Title: Formative Feedback Handheld Tools for Teachers

Abstract: Formative assessment has been found to improve teaching and learning but formative feedback tools are often left out of school data systems. Via a Design-Based Research process we collaborated with 11 elementary school teachers, leaders, and staff to examine data collection practices and design handheld formative feedback tools for classroom practice. The iterative design process revealed surface-level differences but deep functional similarities across teachers and highlighted the tension between data and tool standardization and customization.

A prior NSF-funded study that explored how leaders help their schools develop the capacity to act on achievement data demonstrated the important role played by formative feedback systems (Halverson, Prichett, Grigg, & Thomas, 2005; Halverson, Prichett, & Watson, 2007). "Formative feedback systems are systems of structures, people, and practices that help teachers and administrators translate testing data into practical information for everyday use" (Halverson, Prichett, & Watson, 2007). The study revealed that school data systems typically consist of two levels. One level is a technologically-complex, district-sponsored summative system that meets external accountability requirements. The second level is a distributed, fragmented, teacher-driven formative system located in the classroom. The research found that 1) information was rarely exchanged formally across these levels largely because of the lack of attention paid to the teacher level, 2) tools that provide teachers the kinds of formative information necessary for student learning are often left out of holistic district-school-classroom data system designs, and 3) formative tools that exist are often low-tech paper-and-pencil designs which result in data fragmentation between classroom-based data systems as well as the district system. Therefore, we were interested in understanding specifically how teachers collect, track, make sense of, and reflect on student classroom data and instruction. We wanted to fully describe the classroom-centric formative feedback system that has an immediate, direct impact on learning. Based on these findings, we intended to explore how a software tool could reveal, support, and stretch teacher formative feedback practices. Because we are in an era of mobile technology, we can now think of education as "a conversation in context enabled by continual interaction through and with personal and mobile technology" (Sharples, Taylor, & Vavoula, 2005). In addition, as Roschelle, Penuel, Yarnall, & Tatar (2004) found, teachers need ways to increase the quality of assessment information and need tools that "informate" rather than "automate" existing assessments." This poster describes the preliminary findings from our design experiment to build digital handheld formative feedback data tools with and for the highly mobile classroom teacher.

Method

We selected a design-based research approach for our study as "design is central in efforts to foster learning, create usable knowledge, and advance theories of learning and teaching in complex settings…and for understanding how, when, and why educational innovations work in practice" (Design-Based Research Collective, 2003). A design-based model for research surfaces the real constraints and affordances that shape what professionals see as possible. Such a collaborative, iterative model identifies the moments for which formative feedback tools might be constructed and provides a real-world participatory opportunity for testing and customizing the new tools in context**.**

We collaborated throughout the research process with 11 teachers, leaders, and staff in a rural intermediate school (grades 3-5). We selected the school because of its reputation for effective data use to inform student learning and its established record of improving student test scores as discovered via the prior Data-Driven Instructional Systems study (Halverson, Prichett, Grigg, & Thomas, 2005). We worked with the principal and instructional coach and by purposive sampling, recruited experienced (had taught between 8-18 years) educators who were knowledgeable about both school-wide and classroom-centric data and assessment programs and processes. The participants included two teachers from each of the three grade levels (who teach core academic subjects) as well as the art teacher, instructional coach, literacy specialist, school principal and the district technology coordinator.

We collected 40 teacher-level student data collection and assessment documents. These documents consisted of grade sheets, student-teacher conference tools, weekly quizzes and assessment tools from grade-level subject-matter third-party curricula, observation checklists, rubrics, report cards, and student self-evaluation forms. All teacher-level artifacts were paper-based and half included student data that was de-identified. Via content analysis we developed a detailed typology of assessment practices and codes to inform the tool design in a way that would both support and stretch practice. Parallel to and integrated with the document analysis, we observed the teachers during instruction in order to identify the junctures for which digital formative feedback tools might be used in practice. We also engaged in focus group design meetings. At these meetings we discussed and applied assessment practices to the designs, reviewed assessment software tools and devices, examined interface sketches, and discussed tool feature and functionality needs and priorities.

Preliminary Findings

During the design process, underlying assumptions on formative data practice and use surfaced while the team discussed needs and practices and identified common and individual tools, symbols, and symbol meanings. Our classroom observations suggested that a tool for formative feedback would integrate best with individual and small group activity in the classroom. Our document analysis revealed data collection practices and idiosyncratic assessment symbol system consistencies and variances across teachers and disciplines (See Table 1).

Table 1: Example teacher-centric formative assessment symbol systems

Subject	Teacher 1	Teacher 2	Teacher 3
Math	5, 4, 3, 2, 1, blank, absent	A, N, A/N, N/A ½, 2/3, ¾	+, √, – , blank, abs, LATE
Literacy – Reading Comprehension	3, 2, 1	4/ ☺, 3, 2, 1/ ☹	3, 2, 1, blank, abs, – ◤, ◥

Like our initial document analysis, the design-based research process highlighted a tension between standardization and customization; although we found patterns in how teachers collected and recorded data within disciplines, we also found that teachers generally valued the ability to customize their data-collection tools as well as the data types. Although teachers thought about data collection in terms of the curriculum and assessments already in place in their school, they wanted data collection tools that could be customized to their own needs. Teachers repositioned our initial plan to build a completely standardized tool and encouraged us to enable as much customization as possible.

Conclusion

We intend for this research to contribute to understanding of the formative aspects of school data systems and inform designs for compatible tools that might alleviate the tension between standardization and customization. We hope to stretch formative classroom practices and initiate dialogs about data to influence learning and teaching in new, positive ways. Despite the differences between teachers' formative feedback tools and systems, we believe that we are able to accommodate for deep structural similarities across teachers' formative feedback practices as well as individual differences. Our tool designs could therefore enable informate conversations across teachers and the district data system. We will demonstrate *KidGrid* Apple iPhone/iPod Touch application we built during the poster session in conjunction with a poster of our design-based research process and preliminary findings.

References

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