Development and Validation of a Mobile, Web-based Coaching Tool to Improve Pre-K Classroom Practices to Enhance Learning

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The search for measures to describe effective teaching has been extensive and has concentrated primarily on the upper elementary and middle grades. Recently the Gates Foundation invested resources in a project labeled Measuring Effective Teaching. They concluded that while it was possible to define and promote great teaching, it was arduous and involved a combination of classroom observations, student surveys and student achievement gains (Gates Foundation, 2013). Moreover, the work highlighted the enormous importance of providing feedback to teachers.

Children from low-income backgrounds enter school with less knowledge in critical content areas such as math (e.g., Jordan et al., 2009). Teachers in Pre-K programs serving low-income children may need specific assistance in promoting math knowledge for children. It is possible that teachers are not able to accurately gauge the frequency with which they provide math or science-focused activities for children. For example, a recent study indicated that when Pre-K teachers were asked how often they incorporated math in their classrooms, they reported that they regularly engaged children with math activities, daily or almost daily (Walter & Lippard, 2017). Pre-K teachers need valid information about their classroom practices before they can take steps to improve these practices. Instructional coaches are in the position to be able to provide this type of feedback. In order to do so, coaches need to know when to observe in a classroom, what to look for, a way to collect information (i.e., data) systematically on what they see, and an understanding of how to use the information to inform their coaching of teachers.

In August of 2018, we received a Discovery Research K-12 grant from the National Science Foundation to address this need. The goal of our work is to create a user-friendly web-based coaching tool that will 1) guide instructional coaches to collect specific data targeting classroom practices that are linked to student gains and 2) connect what they see in the classroom to specific coaching strategies.

The focal classroom practices that serve as the foundation for our coaching tool were identified over the course of a four-year partnership between education researchers and a southeastern metropolitan school district. Trained observers conducted day-long classroom observations using a complex measure that requires the observer to collect data across nine dimensions of student and teacher behaviors. Data collected in the first year of the partnership identified 8 clusters of classroom practices that were linked to children's gains across a number of different domains (Farran et al., 2017). The same 8 practices that were identified after the first year of the partnership were replicated in the subsequent years.

1. Reducing time spent in transitions
2. Promoting positive classroom climate
3. Increasing children's associative and cooperative interactions (social learning)
4. Promoting participation in sequential activities
5. Increasing children's level of involvement/engagement
6. Increasing teachers' level of instruction
7. Increasing teachers' listening to children
8. Promoting more time spent in math

Observation tools designed for research purposes, such as those used during the partnership described above, are not practical for use by instructional coaches, who have limited time for conducting observations and often are assigned to work with multiple teachers. Further, the measures require a great deal of post-data collection processing prior to interpretation. The next critical step toward empowering coaches to help teachers make meaningful changes in classroom practices is to provide them with a user-friendly tool that allows coaches themselves to be the data collectors – from beginning to end – so they can generate their own data and provide instant feedback and coaching to teachers.

Approach

Design Feature and Data Collection Functionality for Coaching Tool Prototype. At the beginning of the project, we formed partnerships with instructional coaches, teachers, and engineering students with the expertise to develop a progressive web application.

The team of undergraduate students enrolled in a Mobile Cloud Computing class to develop the data collection functions for the coaching tool. Over the course of the 2018-19 academic year, we focused on developing data collection tools for four of the 8 classroom practices: transitions, classroom climate, sequential activities, and social learning interactions. We worked together to draft and discuss mock-ups of the data collection prototypes.

We engaged our partnering pre-k instructional coaches to provide iterative feedback on the functionality of the tool. We communicated this feedback to the engineering students and they implemented changes to refine the tool throughout the development process. Coaches piloted iterations of the tool in classrooms and provided us with additional feedback on functionality and terminology used in the tool. Figure 1 provides an example of one of our data collection screens, focused on transition time.

Design Observation Data Output for the Coaching Tool. Similar to the iterative design process of the data collection tools, researchers and engineering students utilized coach feedback about how observation data should be displayed in order to be easily interpretable and useful for both coaches and teachers. These decisions about how the data should be displayed (e.g., pie charts versus bar charts; percentage of time versus time in minutes) have informed the real-time analyses that the students have embedded in the prototypes for transitions, classroom climate, and collaborative learning interactions results prototypes. Figure 2 shows output associated with data on transitions.

Connect Data Collection to Coaching Cycle. Coaching supports growth in teacher practices when sufficient coaching cycles occur (Hemmeter et al., 2016). One critical component of a cycle is using data from focused observations to facilitate teacher reflection and goal-setting. Our tool supports this step by pairing observation data with practice-specific questions to guide a coaching conversation between teacher and coach. If data revealed that children spent most of their time during transitions waiting for materials, the tool would suggest a prompt around lesson preparation and organization (see Figure 3).

Our goal is to develop a tool that empowers teachers, with support from a coach, to engage in professional growth to enhance student learning. Our tool enables teachers to set goals and specific action steps, leading to practice improvements that truly matter for the children they teach.

References

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Figure 1. Data Collection Screen for the Transition Time Tool.

Figure 2. Results of Transition Time Data Collection.

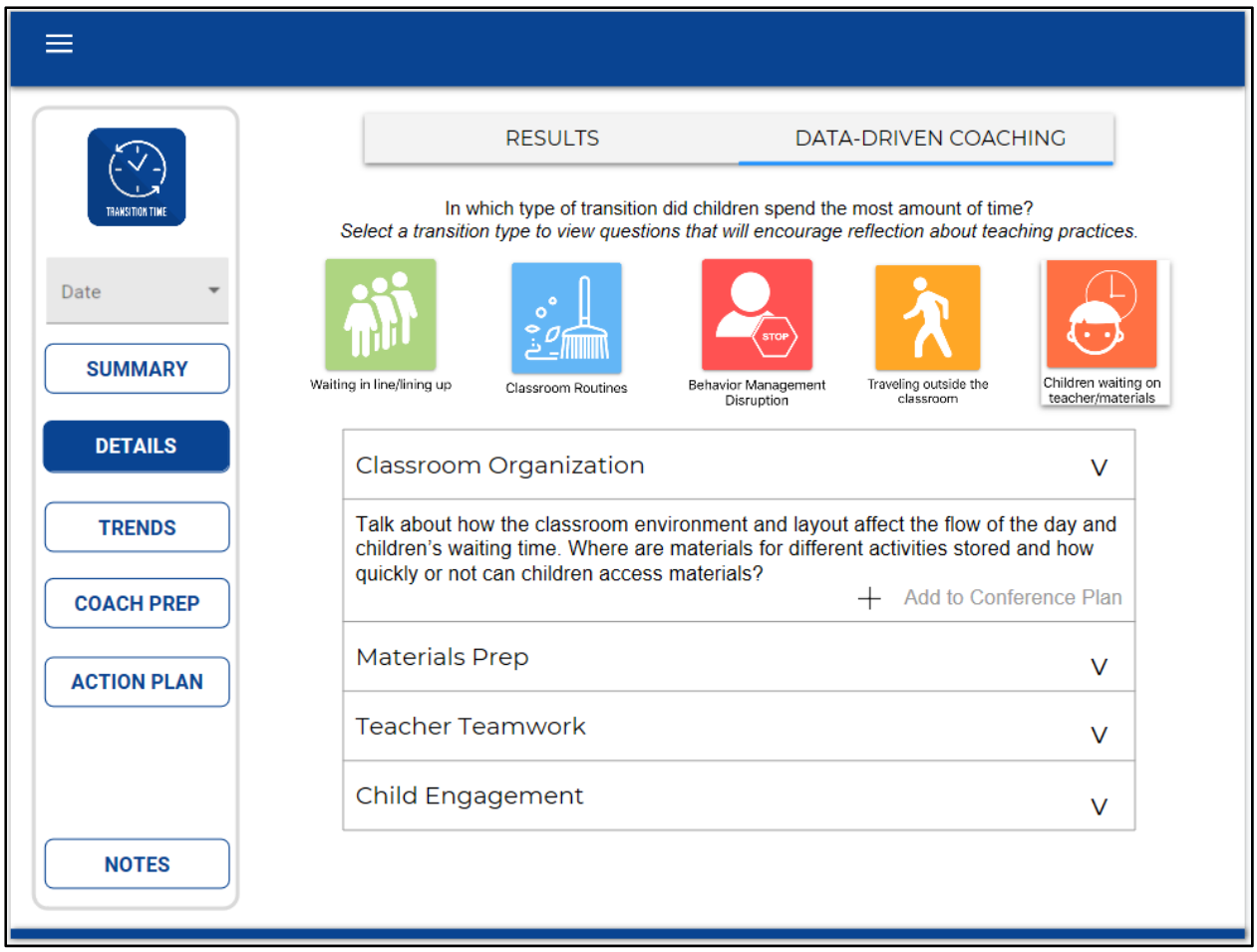

Figure 3. Data-Driven Coaching Screen focused on Transition Time.