1

Interpret and Analyze Images

NEWS STORIES OCCASIONALLY remind us that image interpretation and analysis skills are essential. In 2010, the United States Postal Service (USPS) issued a Statue of Liberty Forever Stamp featuring an image of a replica of the Statue of Liberty from the New York-New York Hotel and Casino in Las Vegas—not the Statue of Liberty in New York Harbor. A stamp dealer discovered the mistake, and the collectors' magazine *Linn's Stamp News* reported that the photograph, selected from Getty Images by the USPS, was accompanied by metadata clearly identifying it as the Las Vegas replica. How could this happen with such an iconic monument? Chances are that applying some of the approaches in this chapter could have headed off the mistake. Strategies such as looking carefully, reading the metadata and textual information associated with the image, and discussing with others could have prevented the mistake. Images are all around us, and we're accustomed to casually glancing at pictures and assuming we know what they are and what they mean. The USPS incident is a good reminder to take the time to *look, read, examine, describe,* and *check understanding.*

This chapter sets forth a flexible process for interpreting and analyzing visual content that you can apply in your work with students as they begin to analyze the meanings of images and visual media. Use our adaptable, inquiry-based process in consultations, instruction sessions, and assignment design.

ACTIVITIES IN THIS CHAPTER

Visual Literacy for Libraries: A Practical, Standards-Based Guide by Nicole E. Brown, Kaila Bussert, Denise Hattwig, and Ann Medaille (Chicago: American Library Association, 2016).

Through systematic looking, thinking, and questioning, students can come to a solid understanding of the way meaning is produced in images. Some activities in this chapter provide entry points for interpreting and analyzing images, and others move into the deeper consideration of images needed for advanced academic work. Activities range from analyzing photographs to reflecting on the implications of image manipulation. The images, activities, and examples in this chapter can be adapted to align with different disciplinary contexts and levels and to inform partnerships with faculty as you embed visual literacy concepts into the curriculum.

Foundational Questions

How Do I Begin Interpreting and Analyzing?

Start by looking closely at images and asking yourself a few key questions. We offer a flexible, five-step process for interpreting and analyzing visual content. The process begins with learning to look at an image and moves through incorporating textual information, thinking more deeply about meaning, and reflecting on how to further your understanding.

What about Cultural and Social Context?

All images carry meanings that can only be understood through a contextualization of how, when, where, and why they were produced. Images do not exist in a vacuum. Situate images within the framework of their social, political, and economic circumstances.

How Do I Interpret Graphical Information?

To dig deeper into data visualizations, begin by observing and describing the way the data are being presented. Then, ask questions about the data: Who produced the data? Are the data reliable? What methods were used? Consider the audience, purpose, and effectiveness of visual design as you interpret graphical information.

What Does the Text That Accompanies Images Tell Me?

When interpreting and analyzing images, the text you read alongside the images furthers your analysis by telling you more about those images. Use text to gain valuable context about *where, how, why,* and *for whom* the image was created. Text may also reveal that an image is part of a larger collection or let you know who holds the image rights.

What Do I Need to Know about Image Alterations and Manipulation?
Has the image you're looking at been edited and altered? Changes to image files can have significant implications for their meaning, authenticity, and reliability. A general awareness of common image manipulations will help you know what to look out for.

Getting Started: Looking and Interpreting

Careful looking is the essential first step in image interpretation. We encounter so many images in our daily lives that a quick glance is usually all we have time for. When using images in academic work, however, a quick glance does not give us the information we need and can lead to misinterpretation and misuse. Developing the patience to look closely at an image can take practice, and **Activity 1.1: Learning to Look** gives you the opportunity to walk through this process.

The beginning of a typical library instruction session is an excellent time to present an engaging opening activity using images. Images related to

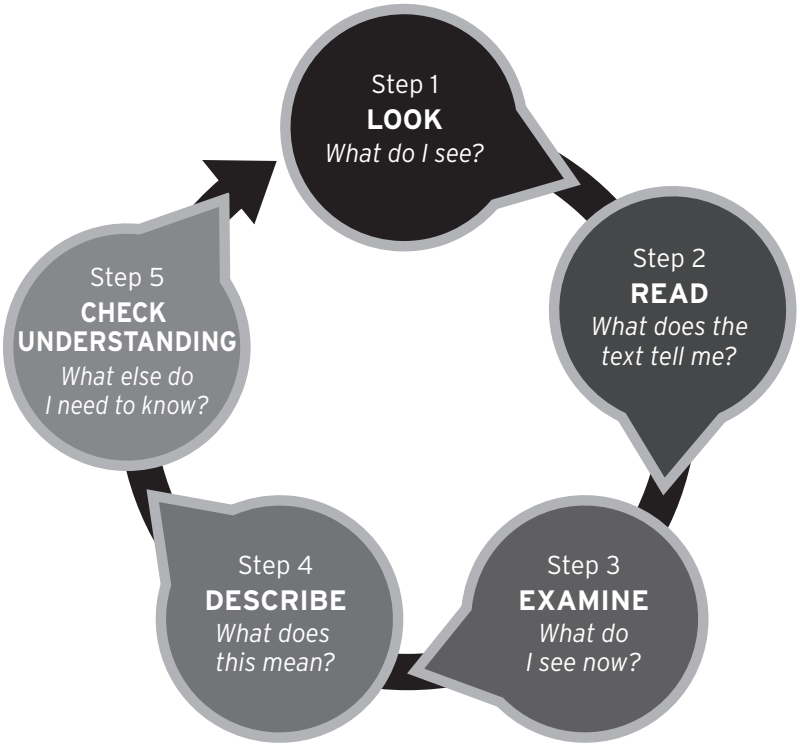


Figure 1.1. *Interpreting and Analyzing Images*

COFFEE BREAK!

Begin to Interpret and Analyze an Image

Choose an image and take a few minutes to look at it closely. Answer the questions, then reflect.

What do I see?

What is going on?

Why do I think this image was created?

REFLECT

What do you want to know more about?

How might you put this exercise into practice?

course content coupled with a few "looking prompts" can get students in a question-driven mind-set and frame the research process. Try projecting an image related to course material at the beginning of class, then give students a few minutes to engage with the image and to write answers to questions such as: *What do I see? What is going on? Why do I think this image was created?* After students spend a few minutes freewriting answers, use a think-pair-share technique to debrief. Invite students to share their responses with a partner and then open the questions for the whole class to discuss. This approach sets the stage for an inquiry-based research session and works as a lead-in to more pointed visual analysis. **Activity 1.2: Interpreting and Analyzing Images** provides a comprehensive process, along with question prompts that can be adapted for instructional scenarios across the disciplines.

Interpreting the Meanings of an Image

Image meanings are shaped by factors beyond what is initially visible. The historical and social contexts in which the image was created, and cultural factors such as suggestion, metaphor, and symbols within the image, all contribute to the significance and communicative value of an image. Visual content does not stand alone, and only through careful looking and informed interpretation practices can images be accurately understood and used.

CULTURAL AND SOCIAL CONTEXT

To understand the richness of images as information sources, students need to situate images in their cultural, social, and historical contexts. You can sharpen students' image interpretation skills by regularly using examples of images that differ in terms of time period, medium, and subject matter and by guiding students through the process of looking carefully and making sense of what they see. By learning to interpret images in various contexts, students gain a deeper understanding of visual content and prepare to think about incorporating images into research papers and projects.

Understanding the context of an image includes thinking critically about how the image represents people—both as individuals and as representatives or signifiers of different groups. Image interpretation skills help students to arrive at an informed, nuanced, and historically contextualized understanding of diversity and difference across cultural groups and identifications and among individuals within those groups. Images are also excellent sources for research projects that focus on historical or diversity-related issues because they often contain gender, ethnic, and other cultural or social identifiers, cues, or stereotypes. Visual literacy interpretation practices equip students to approach looking with a critical eye when they encounter images of people different from themselves, and advance students' research process through accurate and informed analysis of representations.

Use classroom activities to generate discussions about how individuals and groups are depicted in images. Discussions can focus on the relationships among people and objects within the image, the social and economic status of individuals or groups represented, and the use of suggestion and symbolism to portray cultural identifiers. An excellent source for images to generate such discussion is the blog *Sociological Images* by Lisa Wade, a sociology professor at Occidental College. With over five thousand posts consisting of an image alongside content analysis, Wade's blog aims to encourage people "to exercise and develop their sociological imagination by presenting brief . . . discussions of compelling and timely imagery that span the breadth of sociological inquiry" (Wade n.d.).

Advertisements are another rich source of content for deepening image analysis skills. Exploring the images, layout, and other design choices in ads sharpens visual literacy skills while helping students to think about historical context. You might lead students to ads related to specific time periods, products, or services and then launch into a targeted discussion. Subscription databases, such as ProQuest Historical Newspapers, and free resources, such as Duke University Library's Ad*Access project, are excellent sources for

Key Questions for Ad Analysis

- Where does your eye go? Why?
- What is the relationship between the text and the image?
- What ambience or mood does this ad create?
- What might it have been like to see this ad when it came out?
- What does this ad tell you about the ideal (look, role, relationship, etc.) of the time?
- What role do you think this product played in the culture and society in which it was created?
- What sociological, political, economic, or cultural attitudes are reflected in this ad?

historical advertisements. When used in the classroom with our **Key Questions for Ad Analysis,** historical ads build analysis skills while setting the stage for further research. **Activity 1.3: Analyzing an Ad for Context** situates ad analysis in a library context and uses visual literacy as a bridge to information literacy.

SUGGESTION AND METAPHOR

Images are representations that contain meanings beyond the literal, and an image's impact can come from the use of suggestion or metaphor. For example, an image of a lion evokes the literal or primary meaning of a large, orange-colored member of the cat family. However, the same image of a lion might evoke a feeling such as fear or awe, or suggest an idea such as power, importance, or strength. The suggestive or metaphorical meaning derived from images is influenced by the context in which the image is presented and by the type of image used. Thus, an image of a lion that is situated next to an image of a mouse may suggest one meaning while the same image that is situated next to text that reads "It's a jungle out there!" will suggest another. Similarly, an image of a roaring lion will suggest a meaning that is different from that of a sitting lion, a yawning lion, or a napping lion.

Sometimes images are repeatedly associated with an idea or concept and may come to take on symbolic meaning. So if you've ever seen an image of a lion and thought "king," or seen an image of a dove and thought "peace," it may be because these animals have been traditionally associated with the idea of a king or peace, not because a lion is a sovereign over other animals or because a dove seeks to create harmony. The interpretation of visual signs, symbols, and their meanings may vary depending on one's cultural background or life experience,

MORE TO EXPLORE: IMAGE INTERPRETATION AND ANALYSIS

NARA Document Analysis Worksheets

www.archives.gov/education/lessons/worksheets

The National Archives and Records Administration's education staff provides structured worksheets for analyzing photographs, cartoons, posters, and maps.

LOC Teacher's Guides and Analysis Tool

www.loc.gov/teachers/usingprimarysources/guides.html

The Library of Congress provides analysis tools for primary sources, photographs, manuscripts, sheet music, and more.

NASA: How to Interpret a Satellite Image

http://earthobservatory.nasa.gov/Features/ColorImage

NASA Earth Observatory's writers and data visualizers provide tips and strategies for understanding satellite images.

or the context in which the image is used. For instance, the peace sign might symbolize antiwar sentiments for some or an alternative to waving goodbye for others. Taking a critical approach to investigating the construction of meaning in images is an essential component of image interpretation and analysis.

Visualizing Data

Visual representations of data and information let us see relationships, patterns, and trends we may not easily see otherwise. Data visualizations are central to scientific inquiry and communication because they aid in understanding complex information quickly and efficiently. Statistician Francis Anscombe demonstrated the extent to which visualizations can provide critical insight into the qualities of data with his four data sets known as Anscombe's quartet (Anscombe 1973). Although his data sets have nearly identical statistical properties, they appear very different when presented as graphs because the data contain variations. Visualizations, in other words, reveal important aspects of the data that might otherwise be overlooked. Visualizations can also elicit new insights—for example, when statistical information (quantitative data) is displayed on a map or when the number of words from a textual corpus (qualitative data) is processed as a word cloud.

COFFEE BREAK!

Interpret a Visual Sign or Symbol

Walk around your library (or look at the website) and select a sign or symbol that you encounter. Then answer the following questions.

What sign or symbol did you choose?

What does it represent to you?

Why?

What might the sign or symbol represent to a person who:

- Is a new student?
- Has never been to your library?
- Saw it two hundred years ago?
- Sees it two hundred years from now?

REFLECT

What did you learn from this process?

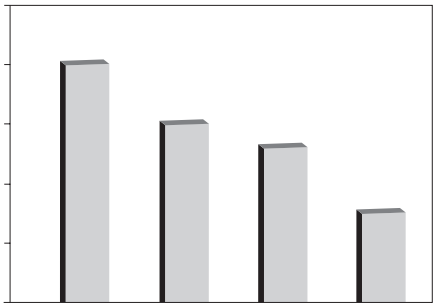
How might you apply this process to your work?

Though visualizations make quantitative information easier to understand, interpreting and analyzing them requires some instruction and practice. In a review of graph comprehension research, psychologists Shah and Hoeffner (2002) contend that three important factors impact how well someone interprets graphic information: (1) the visual characteristics of the graph, (2) general knowledge about graphs and how they function, and (3) the person's prior knowledge and beliefs about the content. Shah and Hoeffner argue that to improve graph comprehension educators should train students to apply metacognition and "think of graph reading as an interpretation and evaluation task as opposed to a mere fact retrieval task" (2002, 64). **Activity 1.5: Evaluating Data Visualizations in the News** takes students through this interpretation and evaluation process by engaging with a real-world news example in which graphs are used to explain a societal trend.

Because being a successful reader of data visualizations depends upon knowing what to look for and what questions to ask, we provide **Twenty Key Questions for Interpreting and Evaluating Data Visualizations.** The questions are divided into three stages: observation and description, interpreta-

tion, and evaluation. For example, two of our key questions ask students to articulate general knowledge about graphs so that they can practice identifying the format and situating it within a schema that categorizes data visualizations according to the communication goal. This exercise positions students to recognize the type of graph with a description of its basic purpose (e.g., *This is a bar chart, which is useful for comparing values across categories*). Students will begin to grasp that one type of visualization is not necessarily better than another; rather, each has its strengths and limitations. The following sections show common communication purposes alongside a typical example for visualizing data based on the purpose.

COMPARE VALUES ACROSS CATEGORIES



Example: Bar Chart
A bar chart uses rectangular bars, plotted vertically or horizontally, with the height or length showing each value.

Strengths

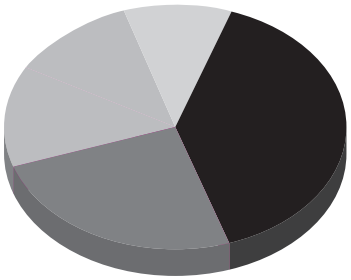
- Provides a quick comparison of values across categories
- Conveys the maximum, minimum, and relative ranking of the categories being compared

Limitations

- Can provide an incomplete or simplified view of the data
- May imply, but not actually reveal, trends and patterns

Other Examples: Horizontal Bar Chart, Stacked Bar Chart

SHOW PARTS OF A WHOLE



Example: Pie Chart
A pie chart is a circle divided into sections that represent proportions of the whole.

Strengths

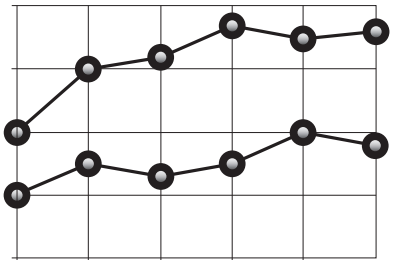
- Shows a percentage or proportion, also known as a *part-to-the-whole* relationship
- Familiar format to a wide audience

Limitations

- Less effective when there is a large number of categories
- Difficult to discern small differences between categories
- Difficult to illustrate trends over time using a series of pie charts

Other Examples: Stacked Bar Chart

SHOW CHANGES OVER TIME



Example: Line Chart
A line chart or line graph uses a line to connect a series of data points.

Strengths

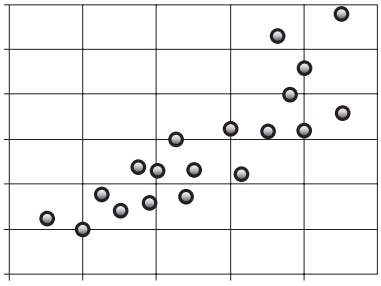
- Shows change over time, or historical trends, when plotted in a time series
- Can compare different data series or multiple lines in the same time frame

Limitations

- More difficult to interpret when comparing multiple lines or series
- Aspect ratio (height and width) can influence the appearance of the lines and interpretation of the chart

Other Examples: Area Chart, Stacked Area Chart

SHOW RELATIONSHIP BETWEEN VARIABLES



Example: Scatter Plot
A scatter plot (also spelled scatterplot) is a set of data points plotted on the ***x*** and ***y*** axes.

Strengths

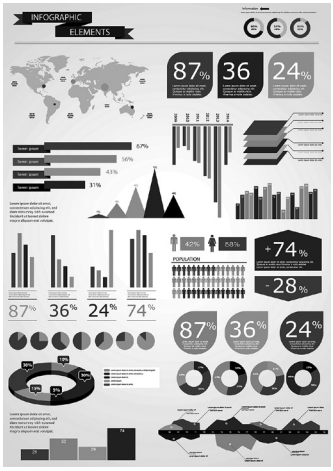
- Used to explore relationships or trends between two variables
- Can illustrate many different aspects of the plotted data, such as:
    - ◊ Correlation between variables (and whether the correlation is positive or negative)
    - ◊ Variation of the data (clear trend or scattered)
    - ◊ Nature of the relationship (linear or nonlinear)
    - ◊ Identification of outliers
- In statistics, used for evaluating a line of best fit

Limitations

- Displays only two variables at a time (may not provide a full picture for data sets with many variables)

Other Examples: 3D Scatter Plot, Bubble Chart

TELL A STORY ABOUT A COMPLEX ISSUE



Example: Infographics
Infographics present information and data, often combining multiple forms of visualizations, to illustrate a topic in a concise, engaging, and aesthetically pleasing manner.

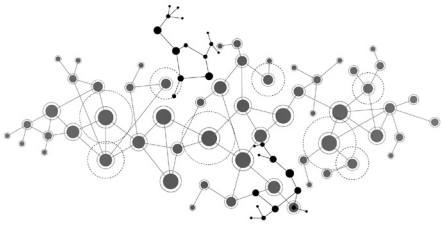
Strengths

- Can show a variety of data in relatively small and succinct visual forms
- Uses data to present a narrative or advocate for a position

Limitations

- Can be "busy" and difficult to read
- Presents data selectively and therefore can be biased
- Emphasizes the story over a comprehensive view of the data
- Design choices and templates can compromise accuracy

SHOW CONNECTIONS



Example: Network Diagram
A network diagram consists of a set of nodes and connecting lines.

Strengths

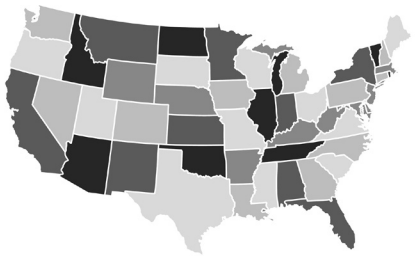
- Illustrates the connections or links between people or things
- Size, shape, and position of lines and nodes indicate the type and strength of relationships

Limitations

- Often requires interactivity to present large and complex data sets
- Can require specialized knowledge of network analysis for understanding

Other Examples: Arc Diagram, Flow Chart, Organizational Chart

SHOW GEOGRAPHIC DISTRIBUTION



Example: Choropleth Map
A choropleth map uses colors and shading to represent quantities within defined geographic areas.

Strengths

- Can reveal patterns that may not be clear in other forms of visualization
- Effective at many scales, from local to global, with suitable geographic data

Limitations

- Because geographic boundaries are not typically uniform in size and shape, can distort the visual significance of areas represented on the map (e.g., the size of Texas versus Rhode Island)
- Color and shading can affect interpretation of the map

Other Examples: Contour or Isopleth Maps, Dot Maps, Heat Maps

Using Text to Understand Images

Taking the time to read captions, metadata, and other text that accompanies an image gives you essential information you cannot get from simply looking at the image. Just as reading a catalog record for a book reveals information beyond the author and title, examining the text alongside an image fills in details that provide context for the image and further the research process. For example, an online image might include information about a collection that the image is part of, a formal description, names of the rights holders, information about the time period in which the image (or its representation) was created, geographic locations, or even the process used to create the image. Quality metadata and textual information provide essential context such as *why, where, how,* and *for whom* the image was created.

The level of description tells you a lot about an image and its source, and what's *not* there can also tell you something about the image or raise additional questions. Somebody—whether the image creator herself, using natural language, or a visual resource cataloger at a cultural heritage institution, using a fixed taxonomy—took the time to generate the descriptions you find. Tags and metadata can indicate aspects of the image that were important to the image creator, image provider, or commentator. As a researcher, noticing these textual clues (or lack thereof) is crucial for critically engaging with visual

Twenty Key Questions for Interpreting and Evaluating Data Visualizations

Carefully read the title, description, headings, units, and each part of the key before answering the following questions.

OBSERVE AND DESCRIBE

What information is being presented?

1. What components or variables are presented?
2. What do the lines, colors, symbols, and so forth represent?
3. What are the units of measure?
4. What trends and patterns do you see?
5. What type of graph or visualization is being used?
6. What are the sources of data?
7. How were the data collected?
8. Were the data modified, analyzed, or summarized?

INTERPRET

What are the meaning and purpose of the data or information presented?

9. What conclusions can you draw from your observations of the data?
10. What is the question, topic, or issue being addressed?
11. What does the data tell you about the issue, and are these findings meaningful?
12. What does the data not tell you, or what are the limitations of the data?

EVALUATE

Are the design and function effective and appropriate?

13. Does the visualization help you understand the data or the broader issue?
14. Do design elements (typography, color, line, etc.) work together to convey the overall message?
15. Is the type of graphic appropriate for the data being presented?
16. Are there better, alternative options to display the data?
17. Are the data and methods reliable and appropriate?
18. Is there a related data set that would add to your understanding of the question, topic, or issue?
19. Are there other visualizations that would add to your understanding of the question, topic, or issue?
20. How might you use this data visualization?

Visual Literacy for Libraries: A Practical, Standards-Based Guide by Nicole E. Brown, Kaila Bussert, Denise Hattwig, and Ann Medaille (Chicago: American Library Association, 2016).

MORE TO EXPLORE: VISUALIZING DATA

Data + Design by Trina Chiasson, Dyanna Gregory, et al., https://infoactive.co/data-design (CC BY-NC-SA)

Data Points: Visualization That Means Something by Nathan Yau (2013)

Data Visualization: A Successful Design Process by Andy Kirk (2012)

How to Lie with Maps by Mark Monmonier (1996)

Show Me the Numbers: Designing Tables and Graphs to Enlighten by Stephen Few (2012)

The Visual Display of Quantitative Information by Edward Tufte (2001)

"Visualise Data" in *BetterEvaluation* (blog) by Stephanie Evergreen (2014), http://betterevaluation.org/plan/describe/visualise_data

The Wall Street Journal Guide to Information Graphics: The Dos and Don'ts of Presenting Data, Facts, and Figures by Dona M. Wong (2010)

content. Questioning the text can also influence what you see in the image and how you see it. Use our **Key Questions for Using Text to Interpret Images** to facilitate discussions about image interpretation and to conduct image analysis. Practice looking closely at image metadata from different sources with **Activity 1.4: Comparing Image Metadata**.

Analyzing Images for Alterations and Editing

Simple image alterations, such as cropping and color correcting, can significantly change an image's meaning. Images have immediate emotional impact and are used in the media and advertising to persuade readers and consumers. This combination of ease-of-editing and direct impact has been exploited in the media with distorted images that convey targeted messages. For example, in a January 31, 2012, news story in *The Guardian,* John Plunkett reported that the UK's Advertising Standards Authority banned a L'Oréal wrinkle cream ad featuring Rachel Weisz, stating that the photograph in the ad "misleadingly exaggerated the performance of the product" because Weisz's skin appeared to be flawless. In France, politicians are addressing a similar concern by proposing required warning labels on photos that have been digitally altered, much like labels on genetically modified food. Israel even has "Photoshop laws," which regulate the use of image alterations in media and advertising. According to an article in *The Atlantic* by Talya Minsberg (May 9, 2012), the Israeli law

requires all ads that "use airbrushing, computer editing, or any other form of Photoshop editing to create a slimmer model must clearly state that fact." If you're not an expert at image manipulation, how can you determine whether an image has been digitally altered?

Even if you're looking at a nonadvertising image, or an image that presents itself as factual or documentary, be aware that any image *can* be digitally manipulated. Some research may be required to determine whether it has been. You can be proactive by researching the creator, the production, and the context surrounding the image. Here are some questions you might ask:

- Who created or produced the image?
- Did the image creator or producer have a particular agenda?
- What were the circumstances surrounding the production of the image?
    - ◊ Why was it created?
    - ◊ How was it distributed?
- Do other depictions of the image subject confirm or conflict with this image?

This thoughtful approach will ensure that you are a critical reader of visual information. **Activity 1.6: Inspecting Scientific Images** concretizes these skills by exploring possible image manipulations, and their consequences, in the production of scientific knowledge.

Key Questions for Using Text to Interpret Images

- How does the textual description relate to your initial observations of the image?
- Based on the text that accompanies it, what do you know about this visual representation?
- What questions remain unanswered about the image's original historical and cultural context (the *who, what, when, where,* and *why*)?
- How might you begin to answer these new questions?
- What keywords, descriptions, or text might help you with further research?
- What sociological, political, economic, or cultural attitudes are reflected in this ad?

Next Steps

Develop interpretation and analysis by looking carefully, reading the textual information associated with images, and discussing what you see with others. To incorporate this strategy into your work in consultation and the classroom, try the following:

- Try our **Five Steps for Interpreting and Analyzing Images** to look at, read, examine, describe, and check understanding for various types of images.
- Use the **Twenty Key Questions for Interpreting and Evaluating Data Visualizations** to observe, describe, interpret, and evaluate graphic presentations of data.

REFERENCES

Anscombe, Francis J. 1973. "Graphs in Statistical Analysis." *American Statistician* 27 (1): 17–21.

Shah, Priti, and James Hoeffner. 2002. "Review of Graph Comprehension Research: Implications for Instruction." *Educational Psychology Review* 14 (1): 47–69.

Wade, Lisa. n.d. *Sociological Images* (blog). http://thesocietypages.org/socimages.

ACTIVITY 1.1

Learning to Look

LEARNING OUTCOMES

- Look carefully at an image and observe content and physical details.
- Describe pictorial, graphic, and aesthetic elements of an image.

DESCRIPTION

Guide students through the practice of dedicated looking, using an image that you provide. Project the image or distribute copies of the image to students. When students have completed looking carefully at the image, they compare observations. Distribute the **Learning to Look Worksheet**, or use the following instructions to lead the activity verbally:

- Look carefully at your image.
- Write down ten details you notice. Include at least one detail from each quadrant of the image. Look for details about people, places, things, color, design, movement, and composition.
- When you have completed your list of details, exchange your list with a classmate and compare your observations. Did you observe the same details?

TIP FOR SUCCESS

- If projecting the image, choose one with high resolution.

OPTIONAL EXTENSION

- Give students different images to work with in step 1, and use step 2 for students to exchange their images *and* observations with a classmate.

  Ask: Can you find every detail your classmate observed? What did you notice that your classmate did not?

VISUAL LITERACY STANDARDS CONNECTION

- ACRL Visual Literacy Standard 3, Performance Indicators 1 and 3

WORKSHEET

Learning to Look

Step 1: Look carefully at the image.

Record ten details you notice. Include at least one detail from each quadrant of the image. Look for details about people, places, things, color, design, movement, and composition.

II	I
III	IV

Step 2: Exchange your list with a classmate and compare your observations.

Describe a detail that your classmate noticed and that you missed.

ACTIVITY 1.2

Interpreting and Analyzing Images

LEARNING OUTCOMES

- Apply a five-step process to interpret and analyze images.
- Develop questions for further research.

DESCRIPTION

This worksheet provides a flexible and comprehensive approach to interpreting and analyzing images. In an instruction session, students respond to an image by answering as many questions as they can. These questions can be used in consultations with faculty and students, in library instruction sessions, in professional development workshops, and by faculty across the disciplines.

TIP FOR SUCCESS

- If projecting the image, choose one with high resolution.

OPTIONAL EXTENSIONS

- Give students one step at a time. Discuss, then proceed to the next step and repeat.
- Use a jigsaw technique: First form five groups of students. Each group will become "experts" in one step of the process. Then form discussion groups with at least one person from each "expert" group.
- Have students add questions to each step, then discuss.

VISUAL LITERACY STANDARDS CONNECTION

- ACRL Visual Literacy Standard 3, Performance Indicators 1, 2, and 4

WORKSHEET

Interpreting and Analyzing Images

Here are five steps for interpreting and analyzing images. The approach is iterative and fluid—you may not need to (or be able to) complete each step, or you may repeat some of the steps. Ask and answer as many critical and relevant questions as you can.

Step 1: Look.

What do I see? *Look at the image and articulate what is going on.*

1. What do you see in this image?
2. Are there people in the image? What are they doing? How are they presented?
3. What do you notice about the setting, place, or context?
4. What objects or components do you see?
5. How is the image composed? How are elements in the image arranged?
6. What colors are used in the image? What effects are created by the use of color?

Step 2: Read.

What does the text tell me? *Read any textual information that accompanies the image and consider what else it tells you.*

1. What text accompanies the image?
2. What is the purpose of the textual information?
3. What kind of context does the textual information provide?
4. Can you determine *where, how, why,* and *for whom* the image was made?

Step 3: Examine.

What do I see now? *Now that you know more, examine the image again.*

1. What do you see now that you didn't see before?
2. Did reading the text change how you see the image? How?
3. What are the most important visual elements in the image? How can you tell?
4. Can you interpret the image in different ways?

Step 4: Describe.

What does this mean? *Describe the image and its subject.*

1. What meanings are conveyed by the information, people, things, or actions in the image?
2. How do design choices contribute to the meaning of the image?
3. Why might the image have been created, and who might have been the intended audience?
4. How does this image function? Does it illustrate, document, entertain, persuade, and so on?
5. How was the image made?
6. If you were asked what the image is "about," what subjects would you describe?

Step 5: Check understanding.

What else do I need to know? *Generate new questions based on your findings.*

1. What do you need to find out more about?
2. How does the image fit with or disrupt what you already know?
3. How does your interpretation align with or differ from that of others?
4. How might discipline-specific or interdisciplinary perspectives or approaches further inform your analysis?

Reflect.

Scan your answers to the preceding questions. What will your next step be?

Visual Literacy for Libraries: A Practical, Standards-Based Guide by Nicole E. Brown, Kaila Bussert, Denise Hattwig, and Ann Medaille (Chicago: American Library Association, 2016).

ACTIVITY 1.3

Analyzing an Ad for Context

LEARNING OUTCOME

- Analyze an advertisement for social and historical context.

DESCRIPTION

This activity takes students through the process of critically analyzing an advertisement. Distribute the **Analyzing an Ad for Context Worksheet** and have students work through the questions individually or in pairs or groups. The worksheet ends by asking students to list several sources for finding information about the social and historical context of the ad. Grappling with the questions in this activity helps students to see everyday images as cultural artifacts, enhancing their visual and information literacy skills at the same time.

TIPS FOR SUCCESS

- Provide students with a historical advertisement from a time period they are studying.
- Once you choose an ad for this activity, be sure that *you* know the answer to the final question; moving students from examining an ad to locating appropriate background sources makes this activity work in library instruction.

OPTIONAL EXTENSIONS

- Choose a current ad for the same (or similar) product and go through the activity questions again. Discuss similarities and differences.
- Instruct students to write descriptions of the people or objects in the image, including such aspects as physical features, facial expressions, clothes, hair, gestures, colors, textures, and so on.
- Show students an image, then ask them to play the part of a news reporter preparing to write a story about an event depicted in the image. Students record the details of the event in a notebook and share their thoughts with the class.

VISUAL LITERACY STANDARDS CONNECTION

- ACRL Visual Literacy Standard 3, Performance Indicators 1–4
- ACRL Visual Literacy Standard 4, Performance Indicators 1–3

WORKSHEET

Analyzing an Ad for Context

Look at the advertisement and answer the following questions.

1. Where does your eye go? Why?

2. What is the relationship between the text and the image?

3. What ambience or mood does this ad create?

4. What might it have been like to see this ad when it came out?

5. What does this ad tell you about the ideal (look, role, relationship, etc.) of the time?

6. What role do you think this product played in the culture and society in which it was created?

7. What sociological, political, economic, or cultural attitudes are reflected in this ad?

8. Where could you go to learn more about this ad's time period? List *at least* three source ideas.

EXAMPLE

Analyzing an Ad for Context

This Pepsi-Cola ad was used in a library research workshop for a food-writing course at New York University during former mayor Bloomberg's attempt to ban large sugary drinks in New York City. Students analyzed the following ad, scanned from the *New York Times*. This full-page ad appeared on February 12, 1956, on page SM133, adjacent to an article called "Pizza a la mode: In many variations, Italy's famous pie now rivals the hot dog in popularity." The ad positions Pepsi as a beverage with health benefits. The copy leads with "How come this brimming land of plenty should produce the leanest, fittest-looking men and slimmest-waisted women in the world?" and ends with "Have a Pepsi—the modern, light refreshment." (*Continued on page 25*)

Pepsi Ad scanned from the New York Times *(February 12, 1956, p. SM133)*

EXAMPLE

Analyzing an Ad for Context *(continued)*

Look at the advertisement and answer the following questions.

1. Where does your eye go? Why?

My eye goes right to the couple's heads, probably because the picture is composed to draw you in and want to know more about them.

2. What is the relationship between the text and the image?

The image is the main focus and then the text supports what's presented—the couple is really good looking, and the text says that Pepsi goes along with a "sensible trend in diet."

3. What ambience or mood does this ad create?

The mood is sort of romantic and classy, in an old-fashioned and traditional way.

4. What might it have been like to see this ad when it came out?

It might make you feel bad about yourself if you're not as well-dressed as the couple!

5. What does this ad tell you about the ideal (look, role, relationship, etc.) of the time?

It seems like people really paid attention to their outfits—the woman is wearing a hat and gloves.

6. What role do you think this product played in the culture and society in which it was created?

They're calling it a "modern, light, refreshment" and they have it set up almost like a cocktail.

7. What sociological, political, economic, or cultural attitudes are reflected in this ad?

For starters, the couple is white and heterosexual—pretty old school. The text says that Americans "keep slender and fit through their wholesome, up-to-date eating habits," so it seems like being skinny was a social pressure then, just like today!

8. Where could you go to learn more about this ad's time period? List *at least* three source ideas.

I could ask my grandmother because she was alive in the 1950s or try to find a book about the history of soda; maybe news stories written during the 1950s would be good too.

ACTIVITY 1.4

Comparing Image Metadata

LEARNING OUTCOMES

- Compare image metadata from different sources.
- Practice reading metadata to understand images.

DESCRIPTION

Students compare metadata accompanying images from different sources and become familiar with the types of information included in image metadata. As students work with a partner to find two images related to a topic, you provide guidance by suggesting image databases or sources relevant to the course and student topics. Students then analyze each image's metadata and complete the **Comparing Image Metadata Worksheet**. Use the suggested prompts to discuss findings.

DISCUSSION PROMPTS

- Which source provided the most metadata with the image?
- Were any of the metadata labels confusing (e.g., medium, repository, etc.)?
- What kinds of metadata did you find most useful for understanding the image (e.g., title, date, tags, etc.)?
- Was there information you expected to find about an image that wasn't there?

TIP FOR SUCCESS

- Find image sources for this activity in advance and provide an easy way for students to connect to those sources, such as by providing links on a course guide.

VISUAL LITERACY STANDARDS CONNECTION

- ACRL Visual Literacy Standard 2, Performance Indicator 2
- ACRL Visual Literacy Standard 3, Performance Indicators 1, 2, and 4

WORKSHEET

Comparing Image Metadata

In the following chart, record the metadata you find with each of two images.

	IMAGE FROM SOURCE 1	IMAGE FROM SOURCE 2
Database or source		
Title		
Creator		
Date of creation		
Image size		
How was the image created?		
Are any tags or keywords attached to the image?		
Is there a caption or other description?		
What other metadata are included?		

ACTIVITY 1.5

Evaluating Data Visualizations in the News

LEARNING OUTCOMES

- Interpret data and information displayed in charts and graphs.
- Consider alternative formats for data visualization.
- Evaluate the effectiveness of charts and graphs for purpose and argument.

DESCRIPTION

This activity provides a scaffolded process for interpreting and evaluating graphs that display information from the same data set. Students begin by reading a news article that presents an argument using graphs, then complete the **Evaluating Data Visualizations in the News Worksheet** comparing several graphs.

For this activity we use a February 7, 2015, online article in *Vox*, "Master's Degrees Are as Common Now as Bachelor's Degrees Were in the '60s," which claims that "the master's degree is the fastest-growing college credential in the US," and explore the source data sets from the National Center for Education Statistics.

First, students describe what they see in graph 1 (the first graph contained in the article) and then compare it to graph 2 (an alternative graph created in Excel using additional information from the article's source data set, available at nces.ed.gov/programs/digest/d13/tables/dt13_318.20.asp). Discuss which graph is better at conveying the information clearly and effectively. Next, students compare graph 2 and graph 3, which demonstrate that different graph formats can offer different, legitimate ways of presenting data. Finally, students compare graphs 4 and 5 with the previous graphs to explore how other authoritative methods are used to communicate these data. Students write or discuss their answers to the questions in the activity and reflect on which data and graphs they might include if tasked with writing a piece about the same issue.

DISCUSSION PROMPTS

When comparing graphs 1 and 2:

- Do you notice any elements that are missing from graph 1?

  Note: Graph 1 is missing several important elements—it lacks a complete title, a *y*-axis label, and a proper source citation.
- Do you notice anything questionable about the data?

  Note: Along the *x*-axis in graph 1 (years), the interval between data points jumps from data points every ten years to annually; however, the data points themselves are graphed at a uniform interval. This changes the shape of the line and therefore the effectiveness of the claim.

- What additional data does graph 2 include? What role do these data play?

  Note: Graph 2 includes an additional series—the number of bachelor's degrees. This provides more context, to be more consistent with the original claim. After all, the title of the news piece begs a comparison between master's and bachelor's degrees.

When comparing graphs 2 and 3:

- What differences do you notice between graphs 2 and 3?

  Note: Here the data points are the same, but by using a different type of graph (a stacked bar chart instead of a line graph) we see different aspects of the data more effectively and ask more questions. Although the original line graph can show the total number and trend for bachelor's and master's degrees, the strength of the stacked bar chart is that it can more readily show the proportion and changing proportions over time. At the same time the stacked bar chart has a drawback in that it doesn't show the total number of bachelor's degrees as clearly.

When comparing graphs 4 and 5 with the previous graphs:

- How are these graphs different from those seen earlier?

  Note: It is important to consider additional sources of information and visualizations to understand an issue. Graph 4 is an example of how the pros do it. By examining an authoritative source, students may see how others communicate and think about different types of data or topics. In graph 4, from the February 2012 U.S. Census Bureau Report, "Educational Attainment in the United States: 2009," the data are presented as the proportion of the population with a given educational attainment; in other words, this graph is corrected for the natural population growth of U.S. college-age students across the decades. Graph 5 adapts the visualization approach from the U.S. Census, with the addition of master's degree data, and a different view of the data emerges than originally presented in graph 1.
- Do these graphs help you understand the topic?

  Note: In some cases exploring the underlying data set can reveal different stories than originally presented. Data visualizations should be tools for thinking clearly about a topic. Seeking additional information (e.g., controlling for natural population growth) can be important to communicating the full story within the data.

TIPS FOR SUCCESS

- Use the "Visualizing Data" section of this chapter to discuss the common purposes for different types of charts and graphs. Depending on the context, there is not always a right or wrong answer. Students will begin to assess the strengths and weaknesses of different types of graphs, as well as the way data visualizations are used to make an argument.

- When selecting graphs to use with your students, consider the following:
  - ◊ Are the design and function of excellent or poor quality?
  - ◊ Are the sources and methods of the data clear from the visualization and reliable?
  - ◊ Is the chart or graph engaging enough to lead to interesting questions?

OPTIONAL EXTENSIONS

- Expand the discussion to analyze the article's specific claims and whether the graphs help support these claims and provide a clear understanding of the issue. Give your students the opportunity to explore the data set and additional visualizations to see what other stories the data might be telling.
- Have students create different types of charts and graphs with Excel using the same data set from the National Center for Educational Statistics.

VISUAL LITERACY STANDARDS CONNECTION

- ACRL Visual Literacy Standard 4, Performance Indicator 1
- ACRL Visual Literacy Standard 6, Performance Indicator 1

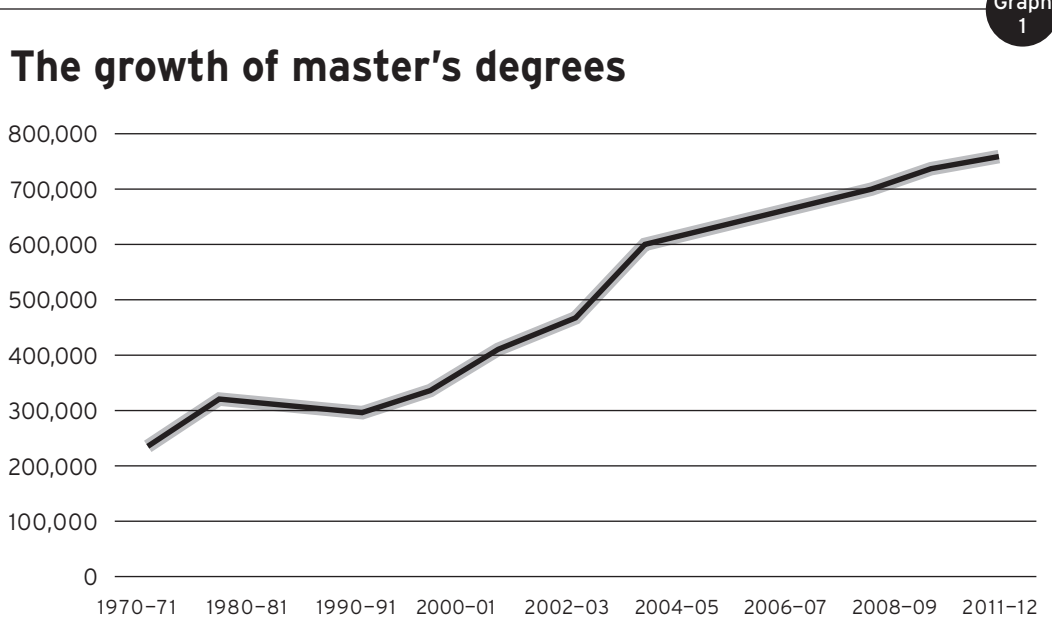
WORKSHEET

Evaluating Data Visualizations in the News

As you examine each graph, describe what you see and what you think the graph means.

Step 1: Describe what you see in graph 1.

Graph 1



Source: Education Department

1. What information is this graph presenting? _____

   _____

2. What are the components or variables? _____

   _____

3. What are the units of measure? _____

4. What is the source of the data? _____

   _____

5. Can you name the type of graph? _____

6. Why would you use this type of graph? _____

   _____

7. Do you think this is an effective graph? _____
   Why or why not? _____

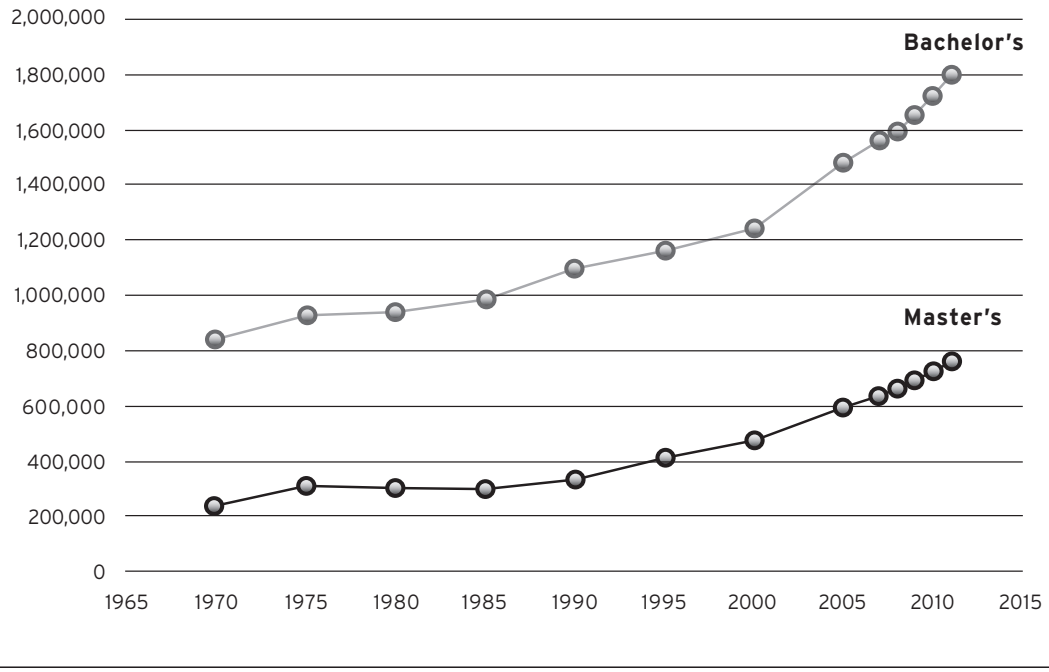
   _____

With contribution from Russ White.

Visual Literacy for Libraries: A Practical, Standards-Based Guide by Nicole E. Brown, Kaila Bussert, Denise Hattwig, and Ann Medaille (Chicago: American Library Association, 2016).

Step 2: Compare graphs 1 and 2.

Graph 2



Source: National Center for Education Statistics Table 318.20

8. What's different in graph 2? _____

_____

9. Does graph 2 improve understanding of the data and overall topic? Why or why not? _____

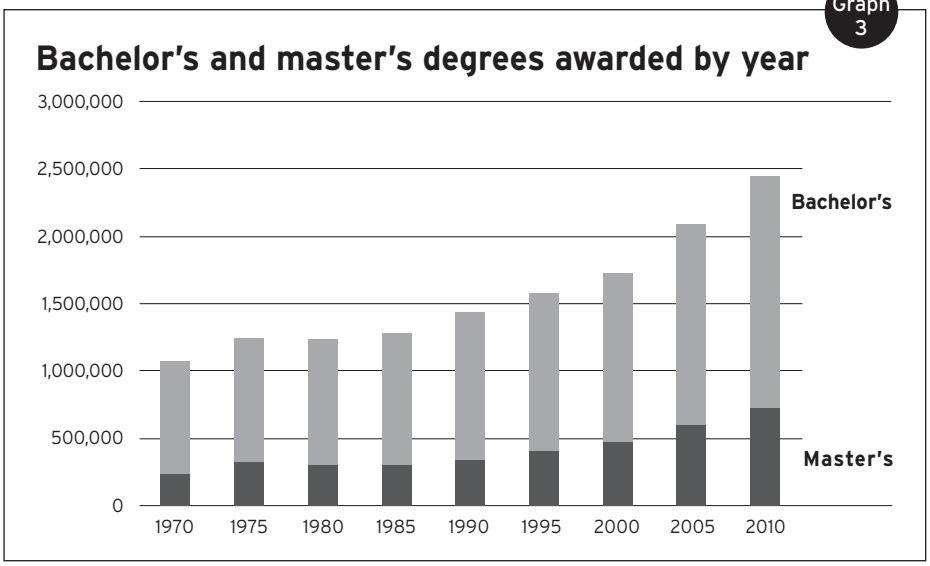
_____

10. Does graph 2 strengthen or weaken the original written argument? _____

_____

Step 3: Compare graphs 2 and 3.

Graph 3



Source: National Center for Education Statistics Table 318.20

11. What's different compared to graph 2? _____

_____

12. Can you name the type of graph? _____

13. Why would you use this type of graph? _____

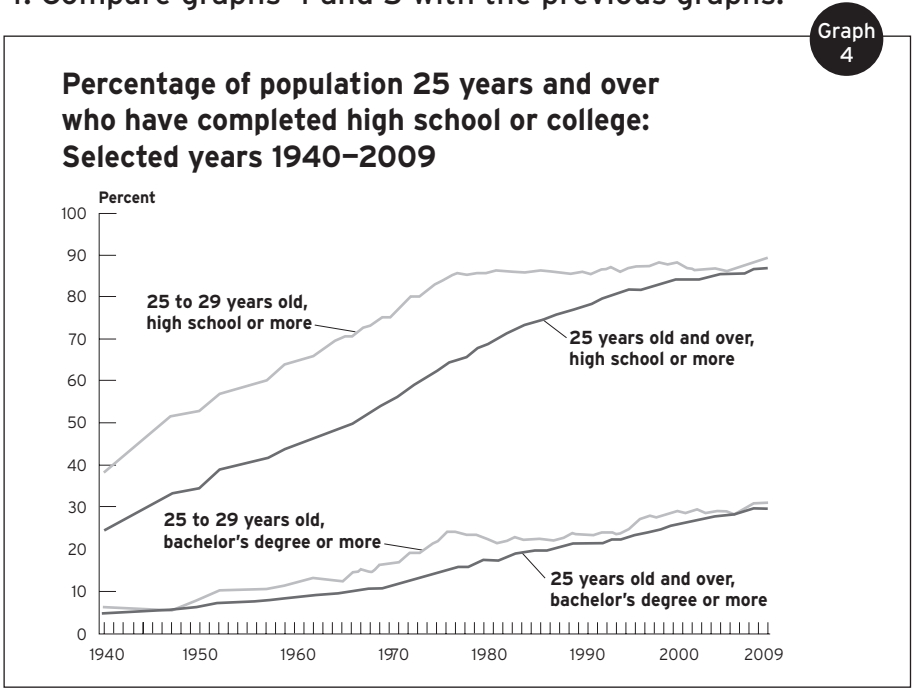
_____

14. Is graph 3 more or less effective than graph 2? _____

_____

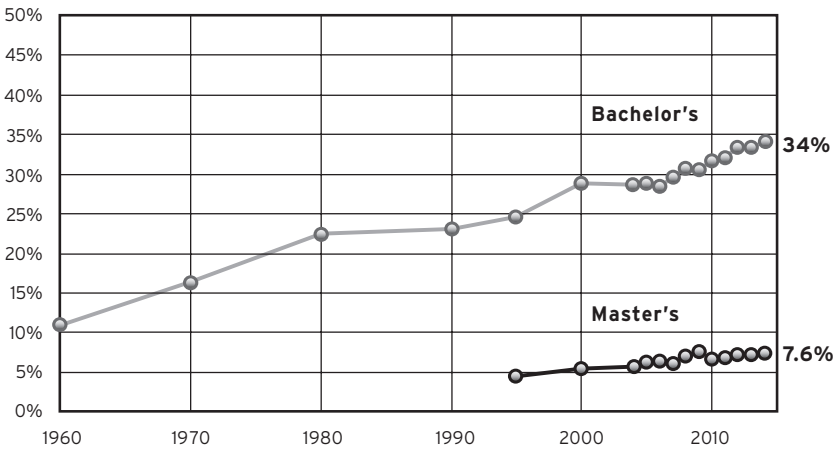
Step 4: Compare graphs 4 and 5 with the previous graphs.

Graph 4



Source: U.S. Census Bureau, Current Population Survey and decennial censuses.

Graph 5



Source: National Center for Education Statistics Table 104.20

15. How are graphs 4 and 5 different from the previous graphs? _____

_____

16. Do graphs 4 and 5 improve understanding of the data and overall topic? Why or why not? _____

_____

17. Do graphs 4 and 5 strengthen or weaken the original written argument? _____

_____

Step 5: Reflect.

If you were writing an article about trends in bachelor's and master's degrees, which graph(s) would you include? _____

_____

ACTIVITY 1.6

Inspecting Scientific Images

LEARNING OUTCOME

- Explore the impact of image manipulations in the production of scientific knowledge.

DESCRIPTION

Lead students to "What's in a Picture? The Temptation of Image Manipulation" by Mike Rossner and Kenneth M. Yamada, or distribute the article. Then form groups of students to explore the following issues:

- Group A: Gross misrepresentation (figures 1 and 2)
- Group B: Subtle manipulations (figures 3 and 4)
- Group C: Misrepresentation of data (figures 5 and 6)

After students complete the **Inspecting Scientific Images Worksheet**, use the PowerPoint slides provided with the article (http://jcb.rupress.org/content/166/1/11.full) as prompts for each group to discuss the examples of manipulations in scientific images.

DISCUSSION PROMPTS

Each group chooses one issue and a consequence to present to the class. Additional prompts include the following:

- Why did you choose the issue you did?
- What does image manipulation mean for you as a reader of scientific literature?
- What does image manipulation mean for you as a potential author?

TIPS FOR SUCCESS

- Before conducting this activity, gain an understanding of image manipulation in the sciences by reading the following articles:
  - ◊ Mike Rossner and Kenneth M. Yamada (2004), "What's in a Picture? The Temptation of Image Manipulation," *Journal of Cell Biology* 166 (1): 11–15, http://jcb.rupress.org/content/166/1/11.full.
  - ◊ Mike Blatt and Cathie Martin (2013), "Manipulation and Misconduct in the Handling of Image Data," *Plant Physiology* 163 (1): 3–4, www.plantphysiol.org/content/163/1/3.short.
- If your class is large, assign two groups to each issue.

Visual Literacy for Libraries: A Practical, Standards-Based Guide by Nicole E. Brown, Kaila Bussert, Denise Hattwig, and Ann Medaille (Chicago: American Library Association, 2016).

OPTIONAL EXTENSIONS

- Many open-access scientific journals allow readers to download the images. Ask students to download the image from a PLOS (Public Library of Science) article, apply a change to the image, and then describe how the change might impact a researcher's interpretation of the image.
- The PLOS guide to figures (http://journals.plos.org/plosbiology/s/figures) pairs well with this activity.
- Expand this activity with the Council of Science Editors' "White Paper on Publication Ethics" (www.councilscienceeditors.org/resource-library/editorial-policies/white-paper-on-publication-ethics). Section 3.4, *Digital Images and Misconduct*, contains guidelines for handling image data and suggested procedures for dealing with violations of the guidelines.
- Shift the focus to image analysis and use NASA's tips and strategies (http://earthobservatory.nasa.gov/Features/ColorImage) for reading satellite images.

VISUAL LITERACY STANDARDS CONNECTION

- ACRL Visual Literacy Standard 2, Performance Indicator 2
- ACRL Visual Literacy Standard 3, Performance Indicators 1, 2, and 4

WORKSHEET

Inspecting Scientific Images

Complete the steps using the article "What's in a Picture? The Temptation of Image Manipulation" by Mike Rossner and Kenneth M. Yamada.

Circle your group.

a. Gross misrepresentation (figures 1 and 2)
b. Subtle manipulations (figures 3 and 4)
c. Misrepresentation of data (figures 5 and 6)

Step 1: Examine your assigned figures and read the accompanying section of the article, then complete the table.

LIST ISSUES PRESENTED IN THIS SECTION	DESCRIBE A CONSEQUENCE OF EACH ISSUE

Step 2: Choose one issue and a consequence to present to the class. Be prepared to answer the following questions:

1. Describe the image manipulation issue and the consequence.
2. Explain how what you learned about image manipulation will inform the way you interpret and analyze scientific images in the future.