10 Points in Working with Quantitative Data when Students Need or Seek Support

When students work with data, especially for the first time, they learn about the requisite steps often while working on their own, outside of the classroom. In order to keep students from getting unnecessarily hung up on relatively minor issues, it is useful both to prepare students by articulating these steps in instruction and assignments and by providing support in a way that anticipates potential roadblocks. As a contribution to a broader campus conversation in which we begin to form a common vocabulary for students’ encounters with data, the Research Data Services and Support Group (RDSSG) offers the following list of areas, from our experience, in which students seek help.¹

What is of particular interest to the RDSSG is that for many of these steps, there is no support service on campus that provides the needed support across the curriculum. When the service is provided, it is not promoted in such a way that students can find it on their own or use it to learn to develop these skills independently outside of class. Another challenge is providing support at those times of day when students are actually doing their work, largely outside of business hours and on weekends.

Finding and downloading files
Assignments call for students to retrieve known data from Collab, Moodle, or from web sites, or they require students to go out in search of quantitative information. Beyond assignments, we aspire that students, over time, develop a habit of seeking out their own quantitative evidence whenever it is appropriate to making an argument. Comps, too, frequently require students to work with data. Currently students get help in this area from librarians (mainly Kristin Partlo and Danya Leebaw for datasets, but all librarians help students find and access quantitative information) and Wei-Hsin Fu for spatial data as well as from their faculty and prefects for their own classes.

Collecting and creating
Students are generating data from experiments, conducting surveys and interviews, and creating numeric data from analyzing visual, text-based and audio sources. They would benefit from help understanding how to structure their data to work with available software, archive it for future use, and protect sensitive or restricted content.

Reformatting
Students often find data that are potentially relevant to them, but are not formatted for statistical software with which they are familiar. Paula Lackie provides consultation to teach students how to reformat files for use in non spatial analysis software. Kristin Partlo can do a limited amount to augment

¹ For the purposes of this document, we use the word ‘support’ broadly to mean any of the following: hardware and software computing infrastructure, one-on-one or group consultation by appointment, drop-in help at a service point or office hours, online instructional materials and guides, and spaces in which to work (limited by open hours, availability of help, and proximity to one’s regular work-space), and focused instruction sessions or workshops. Depending on the context, in addition to technical help, it extends to instruction and appropriate application of principles (e.g., Wei Hsin teaches spatial research methods, reference librarians teach don’t hand over data but teach students how to find it, and Paula Lackie teaches about the data life cycle).
what she does. Wei-Hsin Fu provides the support for files to be used with spatial analysis software.

**Basic statistical software support**
When students are unfamiliar with statistical packages, they can’t even open files, let alone explore them and do preliminary analysis. Students enrolled in Stats classes receive help in the stats labs. Paula Lackie provides this type of help in consultation for non spatial analysis packages. Wei-Hsin Fu provides support for spatial analysis packages.

**Collection management**
Students in some courses are being asked to collect data from disparate sources. These students need help organizing what they find into meaningfully structured files. Paula Lackie helps students with this by appointment through referral and word-of-mouth as does Wei-Hsin Fu in the context of spatial data.

**Cleaning data**
When students are reusing data, there is usually substantial work to do to prepare it for analysis (e.g., recoding, defining variable types, etc.). This help is currently provided by Paula Lackie, Wei-Hsin Fu and by individual faculty members.

**Choosing analysis type**
In ill-structured problems and independent work, students need to draw on the concepts they have learned from faculty and apply them to a particular research question. Faculty teach and consult with students, augmented by Paula Lackie who provides face-to-face consultation and online guidance. Wei-Hsin Fu provides support in selecting appropriate spatial analysis methods and interpreting the results. Beyond spatial analysis, this support is not easily discoverable.

**Data visualization**
There is progress to be made in providing instruction and assistance outside the classroom in visualizing data, allowing students to develop this capacity outside of assignments where it is explicitly required of them. Paula Lackie and other staff support statistical software visualizations from Excel to R such as online guides and consultations, but these are not yet well coordinated or publicized. Also, students currently come to the Research/IT for help in this area but this is not within the current scope of this service point, reflecting a need for drop-in support. Beyond statistical software support, we could be doing more to help students be aware of online applications that are emerging and developing constantly and providing novel ways for students to understand and present their data. Paula and Kristin both have web-based guides linking to visualization tools. Wei-Hsin provides support on visualizing data in a form of maps, as well as using on-line mapping applications to create maps. In the case of posters, students who have had classes visited by Doug Foxgrover or Paula Lackie know they can contact them for help.

**Analysis process**
Students are taught by faculty how to do the actual analytic work with their data. Students can turn to their professors and classmates or to Paula or Wei-Hsin for assistance, depending on the degree of help
needed.

Writing it up
Beyond their professors and prefects, students can get help describing their analysis and writing with numbers from the Writing Center assistants.

What else?
Are there other important stages most students encounter when working with data when they encounter stumbling blocks? Are there areas of support not included here? How can this list be improved? Send your suggestions to rdsg@lists.carleton.edu or to Kristin Partlo, x7668, kpartlo.

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