Repositioning Data Literacy as a Mission-Critical Competence
Roundtable Discussion Handout

The Definition question

What does it mean to be data literate on the 21st century campus?

Sample definitions of data literacy and their contexts

"the ability to consume for knowledge, produce coherently and think critically about data. …includes statistical literacy but also understanding how to work with large data sets, how they were produced, how to connect various data sets and how to interpret them"

(Gray, Bounegru & Chambers, 2012, p. 148)   [JOURNALISM]

"understanding what good data and data analysis is so that you can make stronger arguments and better evaluate the arguments of others"

(Bowen & Bartley, 2013, p. ix)   [SCHOOL TEACHING]

"the ability of individuals to understand and draw meaning from data …the abilities necessary to thoughtfully consume data"

(Gemignani et al., 2014, pp. 23, 196)   [BUSINESS}

"The desire and ability to engage constructively in society through and with data."

(Bhargava et al., 2015)   [CiVIL SOCIETY]

Data literacy for teaching is 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, and so on) 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.

(Gummer & Mandinach, 2015, p. 2)   [TEACHER EDUCATION]

"data literacy includes the ability to read, work with, analyze and argue with data as part of a larger inquiry process"

(D'Ignazio & Bhargava, 2016, p. 84)   [COMMUNITY INFORMATICS}

"data literacy is the ability to access, critically assess, interpret, manipulate, manage, summarize, handle, present, and ethically use data"

(Okamoto, 2017, p. 120)   [OPEN GOVERNMENT]

"the ability to read, write and communicate data in context, including an understanding of data sources and constructs, analytical methods and techniques applied, and the ability to describe the use case, the application and resulting value"

(Gartner, 2018)   [TECHNOLOGY CONSULTANCY]

Common conceptions of data literacy

- Data literacy as a life skill for everyday problem-solving – enabling community engagement, citizen empowerment, activity tracking, and personal health management

- Data literacy as data protection, security and privacy in social networks and personal data management – understanding digital footprints and data silhouettes

- Data literacy as data-based/data-driven decision making, supporting business strategy, classroom practice, library assessment, etc. – implementing applied analytics

- Data literacy as essential education for the subjects of business and learning analytics – explaining data doubles, practicing business ethics/professional conduct

- Data literacy as data-driven storytelling in the media and business – using data visualization/infographics

- Data literacy as a research skill for students and professionals – accessing existing data sets to produce and communicate new knowledge, making scientific experiments robust and reproducible

- Data literacy as a building block and critical success factor for rolling out data science in business, government, and research

- Data literacy as a new *lingua franca* or second language for organizations – a foundational competence

An interdisciplinary multiliteracy construct
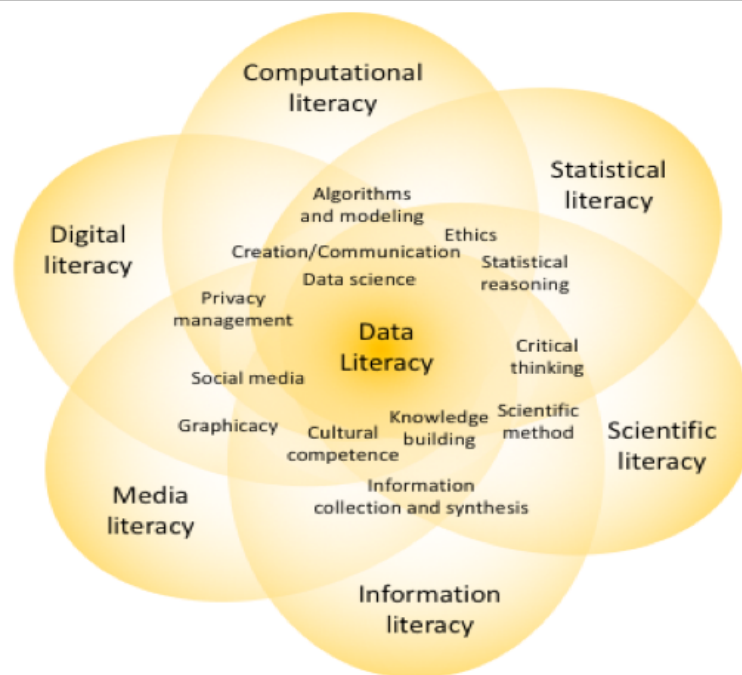
How different modern types of literacies interact (Bhargava et al., 2015, Figure 3)

What can we take from the similarities and differences among the definitions of data literacy?

The Pedagogy question

How can we best design the teaching and learning of data literacy?

➢ Are there frameworks, models or strategies from information literacy instruction we can reuse or adapt for data literacy education?

➢ Are there recent innovations and emergent collaborations with significant potential?

Promising practices for data literacy education

Two liaison librarians at Indiana University–Purdue University Indianapolis used an existing five-module framework for Data Information Literacy (Calzada Prado & Marzal, 2013) to prepare business undergraduate students and public health master's students for using data to make decisions in the workplace.

(Macy & Coates, 2016)

An iSchool professor and instruction librarian at the University of Michigan collaborated with data and curriculum experts to create resources and courses to help teachers and high school librarians teach data literacy skills for class research projects and real world contexts.

(Fontichiaro & Oehrli, 2016)

Three librarians from the University of Central Missouri presented a paper at ACRL 2017 on teaching information literacy through multiple life perspectives by using scenario-based assignments to help students meet their academic, professional, and personal information needs in a general education course for freshman and sophomore undergraduates.

(Ruleman et al., 2017)

A liaison librarian and research data specialist at Carnegie Mellon University combined the ACRL Framework with three principles for Data Informed Learning (Maybee & Zilinski, 2015) to teach data literacy and research management to modern languages graduate students.

(Pullman & Zilinski, 2017)

Librarians from the University of Pittsburgh and Carnegie Library of Pittsburgh are partnering with the Western Pennsylvania Regional Data Center and the Urban Institute/ National Neighborhood Indicators Partnership to explore library roles in improving data, statistical and technological literacy as data intermediaries in civic open data ecosystems.

(Gradeck, 2018)

Various civil society organizations/social movement initiatives offer free learning resources and/or online courses supporting data literacy development; e.g.,

    Data-Pop Alliance Toolkit (https://datapopalliance.org/additional-materials/)
    Qlik Data Literacy Program (https://www.qlik.com/us/services/training/data-literacy-program)
    School of Data online courses (https://schoolofdata.org/courses/)

Do you have any examples of good practice in data literacy education to share with colleagues?

The Stakeholder question
Who should we work with to develop data literate communities?

Identifying internal stakeholders

Given the diversity of academic, professional, personal, and social contexts where people are exposed to and interact with data, which individuals or groups on your campus would you prioritize as partners or participants in your program?

➢ Students and faculty may need help with accessing external data sets, including open government data, or assistance in managing and sharing their own research data.

➢ Staff and administrators may require advice and guidance on using blbliometric or altmetric data for research impact assessment, and similarly with managing and interpreting learning analytics data to improve student retention and success.

➢ Assessment librarians may need support from data librarians in developing data management plans for big data analytics projects.

Engaging external stakeholders

If we extend our academic programs to prepare participants for interaction with data in the workplace and everyday life, there are many more potential collaborators whose expertise could strengthen provision and add coherence, including librarians working in other sectors, but also established and emergent organizations that have shown interest in data literacy; e.g.,

➢ Research and development funding bodies/grant agencies – IMLS has funded 10+ projects related to data literacy, NSF has funded 25+ projects referencing data literacy.

➢ Professional associations and special interest groups – ACRL, the CILIP Information Literacy Group and the IFLA Information Literacy Section have produced definitions, frameworks, guidelines, and other resources that could be developed to advance data literacy.

➢ Organizations acting as data education and training providers – as well as the corporate and social enterprises referenced on page 3, there are centers of expertise in higher education offering training and materials to the community; e.g., ICPSR at the University of Michigan, and MANTRA at the University of Edinburgh. *See* the guide from the National Network of Libraries of Medicine for other examples (https://nnlm.gov/data/guides/data-literacy).

Applying stakeholder theory

A **stakeholder** is "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984, p. 46).

The MAW **Theory of Stakeholder Identification and Saliency** categorizes stakeholders on the basis of their possession of one, two, or three key attributes: their *power* **to influence** the firm [organization or phenomenon], the *legitimacy* **of their relationship** with the entity/issue, and the *urgency* **of their claim** on it (Mitchell, Agle & Wood, 1997). The MAW model offers criteria for selecting the groups and individuals who are best placed to become productive partners in the data literacy movement and should therefore be targeted as potential collaborators.
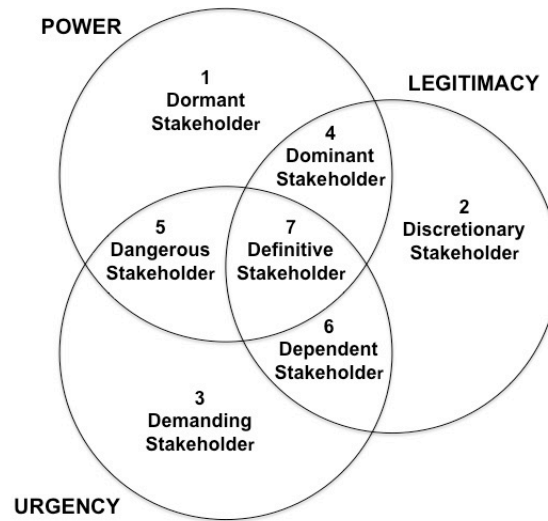
Stakeholder Typology: One, Two, or Three Attributes Present (Mitchell et al., 1997, p. 874)

The MAW typology recognizes stakeholder attributes vary over time (and should therefore be continually monitored). By including *urgency* as a key stakeholder attribute, which is defined here in terms of both *time-sensitivity* (immediacy) and *criticality* (importance), the theory enables a more nuanced understanding than basic classifications of stakeholders as primary and secondary, internal and external stakeholders, or by applying the 2x2 *power-interest* grid; and encourages a more strategic focus on "who and what really counts" (as the authors claim).

The table below elaborates the typology and also groups the types or classes of stakeholder into three categories according to their possession of one, two or three attributes.

We can use these key criteria to choose internal and external stakeholders who have the ability/resources to get things done, whose involvement is appropriate/desirable, and who recognize the need to act quickly.

Eight-Dimensional Stakeholder Typology
(adapted from Mitchell et al., 1997; Smith & Fischbacher, 2005, p. 1028)

		Stakeholder attributes		
Stakeholder categories	Stakeholder classes	Power	Legitimacy	Urgency
Definitive (High salience) *Give priority*	Definitive	✓	✓	✓
Expectant (Moderate salience) *Acknowledge importance*	Dependent		✓	✓
	Dangerous	✓		✓
	Dominant	✓	✓	
Latent (Low salience) *Do nothing*	Demanding			✓
	Discretionary		✓	
	Dormant	✓		
Potential stakeholder (No salience)	Non-stakeholder			

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