

# Introduction

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*"Just skip the statistics."*

*"If I liked numbers, I wouldn't have gone into librarianship."*

*"I'm not interested in data."*

These were the kinds of statements we tended to hear when the topic of data and statistics arose among the school and even some academic librarians. In listservs and at conferences, conversations about students' reading and research skills inevitably turned to how we could help them navigate *text*. We would hear passionate arguments about the need for high school students to use scholarly articles for their research. When we saw handouts or tutorials designed to help students navigate those data-heavy materials, they rarely included advice for navigating data, statistics, or visualizations.

Simultaneously, we began to see an explosion of digital tools that made it possible to create data visualizations and infographics with just a few clicks. New challenges emerged, like pie charts that added up to 193% (not 100%). Infographics that were little more than a random collection of factoids and icons gave us concern. In the era of the *Standards for the 21<sup>st</sup>-Century Learners* (AASL 2007), wasn't learning supposed to be deeper and more meaningful than this?

At the same time, we saw that data was being used to support arguments in ways that were unanticipated. Sometimes, politicians from across the aisle could cite identical statistics to support *opposite* stances. Could a better understanding of data make it possible to create better-informed future voters?

These issues, and others, led us to begin considering data and statistical literacy as the logical expansion of librarianship's work in information literacy. Thanks to funding from the Institute of Museum and Library Services (RE-05-15-0021-15), we launched a two-year project entitled

*Supporting Librarians in Adding Data Literacy Skills to Information Literacy Instruction.* Our goal was to give front-line high school librarians effective and efficient strategies for raising their own – and, by extension – their students’ ability to work effectively with data.

We wanted to layout a beginner’s landscape for data across the two years of our project. In Year 1 (represented in this volume), we would concentrate on the nuts and bolts of modern data and usage: data and statistical comprehension; data in arguments; and data visualization. Year 2 (to come in a forthcoming volume) would concentrate on application of data principles in areas including Big Data, crowdsourced/citizen science, personal data management, and personal data use.

We also scheduled two online data literacy education conferences (<http://dataliteracy.si.umich.edu>) as satellites to the 4T Virtual Conference. Volume 2 will provide discussion prompts, activities, and links so that school districts can access and use the archived webinars in future professional development.

We set our core audience as high school librarians and quickly realized that there were multiple secondary audiences, including classroom teachers, community college librarians, and librarians at four-year or research universities. In fact, at our 2016 4T Data Literacy conference, we had approximately 80 different job titles register. We weren’t the only ones thinking about how to bridge the gap for high schoolers.

Our project brought together two teams of experts. As experts in data and its use, Justin Joque (University of Michigan Library), Lynette Hoelter (Interuniversity Consortium for Political and Social Research – ICPSR, housed at the University of Michigan), Jacob Carlson (University of Michigan Library), and, unofficially, Justin Schell (University of Michigan Library’s Shapiro Design Lab) would help inform and provide expert oversight of the publications. As experts in teaching and learning in libraries, our team of curriculum experts would contribute real-world framing, considering how these principles could be brought into existing research practices in high school in a practical and pragmatic way.

Our curriculum team features Debbie Abilock, Susan Ballard, Tasha Bergson-Michelson, Jennifer Colby, Jole Seroff, Susan Smith, Wendy Steadman Stephens, and Connie Williams represent a cross-section of public and private schools, industry expertise, and library education. New academic librarians Martha Stuit and Tierney Steelberg contributed their insights.

In this volume, team members contribute their perspective and expertise on how data education can integrate effectively in the already jam-packed world of high schoolers.

We open with Chapter 1, in which *Lynette Hoelter* reminds us that data and statistics in the “real world” can be a different kind of encounter than how we experienced them in math class. She identifies the most practical, high-leverage data practices that will instantly raise your quantitative game so you can do the same for your students.

Students – even those as young as first grade – intuitively sense that numbers matter. But how do the words *around* the numbers impact how we read them? That is *Tasha Bergson-Michelson’s* exploration in Chapter 2.

In Chapter 3, *Jole Seroff* shows us what data-infused moments might look like in various moments in the research process, including a memorable look into her students’ exploration of migrants and refugees.

We want students to have authentic experiences with data, but we also want their first data experiences to be with good datasets, or collections of data. *Wendy Steadman Stephens*, in Chapter 4, provides an overview of reliable data sources so you can quickly connect students to good data and keep them moving in their research.

Once you’ve downloaded a dataset, how do you sort, eliminate duplicate data, and find patterns? Academic librarian *Martha Stuit* answers this question in Chapter 5 when shows how to download an existing

dataset and perform common sorting and filtering functions using Microsoft Excel or Google Sheets.

With Chapter 6, we transition to data visualization – the mapping, graphing, or illustration of data in visual form. *Justin Joque*, data visualization librarian at the University of Michigan, shows us how to unpack data visualizations with a variety of questions and probes. By doing so, we better prepare our students for creating visual content that is attractive *and* impactful.

In Chapter 7, academic librarian *Tierney Steelberg* walks novices through a mini-textbook on visualization types. Her work presents common visualization formats and advice about choosing and populating a visualization.

*Susan Smith* (Chapter 8) shows us how we can teach high school students concrete comprehension strategies for data visualizations. Her chapter includes sample infographics with discussion prompts, practical guidelines to help students select a just-right visualization type, and a series of questions with which we can interrogate a visualization.

When it comes to making infographics, the fear is that students will too-quickly cut and paste from the web into software. *Connie Williams* shares the process of “storyframing,” a way of slowing students down so they move from infobits to a cohesive argument, in Chapter 9.

Public high school librarian *Jennifer Colby* (Chapter 10) knows that when it comes to integrating something “new” into the curriculum, it needs to align with standards and test-taking. She shows us how data already fits into existing standards and tests, while also demonstrating how the Reading Apprenticeship model maps to data and statistics. Her chapter closes with numerous sample lessons and test questions: where the rubber hits the road.

In Chapter 11, *Debbie Abilock* looks ahead to advanced student users of data, showing us nuanced ways in which data can inform both large and small moments in the research process.

Chapter 12 focuses on action research, in which educators identify problems to study that are relevant and important to their classroom or schools. *Susan D. Ballard* provides a template for how teachers can engage in their own research design, data collection, and analysis, all for the purpose of improving teaching and learning. The process is flexible and accessible, meaning that once educators are experienced with the technique, they can teach it to their students.

Throughout many chapters, you'll find teaching tips whether you have 15 minutes, an hour, or a full unit to get things done.

We cannot close this introduction without thanking additional colleagues. Heather Newman, head of Marketing and Communications at the University of Michigan School of Information (UMSI) helped us organize our graphics efforts. David Young from that office was our graphic designer. Tyler Hoff, Kelly Hovinga, and Martha Stuit all made critical contributions to our project deliverables at various stages. Michigan Publishing shepherded the final design through its publication channels.

We hope this book will lead you into thoughtful explorations and fruitful learning for both you and your students. We look forward to hearing about your experiences at [contactdataliteracy@umich.edu](mailto:contactdataliteracy@umich.edu).

Happy reading!

## Resources

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American Association of School Librarians (AASL). 2007. *Standards for the 21st-Century Learner*. Chicago, IL: American Library Association. Accessed April 18, 2017. <http://ala.org/standards>.

