

Report and Suggestions from IPEDS Technical Review Panel #59: IPEDS Data Visualizations

SUMMARY: The Technical Review Panel reviewed a series of data visualizations created using IPEDS data and provided feedback for NCES to consider as it continues the development process. This summary provides an overview of the information presented to the panel and the primary themes and takeaways that emerged during the associated discussion. Comments from interested parties are due to Janice Kelly-Reid, IPEDS Project Director at RTI International, at ipedstrpcomment@rti.org by September 2, 2019.

On June 25 and 26, 2019, RTI International, the contractor for the Integrated Postsecondary Education Data System (IPEDS) web-based data collection system, convened a meeting of the IPEDS Technical Review Panel (TRP) in Washington, DC. IPEDS TRP meetings are conducted by RTI to solicit expert discussion and suggestions on a broad range of issues related to postsecondary education and the IPEDS collection. As the postsecondary education industry evolves, IPEDS TRP meetings are increasingly critical in addressing changes to ensure that IPEDS data remain relevant, informative, and on the forefront of industry advancements and legislative needs. To this end, IPEDS TRP meetings are designed to foster public discourse and enhance IPEDS data collection, products, data quality, and system user-friendliness. The TRP does not report to or advise the U.S. Department of Education.

RTI's specific purpose for TRP 59 was to discuss and solicit feedback on several data visuals using IPEDS data. The panel consisted of 47 individuals representing institutions, researchers, state governments, the federal government, higher education associations, and other experts.

Background

NCES is looking to new tools to increase the accessibility of IPEDS data. As part of this effort, NCES explored and acquired a commercial off the shelf solution, Tableau, to distribute data to users in a timely fashion and in a format that is easy to use. With the acquisition of Tableau, NCES plans to recreate and release IPEDS *First Look* tables and Web Tables as dynamic online tables with a set of downloadable options to accelerate the IPEDS data dissemination release and move beyond static publications. In addition to this initiative, NCES is also interested in exploring the full potential of its data visualization tools. Using data visualization techniques to distribute IPEDS data in new ways could increase access to the data by making it available to a wider audience, facilitate new types of analyses using IPEDS data, and increase the public's usage of and access to the data. In particular, smaller institutions and other stakeholders with fewer resources at their disposal could use the NCES-created IPEDS data visuals in their work in quickly communicating IPEDS data in a visual, helpful way.

TRP 59 is the second in a series of TRP meetings to discuss data visualizations. The first meeting, TRP 58, convened other organizations (i.e., federal agencies, postsecondary institutions, research, and other non-education organizations) to discuss effective data visualization tools and share best practices in data visualization. The purpose of TRP 59 extends what was learned from TRP 58 to discuss data visualizations using IPEDS data. The panel was asked to review and provide feedback

on several data visualizations, which are targeted at IPEDS data users (i.e., researchers, policymakers, and consumers).

Tableau Dashboards with IPEDS Data

Prior to the meeting, a series of data dashboards using IPEDS data were created in Tableau, drawing from the best practices identified in the TRP 58 discussion. These draft dashboards display visual representations of IPEDS data to various audiences, primarily (1) policymakers (national, state, and local level) and (2) Institutional Research professionals with varying data-research skillsets and experience (i.e., ranging from beginners to advanced data visual users). The panel was asked to discuss and provide feedback on the following IPEDS data visualization concepts, in terms of initial reactions, ability to understand the visualization without direction, need for the visualization among the desired audience, presentation, improvements, and functionality.

Navigational dashboards. Data visualization techniques can be used to help users intuitively navigate and explore data to access the information they are seeking more easily. Ensuring that users can successfully navigate the tools is an important step in maximizing data availability and access. The panel reviewed a series of dashboards intended to demonstrate various conceptual approaches to navigation as well as specific functionality through which navigation can be accomplished. In these visualizations, users begin by making certain selections (e.g., one or more states, academic years, institution sector, specific institutions) that result in a data output or reports, which may include bar, line, and other charts specific to the selections that were made. The nature of the reports varies depending on those selections and whether or not a report is available at a given level.

Location dashboards. Location information is important for many audiences and would be a fundamental component of IPEDS data visualizations. State legislators, for example, could use visual dashboards to analyze data about the geographical locations of institutions and inform state policy discussions. Panelists reviewed various visualizations that presented data on institution location as well as data associated with those institutions. In some visualizations, users would make selections using drop-down menus and filters, which would then display a map with data based on the chosen options. In others, users would click on a visual map in order to display results based on the area selected. Having map-based dashboards allows users to view various IPEDS data while retaining a familiar layout and common functionality.

Drill-down functionality. A key advantage of data visualization is that it provides an immediate visual representation while also permitting users to drill further into the underlying data to explore in more detail. As demonstrated to the panel, this drill-in functionality can be accomplished in a number of different ways depending on the nature of the visualization itself and the experience and preferences of the user. One approach is allowing users to click directly on a chart, graph, data point, or other content within a visualization to narrow the data or present more detail. Hover text can also be used to guide users and provide a preview of what can be explored further with a given click. Drill-in functionality in a dashboard can also be accomplished with filters, wherein users make selections using menus to refine the scope of the data. These filters can be organized in a narrative-like structure, leading users through logical steps of data selections, or presented in a less-guided manner with a more standard layout, catering to more data-savvy users who may not require as much navigation assistance.

Inter-state comparison. The comparison of data between states is important for state legislators and policymakers and is one of the fundamental uses of IPEDS data. The panel was presented with a series of data dashboards designed to facilitate comparison of key IPEDS metrics at the state level. These IPEDS dashboards ranged from simple bar charts to more complex line graphs conveying multiple layers of data and included various filtering and drill-in functionality similar to other dashboards presented.

Institution peer comparison. One of primary uses of IPEDS data by individual institutions is the comparison of their own data with those of peer institution groups. Institution peer comparison is a key component of the IPEDS Data Feedback Reports, which are an annual NCES static bar-chart report to enable institutions to measure their own metrics against the benchmarks of their peers. Data visualizations could provide users with additional dynamic tools with which to make these important comparisons. A number of IPEDS dashboards developed for peer group comparisons were presented to the panel. These were relatively complex visualizations that included stacked line charts, box plots, and bar-in-bar charts, as well as adjustable parameters and filters for manipulating the data. The styles of these visualizations could be adapted for and applied to a variety of data types.

Institution individual comparison. Similar to peer group comparison, IPEDS data are also frequently used to make comparisons between individual institutions on a one-to-one basis. This functionality currently exists in the customizable IPEDS Data Feedback Reports as well as the College Navigator tool. Two IPEDS dashboards shared with the panel illustrated various possibilities for how individual comparisons may be presented visually. These included line graphs, bar charts, and pie charts, as well as a ranking of certain data points (e.g., the names of the top awards conferred at each institution). In these visualizations, the number of institutions under comparison was limited to three in order to maintain simplicity.

Specific analysis. In addition to expanding the presentation of general IPEDS data to new formats with which users can perform their own analyses (similar to how existing IPEDS data tools are used), data visualization also provides opportunities for more deeply exploring specific topical areas that may be of particular interest and value to certain audiences within the higher education community. The panel reviewed a set of IPEDS dashboards that could be used for users' specific analyses. Non-specific analysis IPEDS dashboards presented data for users to analyze as they see fit. In contrast, specific analysis IPEDS dashboards intentionally focus either on a specific research question, communicate a certain story, or facilitate deeper analysis of a particular topic of interest using a more journalistic or narrative style.

Overarching Themes and Takeaways

As the panel reviewed and discussed the data visualizations, several topics, concepts, and themes emerged, which can help guide the development and public release of IPEDS data dashboards.

Positive support for IPEDS data dashboards. The nature of data visualizations—which can be more appealing than static data sets—could increase the likelihood of their adoption by both existing and new IPEDS data users. Panelists noted that NCES can leverage its position as a trusted statistical agency and release these tools to the public directly. An added benefit is educating users on understanding the dashboards, IPEDS data, and properly using the data.

Varying audiences and skill sets. IPEDS users comprise many audiences with varying skillsets. As the IPEDS dashboards are developed, panelists noted the need to properly identify and define the

intended audience(s) for a particular visualization, which will help drive appropriate development of the tools and ensure a good fit with users. Data visualizations are best when tailored to the intended audience. Deliberate website navigation functionality should direct each audience to the visualizations most likely appropriate for them.

Context is key. Because IPEDS collects and disseminates a wide variety of data about many different types of institutions, providing proper data context for the dashboards is important. Panelists noted, for example, that some institution characteristics can drive and explain a great deal about the data (e.g., institution level and control and the type of accounting standards used), ensuring that the analytical information in the dashboards are not taken out of context. Proper organization and layout of the visualizations within each dashboard can help provide context, as can features within the tools themselves. Panelists suggested including supplementary resources such as embedded help tips and links to definitions. Panelists also pointed out that clearly showing numbers and percentages whenever possible is important contextual information, especially for small sample sizes encountered when drilling into the dataset.

Thoughtful organization of navigation and drill-down functionality. Proper organization of high-level navigation as well as effective use of filters and drop-down menus within the tools themselves can help users narrow and explore the IPEDS dashboards more efficiently. While the specific options that are relevant and thus made available will vary depending upon the nature of a certain visualization, panelists suggested maintaining consistency of these features across visualizations whenever possible and appropriate. Panelists noted that this not only improves ease of use but can also train users to properly navigate and use the tools.

Comparisons are fundamental to the utility of IPEDS data. IPEDS is a particularly well-suited data source for performing comparative analyses of states, groups of institutions, and individual institutions. The ability to make these comparisons is fundamental to the use of IPEDS data, so specific data visualizations designed to facilitate these comparisons would be expected by the higher education community. Inter-state comparisons using IPEDS data are important for state legislators as they make decisions regarding state higher education policies. Panelists pointed out the need to maintain simplicity as much as possible in visualizations intended for policymakers. Furthermore, the appropriate layering of national-, regional-, state-, and institution-level data (in that order) would increase ease of use. Because institutions regularly use IPEDS data for benchmarking themselves against groups of similar peer institutions, panelists agreed that this should also be a capability of IPEDS dashboards. Panelists recognized the limitations of building and incorporating peer group comparisons into data visualizations but encouraged NCES to explore possibilities for allowing institutions to define their own peer groups in addition to the groups developed by NCES in existing IPEDS tools and reports. Panelists also acknowledged the demand for certain audiences to be able to use IPEDS data to make individual institution comparisons. Panelists recognized the value of NCES facilitating these one-to-one comparisons and suggested this functionality be included as IPEDS dashboards are developed.

Value of data visualization for specific analyses. Panelists agreed that defining a research question carefully and clearly is critical, as is providing an initial, basic overview of the topic to set the contextual stage for further exploration of the data. This discussion supported the suggestion from TRP 58 that purposeful storytelling is important, but that NCES, as a statistical agency, should take care to maintain neutrality in the presentation of data.

User education and feedback. Panelists anticipate a strong appetite for IPEDS dashboards among the higher education community and expects similar demand for education and resources to support data visualization users. Panelists suggested linking to existing resources (e.g., glossary, brochures, video tutorials, FAQs) alongside the dashboard tools or in a central web portal. Panelists also recognized the importance of user feedback and suggested establishing a mechanism for allowing users to provide feedback on the usefulness of the dashboards as well as the online interface, to facilitate improvement of the tools over time and to ensure they continue to meet the needs of users.

Accessibility. Panelists agreed that designing data visualizations with user accessibility in mind is important but acknowledged that doing so may be a challenge for more complicated visualizations. Panelists suggested planning for and addressing accessibility early in the development process and pointed out that providing alternate, accessible dashboard versions early in the user navigation sequence would be helpful, as would incorporating printing features wherever reasonable and appropriate.

Moving forward and prioritization. Due to the expected demand for IPEDS data visualizations, panelists suggested thoughtful during planning and development of the tools, especially with regard to prioritization of topics. Panelists suggested beginning with well-established topics to provide a broad-based description of higher education (e.g., enrollment, completion) and subsequently progress to releasing dashboards that have traditionally had less visibility by NCES, but have greater audience interests (e.g., outcome measures, student financial aid, finance, and human resources). Furthermore, panelists suggested exploring avenues for outreach in order to promote and build interest in IPEDS data visualizations, including collaboration with associations and organizations whose members would benefit from the dashboards.

College Map: Removing its Beta Status

In addition to providing input on data visualizations using IPEDS data, the makeup of this Technical Review Panel was particularly suited to provide feedback to NCES on its College Map search tool, which is designed to aid students in their college-choice process by visually identifying potential colleges and universities. College Map is populated with the current IPEDS data and allows users to filter institutions based on location and other institutional characteristics. The program is currently in beta status with NCES seeking guidance on next steps toward a full release.

Following a demonstration of College Map, panelists made suggestions for improving the features and functionality of the tool and the data used to populate it. Panelists also made suggestions for promoting College Map to appropriate audiences (i.e., students, parents, counselors). The TRP suggested NCES remove College Map's beta status once known functional issues are addressed and reasonable and appropriate improvements are made to the tool.

Next Steps

Once the TRP summary comment period has closed, RTI will review the comments and outline recommendations for NCES based on the outcome of the TRP meeting and subsequent public comment period. NCES will review the recommendations to determine next steps.

Comments

RTI is committed to improving the quality and usefulness of IPEDS data as well as strategies that might be helpful in minimizing additional reporting burden. We encourage interested parties to send any comments or concerns about this topic to Janice Kelly-Reid, IPEDS Project Director, at ipedsTRPcomment@rti.org by **September 2, 2019**.