

Essential Elements of Comprehensive Data Literacy

Developing a solid foundational knowledge of data literacy is integral to building role-specific knowledge and building capacity of educators to use and apply these skills appropriately. However, the definition of data literacy is inconsistent and often too narrowly applied within the field of education. National experts and technical assistance service providers from multiple centers embarked on a journey to more comprehensively and consistently define the essential elements of data literacy in education.

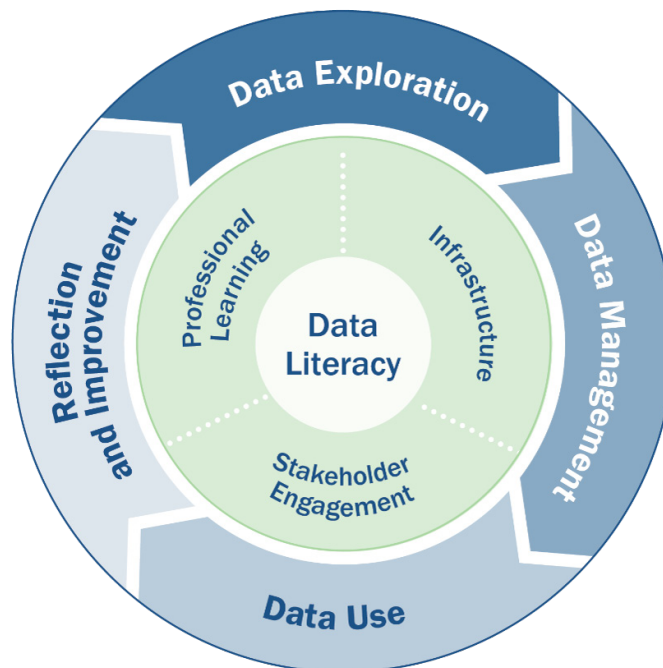
IDENTIFYING ESSENTIAL ELEMENTS AND SUPPORT STRUCTURES

Data literacy should encompass understanding data, communicating about data, and using data to make decisions. Building a common understanding of data literacy across all levels of the system (e.g., state, district, school, educator) through aligned professional learning opportunities increases the efficiency and effectiveness of teaming and data use throughout the system.

With a goal of identifying common language and explicitly defining the essential elements of data literacy in education, the National Center for Systemic Improvement (NCSI), National Center on Educational Outcomes (NCEO), IDEA Data Center (IDC), and Center for the Integration of IDEA Data (CIID) teamed up and shared their experiences in providing technical assistance to support data literacy. These Centers collaboratively defined four key elements and three support structures that work together to build capacity in data literacy across all levels of the system. Figure 1 depicts the elements and support structures identified by the cross-center work group.

The cross-center work group examined guidance and specific models previously developed that support activities within one or more of the key data literacy elements (e.g., Moving Your Numbers,² DaSy,³ IDC,⁴ NCEO⁵). The data literacy elements and support structures framework developed (figure 1) was intended to complement existing models by providing a high-level overview of the essential elements of data literacy, making a complex construct accessible to all stakeholders, including parents and students. In this brief, we offer a broad look at the four elements and the three supporting structures that foster developing and sustaining data literacy.

Figure 1. Data literacy elements and support structures



Essential Elements for Data Literacy

Four essential elements of comprehensive data literacy work together to support data-based decision making. These elements include:

- **Data Exploration:** considering the purpose or “why” of the data,
- **Data Management:** getting and storing the right data,
- **Data Use:** analyzing, interpreting, reporting, etc. to achieve our purpose,
- **Reflection and Improvement:** examining each element to consider how we can better or more efficiently achieve our purpose.

The purpose of this document is to describe key each element and support structure. We provide activities to support building data literacy within each element, sample guiding questions for teams to consider, and tips for successful implementation. We hope this work will help us move toward a common language where we can talk about data within and across organizations, system levels, and stakeholder groups.



ELEMENT 1: DATA EXPLORATION

Data Exploration focuses on identifying the questions we want to answer. Being clear and transparent about what we want to know allows us to be more efficient and effective in our use of data. To ensure our data literacy efforts result in positive outcomes, we must first come to consensus with relevant stakeholders about what we need or want to know. Understanding why various

data sources are needed, what data are already being collected and how those data could help you answer your questions, and defining data that still needs to be collected will improve activities within the other key elements of data literacy. Additionally, the Data Exploration element may be revisited as we learn more about what we want and need to know from our data.

Key Data Literacy Activities

- Identify the broad area(s) you want to address through data (e.g., evaluate and improve a program or practice, improve outcomes for a specific population)
- Identify stakeholders and get their input, consensus, and buy-in throughout this process
- Articulate what **we want or need to know** and clarify **why**
- Clarify the specific questions⁶ we will answer through our data

What can data help us explore?

Data can help us answer many questions. Here are several examples.

- ✓ How efficiently are we using our resources (e.g., budget, staff, time, materials)?
- ✓ How effective are our core and intervention programs and practices?
- ✓ Which students, educators, or systems need additional support?
- ✓ What instructional changes are necessary to support groups or individual students?
- ✓ To what extent are programs and practices being implemented with fidelity?
- ✓ What are areas of improvement? What is our impact?

Tips for Successful Implementation



Stakeholder Engagement

Establish buy-in prior to moving to other data literacy elements to help ensure:

- You ask the right questions and identify the right data (including existing data) to answer them



Professional Learning

Ensure staff in all roles get professional development in data exploration



Infrastructure

Ensure adequate time for:

- Teaming
- Involving stakeholders



ELEMENT 2: DATA MANAGEMENT

Data Management focuses on identifying and collecting data to answer the questions you have prioritized. Data management includes data source selection, collection, quality, access, and storage. One of the first steps is selecting appropriate measures that do not place undue burden on data collectors and users. Infrastructure

becomes increasingly important as we may use multiple measures to answer a single question. An efficient, sustainable, and integrated data system is required for easy and timely data entry, access, and analysis. Ensuring access to quality data is also essential for making accurate and valid interpretations of the data.

Key Data Literacy Activities

- Select existing data sources/measures or define new data collection needs
- Clarify data submission procedures and requirements
- Provide professional learning to data collectors and managers
- Monitor fidelity of data collection and entry
- Collect and store the data in an integrated, reliable, usable, and accessible system

Considerations for Data Management

Data management includes many components. Consider the following:

- ✓ What are valid indicators of what we want to know?
- ✓ What data sources are already available?
- ✓ What is the burden (e.g., costs, time, feasibility) of collecting and submitting these data, including professional learning needs?
- ✓ Have we consulted any applicable data governance processes or staff?
- ✓ Do we have quality data (e.g., accurate, representative)?
- ✓ How will we store the data? Are the data easily accessible?

Tips for Successful Implementation



Stakeholder Engagement

Gather input on the burden (e.g., time, cost) and usefulness of:

- Existing data sources/tools
- Processes for entry, submission, access, etc., including use of data system(s)



Professional Learning

Provide role-tailored professional development so staff:

- Understand how different data sources can be used,
- Can accurately administer, score, and enter data



Infrastructure

- Assign staff to lead data management efforts
- Develop, update, or maintain an easy-to-use data system
- Articulate standardized processes for components of data management.



ELEMENT 3: DATA USE

The Data Use element focuses on analyzing the data, interpreting findings, and making decisions to revise implementation activities to reach intended outcomes. Are you feeling data-rich but information-poor? Education systems are increasingly inundated with data sources intended for different purposes. In a single week, we may use data to identify gaps in our system or

knowledge, engage in continuous improvement activities, make instructional decisions, allocate resources, evaluate programs, meet reporting requirements, or identify students not making progress. Using data well is essential at the state and local level to effectively implement education programs designed to improve student outcomes.

Key Data Literacy Activities

- Synthesize and analyze data to answer what you want to know using data for instructional literacy
- Summarize findings and share results with stakeholders
- Use data for short-term and long-term decision making

Consideration for Data Use

- ✓ Which data sources need to be examined together to explore relationships (e.g., between implementation and outcomes)?
- ✓ What data analysis approaches will we use with which data sources?
- ✓ Do we have the capacity to conduct and interpret the analyses?
- ✓ What figures or reports will support analysis/interpretation?
- ✓ What information do our stakeholders need or want us to report?
- ✓ What are the best methods for sharing data with our stakeholders?
- ✓ What analyses, decisions, and/or reports will each stakeholder group need?
- ✓ Do stakeholders have the skills needed to interpret relevant findings and make informed decisions?

Tips for Successful Implementation



Stakeholder Engagement

- Involve stakeholders in interpreting data
- Gather feedback on effective data use and reporting practices
- Use data visualization strategies to share data



Professional Learning

- Provide role-specific professional development on:
- Analyzing and interpreting data
 - Reporting data
 - Using data to inform different types of decisions



Infrastructure

- Ensure easy, role-appropriate access to
 - » Stored data
 - » Reports
- Provide time for teaming and data use



ELEMENT 4: REFLECTION AND IMPROVEMENT

Despite our best planning efforts, there always will be space to reflect and improve our data literacy practices. While we will likely make adjustments and refinements to our approaches throughout the process, it is important to stop and systematically reflect on the system as a whole. Are we engaging in the elements of data literacy in efficient ways? Are the measures being used still meeting our needs? Have the needs

of stakeholders changed? The continuous focus on improving data literacy moves us toward more efficient and effective use of data. An important outcome of Reflection and Improvement is to reduce undue burden on educators and improve their ability to use data for various purposes. It allows us to be responsive to ongoing changes in staff, data sources, infrastructure, and stakeholder needs.

Key Data Literacy Activities

- Identify inefficiencies across elements and work with stakeholders to define strategies for improvement
- Monitor fidelity to the data literacy processes
- Plan for scale-up of successful strategies and processes
- Increase sustainability through professional development opportunities.

Consideration for Reflection & Improvement

- ✓ Have we successfully built data literacy across our key stakeholder groups, across all elements? Where do we still need to improve?
- ✓ Across all elements, how can we reduce the burden on stakeholders?
- ✓ Did we answer all of our questions? Are we still asking the right questions?
- ✓ Are there more efficient and effective approaches to
 - » Collecting accurate data?
 - » Using data to answer to our questions?
- ✓ Are current practices sustainable?
 - » Do we anticipate changes to our current tools or data systems? Could something become out-of-date or obsolete?
 - » Have we planned for staff turnover? Funding changes?

Tips for Successful Implementation



Stakeholder Engagement

Gather feedback on:

- Professional development, systems documentation, and other processes across elements
- Stakeholder engagement (extent, quality, ways to improve, etc.)



Professional Learning

Provide professional development on improvement science with a focus on improving data literacy



Infrastructure

Provide time to engage in the improvement process

Support Structures Necessary for Data Literacy

As seen in the graphic, the four data literacy elements of data exploration, data management, data use and reflection and improvement are dependent on three support structures: professional learning, infrastructure, and stakeholder engagement. As an example, read about how Florida addressed these three supporting actions and built a common understanding of data literacy as part of their successful efforts to increase graduation rates in the *NCSI Data Use Spotlight Update on Florida*⁷. Each support structure is briefly described in more detail below.

Professional Learning

Access to ongoing professional learning is essential to fostering data literacy across roles and system levels. Data literacy in education is currently inconsistent across the public, private, and academic sectors, and data literacy training has not been approached systematically or formally within and across states. Our conversations with personnel from state and local education agencies suggest that professional learning a) has historically targeted data management and use, with less attention to other elements (such as why we need to collect specific data) and b) is usually a time-limited set of modules or trainings as opposed to professional learning that is ongoing, like coaching supports. In addition, many pre-service and in-service educators hold negative views of using data in education settings, confirming the importance of combining stakeholder engagement with ongoing professional learning.

Across roles, stakeholders need:

- Professional learning content that addresses all elements and is both tailored to specific roles and aligned across roles (e.g., using consistent terminology).
- Coaching to build capacity to understand, select, and use data effectively.
- Ongoing learning related to changing purposes, tools, or processes.

Infrastructure

Supportive infrastructure is essential for data literacy at all levels.⁹ Teachers need time to analyze the right data¹⁰ with colleagues to adjust instruction and administrators need data systems that allow them to easily manage, access, and use multiple data sources. A survey of K-12 teachers¹¹ identified the following challenges to using data to inform instruction: not enough time (57% of respondents), too much data (34%), and delayed access to data (26%). These challenges can apply across system levels and roles. Strategies to address the main barrier, time to use data, include:

- Prioritizing which data sources we collect and analyze, reducing the amount of data and possibly freeing up more time to use data.
- Streamlining data collection, entry, and access systems/procedures to allow more timely access to and use of data.
- Adjusting staff schedules/tasking to free up more time for data use.
- Allotting time/resources to stakeholder engagement and ongoing professional learning to increase efficiency of data collection and use.

Stakeholder Engagement

Engaging stakeholders strengthens all elements of data literacy. Stakeholders can help us select the right data, increase data quality and access, and improve the efficiency and effectiveness of data use. In addition, stakeholders can help confirm whether we are asking the right questions and whether the results of our data use are meaningful. Using a facilitated consensus-building process can also help stakeholders move toward common understandings of data¹² Recommended practices for engaging stakeholders include:

- Engage stakeholders in decisions about why we need data and which measures best help us answer our questions.
- Communicate a clear and consistent message to stakeholders regarding the importance of collecting and using high-quality and reliable data.
- Promote buy-in among stakeholders by engaging them in data-related decisions and efforts, including soliciting their feedback on how to improve these efforts.
- Regularly share data with internal and external stakeholders, including information on data quality, implementation, and outcomes.

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This brief was written by Kristin Ruedel, Laura Berry Kuchle, and Tessie Bailey from NCSI with support from the other Centers.

ENDNOTES

- 1 <http://www.movingyournumbers.org/>
- 2 *DaSy Data System Framework* for Part C and Section 619 data <https://dasycenter.org/resources/dasy-framework/>
- 3 *IDEA Data Center Part B Data System Framework* <https://ideadata.org/resources/resource/1593/idea-data-center-part-b-data-system-framework>
- 4 *Data Analysis and Use Planning Tool for Examining AA-AAAS Participation: Addressing the Percentage of Students Participating in the Alternate Assessment* <https://nceo.umn.edu/docs/OnlinePubs/Tool2DataAnalysisAndUse.pdf>
- 5 Questions may vary by specific audience and data set. Various resources may help you consider or prioritize questions for your situation. For example, the Common Education Data Standards Connect Tool (<https://ceds.ed.gov/connect.aspx>) helps stakeholders make connections between specific questions and the P20W education data elements needed to answer them.
- 6 Weingarten, Z., Bailey, T., & Ruedel, K. (2019). *State Data Use Spotlight Update: Florida*. National Center on Systemic Improvement. Retrieved from <https://ncsi-library.wested.org/resources/251>
- 7 Dunn, K. E., Skutnik, A., Patti, C., & Sohn, B. (2019). Disdain to Acceptance: Future Teachers' Conceptual Change Related to Data-Driven Decision Making. *Action in Teacher Education*, 41(3), 193-211. doi:10.1080/01626620.2019.1582116
- 8 Bailey, T., Nelson, G., Weingarten, Z. & Ruedel, R. (2018). State Data Use Spotlight: Florida Builds Local Data-Use Capacity. National Center on Systemic Improvement. Retrieved from <https://ncsi-library.wested.org/resources/235>
- 9 Ruedel, K., Nelson, G., Bailey, T. & Blackmon, D. (2018). State Data Use Spotlight: West Virginia increases graduation rates for students with disabilities. National Center on Systemic Improvement. Retrieved from <https://ncsi-library.wested.org/resources/180>
- 10 Data Quality Campaign (2018, Sept 12). What Parents and Teachers Think About Education Data. Retrieved from <https://dataqualitycampaign.org/resource/what-parents-and-teachers-think-about-education-data/>
- 11 Multi-attribute Consensus Building Tool. <https://nceo.umn.edu/docs/Tools/MACBtool.pdf>

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WestEd is the lead organization for NCSI. For more information about the work of WestEd, NCSI, and their partners, please visit www.ncsi.wested.org and www.wested.org.