Institute of Education Sciences
National Center for Education Statistics

COMPENDIUM ON GOOD PRACTICES FOR GRAPHICS AND MAPS
NISS Technical Expert Panel ∘ March 2012

EXECUTIVE SUMMARY

This compendium is an outgrowth of the Technical Expert Panel on Maps and Graphics organized in 2009 by the National Institute of Statistical Sciences (NISS) on behalf of the National Center for Education Statistics (NCES).

The purpose of the panel was to "assist the NCES [in] reviewing and revising, if necessary, maps, graphics and graphical displays in its publications and on its web site."

This document incorporates the findings and recommendations of the Technical Expert Panel, findings from a contemporaneous NISS study of NCES' methodology, reporting, and projections of education statistics[1]. and material from the section on features and feature extraction (§3) of a review undertaken by NISS in 2011[2]. This compendium includes details leading to defined good practices with extensive examples to illustrate.

NCES' current approach to graphics and maps in its hard-copy (downloadable or not) publications is very conservative. There are sound reasons for this:
- Consistency among publications
- Heterogeneous readership
- Cost.

However, the price of this conservatism is substantial: publications are sometimes both less informative than they should be and less exciting than they could be.

Good Practice: Always answer this question explicitly: *"Why is this information being presented graphically?"*

GRAPHICS
Good Practices
1. Employ horizontal bar charts as the default, especially when values are displayed adjacent to bars. Consider alternatives to tick marks.
2. Make clear which values in a graphic are derived from others. Be explicit about what items labeled "Total" are totals of.
3. Do not impose unnecessary constraints that obscure small data values in graphics. Consider selective use of nonlinear scales.

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[1] Hussar and Bailey (2008)
[2] Karr et al., (2011). "Statistical Statements and Underlying Justifications in NCES Annual Reports."

4. Maximize the content of graphics, measured using even simple metrics such as number of reported values per square inch occupied.
5. In general, do not present discretely indexed data as if the index were continuous.
6. Especially when there is a single non-black color for a publication, it should be used consistently.
7. Unambiguously distinguish projected data values from actual data values.
8. Investigate new visualization methods.

MAPS
Good Practices
1. Use color as the preferred means of encoding numerical information in maps, paying attention to the need for grayscale reproduction.
2. Provide easy access to all data values underlying maps, either on the map itself or in associated tables.
3. When doing so is meaningful, include statistical significance in maps.

ALTERNATIVES TO TABLES
Some tables in NCES publications would be more effective as graphics or maps, provided that access to the data values is maintained.
Good Practice
1. Consider increased reliance on graphics and maps as substitutes for or complements to tables, but not to the point that data values are suppressed entirely.

UNCERTAINTY
Good Practices
1. Include uncertainties in graphics on a selective basis, especially when the "main message" is not diluted and the method used to encode uncertainty is well-established.
2. Pay continuing attention to ongoing research, as well as any broadly accepted practices that emerge.

INTERACTIVITY
Good Practice
1. Interactive sorting and linked views are mature technologies that NCES can employ immediately. Techniques, visual metaphors and software for manipulation of map break- points are still evolving. Giving them an opportunity to "crystallize" before adopting them seems prudent. Always ensure that interactive graphics and maps have a reset functionality.

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