REFEREED ARTICLE

Becoming Data and Information Rich in Education

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Abstract

Despite wanting to make data-informed decisions, the educational system is experiencing the common problem of being data rich yet information poor. Educators have data, often a plethora of data; however, the system struggles to turn that data into effective action. Rising out of information poverty requires three shifts. First, the educational system requires an investment in human capacity building around data literacy. Second, greater attention to small-scale classroom-based assessment data has greater promise for improving student outcomes. Finally, a mind shift is needed so that educators embrace the value of data analysis not for accountability, but rather for instructional improvement.

In their quest for data-informed decision making, educators have made the wrong data investments and gathered the wrong data, all for the wrong purpose. While these missteps have resulted in the ubiquitous problem of being data rich yet information poor, they perhaps more importantly have mired the educational system's basic mandate of human capacity building. Investments in data-gathering and warehousing tools are meaningless without the human capacity to understand and use the resulting information. A focus on standardized test data can result in missed opportunities to build capacity around quality, authentic classroom assessment practice. Finally, using data for accountability checks impairs the ability to use data formatively to improve instructional practice. To this end, important mind shifts are needed. Only then will data-rich decisions be made by data-literate educators who use quality classroom-based assessments for the formative purpose of improving instruction.

Data Rich and Information Poor

The educational system is, as the adage goes, data rich but information poor (Slotnik & Orland, 2010). It is easy to be data rich in today's technologically advanced society, especially if data is viewed as "a synonym for information" (van Barneveld, 2008, para. 2). With data so readily available, "school leaders are often drowning in data" (Datnow & Park, 2015, "Principles, Not Just Practices," para. 4; Gerzon, 2015, p. 3). As it turns out, however, gathering data is the easy part. The system remains information poor when it fails to turn that data into effective action toward measurable gains. This failure to use data for effective instructional adjustments, programming decisions, and general educational improvements is evident in today's schools and school divisions (Datnow & Park, 2015; Gerzon, 2015; Piro & Hutchinson, 2014). It is therefore not surprising that little evidence exists regarding the effect of data use on student outcomes (Mandinach & Gummer, 2013). Being simultaneously data and information rich in education requires capacity to interpret data, to produce quality classroom assessment data, and to use data formatively to improve practice.

The Wrong Investment

A person can buy all of the tools available, but will accomplish little without the knowledge and skills necessary to use those tools properly. Over the last decade, ministries of education and school divisions have made a large "data-systems investment" (Slotnik & Orland, 2010, para. 3) by purchasing data gathering and warehousing tools. They have focussed on building the "technological infrastructure" (Mandinach & Gummer, 2013, p. 34) necessary for gathering,

holding, and summarizing the data. The educational system has not paid similar attention, however, to building the human capacity to use those tools (Mandinach, 2012; Mandinach & Gummer, 2013; Slotnik & Orland, 2010). Even when professional learning sessions have been offered, "supports were often focused on the use of the systems themselves rather than the use of the data housed in the systems" (Jimerson & Wayman, 2015, p. 20). It has been my experience that the singular focus on data tools creates a false sense of having solved the data problem. Simply stated, while the data tools are a necessary investment, it is short sighted to stop there.

If the lack of parallel investment in human data capacity building was due to a belief in educators' data literacy skills, this belief was unwarranted. Evidence suggests that teachers and educational leaders do not have the skills necessary to turn data into action (see Dunn, Airola, & Garrison, 2013; Dunn, Airola, Lo, & Garrison, 2013; Gerzon, 2015; Piro & Hutchinson, 2014; Reeves & Honig, 2015; Slotnik & Orland, 2010). Basic data literacy involves understanding data types and their limitations, being appropriately critical of data in terms of validity and reliability, and having the ability to interpret and create graphs and tables (Lipton & Wellman, 2012, pp. 53-69). True data use, however, involves the "capacity to use data to improve teaching and increase learning" (Slotnik & Orland, 2010, para. 3; see also Gummer & Mandinach, 2015; Reeves & Honig, 2015). This broader notion of data literacy involves a cyclical data inquiry process (Bocala & Boudett, 2015; Gummer & Mandinach, 2015; Lipton & Wellman, 2012). Whichever way data literacy is conceptualized, it is "in short supply in today's educational landscape" (Slotnik & Orland, 2010, para. 9). Stated differently, many educators now have the data tools at their fingertips without the knowledge or skills to use them.

Investment is now needed in human capacity building in the form of professional development around data use. Preservice training is currently insufficient around the development of data literacy (Mandinach, 2012), so in-service teachers require formal guidance to acquire the skills necessary to "draw meaning from data" (van Barneveld, 2008, "Lesson 3," para. 1). This kind of data literacy takes time to develop (Mandinach & Gummer, 2013). Researchers agree that in-service training must be comprehensive, job-embedded and continually supported over time (Bruce, Esmonde, Ross, Dookie, & Beatty, 2010; Dunn, Airola, Lo, & Garrison, 2013; Gerzon, 2015; Mandinach, Parton, Gummer, & Anderson, 2015; Reeves & Honig, 2015). Graduate education programs will also need to ensure that school leaders "have the requisite knowledge and skills to work with data" (van Barneveld, 2008, "Recommendation 2," para. 1). For educational systems to see a return on their data tool investments, parallel investments must be made into improving educators' capacity building to use those tools effectively.

The Wrong Data

In addition to focussing on the wrong investment, the educational system has failed to reach its data-informed decision-making potential partly because it has been focussing on the wrong data. Large-scale assessments, such as standardized tests, have predominated educational data conversations, especially in the United States (Bocala & Boudett, 2015). While standardized test data ostensibly benefit from high reliability, the value of these data for making classroom-level, and even division-level, decisions is questionable. Teachers themselves see little usefulness in the data they are normally required to analyse (Mandinach et al., 2015). At least in some studies, "teachers reported that large-scale assessment data were neither current enough nor aligned adequately with daily instruction to be particularly useful to inform classroom practice" (van Barneveld, 2008, "Lesson 2," para. 3). It seems that large-scale data fall short because "the bigger the data, the less direct their effect typically is on instructional change" (Venables, 2014, p. 17). Consequently, the right data must be closer to the classroom.

In-depth examination of classroom assessment data has a greater chance of informing decisions and thus improving student outcomes. Large-scale benchmark assessment data have

been minimized and overshadowed by the use of ongoing formative assessment data in high-performing schools (Datnow & Park, 2015). This more effective use of formative data is evidence that "the microdata are often more useful than the macrodata in improving teaching and learning" (Venables, 2014, p. 17). At the very least, classroom observation and formative assessment data can be used to triangulate the larger-scale data (Marsh, Pane, & Hamilton, 2006). That being said, educators are cautioned about "a risk of excessive testing" and are advised that they may want to "consider promoting the use of assessments for learning as an alternative to district progress tests" (Marsh et al., 2006, p. 11). Indeed, I have heard many teachers say that classroom-based assessment data provide more timely and useful information than divisional or provincial assessments.

Honouring the data that are a natural outgrowth of the teaching and learning cycle addresses data validity, but may cause concerns about reliability. However, if focus on these data increases, so should professional conversations and training around assessment practices increase. It is my opinion that professional dialogue about assessment data pulled directly from teachers' own assessments will naturally highlight assessment creation, questioning techniques, and rubric development. Making decisions based almost exclusively on standardized testing results sends the message that only external experts can reliably gauge student achievement. By relying on these macrodata, educators have been missing opportunities to build human capacity around assessment literacy.

The Wrong Purpose

Whether overtly stated or implied, much data gathering and analysis are undertaken in response to accountability policies. Increasing pressure exists from both government policies and public opinion for the educational system to use concrete evidence to prove its degree of effectiveness (Mandinach, 2012). Especially in the United States, accountability policies have created pressures to examine and use student achievement data (Marsh et al., 2006). Teacher effectiveness is especially emphasized by this process: "by 2011, almost half of the states had passed state legislation aimed at including student achievement in teacher evaluations" (Piro & Hutchinson, 2014, p. 96). This focus on accountability, with the purpose of gauging teacher effectiveness, results in the summative use of educational data (James-Ward, Fisher, Frey, & Lapp, 2013). While this use of results indicates attainment of some standard, it fails to provide the necessary support to build capacity because "an abyss has been created between data for compliance and data to inform teaching and learning" (Mandinach, 2012, p. 72).

Rather than the summative use of data, using student data formatively for instructional improvement and school improvement planning has the potential to build teacher competency, focus school-wide programming, and ultimately increase student achievement. For years, assessment and evaluation experts have stressed that assessments should be used not just for gauging how much a student has learned, but also to help them learn (Wiliam, 2011), a practice sometimes referred to as assessment for learning (Manitoba Education, Citizenship and Youth, 2006). Similarly, data inquiry needs to be a practice of assessment for teaching, in that teachers should use assessment data to "reflect on the strengths and weaknesses of their instructional practices" (Datnow & Park, 2015, "Principle 3," para.7; see also Mandinach, 2012). Although experimental designs testing the impact of data inquiry on student achievement are scarce, studies are emerging that document positive student outcomes when systematic data inquiry is employed (Data Quality Campaign, 2012; Gallimore, Ermeling, Saunders, & Goldenberg, 2009). In addition to classroom uses of formative data, these data can "be used to inform what should occur next in the school improvement cycle" (James-Ward et al., 2013, p. 24), thus resulting in assessment for leading. Using assessment data for learning, teaching, and leading inspires multi-level reflective practice with the goal of continuous and iterative system improvement.

Far from simple adjustments to data inquiry practices, the shift toward assessment for teaching and leading requires important mind shifts in education. Lipton and Wellman (2012)

suggested that any effective data inquiry process requires various value shifts. Meaningful and iterative instructional improvement can only occur when certain habits of mind are explicitly emphasized and taught. Among these is the commitment to continuous reflective practice that "allows educators to *improve how they improve*" (Bocala & Boudett, 2015, p. 9). The formative use of assessment data to evaluate one's own practice is driven by a teacher's belief that he/she should strive continuously to "know thy impact" (Hattie, 2012, p. 6). These values are integral to building what some call a "culture of data use" (Gerzon, 2015, pp. 2-6). With such a culture in place, educators are empowered and internally motivated to use assessment data on a daily basis, thus realizing the full potential of data as information.

Conclusion

Data-informed decision making involves much more than collecting data. The ability to turn that data into effective action requires data literacy skills. It also requires a validation of teachers' own classroom-based assessment data. Finally, it requires a mind shift of purpose from data gathering for accountability toward data gathering for improvement. These requirements involve increasing knowledge, gaining skills, and changing values. Such a holistic overhaul of current data practices in education certainly will not be easy or quick. It involves changes to both preservice programs and in-service training. Even though this change is daunting, the rewards may be immeasurable. Making the right data investments, gathering the right data, and engaging in data inquiry for the right purpose will benefit student achievement directly because educators will make smarter decisions. There will also be an indirect positive effect on student achievement through building capacity of the adults in the educational system.

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