The Power of Data Visualization: Advanced Presentations of NRS Data

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Chapter 1. Introduction

The National Reporting System (NRS) was implemented in 2000 to meet the need for data about the federally funded adult education program. As the accountability system for the program, the NRS provides information about the characteristics of students, their educational gains, and achievement of other outcomes related to program participation. States and the Office of Vocation and Adult Education (OVAE) have used these data to describe students, demonstrate program effectiveness, document the need for adult education instruction, and obtain resources. OVAE has also promoted state and local use of data for program management and improvement through the development of data-monitoring tools, reporting templates, report cards, and professional development activities focused on using NRS data in research. The NRS has succeeded in producing comprehensive databases about adult education students and outcomes in many states and at the national level.

The need for data, however, has only become greater across the years. With shrinking public resources, demands for greater accountability, and improved program quality, it is more critical than ever to demonstrate program effectiveness and relevance to student and societal needs. In addition, a wider audience now is able to access and understand data. Data consumers are no longer limited to federal and state staff but now include teachers, students, and the public.

Fortunately, the revolution in technology during the last 15 years has produced a wider array of data management approaches and presentation tools that are now readily available and easy to use. Data analysis and reporting that once required expensive hardware and software, and substantial technical and design expertise, can now be performed relatively easily with little training or cost. Access to data is no longer limited to desktop computers. Through the use of laptops, phones, and tablets and the widespread availability of wireless Internet, people have access to information at all times. At the same time, the rise of social media has made it easier than ever to disseminate information. With resources such as Facebook, LinkedIn, and Twitter, we are no long limited to the printed report or Web page. Although we once had very little data that was hard to reach and understand, we now can be overloaded with information. It is often difficult to know what is important and where to focus. Key information may be overlooked or ignored.

One way out of this data swamp is through the use of data visualization—the presentation of data in visually compelling ways. We know through our own experience, and cognitive science research confirms, that people can process visual information much faster than the written word. Furthermore, more information can be conveyed efficiently through the use of pictures, drawings, and graphic illustrations. Graphic displays can help direct us to the information we need and help us present our messages in the most compelling way.

This guide and its related training seek to bring the NRS into the world of data visualization. Our focus will be on two popular and powerful visualization tools: data dashboards and infographics. These tools have different purposes for different audiences but share the same characteristics of putting complex data into visual form. Through visualization, they draw attention to important content, arouse curiosity, and, at their best, motivate the audience to act or dig deeper. Both tools can help improve data management and understanding of program performance and can help convey more powerful and effective messages about state or local programs with NRS data.

Data Dashboards

Data dashboards are presentations of data needed to track progress toward goals and identify challenges that need attention. Their beauty is in their parsimonious visualization of the most important, high-level information you need at a glance. When well designed, they provide the most relevant, timely data in a compact and visually compelling manner.

The automobile dashboard inspired the development of the data dashboard and provides an excellent metaphor of what they can do. Car dashboards show fuel level, engine temperature, indicators of brake problems, speed, and mileage. All of these pieces of data inform you quickly and easily about critical aspects of car functioning and alert you when something is wrong. You may need gas, the engine can be overheating, the battery is not charging, or you are going too fast. Note, however, that dashboards can tell you that *something* is wrong but not *what*. When the *check engine* indicator comes on, you know you need to fix something, but you need to investigate further to determine the exact cause. And although dashboards are often visually appealing to draw your attention to them, they cannot be so attractive that they distract you from the important business of driving.

A good data dashboard for an adult education program shares these same principles. The dashboard provides top-level information about the critical measures reflecting program functioning. The measures should reflect the state or program's key goals and activities and allow the state or program director to see at a glance when something is not going well and needs attention. For example, a state may decide that enrollment, educational gain by level, and number of students passing the GED tests are key indicators of performance. When a measure appears to be deviating from what is expected, the state director can then drill down to find the underlying reason for the problem. Like the auto dashboard, a data dashboard also should not overload the user with unnecessary information or be so flashy that it distracts from important matters with information that is not helpful. Figure 1-1 presents an example of a good data dashboard, developed with the NRS template.

Chapter 2 reviews the purpose of data dashboards and when to use them; essential features of dashboards; and the planning, design, and use of dashboards to meet your strategic goals. We present a model for dashboard development and elaborate a step-by-step process. The chapter also includes a simple planner to facilitate development.

Infographics

Information graphics, or *infographics*, are visual representations of information, data, or knowledge intended to present complex information quickly and clearly. After you become aware of them, you begin to see them everywhere—on billboards, in your favorite magazines, on websites, and in data reports. Infographics are increasingly popular as a medium for conveying information, and there is good reason for this. They can provide a great amount of complex information succinctly, using visually appealing elements that draw attention and facilitate retention.

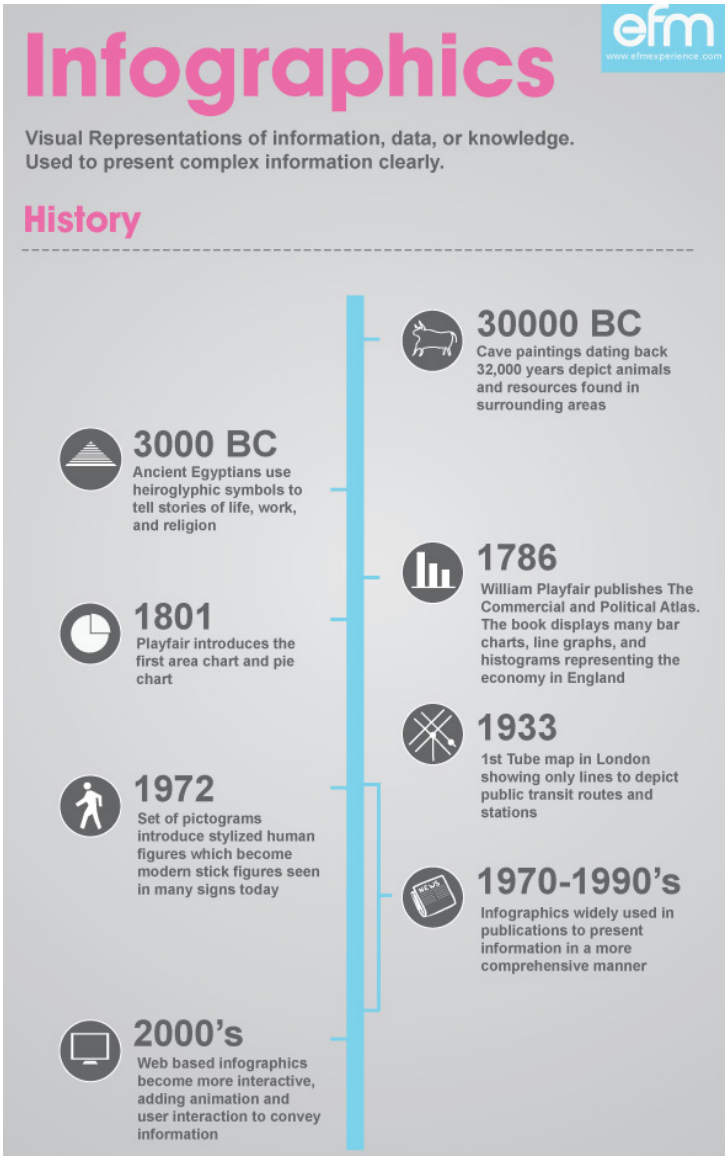
Figure 1-1: Sample Data Dashboard

Infographics tell a story and are usually intended for a specific audience. They illustrate information that would be unwieldy in text form, making information easy to understand and consume. And although charts and graphs can communicate data, infographics turn data into information through their design. They create a new way of seeing the world of data.

However, telling stories and conveying information through visual representations is nothing new—it has been going on for about as long as people have been drawing and writing, as illustrated in Figure 1-2. As media, business, and every other facet of our society has moved online, the possibilities and capabilities of infographics have greatly expanded. Today's technology provides the ability to create them easily and share them globally through social media, which is primarily what differentiates contemporary infographics from early forms.

In Chapter 3 of this guide, we will explore different types of infographics and illustrate why they are effective. We will discuss how to develop them and use them with NRS data and other types of information you may have about your adult education program. In Chapter 4 we evaluate good and bad examples of data dashboards and infographics.

Figure 1-2: The History of Infographics



Source: http://www.urlesque.com/2011/02/11/16-infographics-about-infographics/

NRS Training Guides

This guide presents the basic concepts for designing data dashboards and infographics and methodologies on how to develop and evaluate them. It is the 13th in a series designed to assist states with implementing NRS requirements, improve data quality, and use NRS data to promote program improvement. This guide supports the national face-to-face training conducted in January 2014.

The NRS support project staff at the American Institutes for Research (AIR) developed all the NRS guides through OVAE-funded projects that support the NRS. Readers interested in further information about the NRS, including resources to support data quality and the use of NRS data for program management and improvement, should consult NRSWeb, the project website, at http://www.nrsweb.org/pubs/#trainingGuides. The website houses guides and materials for all previous training.

Chapter 2. Data Dashboards

Data dashboards summarize and present information that you need to make decisions, understand challenges, and highlight progress toward your organization's goals. They are compact, simple, relevant, and easy to read. And, in an age when data are pervasive, everybody seems to want one. Simply put, dashboards are visual conversation starters.

Why Use Dashboards?

As a state or local program director, you are already reviewing your data, all of it, and regularly, perhaps weekly or more frequently. With all the data in hand, why would you need to create a dashboard that provides only a limited amount of data? Dashboards may be too brief for a director who wants to dive into the data to get a deeper understanding of the numbers and outcomes of the program.

A well-designed dashboard is intentionally designed to provide a high-level overview of specific areas of your organization that you want to track, rather than presenting a large amount of data that requires more time to process and understand. Data dashboards are often aligned with, and developed as a result of, an organization's strategic plan. The main goals of your program may include improving retention, greater learning gains, increased student achievements, and other outcomes that show the health of your program. Dashboards can provide a quick overview of these data to you and your staff to focus your conversations on the areas where the program needs improvement or is accomplishing its goals. In other words, dashboards help you obtain and review critical information quickly.

A data dashboard is considered a starting point, a focused tool for analysis and tracking, and a time-saver. When updated regularly, dashboards enable timely tracking of successes and problems as they develop and as they are resolved. Despite a sincere interest in reviewing a program's data, most staff will not have time to look deeply into all the data. Dashboards provide an overview that is focused and broad.

For example, a state director of adult education may want to know whether local programs are reaching outcomes: How many students have passed the GED tests? Are students who exit entering postsecondary education? Are students finding jobs? How long are they attending, and is that long enough to achieve results? In addition, a program director might be interested in tracking interim outcomes that suggest progress toward a broader goal, such as advancement rates of students.

Many states and some local programs already use scorecards or report cards—other short, visually appealing tools—to monitor data. Whereas a scorecard measures performance against goals, a dashboard looks more broadly at the program while focusing on specific areas in which the program wants to improve or where issues have been identified and need to be tracked. Unlike scorecards, which may have data from a year ago or longer, dashboards provide current information about how your programs are performing in the areas that matter to you. This is because the dashboard aligns with strategic goals, whereas a scorecard or report card is used mainly for performance monitoring or reporting. Consider the dashboard as another tool in your

toolbox, but one that is used at strategic levels of your program to guide its work using current data.

The dashboard can provide quick insights into the program, which leads to actions to address issues in a timely fashion, while providing feedback on program initiatives that are reflected in the strategic goals and program activities.

When to Use Dashboards

With so many powerful presentation tools available, how do you know when you need a dashboard? When you are interested in understanding how far you have progressed toward a goal or a set of high-level goals, a dashboard can be very useful. Likewise, when you are interested in understanding high-level factors that affect your ability to achieve particular goals, a dashboard can provide valuable insights. When you want to track how successfully the organization is executing its plans to achieve a goal, or a portion of one, consider building a dashboard.

Suppose your state has a goal of increasing the percentage of students passing the GED tests from 30% to 50%. A monthly or quarterly dashboard can provide information for assessing how well those efforts are going. For example, to track progress throughout the program year, a dashboard might provide monthly updates and trend information on the number of students who passed the GED tests to date, relative to a targeted number. It could provide regular updates on efforts that support achievement of that goal—such as an effort to boost attendance rates or ensure timely posttesting. It might also report advancement rates for a group of students in a particular part of the state, or perhaps by ethnicity or other demographics. Tracking NRS outcomes and other data through dashboards may provide insights that lead to new initiatives, training programs, or other actions within a strategic plan.

As dashboards have varied purposes, they may take different forms, present different kinds of information, and have different audiences. The purpose of the dashboard will also determine which reporting periods are used—whether data are updated daily, weekly, monthly, or even annually. Regardless of their application, dashboards present high-level status information and trends, as well as related factors, concisely and quickly.

Essential Characteristics of Dashboards

With a good understanding of their essential characteristics, we can more easily evaluate the effectiveness of a dashboard's design and more successfully build one that meets the needs of its intended audience. Here we present the characteristics that distinguish dashboards from other data presentation tools. Specifically, dashboards are:

- **High Level**—Dashboards include high-level information about key goals, factors that affect the organization's ability to achieve them, or the success of actions taken to achieve them. Although a depth of information may help decision makers and managers determine how to understand underlying factors or improve efforts to achieve these goals, this level of detail can obscure important insights gained from a high-level view. Dashboards are not intended to answer every question and solve every problem; rather, the user will need to drill down for further information.

- **Timely**—Dashboards offer actionable insights. To do this, the information they present must be timely. Of course, the meaning of *timely* depends on the purpose for which data are being used. For an annual strategic planning activity, recent data may be appropriate. For tracking the progress toward a programmatic goal, such as increasing attendance during the period of a year, data for the recent month, and trends across the past several months, are likely more appropriate. Whatever the context, dashboards must provide timely information to be useful.
- **Compact**—Although dashboards emphasize high-level, trend, and summary data, that does not mean they have to be simple. In fact, they may include content-rich clusters of relevant metrics presented in a sophisticated way. To provide sufficient information, well-designed dashboards often pack many insights into a small area. Certain graphs and charts, for example, may present dozens of data points in a square inch or two.
- **Visually Compelling**—To communicate quickly and effectively, dashboards must be easy to read, which is a function of good layout and presentation. Dashboards with properly chunked information, balanced data and contextual information, sufficient white space, brain-friendly graphs, thoughtfully formatted tables, and effective color schemes help readers get the insights they need.

Each of these characteristics helps dashboards achieve the goal of providing a snapshot including goals, relevant factors, and progress toward meeting them.

What Dashboards Are NOT

Despite their particular role among a wide array of presentation tools, there abound some common misconceptions about the content, structure, and functionality of dashboards. As a result, some dashboards fail to provide the insights for which they were intended. Presentation tools with these characteristics are not dashboards. Dashboards are NOT:

- **Reports**—Dashboards promote high-level understanding of trends and progress toward meeting goals, but they do not deliver much in the way of analysis or explanation. Reports are lengthier and more detailed. They tend to offer a deeper look at insights, and they provide analysis and possibly even solutions. Dashboards are not made for this purpose.
- **Collections of Tables—**Although tables may have a place on a dashboard, they are not always the most effective tool for summarizing data or presenting trends. Dashboards often include a rich set of presentation elements—tables, graphs, and other visualizations. These provide flexibility that enhances understanding and can more readily lead to insights that promote action.
- **Interactive Tools**—Although interactive tools are sometimes made accessible through clickable elements on a dashboard, they serve a very different role. Their increasingly frequent integration with dashboards blurs the lines between these two distinct tools, making it easier for analysts and decision makers to gain insights quickly by viewing a dashboard, then moving seamlessly into a more analytical activity using online analytic processing (OLAP), business intelligence, simulation, or even gaming functionality. However empowering, the role of the interactive portion of these tools differs from that of a dashboard.

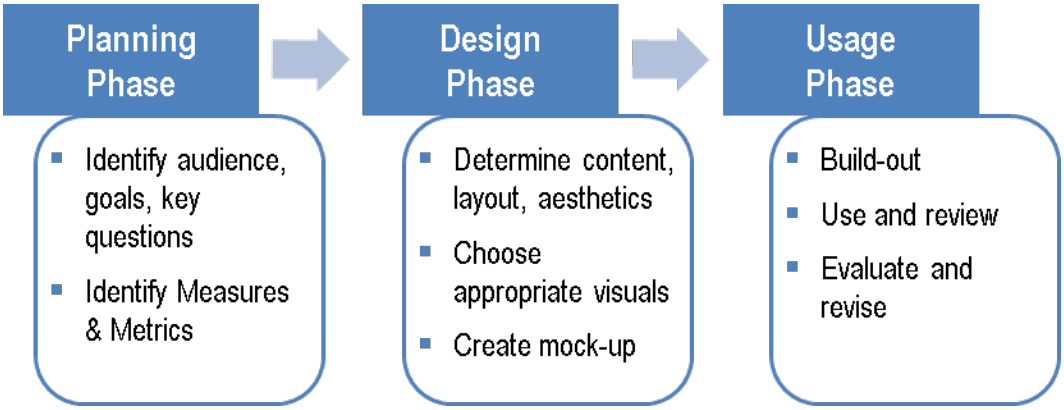
- **Works of Art**—Dashboards sometimes include varied visual elements, stoplight icons, gauges and other visual metaphors, which may lead to an undue consideration of design aesthetics over functionality. When used purposefully, lines, shapes, shades of color, text effects (such as bolding and italics), and other attractive elements have much to contribute to a reader's ability to understand and internalize metrics that matter. When aesthetics is viewed as the top priority, a dashboard's usability can suffer.
- **Works of Persuasion**—Where essays and infographics are tools of persuasion, dashboards aspire to objectivity. As such, the limited space available must be dedicated to carefully considered metrics that answer questions such as, "How are we doing?" These key performance indicators help focus attention on the challenges that matter and the factors that affect them. Of course, the contents of a dashboard might provide insight that informs a decision maker's opinion and inspires the development of a work of persuasion.

Method for Planning, Designing, and Using Dashboards

With an understanding of a dashboard's purpose, a glimpse at its structure and composition, and some sense as to when to use one, we now turn to how useful dashboards are built. When creating a dashboard, you may be tempted to open up a readily available spreadsheet and start populating it with tables and graphs that seem useful. Nevertheless, building a tool that provides pivotal insights and presents them in an accessible, easy-to-digest way, requires a more methodical approach. Through a process of reflection and thoughtful design, a tool will emerge that is more useful and communicative. Such a tool will make moving from strategic or operational insight to appropriate action easier.

Figure 2-1 describes the phases of development. In the planning phase, you identify the audience for the dashboard, goals of the tool, and key questions you want to answer. You will also identify your measure and the metrics that reflect those measures. In the design phase you will determine the exact content and layout and consider the aesthetics of the tool. It is important to choose appropriate visuals to use and then create a mock-up of the dashboard for review. In the usage phase, you will actually build out the dashboard and begin using it on a regular basis. In time, as goals are met or key questions change, you may wish to evaluate the dashboard and revise as needed. We will describe each of these phases in detail.

Figure 2-1: Phases of Dashboard Development and Use



As you move through each phase in the dashboard development process, you will need to document the results of each phase (definition of goals, identification of key questions, and so on) as you progress. In Appendix A, we have included a dashboard development organizer, which also includes a list of software tools that will assist in dashboard development. We will use the organizer to develop a sample dashboard as we discuss the process in this guide.

Planning Phase: Identify Audience and Goals

Before determining which metrics belong on your dashboard, you will need to determine who will be using it and consider the purpose it will serve. A dashboard to help state staff track NRS compliance might focus on goals of meeting targets for assessment, advancement, GED attainment, obtaining and retaining employment, or entering postsecondary education. A dashboard for strategic planning might track demographic trends, factors that affect advancement, or cost-related items. A dashboard to track compliance of local programs with state policies and procedures might focus on attendance, pre- and posttesting rates, and other record-keeping items against state requirements.

Whatever the audience and purpose, you should discuss dashboard goals and desired insights with stakeholders to ensure that you are meeting their needs. If you are the primary stakeholder, consider discussing the dashboard with others to ensure that you obtain a broad range of input.

Figure 2-2 lists goals on which we will base our sample dashboard, which is focused on planning activities for a state adult education organization.

Figure 2-2: Dashboard Development Planner With Goals

Goals	Key Questions or Factors	Measures	Metrics	Visualization
Participation: Ensure that programs have good retention				
Advancement: Ensure that students are advancing academically				
Outcomes: Increase GED completion rates by 15% across 3 years				

Planning Phase: Identify Key Questions

To determine which metrics to include in a dashboard, consider the kinds of information likely to help you make relevant strategic or operational decisions. For example, if a key question is, "How is your group going to achieve its yearly target for GEDs?" You might include (1) progress to date ("We are in month 7 and have met 45% of our target) and (2) seasonal trends ("The majority of GEDs are earned in the third quarter") as factors that affect your ability to meet the GED goal.

To determine key factors, consider questions that must be answered to assess progress toward a goal or inform next steps for achieving it. For example, when working to increase the number of GEDs attained, a state director might ask:

- How far are we from meeting the goal?
- Which systemic factors might be hindering our goal?
  - Are students receiving sufficient hours of instruction before taking the tests?
  - Is the available instruction helping them to advance?
  - When they take the tests, are they prepared to pass them?
- Which differences or factors may affect the goal? For example, which groups of students are passing the GED tests at lower rates than others?
  - Are portions of the state lagging (or leading) others in GED attainment?
  - Are students of particular ages passing the GED tests at higher rates than others?

Documenting key questions in the dashboard development planner will help frame decisions about measures and about metrics, the next phase of development. We include our sample questions in the planner in Figure 2-3.

Figure 2-3: Dashboard Development Planner With Key Questions

Goals	Key Questions or Factors	Measures	Metrics	Visualization
Participation: Ensure that programs have good retention	To what extent are we losing students to apathy or other forms of attrition after intake?			
	How regularly are students attending adult education instruction?			
1. Advancement: Ensure that students are advancing academically	Are programs helping enough students to advance? Are instructional activities becoming more efficient in helping students to advance?			
	Are programs providing instruction that enables students to advance in a timely manner?			
	Are programs assessing student progress in a timely manner?			
2. Outcomes: Increase GED completion rates by 15% across 3 years	At what rate are students obtaining their GEDs?			
	How many contact hours do students need to pass the GED tests?			

Planning Phase: Identify Measures and Metrics

To determine which data to report on a dashboard, consider your strategic or operational goals, which will suggest the key questions you want the dashboard to address. The information from the dashboard should help you make productive strategic or operational decisions. From the questions, identify possible *measures* that will address the questions.

Once you finalize measures, you can identify the *metrics*, or how the measures will provide the information to be included on the dashboard. In other words, your measures represent in a conceptual way the information that you need. The metrics provide a tangible representation of the measures. For example, to determine how quickly students advance through adult education programs, we might choose the number of contact hours as a measure. Metrics for reporting the measure might be the median contact hours to advance or the percentage of students requiring fewer than the current median number of hours to advance.

Identifying good measures and metrics also requires consideration of the availability, quality, and access to needed data. When high-quality and relevant data are not available to use a particular metric, you may need to identify alternatives. To do this, consider other ways to measure the same phenomenon. For example, if you do not have reliable contact hour data to understand advancement, consider using number of class sessions attended or calendar time to advancement. If data are not available to calculate any metrics for a particular measure, identify a similar measure for which data *are* available.

Another consideration when selecting measures is whether the data are available on a timely basis. Because dashboards are not one time reports, you will need to update their contents on a periodic basis. If you cannot obtain data when needed, or if updates require a lot of effort, your dashboard project risks becoming a time waster rather than a helpful decision-making tool. If data elements needed for metrics are not consistently accurate and available when needed, consider using a proxy.

After you have identified the metrics to report on your dashboard, double-check that the metrics you choose are capable of delivering the actionable insights you need. If you can connect a metric to a useful insight about students, programs, service delivery, or program administration that leads to deeper understanding or a clear next step for achieving a goal or solving a problem, it is a useful metric. If not, this is another situation where you need to consider choosing something different. As you identify metrics you wish to use, you can document them on your dashboard planner, as we have done in our running example for our participation goal (Figure 2-4).

Figure 2-4: Dashboard Development Planner With Measures and Metrics

Goals	Key Questions or Factors	Measures	Metrics	Visualization
Participation: Ensure that programs have good retention	To what extent are we losing students to apathy or other forms of attrition after intake?	Time from intake to separation for students not posttested	Median number of weeks from intake for students to reach 12 hours • Past 12 months • Statewide and by region Distribution of students: • More than 20% below • 10%-20% below • Within 10% of • 10%-20% above • More than 20% above	
	How regularly are students attending adult education instruction?	Median student contact hours by program type (adult basic education (ABE), adult secondary education (ASE), English as a second language (ESL) Percentage of students above, substantially above, below, and substantially below median	Median student contact hours/month since enrollment or last advancement • Current students • Overall and by program type Distribution of students: • More than 20% below median • 10%-20% below median • 0%-10% below median • 10%-20% above median • More than 20% above median • Median number of contact hours since enrollment or last advancement across all students	
. . .				

Design Phase: Content, Layout, and Aesthetics

Having identified actionable metrics, we can now begin to design the dashboard. Its layout and presentation implicitly communicate which metrics are related and which are most important. When well crafted, a dashboard's design helps viewers gain insights more quickly and can highlight insights that might otherwise be missed.

Content

To help key audiences maintain attention on the most important high-level information, all content should be viewable on a single page. As discussed earlier, this means that only high-level metrics are included. After viewers review the dashboard and identify challenges that warrant greater attention, they can drill down to learn more about the factors relevant to addressing them.

Layout

The layout of a dashboard influences how its content is perceived, understood, and internalized. When content is thoughtfully positioned, readers can assess more easily which metrics are related and which are most important.

To encourage readers to view the most important information first, position it in the top-left corner of the page. This placement recognizes the practice of English-speaking individuals to scan a page from top left to bottom right. Position subsequent groups of metrics, from top to bottom, in the order you would like to have them viewed. Metrics and charts placed *below the fold,* requiring viewers to scroll down to see more data, can be reserved for secondary information.

As part of the design process, consider also the size of the screen on which the dashboard is displayed. Viewing areas on tablets are smaller than on laptop or desktop computer screens. This may necessitate more of a vertical approach to layout and may require viewers to scroll more frequently.

Content Groups

The human mind perceives clusters of content as being related. Therefore, by clustering related metrics on a screen, you encourage viewers to analyze them together. Cluster metrics either by positioning them next to each other or integrating them into a single display.

Titles

To orient viewers to a dashboard's structure and available content, and to help them find particular metrics quickly, provide a title and label for each of its sections. Include the reporting period to provide time context, and include notes to explain any metrics that are not completely intuitive. At the same time, balance the need for explanation with the virtue of brevity.

Aesthetics

In dashboard design, aesthetics are important in that they support usability. White space makes content easier to process. You can use it to highlight a dashboard's organization, structure content for readability, and highlight particular metrics. Because black or colored borders can become visually confused with content, they do not provide the same perception of space. Use white space to separate dashboard sections and individual charts and metrics from other visualizations. Alternately, borders rendered in subtle shades of color and narrow lines are

acceptable. The goal is to use borders to enhance readability without overshadowing insight-rich charts and metrics.

Titles, Labels, and Annotations

Titles, labels, and annotations are vital to aid comprehension of data and avoid ambiguity. However, excessive use of these devices creates clutter and can hinder understanding. Allow labels to support understanding without grabbing too much attention. Help them blend in by rendering the text in subtle colors.

X and Y Axes

Like labels, chart axes aid in comprehension by providing context and clarity. But they too can get in the way of perception if rendered too prominently. Therefore, keep them as simple as possible, and render them in subtle colors. Minimize the number of digits used in numeric axis labels, use sans serif fonts, and eliminate grid lines if feasible.

Color

Color is often used as a device to differentiate different data series, components of a metric versus totals, good values from bad ones, and so on. Unfortunately, too much color can make a dashboard appear busy, confusing, and difficult to read. For this reason, use consistent color palettes that features a family of colors (e.g., ■■■■■). Moderately subtle colors enable variation without distracting the reader. When a consistent palette is used, highlight colors (e.g., ■) can then be used to flag important distinctions without undo distraction. Consider also other means of noting distinctions by using simple icons (e.g., ▲▼) or subtle outlines. Use these highlights minimally.

Rid Yourself of Chart Junk

The phrase *chart junk*, made famous by Edward Tufte, author of *The Visual Display of Quantitative Information* (2001), refers to superfluous design elements. Although they may be attractive, photographs, ornamental fonts, shading, and ornate borders and visualizations often intended for artistic appeal actually detract from the usability of dashboards and should therefore be avoided.

Similarly, colorful dials and gauges, intended to simulate those found in cars, airplanes, and factories may be attractive. But these elements often take up more space than necessary and may fail to communicate information and insights.

Integrate Navigation With Content

Designers often include navigational elements, such as links or drop-down menus, on a dashboard that connects to a reporting system. Although these items may be useful, they can also be distracting. By integrating them with other elements, such as titles, they can be rendered in a way that serves their role without distracting. Integration of these elements generally simplifies the dashboard and allows for a cleaner, more elegant interaction with viewers.

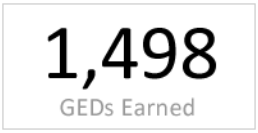
Choose Appropriate Visualizations

Sometimes a well-chosen visualization can help viewers understand data relationships better. Consider which metrics could be grouped in a table or presented to provide better insight. For

every data relationship, there are one or more preferred approaches to visualization. This section discusses a few of the more common visualizations and some of their uses.

Text

For presenting only one or a small number of metrics, nothing beats the simplicity and clarity of text. Whether highlighting the number of students enrolled, dollars spent, or GEDs earned, a solitary number provides necessary information without distracting dashboard users from the key point. In the illustration below, notice the impact of a single number, enveloped by ample white space and clear but not overly obtrusive labeling. Notice how the border frames the metric without overpowering it.



Tables

Tables offer a way to render related metrics precisely and clearly. They are particularly useful for featuring related summary metrics or illustrating simple trends or disaggregated metrics (e.g., enrollment by region, GEDs by ethnicity, and so on). The table in Figure 2-5 presents GED pass rates across regions within a state. Notice the simplicity of the format, which features substantial white space around the metrics and labels, unornamented sans serif fonts, and muted borders. The metric of greatest interest, pass rate, is highlighted just enough to set it apart.

Figure 2-5: GED Pass Rates Metrics for Data Dashboard

GEDs	Taken	Passed	Pass Rate (%)
Northeast	300	180	60%
Central	125	33	26%
South	219	113	52%
Northwest	55	45	82%

However, as the number of metrics increases, tables become inefficient users of space. With white space needed for readability of data in rows and columns, tables become unwieldy as they grow in size. In addition, dashboard users may find it more difficult to recognize trends and patterns as tables grow in size.

Charts

Charts make it easier to understand and internalize larger groups of numbers, visualize trends, and gain insights. Different kinds of charts excel at highlighting particular kinds of relationships among data. We describe a few different kinds of charts and their uses.

Bar Charts

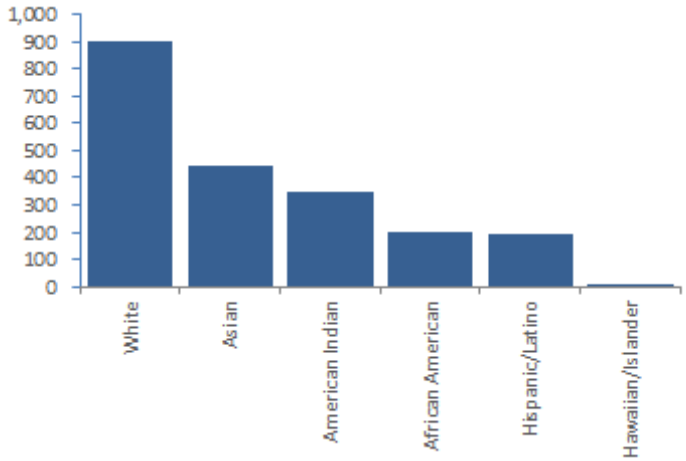
Bar charts are a good choice for comparing sets of discrete values. They can be used to present metrics across time or to highlight differences across groups. They enable readers to see relationships among metrics in a series more quickly than by scanning values in table of numbers. Examine the two illustrations in Figure 2-6. Which communicates the data relationships better at a glance?

Figure 2-6: Comparing Text and Bar Charts

Text

Hawaiian/Islander	3
Hispanic/Latino	194
African American	200
American Indian	350
Asian	445
White	900

Bar Chart

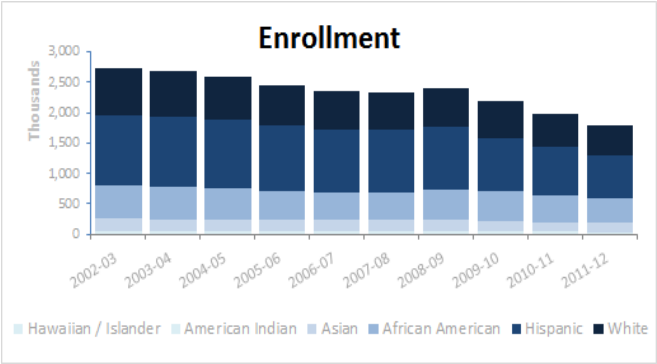


When you want to compare metrics in time order, columns are arranged sequentially. Categorical items can be ordered from smallest metric value to largest. It is important to use a consistent predetermined order repeatedly in all dashboard charts and other meaningful groupings.

Stacked Bar Charts

When you want to highlight the contribution of a series of sources to a trend, consider using a stacked bar chart. Combining each of the bars in the enrollment chart above into a single bar, which can be compared across years, we can provide insights at a glance of the overall trend and the composition of ethnicities that make up the trend (Figure 2-7). Is enrollment declining due to a decrease in Hispanic students? This type of chart provides a level of insight behind the overall trend.

Figure 2-7: Stacked Bar Chart

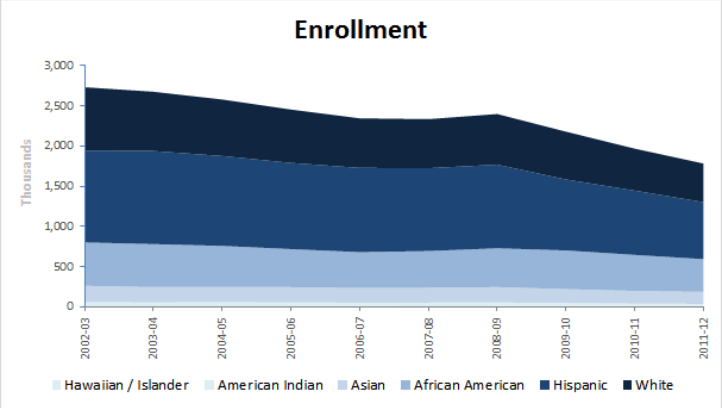


Earlier, we mentioned that charts highlight trends and distinctions more intuitively than text, especially as the number of data points increase. Although you may not initially think the chart above is complex, consider how concisely it presents 70 enrollment-by-ethnicity data points.

Stacked Area Charts

For trends across time, such as enrollment, you can also use a stacked area chart, rendered similarly to the bar chart above but with the bars connected and smoothed into a continuous line. Area charts appear as a blend—part bar chart and part line chart (Figure 2-8).

Figure 2-8: Stacked Area Chart



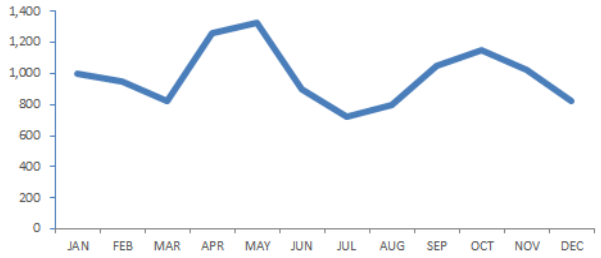
Line Charts

To track trends across time, line charts are useful. To make it easier for viewers to pinpoint values, you can include grid lines or data labels on the chart. To provide an at-a-glance impression of a trend, smaller versions of a line chart, known as *sparklines*, can be embedded in a table or text.

Line charts are also useful for comparing trends across categories across time. For example, the line chart in Figure 2-9 could have included results for each region—Northeast, Central, South, and Northwest. It would have appeared as a larger version of the sparklines shown in Figure 2-9 superimposed on a single chart. Breaking out the lines as we have done provides a more elegant and easier-to-read dashboard element.

Figure 2-9: Line Charts

Line Chart



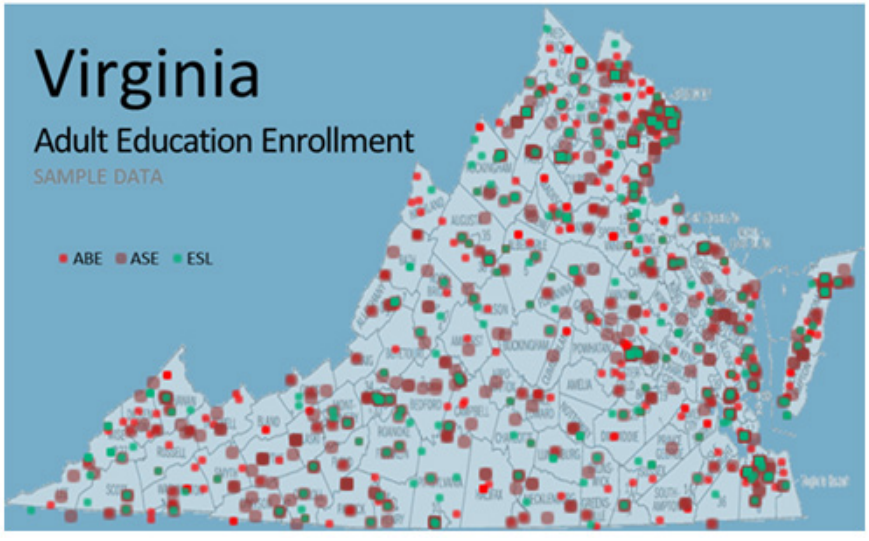
Sparkline

GEDs	Taken	Passed	Pass Rate (%)
Northeast	300	180	60%
Central	125	33	26%
South	219	113	52%
Northwest	55	45	82%

Heat Maps

To show the distribution of items over a particular area, a heat map presents an interesting data display. The sample in Figure 2-10 uses a random data set to illustrate how you might show the distribution of students across a state. A single heat map can compare the distribution of related items by plotting each category in a different color. For example, Figure 2-10 could highlight the distribution ABE students in dark red, ASE students in light red, and ESL students in green.

Figure 2-10: Heat Map

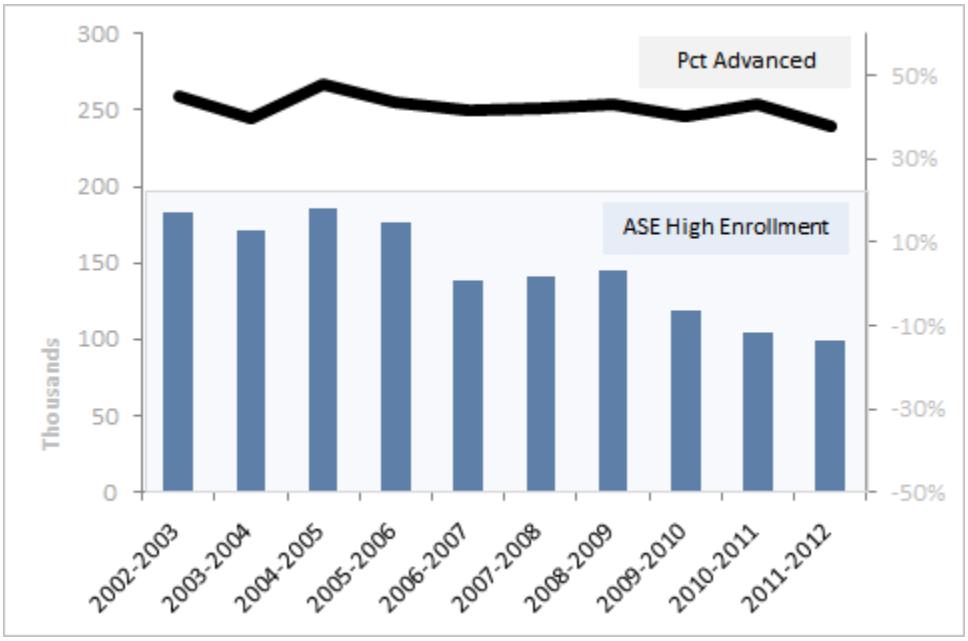


Alternative Visualizations

With a little ingenuity, you can create a new kind of visualization of your own. To create one, start with a clear idea of the data characteristic, trend, or relationship you want to communicate.

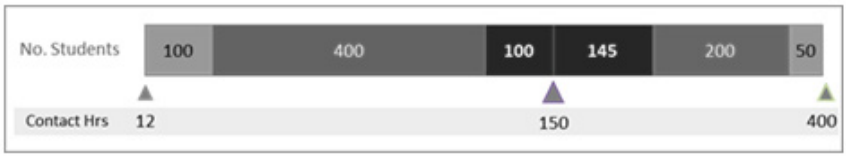
Then, determine whether an existing visualization, or a combination of visualizations, might meet the need. For example, to highlight a relationship between enrollment and advancement across time, you could combine a bar chart to present enrollment levels across time with a line chart showing advancement percentage, as shown in Figure 2-11.

Figure 2-11: Enrollment and Advancement Trends



Tools such as Microsoft (MS) Excel provide an easy means to overlay a line chart on a bar chart, plot points on an existing chart, and so on. Another customized chart in Figure 2-12 shows how long it takes for particular groups of students to advance and whether students in the group vary in the time it takes for them to advance.

Figure 2-12: Customized Chart of Advancement and Contact Hours



The bottom section of the chart presents the median (150), minimum (12), and maximum (400) number of hours students required to advance a level. The top portion shows a breakdown of the number of students requiring fewer or more than the median number of hours to advance at intervals 10% from the median. In this case, 145 students required between 150 and 165 hours to advance (within 10% of the median) and 100 students between 135 and 150 hours to advance (up to 10% less than the median). Four hundred students required between 120 and 135 hours to advance (up to 20% less than the median). Notice how intuitively and concisely this information is presented. Rather than attempt to label every number, the graphic provides reference points that help readers understand the metric without cluttering the display.

Planning Your Visualizations

On the basis of the role you have determined for your dashboard, you identified questions that you would like the dashboard to address. From there, you identified measures and metrics that offer desired types of insights. With the basics of visualization at your fingertips, you are ready to determine how the dashboard will look. To help you think through how each metric should be visualized, we have added a new column to the dashboard planner. Take some time to consider the metrics, individually and in groups, and add to the last column a description of the visualization you would like to use, as illustrated in Figure 2-13.

Design Phase: Mock-Up

After your having considered the groups and individual metrics you want to present, and figured out how each will be visualized, it is time to determine how your dashboard will look. To create the mock-up of the dashboard, you can use paper and pencil, a drawing program such as MS Visio, Adobe Photoshop, or MS PowerPoint. If you have a tool, such as Tableau, SAS/Insight, Cognos, or even MS Excel, for developing the dashboard, you can create a dashboard prototype.

Whatever the tool, your mock-up will include a draft of each dashboard section, rendering of visualizations, and overall layout. Through the process, you will create an overall look and feel for the metrics presented. Develop a first draft and then review and refine the design.

Preparation

Before you start laying out the dashboard elements, determine how many sections the dashboard will contain and how many groups of metrics will be in each section so that you can allocate sufficient space on the page for each. If your content will not fit, you will need to eliminate some metrics, identify more condensed ways to visualize them (perhaps by combining displays), or ad a page. However, it is much better to limit your dashboard design to a single page.

Page Layout

Begin the page layout by determining the order of metrics. A first section might feature top-level summary metrics or important data that you want readers to see first. You can then arrange other metrics in order of importance. Consider ways to present the groups of metrics as cohesive units and, if appropriate, to show interconnections between them. Figure 2-14 shows one possible way of laying out a dashboard page. Your particular design should cater to the metrics groups and visualizations you will include.

Figure 2-13: Dashboard Development Planner With Visualization Plans

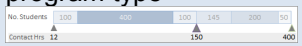
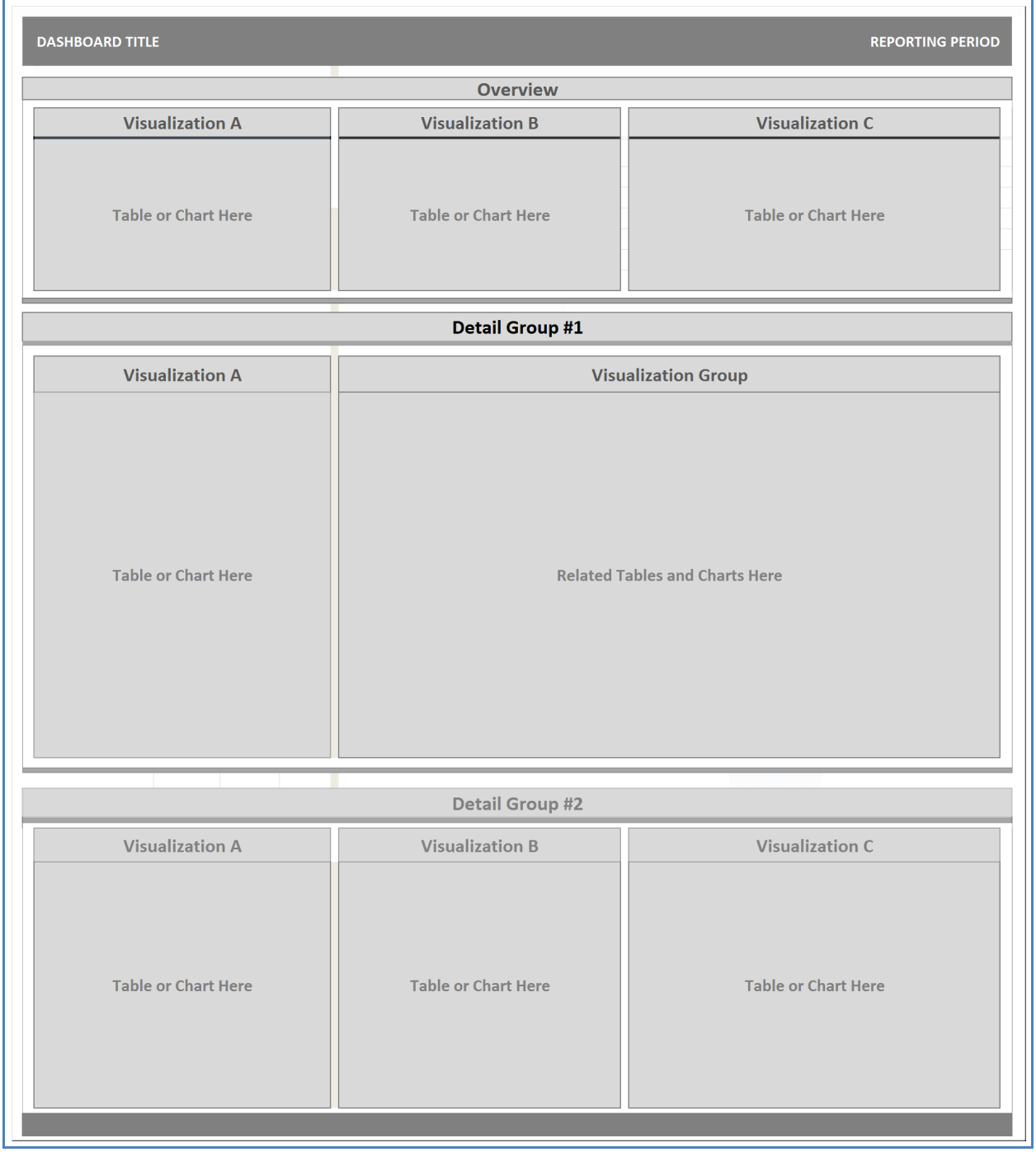
Goals	Key Questions or Factors	Measures	Metrics	Visualization
Participation: Ensure that programs have good retention	To what extent are we losing students to apathy or other forms of attrition after intake?	Time from intake to separation for students not posttested	Median number of weeks from intake for students to reach 12 hours • Past 12 months • Statewide and by region Distribution of students: • More than 20% below • 10%-20% below • Within 10% of • 10%-20% above • More than 20% above	Text-based metric reporting median weeks from intake until separation for students not posttested Custom visualizations to report median weeks from intake until separation for students not posttested 
	How regularly are students attending adult education instruction?	Median student contact hours by program type (ABE, ASE, ESL) Percentage of students above, substantially above, below, and substantially below median	Median student contact hours/month since enrollment or last advancement • Current students • Overall and by program type Distribution of students: • More than 20% below median • 10%-20% below median • 0%-10% below median10%-20% above median • More than 20% above median • Median number of contact hours since enrollment or last advancement across all students	Custom visualizations to report distribution of students around median monthly contact hours since enrollment or last advancement, for each program type  Text version of median contact hours since last advancement or intake for current students Bar chart showing trend
. . .				

Figure 2-14: Sample Layout for Data Dashboard

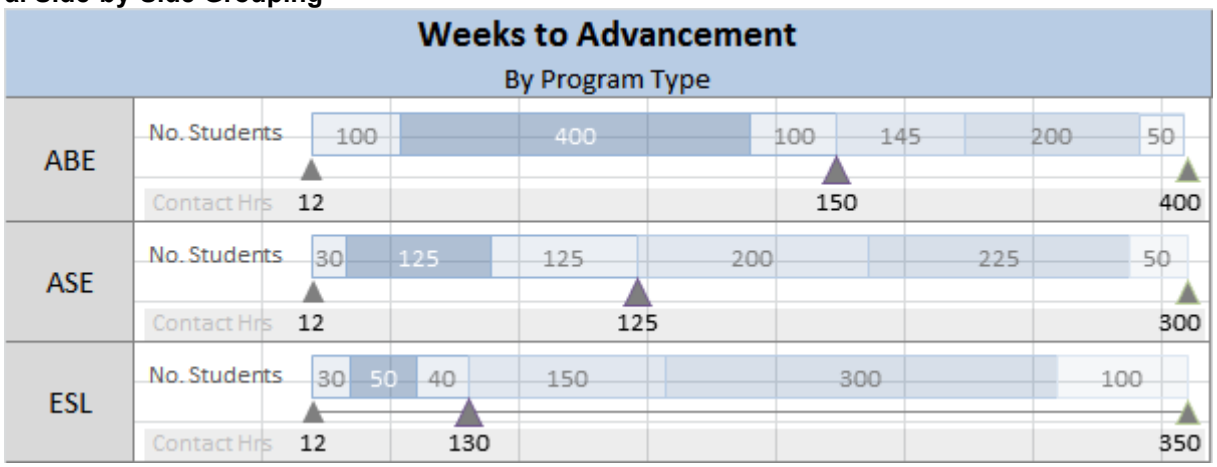


Metric Groups

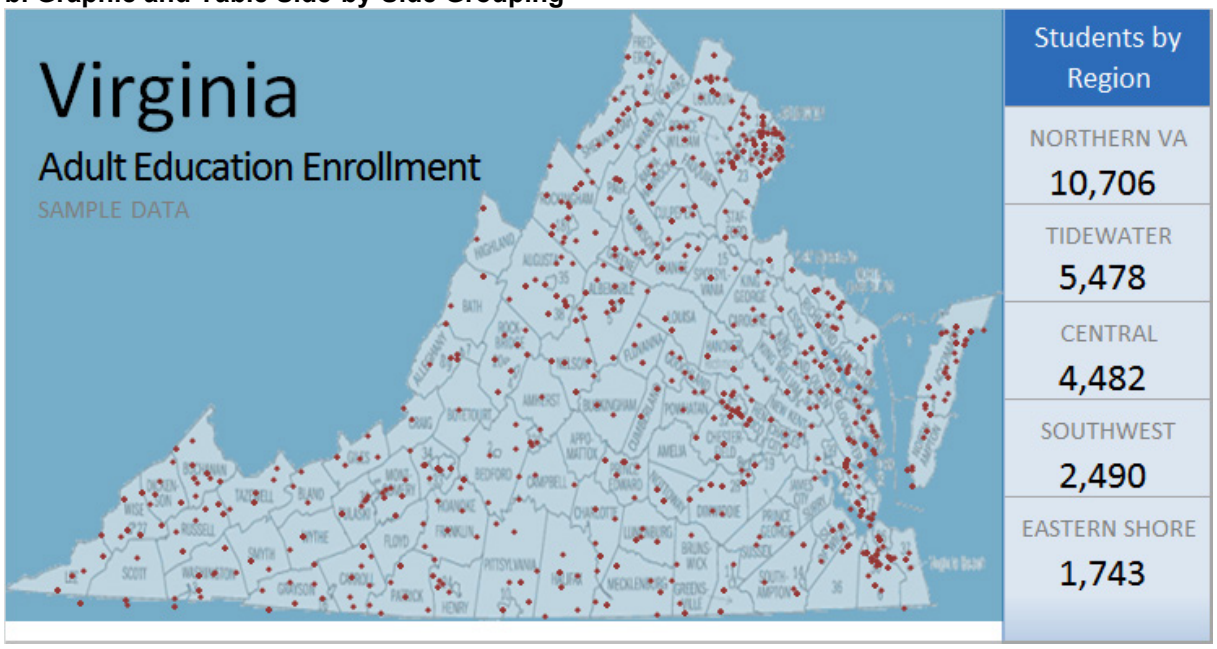
Visualizations, text, and charts within each section should be laid out to show relationships between metrics. Displays that segment the same data differently, or use similar metrics, can be placed side by side for easy comparison (Figure 2-15a). Likewise, a table that accompanies a chart should be shown side by side (Figure 2-15b). Consider using color, formatting, or other methods to relate content in a chart with an accompanying data table.

Figure 2-15: Grouping Metrics in a Dashboard

a. Side-by-Side Grouping



b. Graphic and Table Side-by-Side Grouping



With a carefully considered design presented effectively, your dashboard will lead to actionable insights. All that is left is the implementation.

Usage Phase: Build-Out

The final phase in the process is to build out the dashboard and then to use and evaluate it. Depending on the tool you use, and whether you created a true mock-up or a prototype, it may require some technical work to build out your dashboard. If you are using a business intelligence, OLAP, or other database-driven product, the build-out may be trivial. If not, you will need to determine how to obtain the data you need, merge it with other sources, store it, and transform the data into visualizations. Commonly used spreadsheet tools such as MS Excel also have tools to help build out a dashboard.

Although it is beyond the scope of this guide to detail the process of building out a dashboard, you will need to answer some technical questions to ensure that the final product meets your needs. Here are some considerations for building out the dashboard:

- **Tools**—Which tools will be used to create the dashboard? Which technical skills are necessary to develop it?
- **Data Sources**—Can data be automatically pulled from other sources and included on the dashboard? How much data will need to be entered manually?
- **Constraints**—What constraints are likely to affect your ability to generate the dashboard? Does the effort rely on others to enter data on a particular schedule? Are other agencies involved?
- **Frequency**—How frequently will the dashboard be updated? How frequently do underlying data change?
- **Effort**—How much effort will be required to update the dashboard? Who will do the work?
- **Quality Assurance**—How will you determine that dashboard contents are accurate after each update? Who will do this?

Through forethought and planning, you will create a powerful tool to deliver insights that support clearer strategic and operational decisions for your state's adult education program. Your ability to take your these insights and turn them into actions will determine the success of your dashboard development effort.

Usage Phase: Use and Review

With a data dashboard in hand, you will want to integrate the use of this tool with specific planning activities or operations. Use and review of dashboards should align with the strategic plans of your program and your goals. Will you review the dashboard monthly, quarterly, or more frequently? With whom will you review the dashboard—state staff, local program providers, other stakeholders?

Following our earlier example to track changes on the basis of an initiative to increase attendance, we might plan to add the dashboard review to monthly staff meetings or include it quarterly. We would include staff members to review the metrics, make observations from the data, and share them with the rest of the team. On the basis of insights from the group, we may drill down deeper into specific data to better understand what is happening in your state or program.

In the absence of a formal monthly goal-tracking process, consider where, how, and when the dashboard should be updated and its insights reviewed. For example, you might include the dashboard in a planning or evaluation activity. Insights gained could then be used to discuss specific communication, professional development, compliance, or policy initiatives to support efforts to improve efficiency, data quality, attendance, and so on. By explicitly identifying a role for the dashboard, you are much more likely to put it to use.

Usage Phase: Evaluating and Revising Dashboards

Across time, goals and activities change. As your organization finds success in addressing challenges, new ones appear. To keep up with these developments, dashboards may need to change. You may discover that some metrics are not needed and that needs for new kinds of insights may emerge.

To prevent your dashboard from becoming dated, plan to conduct a periodic review, and be prepared to make changes. As part of your annual strategic planning session, include a review of your dashboard and determine whether the metrics or other aspects of the dashboard should change by considering the following questions:

- Which metrics are helpful?
- Which metrics are we not using?
- Are there new process or operational questions to address?

Removing unneeded metrics is easy, but adding new ones requires additional work. Follow the process described earlier in the guide to identify specific goals, questions to address, and measures and metrics to use. You may need to rearrange the dashboard layout to accommodate the new metrics.

Conclusion

Building a dashboard is a demanding effort. You must identify factors that affect your organization's ability to achieve particular goals, identify measures that deliver insights that inform operations and strategy, create visualizations that communicate those insights effectively, and determine how best to use the dashboard in planning and evaluation activities.

Chapter 3. Infographics

Infographics are data visualization tools that present complex data and information in a short, appealing format. Infographics weave together large amounts of complex data into graphic elements to tell a story. Their visual appeal promotes attention and rapid comprehension. Although they are not new, the relative ease with which they can be created and disseminated has greatly increased their use and popularity in recent years. Modern infographics are typically developed to reside on websites and to be distributed through social media.

In this chapter, we discuss the characteristics of infographics that make then effective and present eight types of infographics. We then discuss how to develop them, beginning with the basic principles of effective infographics and concluding with a step-by-step development process, including the use of color in design. Throughout the chapter, we offer illustrative examples of infographics.

Why Use Infographics?

Although infographics are cool ways to visualize data, they require planning time, creative effort, and resources from your agency or program. Therefore, it is important to understand why infographics can be useful to your state or program, and how, before you consider what to design and how to develop them.

As shown throughout this guide, good infographics are compelling and attractive ways to tell a story about your agency, program, teachers, learners, and other facets of your work. Typically, you promote or explain your program by using reports, report cards, fliers, websites, and other methods that provide important information to various stakeholders. Think of infographics as yet another tool in your communications toolbox but one that has grown incredibly popular because of the unique combination of data and compelling, attractive visual displays. Unlike other materials you develop, though, infographics have the potential to become viral—embedded in your websites or Web pages, through links, blogs, and microblogs—to reach further and faster than print media and static Web pages.

Because of their increasing popularity and appeal, infographics may also drive more traffic to your website, invite more people to learn about your program, and increase awareness of your program and what you offer. The nature of Web-based infographics increases the Google ranking of your site and increases its position in search engines. Ultimately, the greatest use of infographics may be the opportunity to show your expertise and your value within and outside your organization—to partner agencies, funders, students, teachers, and the community.

Characteristics of Infographics

Effective infographics have four essential characteristics that make them effective forms of visual communication.

- **Tell a story.** Stories engage the reader and focus attention. Infographics create a visual story with the data. A good story also meets the interests of the readers or audience. Like a good book, infographics need a hook; readers of your infographic should want to "turn the page" and find out what's happening next.
- **Have visual appeal.** Our eyes are drawn to beautiful or provocative images and photographs, which make us want to view and understand them. Visualization is highly conducive to our absorbing and retaining information. The visual elements of the infographic are what draw in your audience to make it easily comprehensible.
- **Invoke emotion.** Simple data tables and charts can be dry and boring. Infographics create an emotional response from the reader that sparks motivation and curiosity to continue reading and learning more about the topic. Through visualization, infographics can touch both our hearts and minds.
- **Use both text and graphics.** On their own, text and graphics are useful yet imperfect methods for communicating. Combining text and graphics when presenting data takes advantage of each medium's strengths and diminishes each medium's weaknesses.

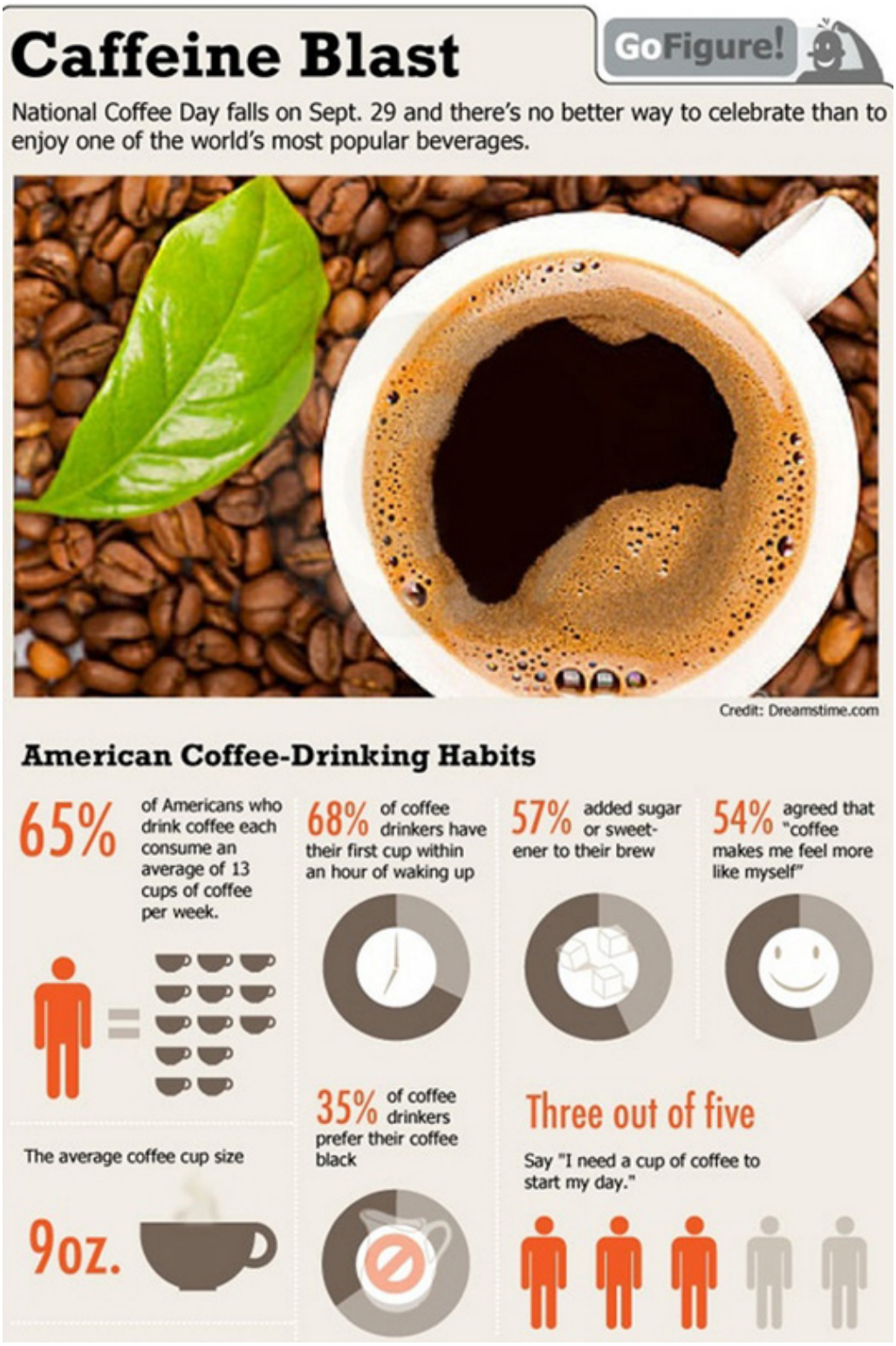
Types of Infographics

There are many ways that visualizations can be used to represent the same set of data; we present eight of the most common types of infographics. As you consider the infographics on the following pages, notice that each one has three essential pieces: a visual, content knowledge, and a story. The visual element of the infographic is usually what hooks your audience. It provides a curiosity that makes them look deeper. After audiences are drawn to the visual, they will examine the content and begin to understand the knowledge you intended to share. Overarching all of those pieces is the story; the infographic should tell a story and provide an "ending" or answer to the central message being shared.

Visualized Article

A visualized article (Figure 3-1) is like reading a picture book. Perfect for situations in which showing data is less important, this infographic is eye-catching and emotive by relying more on the images to convey the message. It is best used when your topic can be supported by imagery, but it should be avoided when a purely visual display will not support the message or content knowledge you wish to share.

Figure 3-1: Visualized Article Infographic

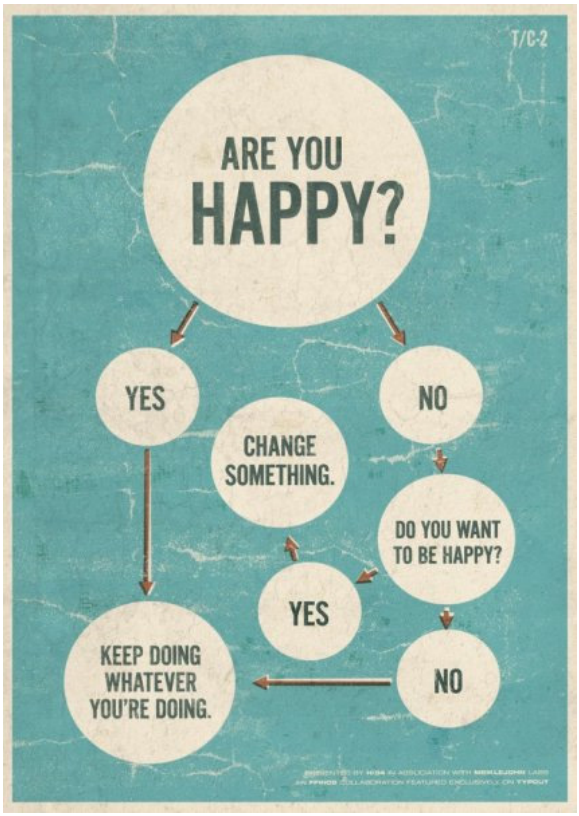


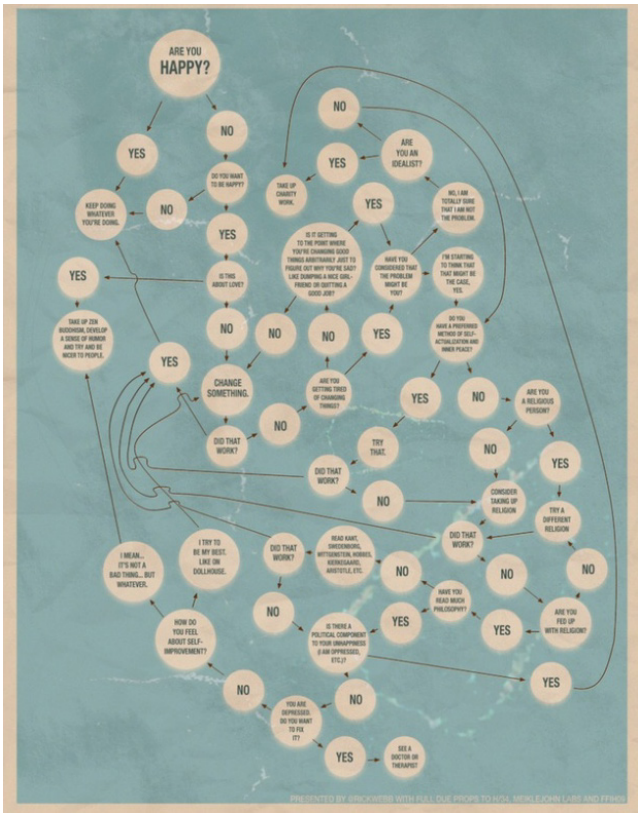
Source: http://www.livescience.com/16297-coffee-facts-national-coffee-day-infographic.html

Flowchart

Flowcharts solve problems, from the practical to the irrelevant to the spiritual. When done well, they can make people linger longer on your infographic to explore the different paths they can take. The most popular flowcharts tend to be humorous and are ideal for when the answer is simple and solves a relevant problem for the viewer (Figure 3-2). This infographic is best avoided when the question posed is too narrow to explore or when there are limited avenues for an answer.

Figure 3-2: Flowchart Infographic



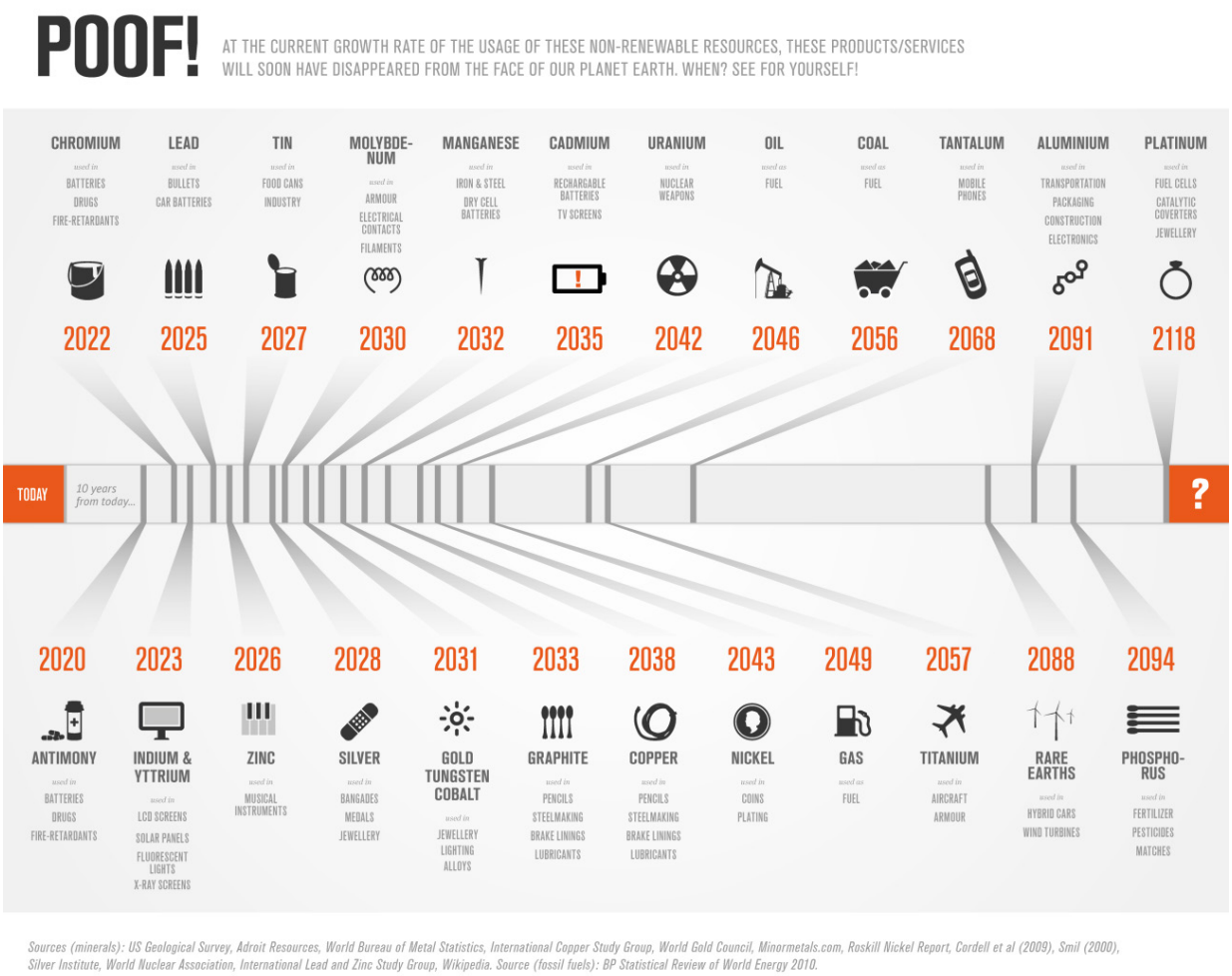


Source: http://www.fastcodesign.com/1661911/ infographic-of-the-day-unhappy-fix-that

Timeline

A timeline takes people on a journey. Instead of just static information, viewers can see the progress and changes that have taken place, and this adds a sense of worldly relevance to data. The trick with timelines is to ensure that the information's history is worthy to be mapped out chronologically. The timeline is best used when the data have an implication for current activities and future action (Figure 3-3).

Figure 3-3: Timeline Infographic

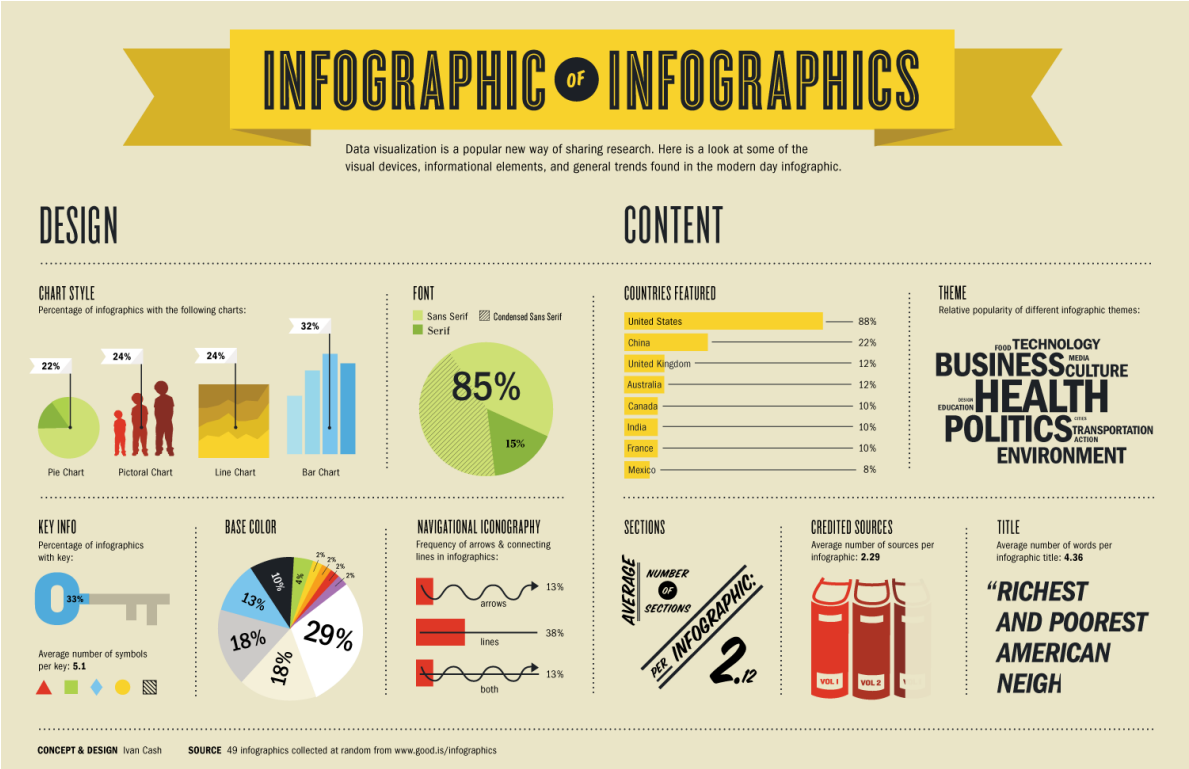


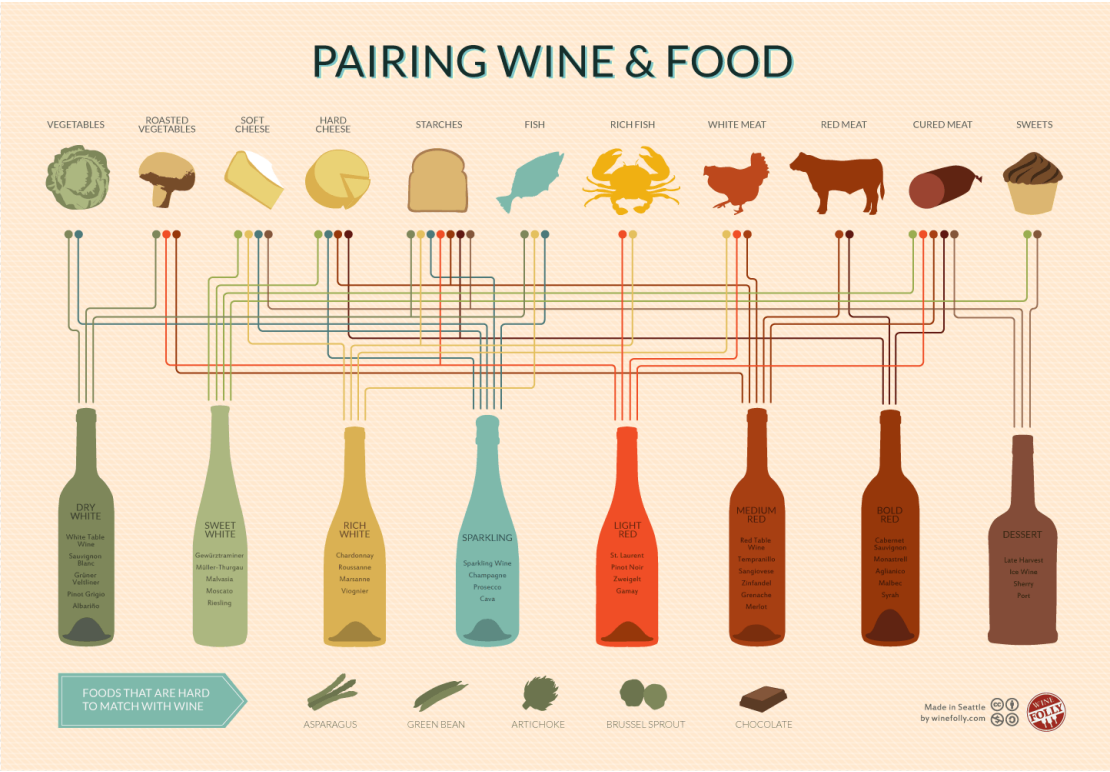
Source: http://www.loveinfographics.com/categories/environment-infographics/non-renewable-resources-infographic-infographic

Useful Bait

Useful baits are simple infographics that present useful information to an audience to help guide decisions. They do not necessarily convey anything new, but they are the perfect reference tool—the kind that your viewers will print and pin to a wall. Useful baits do not have time-sensitive information, so they are ideal for when you have something classic you just want shared, like the two shown in Figure 3-4.

Figure 3-4: Two Useful Bait Infographics



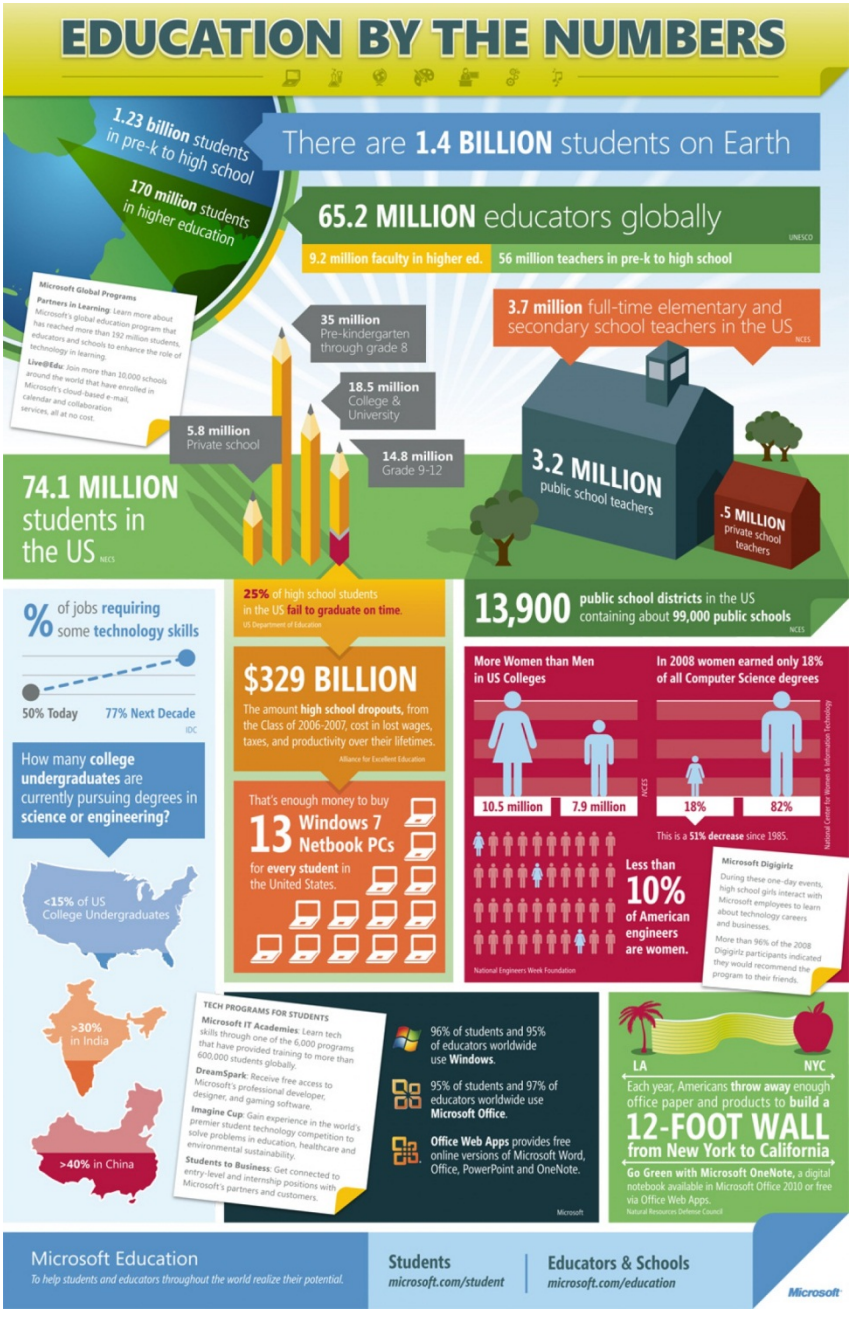


Sources: http://ivancash.com/Infographic-of-Infographics and http://visual.ly/wine-pairing-chart

By the Numbers

When you need to include a wealth of data with an engaging design, use the By the Numbers infographic. The reverse of the visualized article, these numerical infographics boil down to a lot of numbers with a moderate amount of visualization or text to aid comprehension (Figure 3-5). They are straightforward to produce, but you will want to be wary of overloading the infographic with data and numbers.

Figure 3-5: By the Numbers Infographic

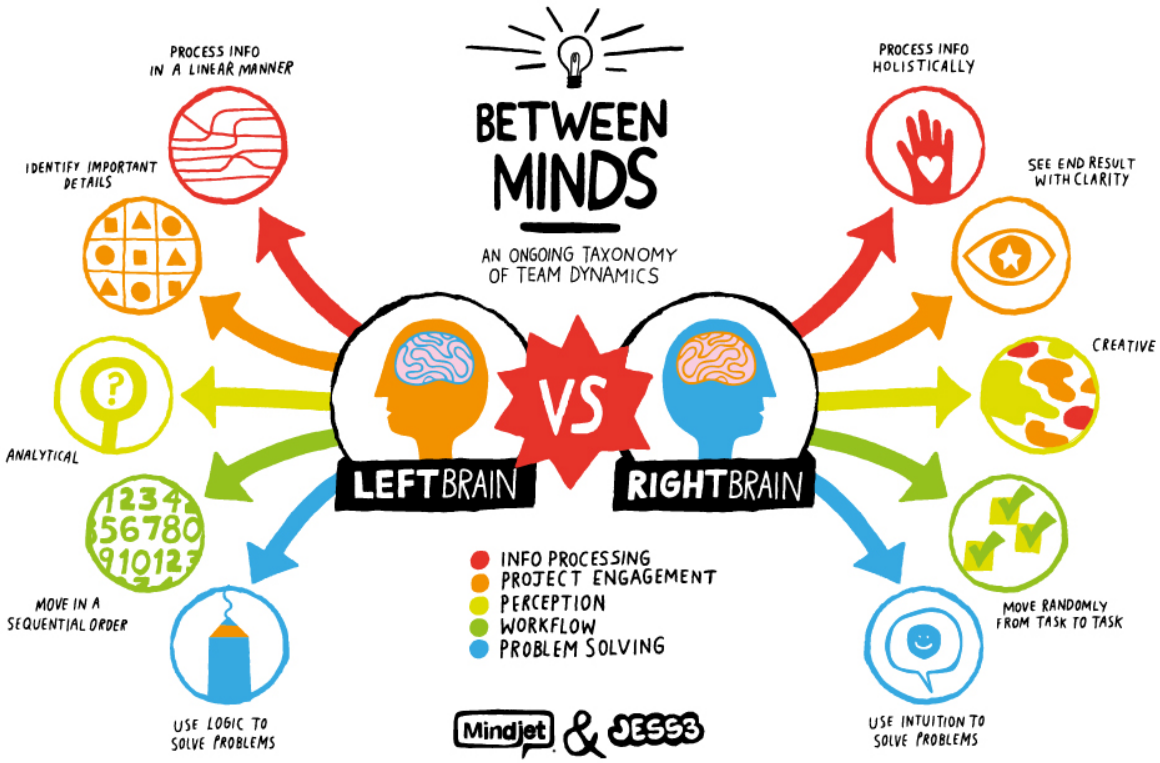


Source: http://visual.ly/education-numbers

Versus Infographic

Versus infographics put two similar or new ideas up against each other to allow a visual comparison to highlight their similarities and differences and better understand them. Matching content to audience is crucial to making these types of visualizations effective because considering what the audience cares about indicates the areas to focus on. The side-by-side layout of a versus infographic also helps ensure that the information is retained because readers compare sections against each other individually as opposed to reading down a chunk of information related to one side and then doing the same for the other section. Figure 3-6 illustrates this comparison graphic.

Figure 3-6: Versus Infographic



Source: http://blog.mindjet.com/2012/05/communication-breakdown-left-brain-vs-right-brain/

Photo Infographic

Photo infographics often lack data and instead rely mainly on photographs and text to tell a story. Often they are used to explain how something works. Usually the most difficult to produce, these infographics need quality photographs and a well-thought-out design to appear professional. When done well, however, these infographics are visually arresting and provide a unique way to display information (Figure 3-7).

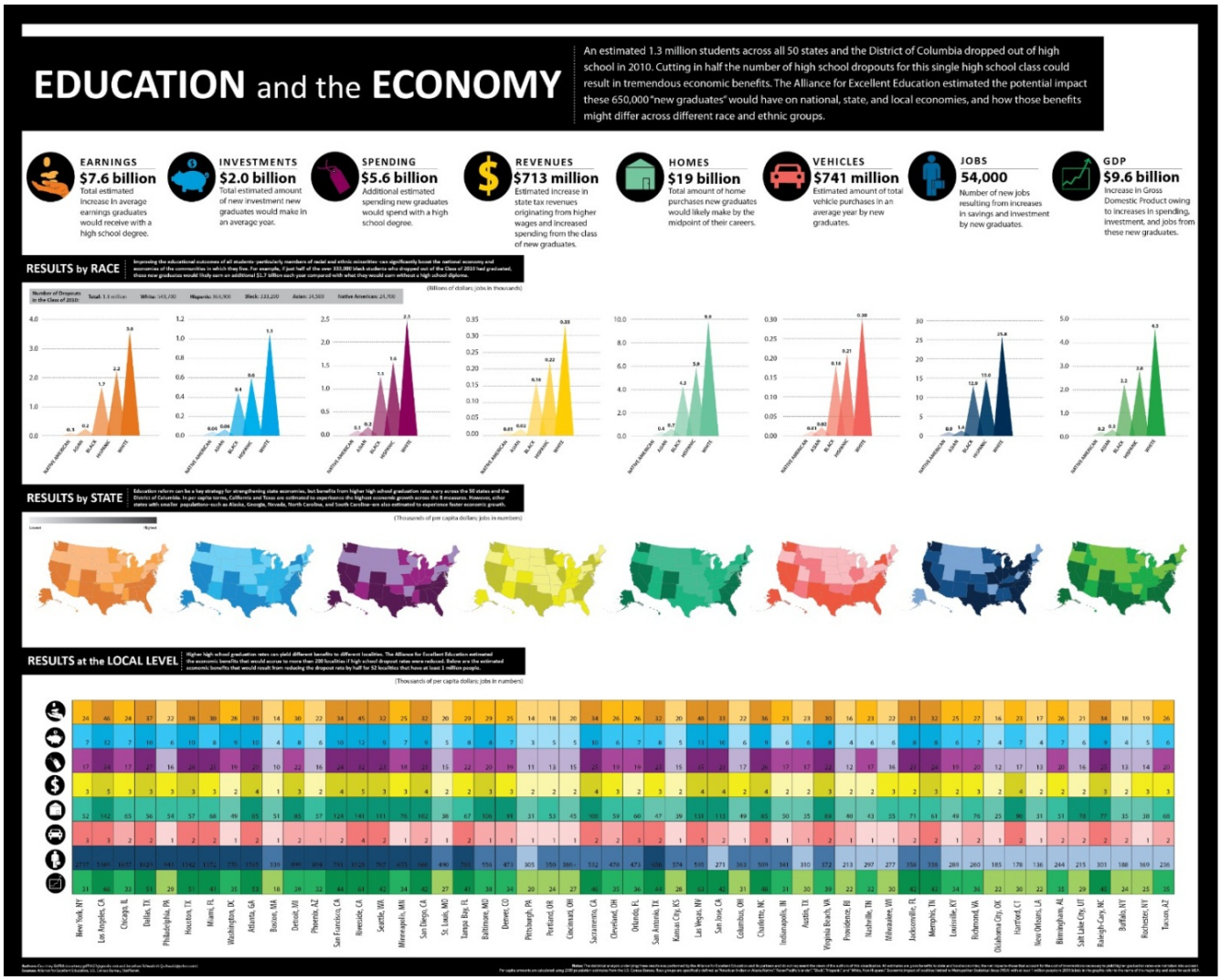
Figure 3-7: Photo Infographic

Source: http://dailyinfographic.com/wp-content/uploads/2013/03/dining-etiquette-101_5029141b424ee.jpg

Data Visualization

This is the classic infographic that turns data into charts and graphs and often includes a stunning visual that helps to tell the story. When done well, the data visualization infographic (Figure 3-8) requires no further explanation.

Figure 3-8: Data Visualization Infographic



Source: http://infographicslist.files.wordpress.com/2013/05/education-and-the-economy-infographic.jpg

Each of these types of visualizations can be used independently, but they can also be combined in creative ways. Use the data visualization that works best to support your story and to reach your audience.

Designing Effective Infographics: Basic Principles

These eight infographic examples offer different approaches to visualize your data and tell your story succinctly and clearly. However, as simple as it is to read and understand an infographic, it can be as difficult to create one. The work of organizing, designing, selecting data elements, and putting it all together falls on the infographic creator. Designing an effective infographic is not quick or easy, and it entails a process that requires careful consideration and planning. Otherwise, the infographic becomes a data and graphic overload, a random presentation that leads to confusion, or just a pretty picture.

There are no strict rules or procedures to lead you through the development process; infographics are as much an art as a science. In this section, we present a procedure that will help you design an effective infographic that is memorable and encourages your audience to learn more or take some kind of action. We first present basic principles of infographic design and then move to the development process. These principles are:

1. Use good data; then find a story in it
2. Stay focused
3. Be unique
4. Keep it simple
5. Make information accessible
6. Prepare to share

As you read through the principles and examples shared in this guide, keep in mind two key ideas that are fused into all of the principles: (1) your audience plays a substantial role in each element of design and (2) information is dry only if you let it be.

Use Good Data; Then Find a Story in It

It may seem obvious, but using good data in an infographic is a key element in supporting your credibility and your message. Collecting data and organizing and arranging it into a design serve no purpose unless the data are accurate. Provide your audience with sources and links for the data so they can learn more about it.

A critical element to an infographic is the story it tells within your data. Every good infographic has a hook or primary take-away message that surprises or entertains the audience. Making this hook the focal point of the design and positioning it in the center or very end of the design is most beneficial because it draws more attention. Give the most important information the most visual weight so that viewers know what to take away. Finding and telling a story through your data support other principles of effective infographics: stay focused, be unique, and keep it simple.

Stay Focused

One of the first steps for designing an effective infographic is to choose one topic and answer one question only. With one question or topic, you can develop strong visual elements with a clear focus. Multiple topics will tend to blur the data visualization. Consequently, it is necessary

to limit the amount of extra information you include, as tempting as it may be to include as much data or inspiring imagery as possible. For example, if you are designing an infographic about the benefits of adult literacy instruction, you may be tempted to include information about the reasons for the need for this type of instruction. However important this may be, it detracts from the key message of the benefits of instruction.

A single topic allows the design to stay focused and organized around a single theme. As we discuss later in this chapter, you will also use colors and other elements to support the theme of your infographic.

Be Unique

In order to create a memorable image and to engage your audience, an infographic must have something unique. Often this can be achieved simply by putting a twist on something that your audience is familiar with or can relate to. For example, where you could use a standard bar graph or pie chart, instead represent numbers with books or diplomas. A unique twist helps to (1) solidify your message, (2) provide a hook to capture audience attention, and (3) make your information come alive.

Keep It Simple

Because the purpose of an infographic is to present data visually, it is important that the intended message is instantly recognized by your audience. Including too many pictures, too much text, or excessive colors will cause the reader to become distracted, and the data and message will be lost. A visually overwhelming infographic will lose your audience and fail to communicate your message.

One way to keep it simple is to show, instead of tell. Although it is necessary to use some explanatory text in an infographic, the text used should support the visual. Limited text will produce more of an impact and keep your audience's attention.

Make Information Accessible

Space is limited with an infographic—often a Web page that fits on a screen or two. To be effective, the infographic needs to be easy to understand, well organized, and balanced. For example, label items to provide clear understanding. Enlarge text or images to indicate something of importance. Vary the size of text and visuals to provide the audience with cues about how to comprehend your message. Another way to make information more accessible is to balance the infographic (i.e., position the elements so they have a visual flow and are not confusing).

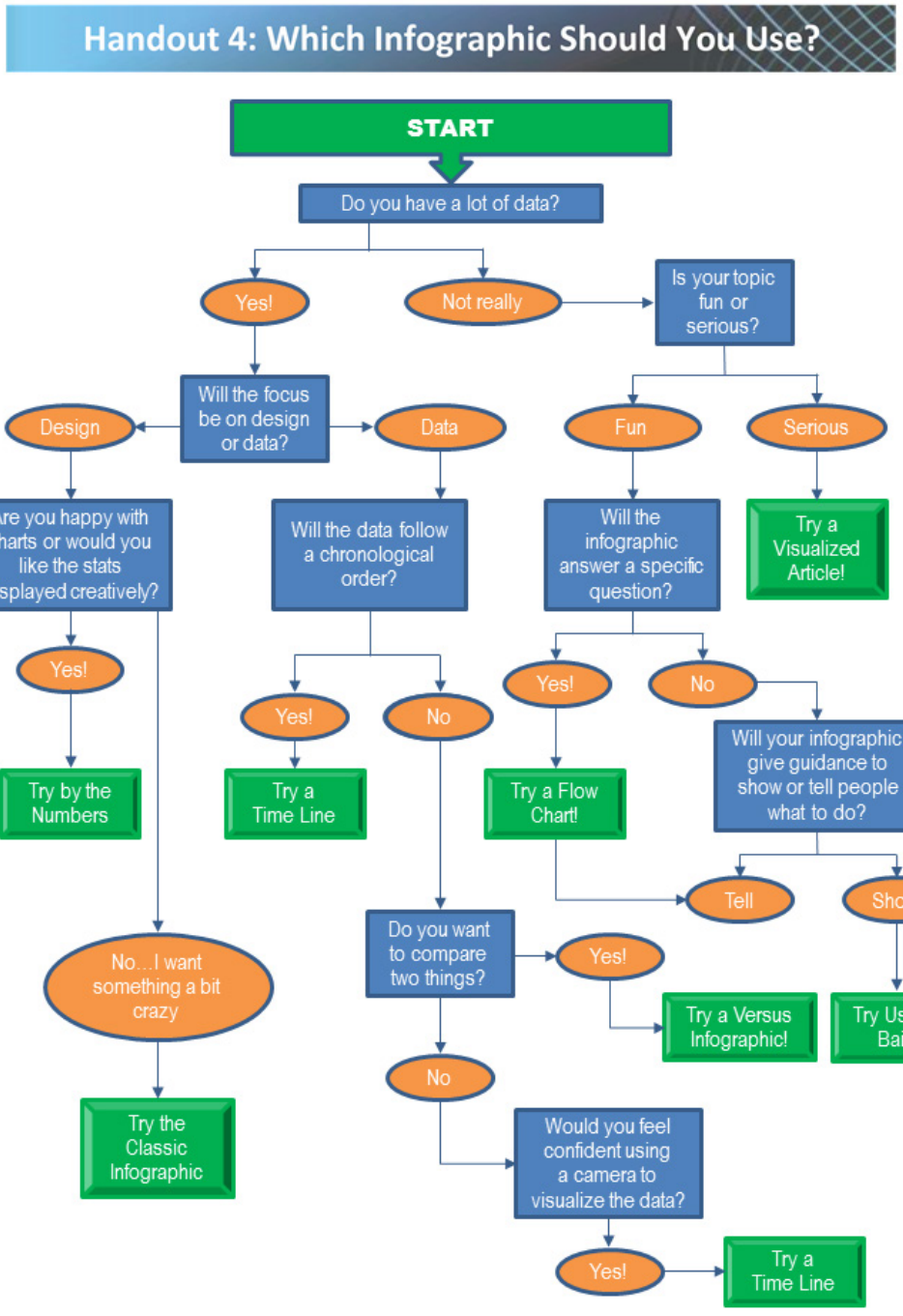
Prepare to Share

Infographics are normally designed for a website and electronic distribution. Consequently, the file size of the infographic should be small enough to download quickly and easily. Your infographic should also have a Web link for easy sharing that should not require more than a step or two to access. With the increased interest in visual information sharing, your audience has the power to exponentially share your infographic (and message), so you will want to make this easy to do. In addition, some readers may want to print your infographics, and the format you select should support printing in common formats. Finally, share your data sources. Provide a link with your infographic to data you used so your readers can look for themselves.

Steps to Create Effective Infographics

When you design an infographic, you become both data analyst and creative director. How do you decide which of the eight infographics to use? Figure 3-9 summarizes our review of them and presents a flowchart that will help you select the right one for your needs.

Figure 3-9: Which Infographic Should You Use?



Source: http://neomam.com/portfolio/which-infographic-is-right-for-you/

To use the flowchart and create an infographic, you will need to:

- Identify the target audience
- Decide what story to tell
- Determine which data to use
- Tell your story simply

Although we discuss each step in sequential order, they are usually decided concurrently. For example, the data you have available may determine your story and audience.

Step 1: Identify Your Target Audience

The first critical piece of developing an infographic is to select your audience. Rather than jumping right into the data, you will need to take some time to figure out who you are trying to reach—teachers, students, policy makers? The audience will drive your planning, creating, and designing, and the success of your infographic is connected to your ability to remain true to your audience's needs.

There are many potential audiences for which your state might want to prepare an infographic of your NRS data. Among the most common in adult education that you are likely to address are:

- Directors of local programs
- Teachers
- Students and potential students
- Staff in other state-level partner agencies
- Local community leaders

Step 2: Decide What Story to Tell

Along with your audience, you need to decide what story you want to tell them through the infographic. Consider what you want to say in light of what interests your audience by thinking about the following questions:

- What am I trying to tell my audience? What is my goal?
- How can I be helpful to my audience?
- What would my audience's reaction be and why?
- How can I make my message relevant to my target audience?

Think about the audiences identified in Step 1 and the stories you might want to tell each of them. Here are examples of audiences in adult education that you might want to reach and suggestions for the stories to share with them.

Audience 1: Directors of Local Programs

Directors of local programs are often interested in improving their own program and achieving better outcomes more efficiently. A story that appeals to them could be about the current state of

their program. The goal of the infographic may be to provide information about their strengths and areas of needed improvement. Consider the audience—what would be most valuable to the local program directors to know about their programs? Where would they like to improve, and how does that align with your vision for the state? Will the infographic focus on educational gain, transition outcomes, or other areas of improvement? Consider including the state average in this infographic to provide a relevant point of comparison and, most importantly, determine what is a compelling story that will move them to action.

Audience 2: Teachers in Adult Education Programs

Although teachers in adult education programs are interested in how the program as a whole is performing, their greater interest may be in their effectiveness and their adult learners. For teachers, highlight the areas in which instruction has been the most successful, as seen by the greatest student gains, presenting the data on specific classes or types of students most relevant to the teacher audience. Again, consider what will make this compelling for teachers—why will they be interested in this story?

Audience 3: Students in Adult Education Programs

Of all your audiences, students may have the most trouble understanding data. Infographics can be an especially powerful way to share relevant information with them. Students may want to know how they are doing compared to others, what they are learning, and how long it takes the average learner to make a level gain or obtain a GED. Adult learners may find it compelling to see the bigger picture of how all students perform in the local program, as well as where they go from the program to the next step—college, career, vocational education, citizenship, and so on. Consider creating several infographics about different student groups and different goals to make sure that students see themselves in the data presented and find the infographic relevant to them.

Audience 4: Potential Students for Adult Education Programs

Infographics can be used as a recruiting tool to draw in potential students who are trying to decide whether to enroll in an adult education program. A compelling story for adult learners could be about the huge difference that adult education can make in their lives with the goal of convincing them to enroll in a program to reach their goals. You can help them understand the value of your program by providing data on the impact adult education has had on others like them and how much time it will take to reach a particular goal. Again, you will need to tailor your infographic to particular groups of potential students. For example, highlighting ESL students' outcomes would make your infographic more relevant to those learners, whereas an infographic about employment outcomes would be relevant to potential adult learners who are currently unemployed.

Audience 5: Staff in Other State-Level Partner Agencies

Adult education programs often need to collaborate with other state agency partners, yet it can be challenging to communicate exactly what an adult education program is because of both an unfamiliarity of those agencies with adult education and the varied participants and goals of adult education programs across the state and the country. An infographic can be a powerful tool to quickly summarize what adult education is, whom it serves, and the types of outcomes that it achieves. Consider tailoring infographics specifically to the office you want to engage with so that it shows the information most pertinent to those staff members (e.g., focusing on employment outcomes when working with the Department of Labor). A strong infographic can

help your state partners realize what the benefits are of collaborating with your agency or program.

Audience 6: Local Community Leaders

Similar to the goals of communicating about adult education to state partners, the broader community may not understand the purpose and accomplishments of the adult education agency or program. An infographic can tell a story that raises awareness about adult education for local community leaders with whom local program directors might want to collaborate. For example, a compelling story for community leaders would be the impact that adult education has had on the community (e.g., increased employment, integration of immigrant groups, stronger communities). This is particularly important for local programs that are looking for partners in the community to provide services and supports to their adult learners. Also, providing local community leaders with easy-to-understand information about adult education programs can help them become vocal proponents of adult learning options and opportunities within the community.

Step 3: Determine Which Data to Use

With your target audience identified and the story you want to tell them in mind, the next step is to figure out which data you will need. Consider the data you need to tell your story to the target audiences. The following questions will help you decide which data and information you will need:

- Do the data need to be drilled down to the program level, or will state-level data provide a more complete picture? Would it be beneficial to provide a comparison of state and local data?
- Do you want to emphasize education outcome measures (obtaining a secondary credential or entering postsecondary education), or is it more important to focus on employment outcome measures (entered or retained employment)? Would your story be told better by including both but going into less detail?
- Are you interested in highlighting how students at one specific educational functional level are doing compared to others? Do you want to look at students within a larger educational functional level category (ABE, ASE, and ESL)?
- Do you need other data located outside of your NRS data system? For example, you may need census data, data from other agencies, or data from public educational statistics databases.

Whatever data you use, it is critical that the data are timely and relevant to your story and are of good quality.

Step 4: Tell Your Story Simply

You know who you want to reach, what you want to tell them, and what information you need to share with them. Now you need to make sure that they will understand what you are trying to say. Even if your story or data are complex, you need to make your story as easy to grasp as possible to make sure that your target audience can understand it. What you share with your audience needs to be simple enough to be understood quickly without much analysis.

In addition to the principles of effective infographics, the following guidelines will help you decide which data to use for each sample audience. Limiting data to a few outcomes will keep your story and your infographic simple and clear.

Audience #1: Directors of Local Programs

- Show only a single program's data.
- Focus on one or two outcomes.

Audience #2: Teachers in Adult Education Programs

- Show only a single teacher's data.
- Focus on one or two outcomes.

Audience #3: Students in Adult Education Programs

- Show data for only a specific subset of students; ABE, ASE, and ESL students should have separate infographics.
- Focus on one or two outcomes.

Audience #4: Potential Students for Adult Education Programs

- Show data for only a specific subset of students; ABE, ASE, and ESL students should have separate infographics.
- Focus on one or two outcomes.

Audience #5: Staff in Other State-Level Agencies

- Show data for only a specific subset of students; ABE, ASE, and ESL students should have separate infographics.
- Focus on outcomes related to that state-level office.

Audience #6: Local Community Leaders

- Present aggregate data for the adult education programs in the community.
- Focus on one or two outcomes.

Selecting a Color Scheme

Infographics rely on color to convey their message. Color provides a tone and feeling to the infographic that enhances its effectiveness. As with other aspects of designing infographics, an important principle to follow is to keep it simple. It is tempting to express your story in your favorite color or use many different exciting colors. However, a too-colorful infographic can overwhelm your story and create unnecessary complexity in design, making it more difficult to understand.

A visually appealing infographic will attract your audience's attention and add to your story with color without distracting. Create a color scheme that complements your story and helps you convey meaning.

The color emotion guide (Figure 3-10) relates colors to emotions, and we offer some guidelines to keep in mind when creating the color scheme for your infographic.

Figure 3-10: Color Emotion Guide

Source: http://blog.bufferapp.com/wp-content/uploads/2013/04/color-guide.png

- A rule of thumb is to stick to a three-color palette when designing your infographic. A restricted palette allows the designer to focus on displaying the intended story without complicating the graphic with unnecessary or distracting colors.
- Consider using the colors in your logo or on your website, which will help to support your organization or program's branding or help create an identity.

- A monochromatic color scheme can create a uniform story while allowing the details and data to stand out. The infographic creator tools introduced here all come with preset templates for your use, many of which include monochromatic color schemes.
- Colors convey emotions to people differently. When selecting your color scheme from scratch, consider the story you are trying to convey and how a particular color can add to, or detract from, that story (see Chapman, 2010).
- Consider using the 60-30-10 rule of interior designers when it comes to color. Sixty percent of the piece should be in one color to create an overall unifying effect and set the mood of the image. Thirty percent should be a color that will convey a delineation of ideas in a subtle way. And the color used for 10 percent is essentially an accent color, used to create a dramatic statement.
- Similarly, if selecting a color palette is difficult, you can stick to the rule of three. Select three primary colors. Select one for the background color (usually the lightest color), and the other two colors should be used to break up the sections of the infographic.

Tools to Create Infographics for Nondesigners

This guide describes the principles and issues you need to consider when designing infographics and how you might want them to look. However, you can learn only so much by reading: The next step is to make one yourself. Fortunately, you do not need to be a graphic designer to make an effective infographic, and there are a variety of tools available to match any skill level to assist you in developing one. To conclude, we list some online infographic creators that provide templates and tools to guide you in your design process.

Each of these tools has free and fee-based options. Although the fee-based versions often provide more designing options, the free versions allow for creating a variety of basic infographics and may be sufficient for a novice to practice displaying data. All of these tools have the following basic commonalities for creating a professional-looking infographic:

- Offer an opportunity to present complex information in a visual and easy–to-understand format
- Provide templates for the user; the number of templates available will depend on whether it is a free or fee-based version
- Allow user to import, copy, or paste in custom data
- Provide customization options for format and style
- Create output as an image that can be placed on a website for viewing or downloaded as a picture

Keep in mind that the principles for creating an infographic remain the same regardless of the tool you decide to use.

In addition to the capabilities noted, each of the tools provides unique features that allow the designer different ways to create or modify their infographics. You can select a tool on the basis of what best fits your scenario.

Easel.ly (http://www.easel.ly/)
This tool has a simple interface and does not require data skills to use because it does not use real data; rather, it allows for conceptual visualization and storytelling.

Infogr.am (http://infogr.am/beta/-)
One of the more basic tools for displaying statistical data, this creator allows the user to import data directly into the site, where the data can then be translated into interactive charts and graphs. Requires sign-in.

Many Eyes V2 (http://www-969.ibm.com/software/analytics/manyeyes/#/) This tool is designed to share statistical data and allows users to either upload their own data or use a global data system to pull statistics. This is a good tool to use if you want to use a data set without losing its source formatting.

Piktochart (http://piktochart.com/)
This tool allows the user to drag and drop high-resolution images, graphs, or other data into its templates for ease of use. It also offers the ability to create searchable, interactive charts, which can be useful for increasing search engine optimization when placing them on your group website.

Visual.ly (http://visual.ly/)
This tool is designed for creating complex graphs by using social media data (by linking to your account) or for posting to your blog, microblog, or Facebook profiles. The tool, however, offers fewer customizable options than do the other creators.

In Appendix B, you will find a Checklist for Designing an Effective Infographic. This checklist incorporates the key features and design elements of infographics and will help you evaluate the quality of your infographic.

Chapter 4. Data Dashboards and Infographics: The Good and the Bad

In Chapter 2, we defined data dashboards, described their characteristics, and presented a method to develop them by using the state NRS data system. In Chapter 3, we covered principles and steps for designing effective infographics. In this chapter, we apply these principles with examples of both types of data visualizations.

Good and Bad Data Dashboards

Good dashboards provide, at a glance, insight into key strategic or operational challenges. To do this, they must be high level, concise, and easy to read. As discussed in Chapter 2, you can assess the quality of a dashboard, whether viewing someone else's or creating your own, by considering whether:

- Metrics align with goals and key questions
- Content is chunked and organized to promote understanding
- Color is used sparingly and only to convey meaning
- Visualizations are appropriate for the metrics being communicated
- Visualizations are compact yet insight rich
- Metrics stand out above structural elements (borders, axes, labels, and so on)

We now present several examples of dashboards. Use what you have learned from this guide to decide whether they are effective, or could be better, and why. We will share our perspectives as well.

Exhibit 4-1: Dashboard Examples

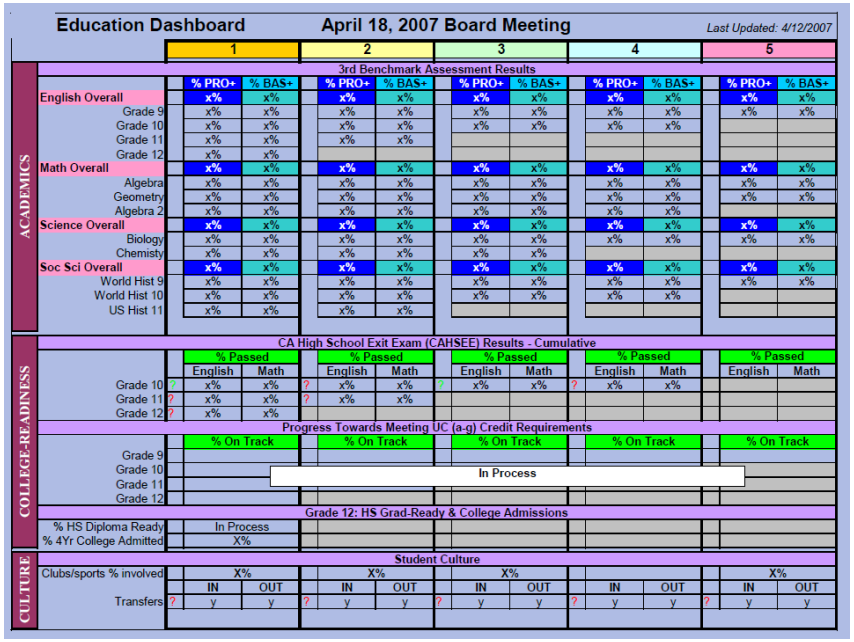
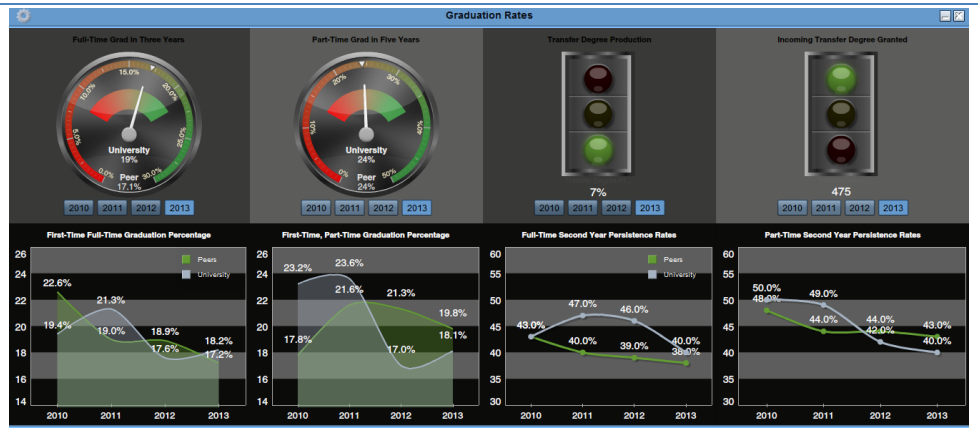
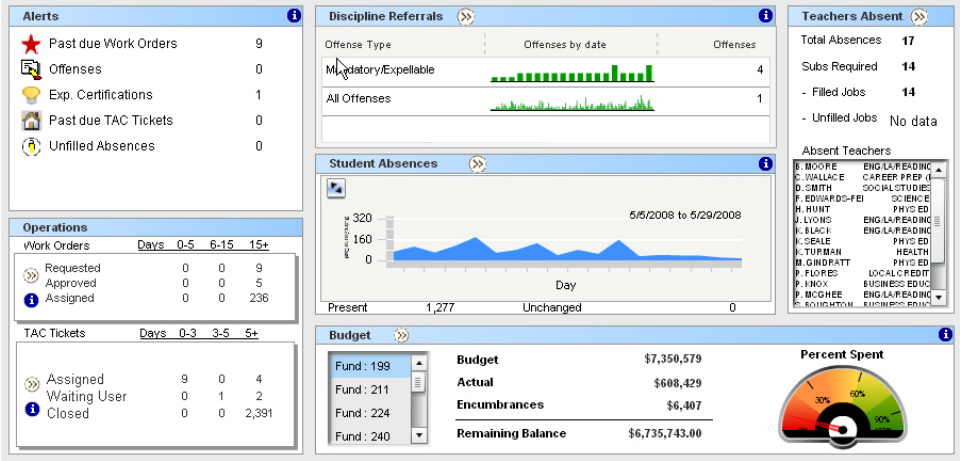
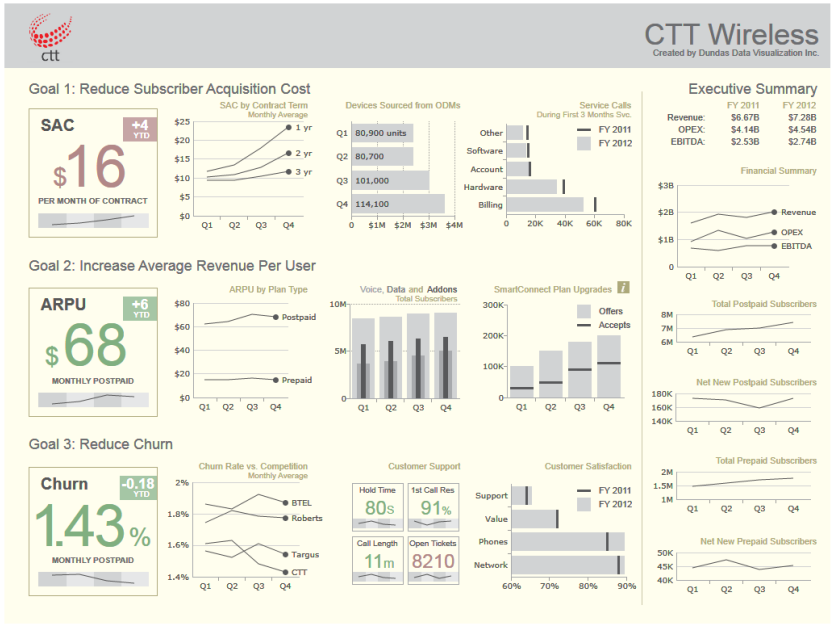
Ex. No.	Example	Rating (Good or Bad)
1		**We think: BAD!** Although the dashboard may present useful information, its format gets in the way of understanding. The use of so many colors (about 12 by our count) makes it difficult for readers to determine which information is most important. Its tabular format does not help highlight meaningful comparisons. Bar charts would better depict differences by subject, grade, or numbered region. The designer placed a lot of emphasis on titles and borders, so much that the actual metrics do not stand out. The "In Process" label does a good job of letting us know that some data are missing. But is that the key message to convey?
2		**We think: BAD!** This dashboard has fancy widgets and lots of flash. The green-is-good, red-is-bad color indicators help communicate important take-away messages, but less so for individuals with red-green color blindness. With a green indicator showing on the top of one traffic light but on the bottom on the other, the visualizations are not synchronized, which can be confusing to readers. The shading under the curves in the line graphs do not communicate any additional insights and may make the visualization more difficult to read. Finally, the gauges and traffic light indicators use a tremendous amount of space for the information they convey. A more concise, and simpler, approach would make this dashboard more effective.

Exhibit 4-1: Dashboard Examples (continued)

Ex. No.	Example	Rating (Good or Bad)
3		**We think: GOOD (mostly)!** As a hybrid dashboard infographic, this example is interesting. It does a good job of highlighting key elements and presents individual ones clearly and attractively for stakeholders of the organization, but probably not for its decision makers. We think it's good, but the design could be improved somewhat by better clustering related metrics. Numbers could have also been rendered in a more consistent size and, in some cases, simplified (e.g., total grant value of "$4.9 Million" rather than "$4,918,451"). Normally, we would discourage the amount of text and large legend. However, for an external audience, and nontraditional design goals, the extra descriptive information is appropriate.

Exhibit 4-1: Dashboard Examples (continued)

Ex. No.	Example	Rating (Good or Bad)
4		**We think: GOOD (mostly)!** This operations-oriented dashboard offers information that a principal might need to manage a school building. The metrics provide a high-level view that brings to light trends and potential issues. It is interesting to note the absence of education outcomes-related information. Clearly, the goals for this dashboard center on operational rather than strategic considerations. The dashboard layout does a good job of chunking related information. It has many good features; however, the icons, color-filled headings, and strong borders draw the eye away from the metrics themselves. In particular, the percent spent indicator draws more attention than necessary to the bottom-right corner.
5		**We think: GOOD!** For its crystal-clear alignment with specific goals, strong layout, and carefully conceived visualizations, we think this is a very good dashboard. Divided into sections for each of three key goals, plus an executive summary, it chunks information sensibly and prioritizes. The metrics are high level with a few of the most basic breakdowns, making it easy to identify challenges and progress toward each goal. Content and design work together to help decision makers determine where best to focus their time and attention. The visualizations are compact yet rich with information. See how the churn visualization provides the most important metric up front and then supports it with a year–to-date change and sparkline graphic to illustrate the overall trend? Color is used to convey useful information. The metrics stand out.

Good and Bad Infographics

As discussed in Chapter 3, a good infographic weaves together large amounts of data into graphic elements to tell a story. The infographic's visual appeal promotes attention and rapid comprehension. The characteristics of a good infographic are that they:

- Tell a story
- Have visual appeal
- Invoke emotion
- Use both text and graphics

Infographics also must use accurate data and information and be attuned to the interests of the intended audience to be effective. Their presentation should be simple and focused. We now examine examples of infographics and apply some of these principles to distinguish the good from the bad in four different categories: the use of accurate and interesting statistics, complex ideas explained simply, telling viewers a good story, and good design. We conclude with a few infographics that the NRS team really likes.

Accurate and Interesting Statistics

An infographic that uses statistics that are not accurate or interesting is most definitely bad. When creating an infographic, spend time researching the facts and ensure your data are accurate. Wrong information will destroy the credibility of the infographic. In addition, an infographic that uses data that are widely known or presents common knowledge will also not seem interesting and will not work as well with your audience. Likewise, your graphic elements should accurately convey the data. A good infographic will be well researched and will contain unique and original data that amaze its viewers.

Exhibit 4-2: Infographic Examples 1

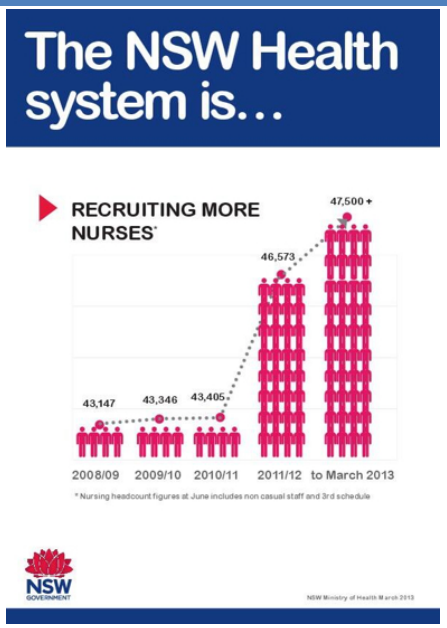
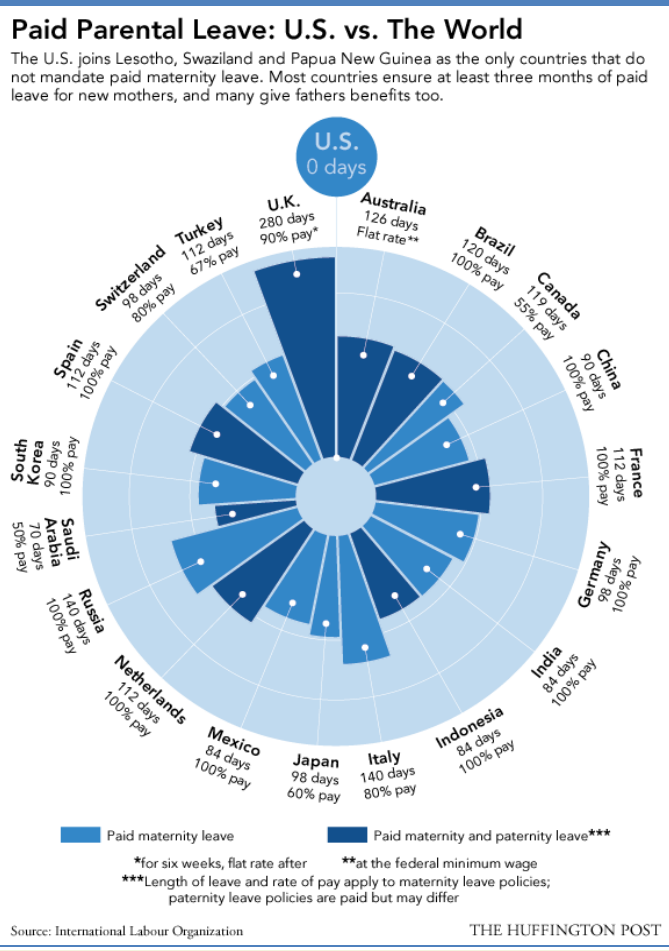
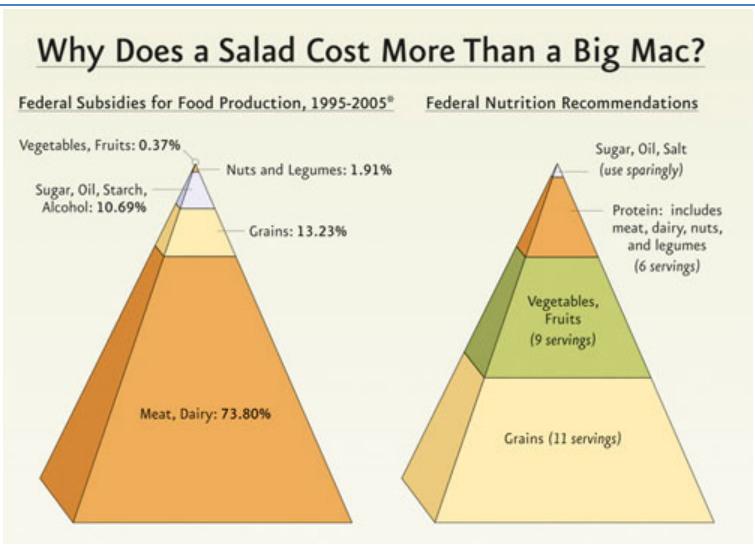
Ex. No.	Example	Rating (Good or Bad?)
1		**We think: BAD!** Sometimes, you get the feeling that an infographic is deliberately trying to mislead you. This one from New South Wales shows the increase in the number of nurses—which is factually correct; the only problem is that you get a very different sense of scale from studying the image than you do if you just glance at it. Four stick people represent 43,000 nurses, so why are 28 more stick people used to represent an increase of just 3,000 nurses? That is a 700% infographic explosion to show a 7% increase. The graphic elements do not accurately represent the data.

Exhibit 4-2: Infographic Examples 1 (continued)

Ex. No.	Example	Rating (Good or Bad?)
2		**We think: GOOD!** The information is unique and thoroughly researched. The designers collected the data and sorted them in a visually attractive way. The data are presented in an attention-grabbing way to emphasize the fact that the United States has zero paid maternity and paternity leave.
3		**We think: BAD!** This graph circulated fairly widely. The design of the food pyramid changed recently, in part because the visual characteristics of the old pyramid did not correspond well to the numerical recommendations. The new designer makes the same mistake but disdains being misleading in favor of mind-bogglingly dishonesty. As in the first version of the pyramid, the graphic elements do not accurately portray the data. The bottom tier of the left-hand pyramid takes up far more than 73.80% of the pyramid's area, and the three-dimensional diagram enhances that distortion even further.

Complex Ideas Explained Simply

If an infographic looks as complicated as a page from a quantum mechanics book, then it is a bad infographic. Infographics should not be complicated. One of the defining characteristics of infographics is that they present complex ideas in a simple way so that a wide audience can understand them. The general rule is that your audience should not need to be an expert in the topic area of the infographic to understand it. A great infographic will communicate complex ideas in a simple and straightforward manner so that it is easy to understand. A bad infographic will do the exact opposite.

Exhibit 4-3: Infographic Examples 2

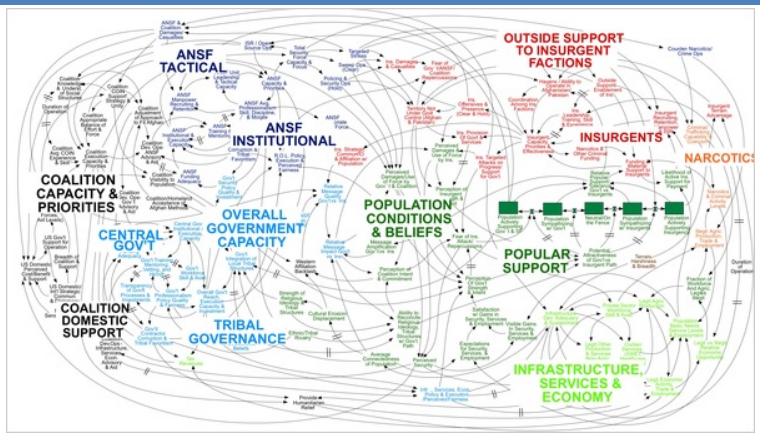
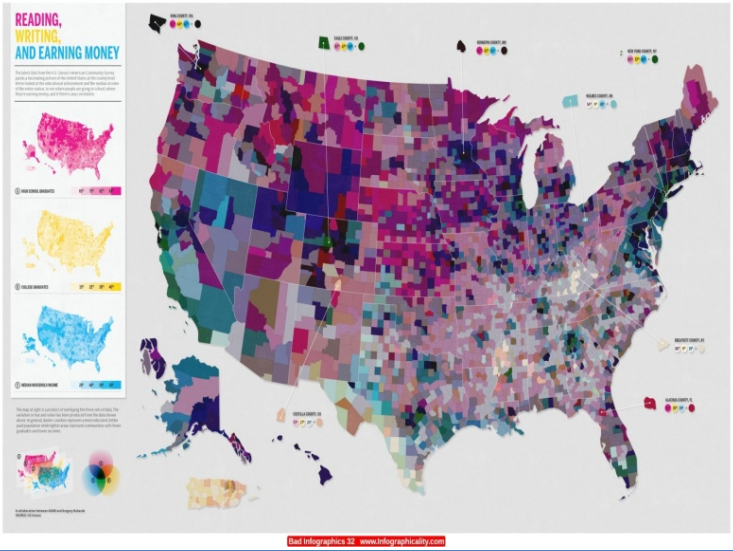
Ex. No.	Example	Rating (Good or Bad?)
1		**We think: BAD!** The *New York Times*' (hilarious) article about a ridiculous infographic depicting American military strategy in Afghanistan is appropriately titled "We Have Met the Enemy and He Is PowerPoint." General McChrystal, was shown this PowerPoint slide that was meant to portray the complexity of American military strategy but that looked more like a bowl of spaghetti. Allegedly, the infographic prompted him to respond with, "when we understand that slide, we'll have won the war."
2		**We think: BAD!** What exactly is the map about? We have no idea.

Exhibit 4-3: Infographic Examples 2 (continued)

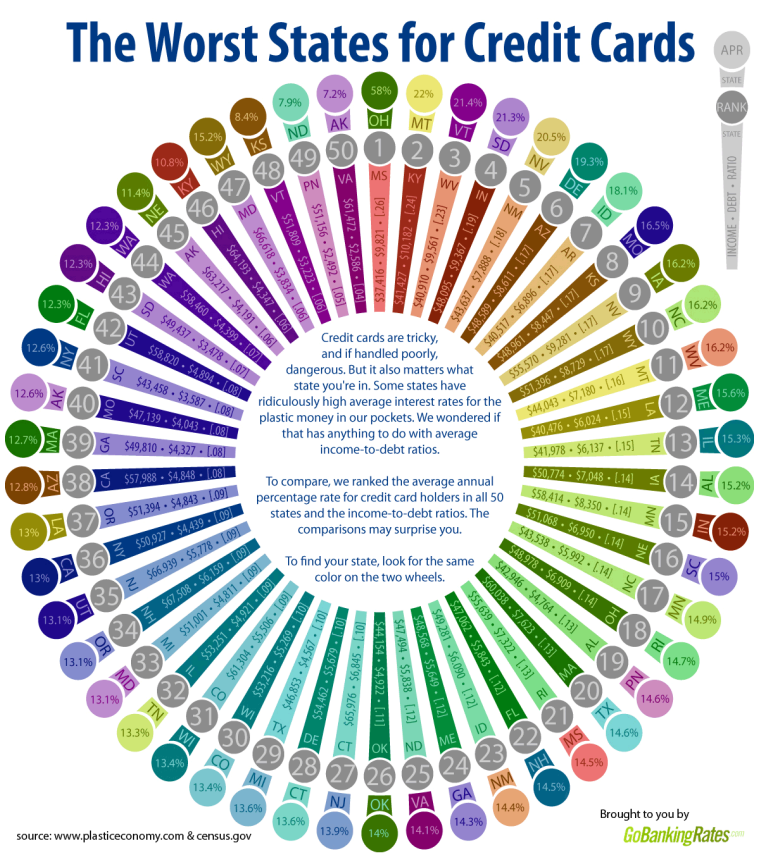
Ex. No.	Example	Rating (Good or Bad?)
3		**We think: BAD!** While searching for states, the colors begin to look the same, and it is not clear how to use this comparison chart, nor do we understand how the ranking system is applied. The information is so complicated that the infographic made the story harder to understand.

Exhibit 4-3: Infographic Examples 2 (continued)

Ex. No.	Example	Rating (Good or Bad?)
4		**We think: GOOD!** What could be a better way to illustrate the most popular coffee drinks? This infographic is simple and easy to understand, and it conveys complex information. Can you imagine how boring it would be if all figures were turned into text?

Tells Viewers a Story

A good infographic presents a compelling story to its readers, making them want to read the entire infographic and engage with it. Bad infographics lack a story and instead are just a number of facts, charts, and graphs placed on an image. It is vital that your infographic communicates a

story to readers from a fresh perspective instead of simply regurgitating facts. This will increase the chances of your infographic being shared and ensure that it is a fantastic infographic.

Exhibit 4-4: Infographic Examples 3

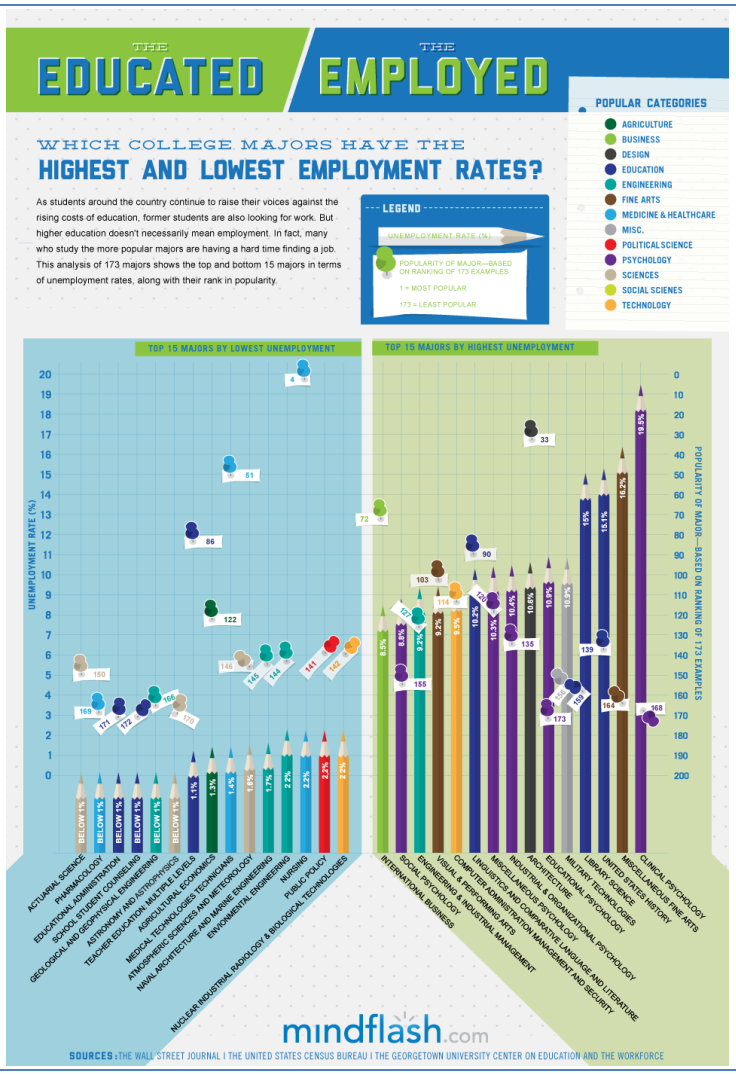
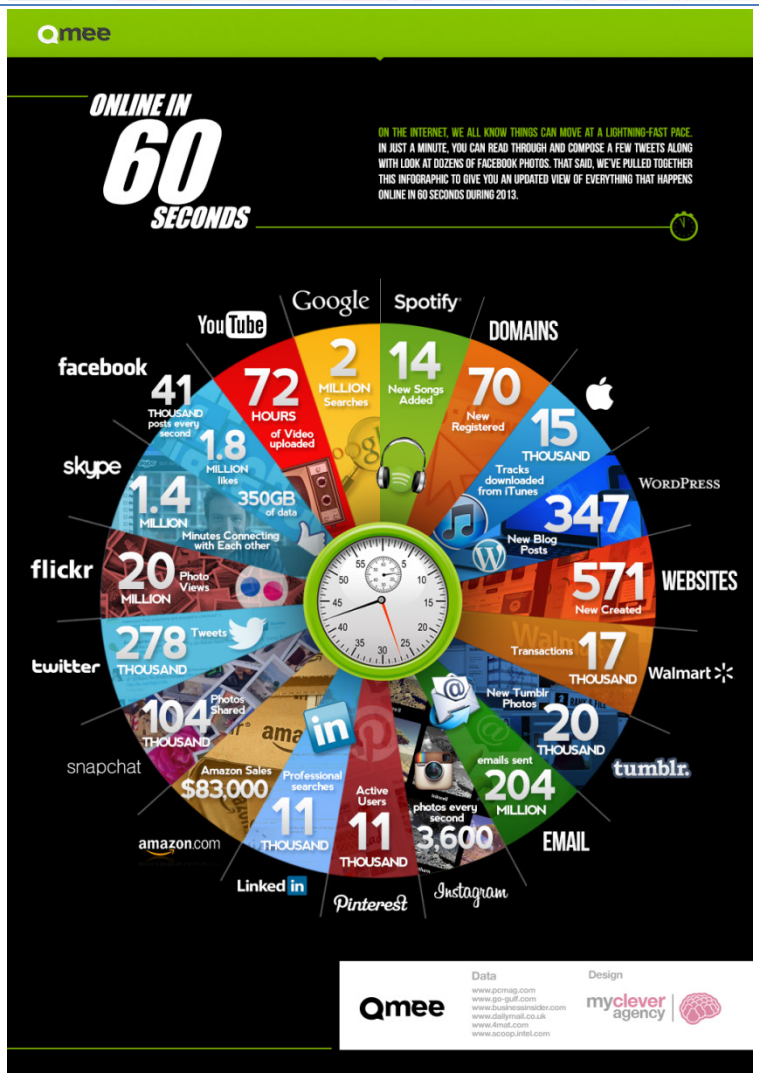
Ex. No.	Example	Rating (Good or Bad?)
1		**We think: GOOD!** This infographic tells a simple and straightforward story: Where can you get the best beer in America? The design keeps the audience focused and engaged. It is easy to tell from the color scheme the most and least favorite states.
2		**We think: GOOD!** This infographic weaves different facts and data together, linking college major with unemployment rate. The design is clean, and the story is easy to understand.

Exhibit 4-4: Infographic Examples 3 (continued)

Ex. No.	Example	Rating (Good or Bad?)
3		**We think: BAD!** This infographic shows that when an android phone is released, lots of different versions can spin off from it. Visually, you can see that many modifications have taken place, but it is hard to say anything more than that. It appears as a visual with no compelling story to tell.
4		**We think: BAD!** This infographic has inaccurate data representations and is confusing. Although "Email" and "Pinterest" do not occupy the same amount of our time online, they each get the same sized slice in this confusing infographic about what a minute on the Internet looks like. You know you have a bad infographic when it raises more questions than it answers, as this one does. For example, which country are we talking about? Is this what the average minute at noon looks like? Or the average minute at midnight? The average minute in July or in December? Where do these data come from? Why were these businesses (which include dailymail.co.uk, which later published the infographic) in this image? These questions raise concerns about the infographic's accuracy.

Great Design Work

Infographics are visualized data, so good design is critical. As we discussed in Chapter 3, a general rule is that the design should be simple and clean and allow the viewers to easily scan the data presented in the infographic in a logical way. The following examples show that this is not always easy.

Exhibit 4-5: Infographic Examples 4

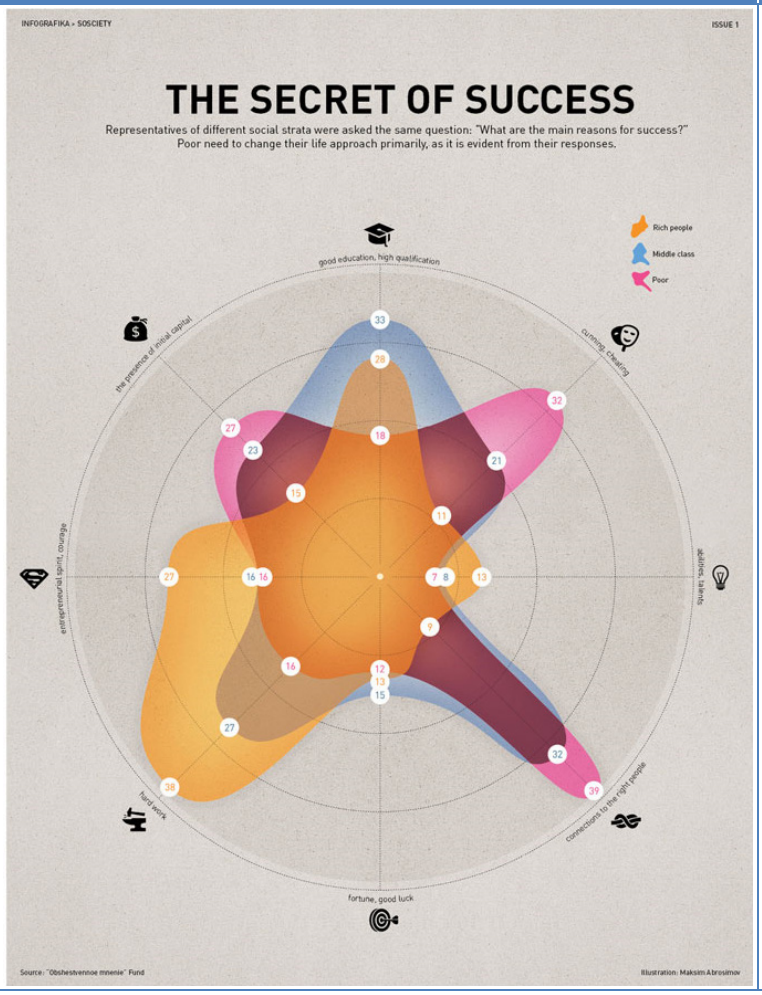
Ex. No.	Example	Rating (Good or Bad?)
1		**We think: BAD!** The purpose of infographics is to visualize data and to communicate information clearly and efficiently. This seems to be an interesting idea, but the design is quite poor. We do not quite understand how to interpret the chart.

Exhibit 4-5: Infographic Examples 4 (continued)

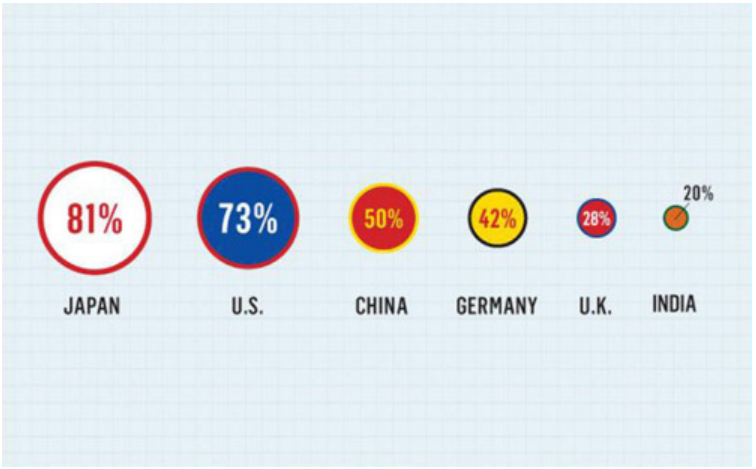
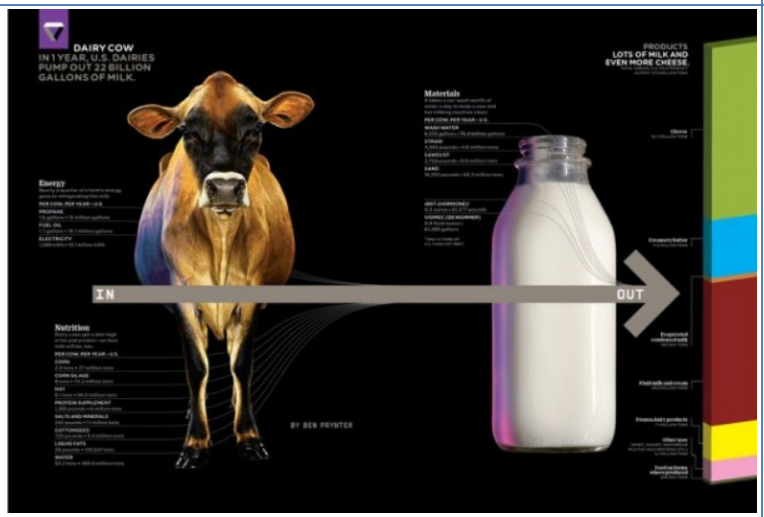
Ex. No.	Example	Rating (Good or Bad?)
2		**We think: BAD!** This infographic does not explain what it is showing. The caption that accompanied this infographic read, "The majority believe Japan is an innovative country." Yes, colored circles on graph paper are interesting, but their representation of or relationship to "innovation" is unclear, and the goal of the infographic is not clear.
3`		**We think: BAD!** This infographic uses the contrast of black background and gray text to poor effect; we found this difficult to read. Also, the arrow is not appealing and only aligns somewhat to the story the infographic is trying to tell.

Exhibit 4-5: Infographic Examples 4 (continued)

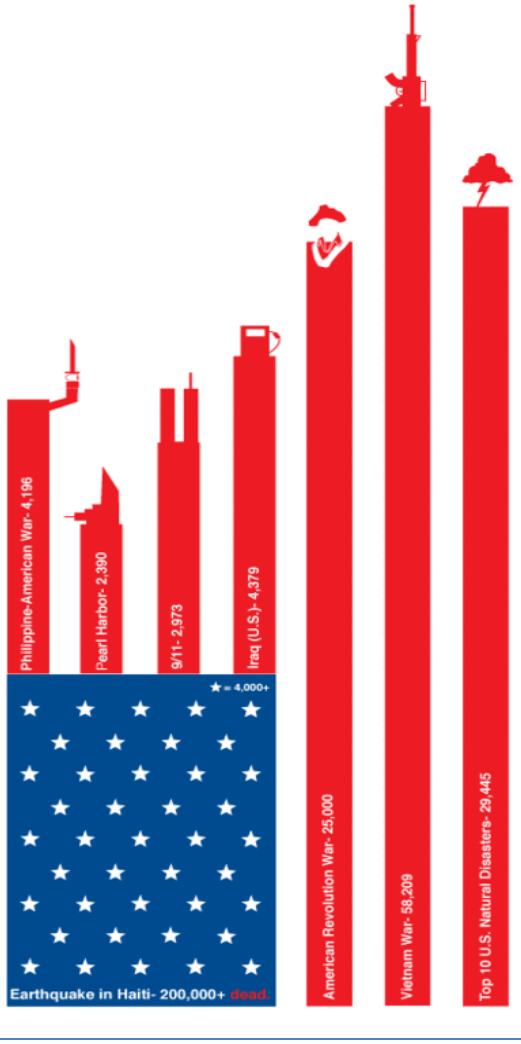
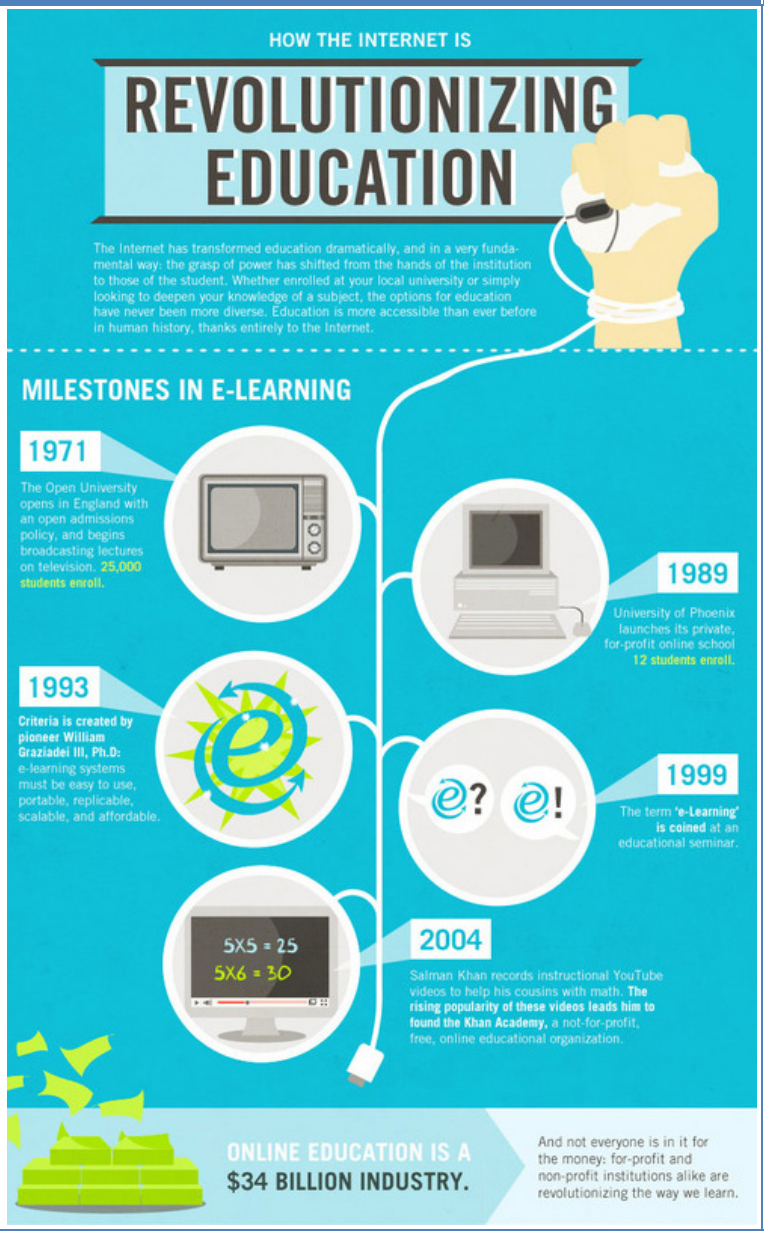
Ex. No.	Example	Rating (Good or Bad?)
4		**We think: BAD!** This visual is striking—the American flag can be emotive for some audiences, but with such an emotion-laden image the information should be clear and accurate. In this case, the red stripes vary in length but are not an accurate representation of the numbers—these proportions are off and are not clearly emphasizing a point. What is the story being told? Is it a positive or negative story? Be certain that when your audience views your infographic they take away the message you are intending and that the data are accurate.
5		**We think: BAD!** The flashy background and bright colors distract from this graph's facts—that are hard to understand. Does the graph describe crime rates? It actually describes only the percentage change in violent crime rates—and is not very informative. New York at 20% of its 1990 crime rate could still be more violent than Philadelphia at more than 100% of its 1990 crime rate. If you want to know how dangerous these cities really are, you will have to look elsewhere.

Exhibit 4-5: Infographic Examples 4 (continued)

Ex. No.	Example	Rating (Good or Bad?)
6		**We think: GOOD!** The timeline design explains how e-learning has evolved during the past few decades. It has a simple design, clear story, and big impact.

A Few Infographics the NRS Team Really Likes

A good infographic will contain interesting and accurate data and explain those data in a simple way by telling a story and using compelling visual design. It gets the point across with very little effort required on the part of the audience. Infographics need not be flashy or complex. For example, pie charts have lasted decades because of their simplicity and power in visualizing categorical percentages. Another simple example is a railroad crossing sign—clear, compelling, and simple enough that the audience understands the message with little effort.

Infographics are used everywhere to direct us in our daily lives—many of them quite good and effective. Consider the simple, clear infographics that you see around you and consider building from that simplicity in your own visual presentation. We conclude this guide with a few infographics the NRS team likes. Can you tell why?

Exhibit 4-6: Infographics the NRS Team Likes

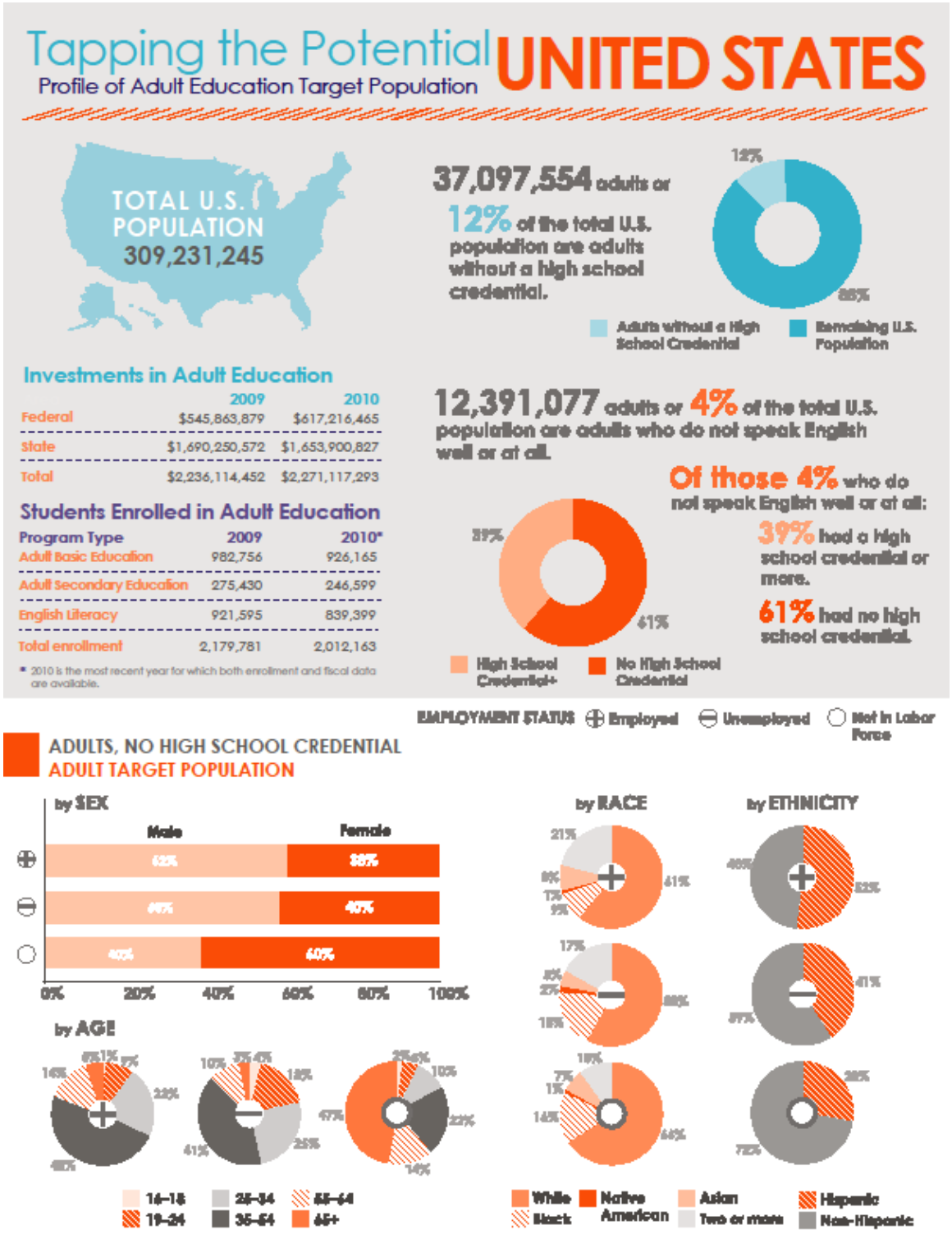
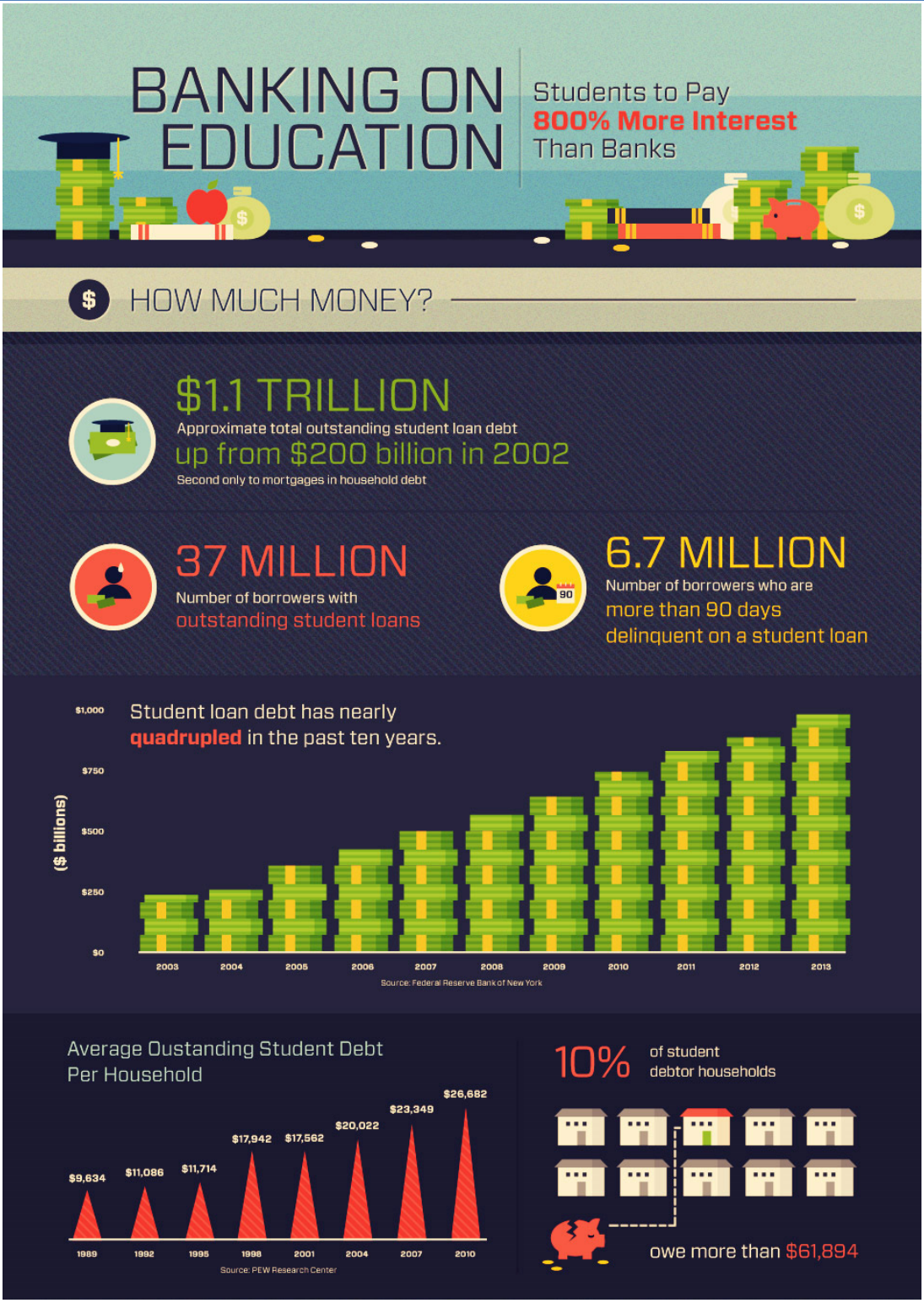
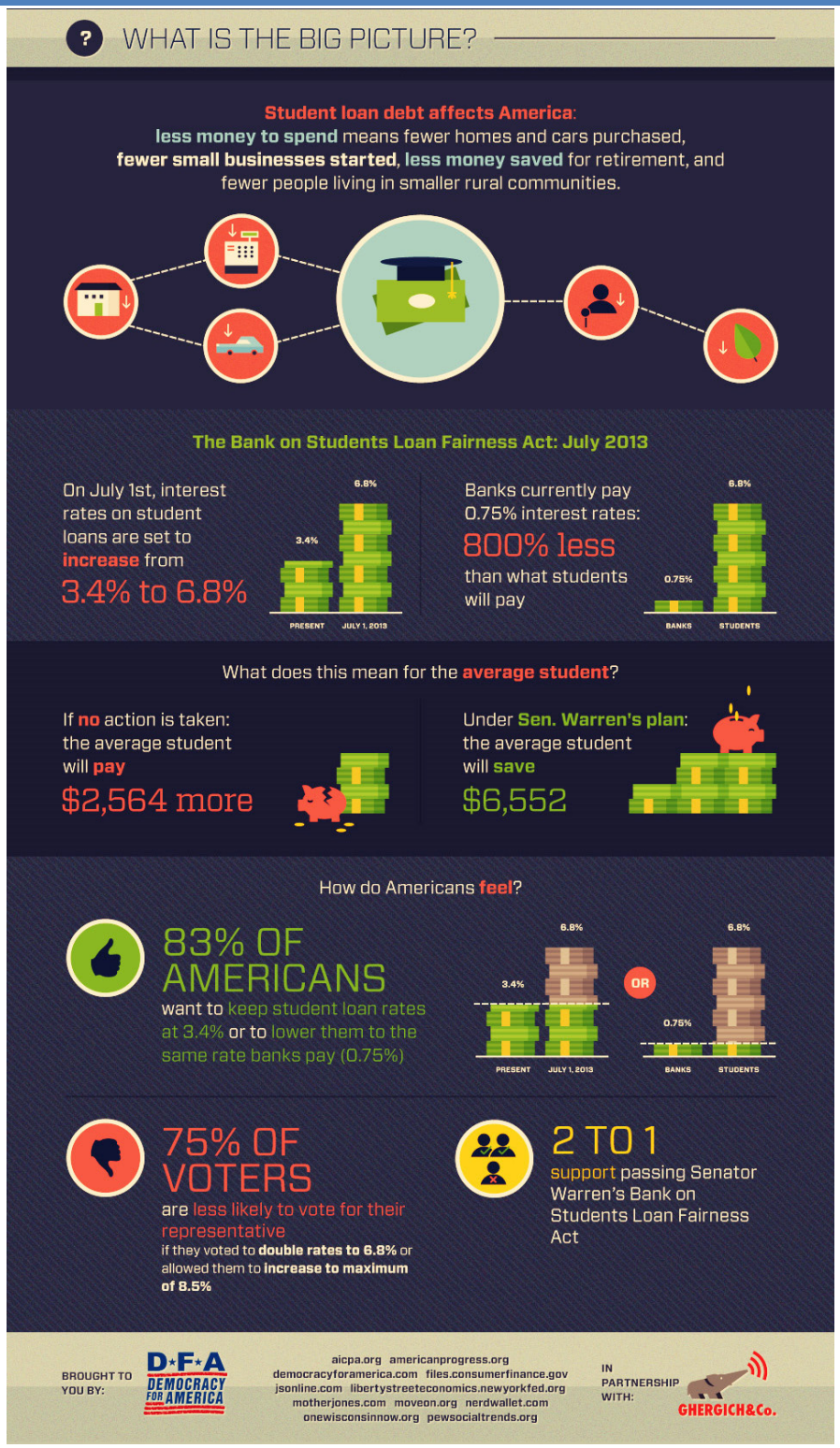
Ex. No.	Example
1	

Exhibit 4-6: Infographics the NRS Team Likes (continued)

Ex. No.	Example
2	

Source: http://democracyforamerica.com/pages/807-banking-on-education

Exhibit 4-6: Infographics the NRS Team Likes (continued)

Ex. No.	Example
3	

Source: http://democracyforamerica.com/pages/807-banking-on-education

Exhibit 4-6: Infographics the NRS Team Likes (continued)

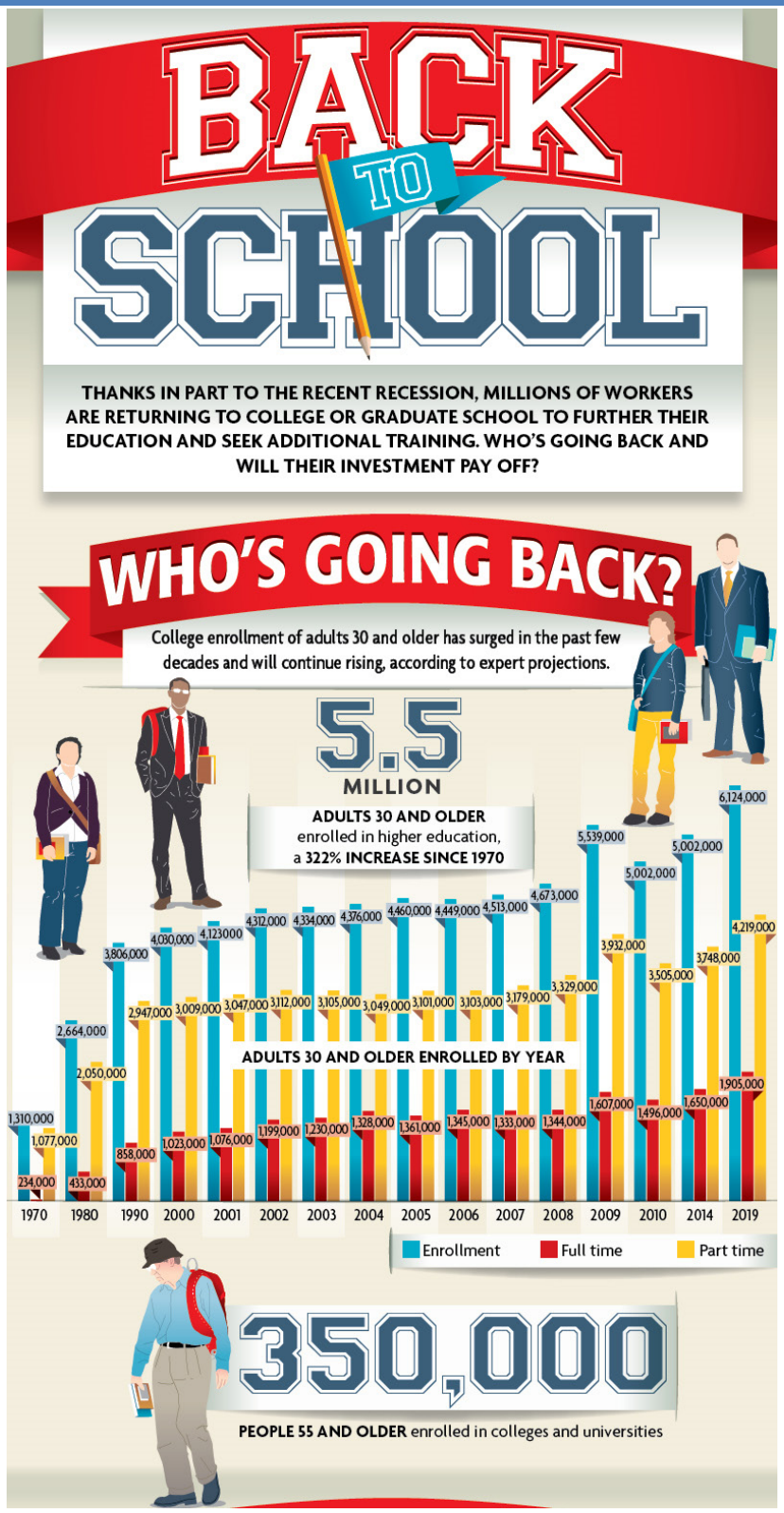
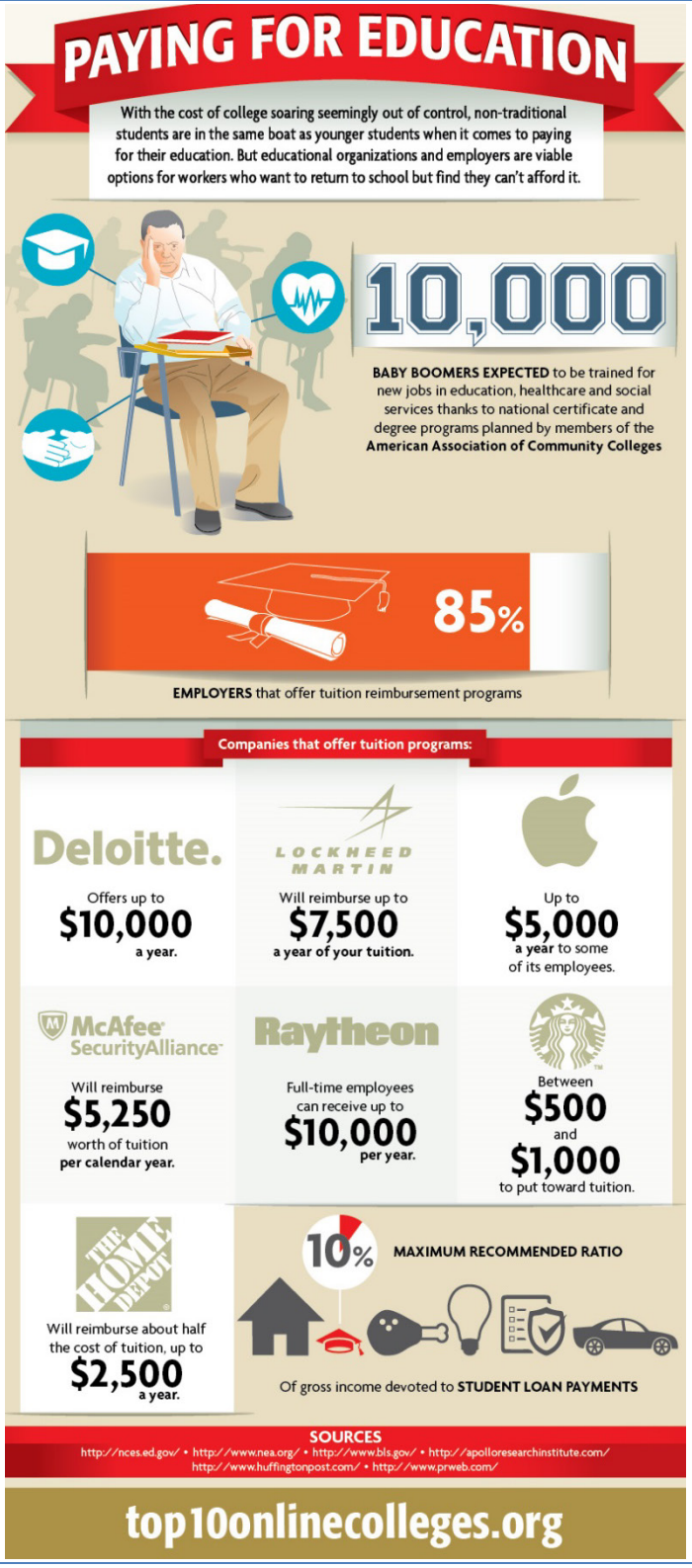
Ex. No.	Example
4	

Exhibit 4-6: Infographics the NRS Team Likes (continued)

Ex. No.	Example
5	

Exhibit 4-6: Infographics the NRS Team Likes (continued)

Ex. No.	Example
6	

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Appendix A:
Dashboard Summary, Tools, and Planner for Data Dashboard Development

We offer a summary of the dashboard development process described in Chapter 2 that explains what to do, and what not to do, when planning, designing, and using your data dashboard. We also provide a list of dashboard design tools and the dashboard planner used in the chapter to exemplify the process.

Summary: Developing a Dashboard

Planning Phase

- **Make Dashboards a Manageable Size**
  With a wealth of information readily available the lure of just one more metric can be enticing. Unfortunately, this can lead to analysis paralysis and confusion about which metrics are most important. To keep dashboards manageable in size, focus on a handful of key, top-level questions you will need to address on an ongoing basis.
- **Focus on Actionable Metrics Only**
  Avoid interesting but unactionable metrics because they take up space and distract attention from truly important insights. With each metric you identify for the dashboard, ask yourself, "How might we use this?" If you cannot answer, consider dropping it.
- **Consult Stakeholders**
  Without stakeholder input, you may be missing important information for developing the dashboard. Work with those who will use the dashboard to determine the questions it will answer and the metrics it will present.

Design Phase

- **Remember the One Screen Rule**
  Simplicity is the key to dashboard design. Find ways to create visualizations that are compact and concise. Pairing related metrics may lead to insights that may otherwise have been missed. When the dashboard spans past one screen, your audience will increasingly have difficulty internalizing its contents.
- **Cluster Like Metrics Together**
  Positioning related metrics together allows readers to more immediately see the relationship, while organizing and assimilating the insights presented.
- **Use Labels and Titles**
  Use labels and titles, as necessary, to identify and explain dashboard displays. Nevertheless, strive to make descriptions brief and unambiguous. Readers should not have to guess the meaning of any metric, table, or chart.

- **Choose Appropriate Visualizations**
  Good dashboards communicate insights efficiently. The visualizations you choose can dramatically affect readability and understandability. Do not be afraid to substitute a table for a graph or a bar chart for a line graph or to create a custom visualization if it gets the information across faster and more clearly. Only include elements that add to the comprehension of the graph or image. There are features that graphic software programs add by default and some of them may be distracting. Actually removing them can make a chart more readable. For example, if the horizontal lines in a MS Excel chart do not add to reading the bar graph, remove them.
- **Avoid Chart Junk**
  Screen space on a dashboard is a valuable commodity. Anything that is not delivering insights (i.e., your metrics) risks taking space from useful content and distracts the audience's attention. For this reason, avoid using oversized gauges, decorative elements, or ornate borders.
- **Promote Color Consistency**
  Dashboard colors should make the metrics easier to read. Subtle, yet discernible, color variations enhance readability by differentiating groups of metrics without distracting readers. By contrast, bright and varied colors draw readers' attention in too many directions and can make the dashboard difficult to read.

Usage Phase

- **Have a Plan for Using the Dashboard**
  Dashboards are useful only when used. Consider the purpose for which the dashboard was created and identify specific efforts and activities during which it will be used and by whom.
- **Use the Dashboard as a Conversation Starter**
  As a tool for delivering high-level insights, the dashboard is a conversation starter. From high-level metrics often come additional questions that lead to further exploration and discussion. Allowing the dashboard to raise these questions allows the insights it provides to lead to new ideas, next steps, and solutions.
- **Review and Revise Dashboards**
  Across time, your organization's challenges and goals will change. By reviewing the metrics and layout of your dashboard occasionally, you ensure that it remains relevant.

Visualization and Design Tools

- **Microsoft Excel**—Readily available spreadsheet software that can organize moderate amounts of data. Moderately customizable, readily available, negligible cost.
- **Power Pivot for Microsoft Excel**—Free add-on that allows for better presentation and interaction with data. Slight learning curve; users need to have add-on downloaded and installed.
- **Google Charts and Dashboard**—Free SQL programming language–based tool that can handle small to moderate amounts of data with visualizations and interactivity. Moderately customizable, dashboard would be Web accessible.

- **Tableau, QlikView, Domo**—High-end dashboard-specific software tools that can handle large amounts of data. Highly customizable, moderate learning curve, significant cost.

Data Management and Databases

- **Microsoft Access**—Readily available database software to house moderate amounts of data locally. Negligible cost.
- **IBM Cognos, SAP Business Objects, Microstrategy, SAS**—High-end organizationwide database tools that can extract large amounts of data from existing databases and comes with built-in visualization tools. Significant cost, highly customizable.

Exhibit A-1: Sample Dashboard Planner

Goals	Key Questions or Factors	Measures	Metrics	Visualization

Appendix B: Checklist for Designing an Effective Infographic

Use this checklist to support your development of an effective infographic. It will help you monitor your design progress and ensure that all principles of effective design are present throughout your process.

- ❑ I have clearly identified a target audience and have designed with that group in mind consistently.
- ❑ The infographic answers one question only.
- ❑ The design elements focus on answering my question.
- ❑ I have included something unique to help my design and message stand out.
- ❑ The design is simple and clear.
- ❑ The text is minimal.
- ❑ The design tells a story.
- ❑ The text supports the visual.
- ❑ I have used design elements to provide balance and a hierarchy (important words and images are larger than supporting ones).
- ❑ The color and image selection are clearly connected to my topic.
- ❑ Links to sources have been provided.
- ❑ It is easy for the audience to share.
- ❑ The data have been checked (and double-checked) to make sure they are accurate.
- ❑ The visual is balanced.
- ❑ The message is clear and easily understood.
- ❑ The information is well organized and supports message comprehension.
- ❑ The audience is going to want to share this.