New Data Collection and Analysis Methods Offer Powerful Insights into Performance

At a recent visit to my general practice doctor, I noticed a curious change in the way he related to my health and me. During the course of our entire half-hour-long interaction, he seemed to be far more intently focused on the laptop in front of him than on me, and when I commented on this, he told me that the best care he could give me was by looking at the many data collected from my various doctors and my past visits instead of by making physical contact with me. I realized that the gold standard of patient care in modern medicine today is to understand the relationship between various data points in a patient’s history. Where he once had to use a stethoscope or otoscope to gather evidence for his analysis, my doctor could now look to historic data for evidence on how I may or may not be progressing or functioning. Health care today is less about “care” and more about how the doctor can use analysis to inform and improve the patient’s “health.”

Although the medical establishment has not yet achieved the complete digitalization of records it has been pushing for, it is still beginning to gain purchase in a number of research universities, private practice, and government programs. Certainly, medical practice and health care in the United States can certainly be improved but some aspects of its praxis (although not its delivery) is the best in the world, and modern medical praxis is heavily grounded in the use of electronic digital information management in which relational analysis management and interpretation is key. Just as measurement science may be excessively focused on
The measurement of status to the neglect of processes in dynamic interaction, the management and use of education measurement data has also been insensitive to the process relations contained in these data. The Gordon Commission’s work implies that the relational analysis of education data is necessary to the understanding of teaching and learning and essential to its informed practice and improvement.

The model I carry in my head is the classroom teacher who sits there with her computer. She has an interest in monitoring or assessing whether learning is occurring at several levels. Whether she is monitoring under what conditions or with what characteristics individual students, groups of students, or the whole class is learning, she is examining the relationship between different points of data. Relational data analysis is an approach that will enable her to answer these questions; or, if she is already attempting to analyze data relationally, new tools in relational data analytics will enhance the answers to these questions. In this chapter, we will discuss the concept of relational data analysis, the need for and emergence of relational data management systems in contemporary educational praxis, some of the barriers to its full adoption, and its implications for enabling assessment for education.

**The Promise and Potential of Relational Data Analysis**

Historically, significant advances in scientific understanding have followed advances in measurement and observation. As the *resolution* power of an instrument increased, so have gains in the understanding of the phenomena being observed. An example is the microscope, which led to insights, verification, and new research questions and theories in the three hundred years since its invention. The microscope’s resolution—the degree of detail that could be distinguished in an image—allowed observation of processes and states that were previously unobservable.

We are now approaching a similar potential in the measurement of students’ learning processes using technology-based tasks. Technology-based tasks can be instrumented to record fine-grained observations about what students do in the task as well as capture