

DATA VISUALIZATION

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Overview and Definition

Data visualization, sometimes called information visualization, can encompass a variety of graphic depictions of data or information, including charts, tables, infographics, graphs, and maps, in both static and interactive formats. The visual representation of data affords audiences the opportunity to analyze and make connections across datasets that would otherwise be too large to examine, and can aid in cognitive processing (Chen 2017).

Basis for Current Interest

Although presenting data in a visual format is nothing new, the growing trend of big data and analytics has fueled a corresponding interest in data visualization as a way to highlight trends, connections, and linkages across large sets of data. Students are likely accustomed to seeing visualizations being used to persuade or inform them about a topic on a near daily basis online, in the news, and on TV. In an era of "fake news," it is key that they have the data literacy skills necessary to interpret and analyze these visualizations to ensure that the graphics are accurately representing the data and not presenting a misleading picture.

As faculty and student researchers collect their own data or work with others' data, they may also be looking for new ways to communicate their findings to wider audiences, and a visual format lends itself well to this purpose. A variety of free or inexpensive tools has made the process of visualizing their data easier than ever; however, beginners might be overwhelmed by the sheer number of options and not know how to begin. There are many decisions to be made in the data visualization process, from deciding which data to use, to choosing the best graphical format to present the data, to making design selections

related to color and accessibility. Researchers may turn to libraries for help in selecting and presenting their data visually, and librarians can offer support for the various stages in the visualization process.

Current Applications in Academic Libraries and Higher Education

With the growth of data, institutions of higher education are offering courses, or even entire degree programs in data visualization. [The New School](#) offers a MS in Data Visualization, [Northeastern University](#) offers an MFA in Information Design and Visualization, while [Purdue Polytechnic Institute](#) offers an undergraduate major in Data Visualization. Other schools, like [Berkley](#), offer data visualization courses as part of data science or data analytics degrees. With the growing focus on data across disciplines, these data visualization courses are also appearing in other subject areas, like journalism. [Columbia's Journalism School](#) offers a Data Specialization Master's degree, with a course in data visualization.

Library engagement with data visualization is varied, ranging from the libraries creating data visualizations of their resources and the library's impact on learning to libraries providing support for students and faculty creating their own visualizations. The Ohio State University Libraries provide one example of the former. The Libraries used Tableau, a visualization and analysis program, to create data visualizations to promote their collections, establish priorities for digitization, and analyze a user satisfaction survey (Murphy 2015). Nevada State College also used Tableau in their visualization of library usage and student success factors (LeMaistre, Shi, and Thanki 2018). College of Charleston librarians similarly used data visualization to compare their library's collections, expenditures, and student enrollment (Finch and Flenner 2016).

Other libraries are going beyond visualizing their own collections and providing resources to support students and faculty members engaged in data visualization. [Duke University Libraries](#), [Harvard Law Library](#), and [North Carolina State University](#) have all created informative resource guides for

visualization, including best practices, resources, and software options. [North Carolina State University](#) additionally offers data visualization workshops focusing on using specific software, while [Northeastern University](#) and [Duke University](#) offer a suite of data visualization services, including individual consultations, class sessions, and introductory workshops.

Applications in Academic Library Instruction

There are several different ways that librarians can support data visualization in their instruction. The levels of support will largely depend on the librarian's familiarity and comfort level with data, data visualization software, design principles, and programming.

Basic data literacy and research strategies is the first type of instruction librarians can provide. Students who are working on data visualizations will need to know where to find data sources, which is a query many research and instruction librarians are already answering. Librarians can point students to library subscription databases as well as freely available data sources to get them started with their research, either through guides or in-class instruction.

Students will also need to know how to present the data they find effectively. A first step toward this process could be helping students understand how to read and evaluate data visualizations. The [Seeing Data](#) project provides a helpful primer on engaging with data visualizations that librarians could use to support instruction on data literacy. Resources such as this one will help students gain the skills necessary to "read" a visualization as well as help them begin to see what makes a good visualization.

Once students have decided on the data they will use, librarians can also help them decide the best format for their visualization. Resources like [the A Periodic Table of Visualization Methods, Chart Chooser](#) and [the Data Visualisation Catalogue](#) can help students decide which visual or graphic format is the best option for the argument they are trying to make.

Finally, librarians may also provide instruction in the use of software to create visualizations.

Although basic visualizations like charts and graphs can be created in familiar software like Microsoft Excel, many of the more complicated visualizations are created from specialized software programs. [Tableau](#), [Infogram](#), [Palladio](#), [Plotly](#) and [Raw](#) are just a few of the freely available visualization tools. For a more extensive list, see [Datavisualization.ch](#).

Potential Value

The process of creating a visualization--from collecting or finding the data to deciding on the visualization format to creating the graphic itself--represents a wealth of opportunities for libraries to further support student and faculty researchers in the evolving scholarly landscape. Librarians, well-versed in helping researchers find reliable sources, can do the same for datasets. Data visualization also presents an opportunity for libraries to communicate their own data -- about their collections, services, or impact on student learning--in an appealing and easily digestible way.

Potential Hurdles

Data visualization represents an intersection between communication, information science, and design (Brigham 2016). It thus requires a number of varied and highly technical skills, such as a knowledge of programming, statistics, and design principles, which might currently be outside the toolset of the typical instruction librarian. A significant re-skilling might be necessary in order to begin to offer more advanced data visualization services. For librarians interested in increasing their familiarity with data visualization, there are a number of free and low-cost resources available. [Coursera](#) offers a data visualization MOOC, as does [Udacity](#). [Lynda.com](#) also offers a number of data visualization courses for beginners. Individual visualization applications often provide their own tutorials, like those available for [Tableau](#) and [Raw](#). Some libraries, like [Duke University Libraries](#), have also recorded their own data visualization workshops, which are freely available for viewing.

Conclusion

Librarians wishing to provide more support for data visualization on their campus have a number of options to get started. Data literacy skills instruction or sessions on reading data visualizations offer an entry point for those who may not yet have the skills for some of the more

advanced visualization software. Providing instruction on creating infographics would also represent a lower learning curve and more manageable topic scope for one-shot sessions. Librarians who do not feel comfortable with some of the higher level or more complicated visualization software might do outreach to see if these services are being offered elsewhere on campus. Librarians might then be able to partner with these other departments for training or combined workshops.

Three Examples from The Ohio State University Libraries Using Tableau." *College & Research Libraries News* 76 (9): 482-486. doi:10.5860/crln.76.9.9379.

Tools Discussed (if appropriate)

- Datavisualization.ch: <http://selection.datavisualization.ch/>
- Infogram: <https://infogram.com/>
- Palladio: <http://hdlab.stanford.edu/palladio/>
- Plotly: <https://plot.ly/>
- Raw: <http://rawgraphs.io/>
- Tableau: <https://public.tableau.com/>

References

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