

Data Literacy for Educators: Making it Count in Teacher Preparation and Practice

By Ellen Mandinach and Edith Gummer

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Data Literacy for Educators: Making it Count in Teacher Preparation and Practice, written by Ellen Mandinach and Edith Gummer (Teachers College Press), tackles a salient aspect of modern teaching practice: the use of data to inform decision-making. Over the past decade and a half, new and diverse sources and forms of data have proliferated within the education sector (e.g., interim/benchmark assessments, school climate data), as have new technologies (e.g., data management systems) by which to manage, access, and analyze such data. Mandinach and Gummer argue that this influx of data and the availability of tools to work with them necessitate new teacher competencies, namely a construct the authors term “data literacy for teachers” (DLFT).

Data Literacy for Educators is a product of the authors’ decade-long intellectual project. This book review considers *Data Literacy for Educators* holistically, and is written from the perspective of an academic engaged in DLFT work in both practice (pre-service teacher education) and research. In addition to summarizing the volume, this review critically evaluates its content breadth, depth, and relevance for various stakeholders. Given particular attention during the review are the following stakeholders: teacher educators, including university faculty; professional development providers, as well as educational researchers; and PreK-12 education practitioners (i.e., teachers and leaders).

Across eight chapters, the book presents an exceptional high-level summary of the state of the DLFT field. Mandinach and Gummer situate recent emphasis on DLFT within the contexts of data use in fields other than education, such as business and sports; educational policies like the Family Educational Rights and Privacy Act; teacher professional standards and licensure requirements; and the assessment-driven educational accountability movement in the U.S. Crucially, the book also both proposes a comprehensive definition of and conceptual framework for the DLFT construct and surveys central research on DLFT. Finally, *Data Literacy for Educators* systemically examines the construct from the perspectives of diverse education actors and constituencies (e.g., local education agencies, policymakers, and testing companies) and offers some suggestions for building DLFT capacity through (especially pre-service) teacher education.

Data Literacy for Educators’ most paramount contribution is the delineation of a robust and integrative DLFT definition and conceptual framework. Mandinach and Gummer describe a years-long iterative and systematic domain-analytic process by which they arrived at their definition of this complex and multifaceted construct. In the book, DLFT is defined as:

the ability to transform information into actionable instructional knowledge and practices by collecting, analyzing, and interpreting all types of data (assessment, school climate, behavioral, snapshot, longitudinal, moment-to-moment, etc.) to help determine instructional steps. It combines an understanding of data with standards, disciplinary knowledge and practices, curricular knowledge, pedagogical content knowledge, and an understanding of how children learn. (p. 14)

A notable feature of their DLFT definition is that it is inclusive of a variety of forms of data, not solely (cognitive) assessment data. This should work to dispel the misconception that data literacy entails the capacity to work with assessment data only, an issue given attention in the book.

Their definition and the larger conceptual framework creatively integrates DLFT with prior scholarship on the data-driven decision making process (e.g., Hamilton et al., 2009), teacher knowledge of assessment (e.g., Stiggins, 2002), and other forms of teacher knowledge such as knowledge of subject matter and pedagogy (e.g., Shulman, 1987). In doing so, the framework not only advances the body of literature on DLFT, but also builds bridges to other prominent teaching domains and processes in the literature. While in prior work such connections have indeed been recognized, to date not enough has been done to carve out how specifically such factors (e.g., knowledge of assessment processes) intersect with DLFT and data use.

The authors' proposed conceptual framework clearly specifies the knowledge and skills, necessitated during different phases of the data-driven decision making process (e.g., identifying questions/framing problems, transforming data into information), comprising DLFT. In the text, Mandinach and Gummer outline a hierarchical DLFT framework comprising domain components, subcomponents, elements, and sub-elements. The framework makes very specific assertions, arguing, for example, that in order to identify and examine data that might help address a particular issue of interest, teachers need to be able to identify possible sources of data, which itself requires an understanding of the purposes of different data; and that to transform data into information, teachers need to be able to understand how to interpret data, which in turn requires an understanding of data displays and representations. The framework presented in *Data Literacy for Educators* is replete with a multitude of similar claims concerning the nature and structure of DLFT. Readers will find the graphical representations of the framework components, subcomponents, and so on, helpful.

The authors thoroughly describe the process by which they derived their conceptual framework for DLFT. In developing their framework, Mandinach and Gummer relied on diverse expert panels, including researchers, policy-makers, and teachers, and analysis of relevant documents such as assessment textbooks. While these are important mechanisms for construct delineation, the degree to which the authors also incorporated the results of cognitive task analyses (either directly or indirectly through the expertise of the panel researchers) was not apparent. Data gathered during teacher think-alouds may certainly have provided a relevant source of evidence for explicating the construct, as well. Recognizing the tentative nature of their proposed framework, it is refreshing that the authors invite feedback in a section named "open invitation for dialogue" (p. 55).

Mandinach and Gummer's thorough analysis of the DLFT construct and resultant conceptual contributions should enable various stakeholders (e.g., researchers, teacher educators) to stand on common and solid conceptual footing. The framework provides the most comprehensive, organized, and detailed treatment of the elusive DLFT construct to date. Through further development, refinement, and/or empirical validation, the framework articulated in *Data Literacy for Educators* could guide future research and practice in this area for years to come. It will support instrument development by researchers, for instance. Those designing and implementing learning opportunities for DLFT must also understand the knowledge and skills that the construct entails.

Data Literacy for Educators also delivers a comprehensive and rigorous summary of extant strands of research on DLFT and data-driven decision making processes. Drawing on years of work analyzing survey, interview, and artifactual (e.g., policy documents) data, the authors trace the arc of several facets of their own DLFT research program. For example, the authors report their findings on the implementation of pre-service teacher education for DLFT, derived from large-scale survey and multiple-case studies. Especially noteworthy is the authors' comprehensive rundown of factors that enable data use at the individual (e.g., teacher pedagogical content knowledge) and school organizational (e.g., principal leadership and technology infrastructure) levels. While the authors themselves conducted a considerable amount of the research cited in the book, as they are prolific scholars in this area, the book also ably represents the work of other key contributors within this sphere (e.g., Wayman, Hamilton, Marsh, and Means). Mandinach and Gummer deserve acknowledgement for their contribution's firm evidentiary grounding, as well as its explicit recognition of the limitations of prior research (including their own).

In addition to conceptual and research-based content related to DLFT, the book provides some discussion of strategies by which to promote teacher learning vis-à-vis DLFT. The authors articulate different pre-service education models for developing DLFT—notably offering stand-alone DLFT coursework and infusing DLFT throughout the pre-service curriculum—giving balanced attention to the advantages and disadvantages of each. The authors also outline a handful of ideas for how to integrate DLFT learning within various education courses such as educational technology and philosophy (e.g., learning about data systems in educational technology courses or the ethics of data use in educational philosophy courses). On the basis of their considerable research program, the authors also underscore potential implementation challenges that may arise in a pre-service context, such as a lack of faculty expertise or competing curricular priorities. These varied emphases of *Data Literacy for Educators* should serve instructive for pre-service teacher education programs.

Mandinach and Gummer also call attention to work that remains to be done within the DLFT realm. *Data Literacy for Educators* raises a number of critical questions concerning DLFT that warrant additional research attention. Chief among these are the extent to which DLFT draws upon various other, distinct bodies of knowledge (e.g., content, pedagogical, and statistical); the relative value of course-based versus clinical experiences in promoting DLFT; the effectiveness of stand-alone pre-service DLFT courses compared to the integration of DLFT throughout pre-service programs in developing DLFT; and the optimal time at which to initiate development of DLFT (e.g., pre-service or in-service stages). On a more practical level, the authors pinpoint a

need for the development of DLFT training materials, instruments designed to elicit evidence of DLFT, and interventions targeting teacher use of non-assessment data in areas such as attendance and behavior. Finally, *Data Literacy for Educators* puts forth specific recommendations for various entities within the education system, including colleges of education, accrediting bodies, and testing companies, on how to advance DLFT.

My primary critique of *Data Literacy for Teaching* centers on its utility for those practitioners involved in the development of DLFT. While the book's back cover promises "concrete strategies for schools of education, professional developers, and school districts," the book provided limited detail about how specifically to implement DLFT training in practice. The book does spotlight four teacher education programs' "emerging" efforts to equip teachers with DLFT. However, much time in this particular chapter is spent contextualizing these efforts within their broader programs and institutions. The ensuing discussion largely addresses the organizational and structural dimensions of these programs' DLFT efforts; some of this is redundant because of an earlier chapter. A thematic approach is pursued to the exclusion of rich descriptions of what these endeavors look like in the curriculum for pre-service teachers (e.g., specific course content, activities, and assessments). An expansion of the chapter dedicated to exploring such particularities of developing DLFT during teacher education may have been more helpful for some readers. Alternatively, Mandinach and Gummer might have invoked other scholarship (e.g., Piro, Dunlap, & Shutt, 2014; Reeves & Honig, 2015) that might have proved illuminating for readers interested in cultivating DLFT in practice.

More generally, *Data Literacy for Educators'* broad, systemic treatment of DLFT (and its development) may have come at the expense of some depth where it "counts." The book may have better served its primary intended audience (expressly administrators and faculty in colleges of education) through elaborated discussion of those matters of most interest and relevance to them. In particular, more attention could have been afforded to concrete strategies for developing DLFT (as noted above), and in-depth explication of the DLFT framework's components, subcomponents, elements, and sub-elements (arguably the book's most effective contribution). Calls to action for professional organizations, policymakers, testing companies, and some other stakeholder groups seem less relevant for teacher educator audiences. Of course, this book does not exist in a vacuum, and interested readers can consult other works—by the authors and others—in which such issues are addressed in more depth. Another minor critique is that, although the book's title references "educators" (a term that may be construed to include multiple in-school actors), the focus of the book is principally on teachers' use of data.

Mandinach and Gummer's book is nevertheless an authoritative primer on the topic of DLFT. Accordingly, I strongly recommend *Data Literacy for Educators* for anyone interested in a thorough examination of this increasingly important construct. Given the specific foci of the book, it will likely not be of much interest or use to PreK-12 teachers. However, the text will be beneficial for those charged with the development of this population's instructional practices, such as college of education administrators and faculty, and PreK-12 instructional leaders. The book affords a wealth of information pertaining to the nature of the DLFT construct domain, especially entailed knowledge and skills, and factors that might support or constrain DLFT's development through pre-service teacher education and application in the classroom. As such, the book will constitute a worthwhile resource for professional development of teacher educators

and in graduate-level coursework in educational/instructional leadership. At the same time, *Data Literacy for Educators* should also prove informative for researchers looking to ground their own DLFT work in a cogent definition of the construct (e.g., for measurement purposes). While it is rare that a single book might be valuable to both practitioners and academicians, in this regard the authors have succeeded admirably.

Author Notes

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