion), in aggregate or survey-by-survey views. The platform also allows for tracking specific response items over time and pins them to the dashboard screen.*



***Notebook**: One key aspect of EdSight is to prompt reflection and sense making from the data representations provided by the platform. Our tool permits teachers to write pre-survey notes when a survey is scheduled (hypothesis, goals, and expectations), post-survey notes (after an analysis has been conducted), and longitudinal notes (when a group of surveys is being analyzed together).*

Next steps and ideas:

- Understand how specific affordances of data representations might contribute to patterns of interpretation.
- Develop a module for instructional coaches to prompt peer-to-peer reflection with teachers.
- Increase involvement of school-level professionals in future design work.
- Understand how EdSight informs learning design, beliefs and pedagogical decisions.
- Develop new forms of representation, to support other types of "stories."

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