CENTER FOR CURRICULUM REDESIGN

Draft Graphic Literacy Standards

(also known as "Document Literacy" (Europe) and "Locating Information" (old ACT terminology, US))

Standards design philosophy: These standards are designed to produce students who are able to interpret -- without any prior discipline-specific knowledge or training -- the non-text information (charts, graphs, diagrams, maps etc.) presented in textbooks, engineering drawings, public policy reports, economic data, scientific research articles and more. This is analogous to a student's being able to understand a history book, without having been taught history, simply because he can read.
In this case, the standards provide secondary school graduates with graphic literacy sufficient to read college textbooks and lower-level technical drawings.

Subjects	Topics	Standards	Grades 3-5 Benchmarks	Grades 6-8 Benchmarks	Grades 9-12 Benchmarks
Simple Graphics	Components	CCR-GL SC 1. Recognize, understand, and draw components of simple graphics.	CCR-GL SC 3-5, 1.1. Recognize, understand, and draw the graphical components (i.e., legends, annotations, number lines, and axis labels) associated with column charts, bar charts, and pie charts. CCR-GL SC 3-5, 1.2. Recognize, understand, and generate the graphical components (i.e., rows, columns, headings, and empty fields (blanks)) associated with simple forms, such as order forms, inventory forms, and application forms. CCR-GL SC 3-5, 1.3. Recognize, understand, and use the graphical components of simple maps (e.g., legends, scales, boundaries, pathways, intersections, and annotations), such as road maps, transportation maps, and floor plans. CCR-GL SC 3-5, 1.4. Understand and use analogue readouts, such as gauges, clock dials, and progress bars.		
	Relationship to Physical Objects	CCR-GL OB 2. Recognize and understand graphical elements are used in everyday objects.	CCR-GL OB 3-5, 2.1. Describe similarities and differences between the multiple manifestations of a single graphical element (e.g., number line vs. thermometer vs. measuring cups or map legend vs. musical key signature vs. stitching legend for embroidery). CCR-GL OB 3-5, 2.2. Recognize that diagrams are often used to communicate how to create "real life" products (e.g., sheet music -> songs; sewing patterns->clothes; assembly diagrams->furniture; subdivision maps->neighborhoods; blueprints->houses; Beauchamp Feuillet diagrams-> dance).		
	Reading	CCR-GL LI 3. Retrieve information from simple, single graphics. [US-ACT Level 3-1]	CCR-GL LI 3-5, 3.1. Interpret a variety of graphic formats that associate two items, such as a table of contents (e.g., book chapter<->page), a menu (e.g., food item><>price), a pie, bar, or column chart (e.g., candidate<-> votes), or a table (e.g., student name<->height). (Grade 3) CCR-GL LI 3-5, 3.2. Describe the meaning of and read instruments with analog dials, such as gauges, compasses, and clocks. (Grade 3) CCR-GL LI 3-5, 3.3. Identify which is bigger or smaller in column graphs, bar graphs, and pie charts that display one type of data only (e.g., height only; inches of precipitation only) (Grade 3) understand and create flow charts. CCR-GL LI 3-5, 3.4. Understand and create Venn and pattern diagrams. (Grade 3) CCR-GL LI 3-5, 3.5. Interpret the information conveyed by color coding on simple maps and diagrams. (Grade 4) CCR-GL LI 3-5, 3.6. Use color coding in preparing maps, charts, and diagrams. (Grade 4) CCR-GL LI 3-5, 3.7. Describe how to get from any random starting location to any random destination location using commercial subway, bus, or rail maps. (Grade 5) CCR-GL LI 3-5, 3.8. Identify present location from a floor plan. (Grade 5) CCR-GL LI 3-5, 3.9. Interpret information from floor plans and be able to answer questions about rooms' sizes, shapes, locations, and connections. (Grade 5) CCR-GL LI 3-5, 3.10. Draw a floor plan to scale. (Grade 5)		
	Using	CCR-GL NS 4. Use information graphics provide to identify the next step in a process. [US-ACT Level 3-2]	CCR-GL NS 3-5, 4.1. Identify the parents, grandparents, aunts and uncles of any random person on a family tree (e.g., Royal, personal). (Grade 4). CCR-GL NS 3-5, 4.2. Self-navigate to emergency exits using arrows printed on a floor plan. (Grade 5) CCR-GL NS 3-5, 4.3. Identify the next step to take using a flowchart or process chart. (Grade 5) CCR-GL NS 3-5, 4.4. Create a process chart or flowchart. (Grade 5) CCR-GL NS 3-5, 4.5. Assemble objects using the assembly diagrams provided in instruction manuals. (Grades3-5) [US-ITEEA USE 3-5, 12-d. (Modified)]	CCR-GL NS 6-8, 4.1. Physically navigate between two geographic locations using a city map and no voice instruction. (Grade 6) CCR-GL NS 6-8, 4.2. Make a to-do list and calendar entries from a GANTT chart and vice versa. (Grade 6)	
	Translating	CCR-GL NR 5. Translate graphic information into an accurate lay language narrative.	CCR-GL NR 3-5, 5.1. Articulate trends displayed in a simple chart, graph, or diagram, in terms of the real-world phenomena each represent (e.g., "the graph bars get higher as they go to the right," which means each year, the city is getting more and more rain.) (Grade 4) CCR-GL NR 3-5, 5.2. Select between a few given narratives the one that most accurately describes what is shown in a simple chart, graph, or diagram and explain why a specific narrative was chosen over others.	CCR-GL NR 6-8, 5.1. Describe, using verbal and written instructions, how to navigate between two locations, using a city map as the only source of information. (Grade 6) CCR-GL NR 6-8, 5.2. Identify the correct and incorrect information that can be drawn from a graph or group of graphs and how to avoid potential misinterpretation (e.g., a graph that shows how the scaling can make it appear that the number of women attending a gym is double the number of men attending, when actually the numbers are similar). (Grade 6)	
More Complex Graphics	Reading	CCR-GL DU 7. Locate or generate information from graphics or graphical elements used in combination. [US-ACT Level 4-1]		CCR-GL DU 6-8, 7.1. Use a sequence of graphics in combination (e.g., bar chart, pie chart, flowchart, tables, diagrams, maps, and dashboards) to find information (e.g., find information located in a graph that in turn must be located from a table of figures in a policy report.) CCR-GL DU 6-8, 7.2. Identify needed information within a single graphic containing multiple levels of data (e.g., multipart bills, filled-out tax forms, dosage charts, logs, maps, train schedules). CCR-GL DU 6-8, 7.3. Extract new information by combining information from legends, scales, and/or numeric annotations found within a graphic (e.g., find the distance between the two tallest mountains using a map having a legend and a scale). CCR-GL DU 6-8, 7.4. Use 2D orthographic projections to find features in a 3D diagram and vice versa. CCR-GL DU 6-8, 7.5. Identify high and low terrain in topographic maps. CCR-GL DU 6-8, 7.6. Use drawings of an object's components to arrange the components to yield an assembly diagram that will explain how an object is constructed. [CAN-QU CON 7-8, Level 4-2.3. (Modified).] CCR-GL DU 6-8, 7.7. Identify and narrow down a table or graphic containing specific information required from a list or sequence of many graphics (e.g., list of figures within a policy report).	
	Comparing	CCR-GL TW 8. Compare two or more pieces of graphical information for consistency, errors and incomplete information. [US-ACT Level 4-2]		CCR-GL TW 6-8, 8.1. Locate "holes" in timetables. CCR-GL TW 6-8, 8.2. Locate missing or incorrect steps in GPS directions. CCR-GL TW 6-8, 8.3. Identify missing data points in a scatter plot. CCR-GL TW 6-8, 8.4. Identify mislabeled legends or scales. CCR-GL TW 6-8, 8.5. Explain why a step diagram containing open and closed symbols at the same X-axis value, is not an error.	
	Identifying Trends	CCR-GL TR 9. Identify a trend, pattern, and/or relationship using graphic information. [US-ACT Level 4-3]		CCR-GL TR 6-8, 9.1. Extract at least two major conclusions from graphics that contain two levels of data within them (e.g., a column chart with two types of columns and two Y-axes; a clustered column chart; a weather map showing temperatures and pressures; a radar/spider chart.) CCR-GL TR 6-8, 9.2. Extract information from two or more graphics (i.e., charts, graphs, diagrams) providing different information on the same topic. CCR-GL TR 6-8, 9.3. Read a public transportation timetable and describe how an individual would use a sequence of connected journeys to get from one location to another. CCR-GL TR 6-8, 9.4. Identify and create walking directions from a site on one floor to a site on another floor using multiple floor plans from the same building. CCR-GL TR 6-8, 9.5. Describe the sequence of steps and likely outcome indicated by a flow chart or process diagram. CCR-GL TR 6-8, 9.6. Describe transactions and/or relationships using vertex-edge graphs (e.g., social network diagrams).	
	Creating	CCR-GL DR 10. Create graphics containing multilevel information or displaying a trend, pattern, or relationship.		CCR-GL DR 6-8, 10.1. Create column charts with two types of columns and two Y-axes. CCR-GL DR 6-8, 10.2. Create a clustered column chart. CCR-GL DR 6-8, 10.3. Create other graphics that contain two levels of quantitative data (e.g., a weather map showing temperatures and pressures, a radar/spider chart). CCR-GL DR 6-8, 10.4. Create floor diagrams containing an exit route. CCR-GL DR 6-8, 10.5. Create a GANTT chart from a list of tasks and deadlines. CCR-GL DR 6-8, 10.6. Create flow charts and process diagrams. CCR-GL DR 6-8, 10.7. Draw hierarchical diagrams, such as organizational charts or conceptual hierarchies based on reading textual information. [CAN-QU CON 7-8, 2. Level 4-3.4] CCR-GL DR 6-8, 10.8. Describe and illustrate transactions and/or relationships using vertex-edge graphs (e.g., social network diagrams).	
	Determining Accuracy	CCR-GL DA 11. Identify whether a graphic is accurately representing the data. [US-ACT Level 4-4]		CCR-GL DA 6-8, 11.1. Identify the trends displayed in bar graphs, column graphs, and scatter plots even when axes are reversed or inverted; the scale is shrunk or magnified; the axes are truncated; or the graph is translated along an axis. CCR-GL DA 6-8, 11.2. Identify information that is erroneously labeled or portrayed in a column graph, bar graph, or scatter plot (e.g., a taller bar with an overlay label that says the bar represents a smaller amount) and explain what the error is. CCR-GL DA 6-8, 11.3. Given several possible extrapolations of data found in a graphic, provide evidence (i.e., supported arguments) that one extrapolation is or is not a better choice than the others.	
	Making Decisions	CCR-GL IN 12. Make inferences or decisions based on information contained in a graphic. [US-ACT Level 4-5]		CCR-GL IN 6-8, 12.1. Extrapolate trends observed in scatter plots or other graphics out to future points in time and describe the future real life implications of these trends.(Grade 8) CCR-GL IN 6-8, 12.2. Discuss graphics affiliated with news articles and whether the graphics support the conclusion given in the news article. CCR-GL IN 6-8, 12.3. Choose the correct item to buy given purchasing criteria and tables of specifications for the various possible choices. CCR-GL IN 6-8, 12.4. Select items that will all fit in a room given a catalog of items and a floor plan, but no software aids. CCR-GL IN 6-8, 12.5. Determine whether a regulation (e. g., compare a floor plan against regulatory requirements for accommodating disabled people in buildings) is met given a public regulation and a graphic displaying the situation. CCR-GL IN 6-8, 12.6. Infer the impacts on a specific community or home from the maps and diagrams describing proposed development activities in a community master plan.	
	Translating	CCR-GL NRA 13. Translate more complex graphic information into an accurate lay language narrative.		CCR-GL NRA 6-8, 13.1. Explain the likely physical features associated with contours on a contour map (e.g., hill or river valley in topographic maps; high and low pressure zones in weather maps). CCR-GL NRA 6-8, 13.2. Explain the physical meaning of any randomly selected, individual data point on a scatterplot (e.g., this data point represents a student who is in the third grade and has a test score of 85.). (Grade 8) CCR-GL NRA 6-8, 13.3. Identify trends (i.e., increasing, decreasing) in scatter plots and describe what the trends imply in real life terms. CCR-GL NRA 6-8, 13.4. Construct a narrative explanation of a phenomenon or situation from an assortment of graphs, diagrams, and tables each giving different information on the topic.	
	Selecting	CCR-GL ID 14. Select an effective graphic given a defined purpose. [US-ACT Level 5-1]		CCR-GL ID 6-8, 14.1. Compare a set of given graph types, select the most effective graph type to use, and explain why chosen when given a data set with a defined purpose. CCR-GL ID 6-8, 14.2. Construct a graph that best illustrates the defined purpose when given a data set with a defined purpose. CCR-GL ID 6-8, 14.3. Explain how well various charts work in answering a specific question given a set of different types of graphs showing the same data in different ways. CCR-GL ID 6-8, 14.4. Develop a question (e.g., on what days this month were average temperatures the most different between Washington, DC and New York, NY) to answer, collect the data to determine the answer, and then decide how to best present the data in a graph so that it answers the question originally posed. CCR-GL ID 6-8, 14.5. Design and create a second alternate graph that answers a given question in a different way and discuss how well the new graph answers the question compared to the original graph with its original question and data.	
	Reading	CCR-GL LIA 15. Find information in more complex graphics, including unusual graphic types, those containing multiple variables, or those densely displayed information. [US-ACT Level 5-2]			CCR-GL LIA 9-12, 15.1. Locate specific pieces of information within complex graphics, such as weather maps showing three or more variables simultaneously (e.g., temperature, pressure, precipitation type, wind speed, direction of moving fronts); line charts having double Y-axes and multiple data series; infographics having many components, network diagrams containing hundreds of elements or displayed at multiple levels of magnification, or graphs with three axes. CCR-GL LIA 9-12, 15.2. Extract more than two levels of meaning from graphics that contain more than two levels of data within them (e.g., (real estate): a chart with two y axes showing total value of housing inventory overlaid by line graphs depicting days in inventory, both plotted against month in which measure was taken (+axis), and dotted lines showing averages of total inventory value and days. (meteorology): a weather map showing pressure, temperature, precipitation type, and motion of pressure zones.)
		CCR-GL LIB 16. Locate and codify information in complex graphics, using information found in a second graphic. [US-ACT Level 5-3]			CCR-GL LIB 9-12, 16.1. Fill out unfamiliar forms (e.g., tax forms having multiple sub-forms) given an unorganized collection of data, some of which is in graphic form (e.g., receipts in a box). CCR-GL LIB 9-12, 16.2. Prepare a complex representation of information that contains multiple data sets representing more than two variables. CCR-GL LIB 9-12, 16.3. Draw the 2D slice corresponding to a cut shown in a 3D diagram or 3D graph. CCR-GL LIB 9-12, 16.4. Draw a 3D representation from 2D views of an object.
	Identifying Trends	CCR-GL TRA 17. Be able to identify and interpret a trend/pattern/relationship using these more complex graphics. [US-ACT Level 5-4]			CCR-GL TRA 9-12, 17.1. Identify patterns or trends from graphics containing three axes or multiple data series. CCR-GL TRA 9-12, 17.2. Draw conclusions from graphs containing more than three axes or multiple data series, about the dependent variable's relationship to each of the independent variables.

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College-Level /Technical Document Literacy	Justifying Decisions	CCR-GL JUS 18. Be able to make and justify an inference or decision based on these more complex graphics. [US-ACT Level 5-5]			CCR-GL JUS 9-12, 18.1. Read graphs with three axes or multiple data series and answer a question relating to one of the variables (e.g., given a brief summary of the year's growth goals and strategies of five engineering companies along with a graph that plots the quarterly profits of the five companies over one year. Determine which company had the most successful year and explain why. There is no absolute right answer, but requires thinking about the information and providing justification for answers.) CCR-GL JUS 9-12, 18.2. Use multiple graphs on the same topic (e.g., hurricane category over time, hurricane path, rainfall amount over time, population density distribution) to justify an inference that integrates graphed variables (e.g., which city suffered the most damage or had the highest cost of recovery per capita). CCR-GL JUS 9-12, 18.3. Review raw data that describes multiple interacting variables and, with the use of graphs, come to a judgement or conclusion (e.g., arrive at a health care improvement strategy using patient satisfaction ratings coded against the service provided, the doctor, the hospital, patient gender).
	Determining Accuracy	CCR-GL ACA 19. Identify the graphic that accurately represents the data. [US-ACT Level 5-6]			CCR-GL ACA 9-12, 19.1. Research online examples of graphics that suggest two different conclusions on the same issue (e.g., graphs showing national deficits or crime rates over time). CCR-GL ACA 9-12, 19.2. Manipulate the presentation of data, without actually falsifying it, to make a desired conclusion more believable or more obvious, and then debate if the change was ethical. CCR-GL ACA 9-12, 19.3. Recognize when the information from 2D views is insufficient to recreate a 3D graph or object and identify what information is missing.
	Corresponding Mathematics	CCR-GL MA 20. Relate graphic trends, patterns, relationships to corresponding mathematics.			CCR-GL MA 9-12, 20.1. Identify the trends across both a histogram and its corresponding cumulative graph and explain how features on one graph translate to another (e.g., a maximum on one graph leads to an inflection point on the other). CCR-GL MA 9-12, 20.2. Use narratives to create graphics containing a trend (e.g., car sales at a dealership start at 50 per month and double each month for a year), and then describe the trend in terms of its closest mathematical form (e.g., linear increase, exponential decrease, quadratic increase, etc.) CCR-GL MA 9-12, 20.3. Describe the mathematics driving the trends (e.g., positive linear, negative quadratic, positive exponential, etc.) given a graph with trend line(s), and then write the generic form of the corresponding mathematical equation (e.g., y=mx+b) and suggest narratives for what each graph might represent (e.g., spread of disease over time; cost of electronics over time; grade distributions in a class; poverty distribution in a region; relationship between organic vs. inorganic crop prices).
	Translating	CCR-GL NAB 21. Integrate and translate multiple pieces of graphic information into an accurate lay language narrative.			CCR-GL NAB 9-12, 21.1. Combine information from multiple graphics or maps in order to create a detailed narrative about a place, experience, social issue, or scientific experiment. CCR-GL NAB 9-12, 21.2. Interpret contour maps showing gradients (e.g., topographic maps showing height gradients; weather maps showing pressure gradients; population maps showing density gradients; pollution maps showing chemical concentration gradients) and explain what the gradients mean and why each are important. CCR-GL NAB 9-12, 21.3. Find information in a complex graphic, create a new graphic that explains the information more relevantly to a lay audience, and write a lay language narrative.
	Tackling Unfamiliar Graphics	CCR-GL UN 22. Decode and explain a complex, unfamiliar graphic			CCR-GL UN 9-12, 22.1. Decode a complex, unfamiliar graphic using sequential steps of isolation and identification of graphic elements (e.g., legend, scale, drawn objects). CCR-GL UN 9-12, 22.2. Determine the content of the graphic by conducting internet research on the decoded graph elements. CCR-GL UN 9-12, 22.3. Construct a narrative explaining the graphic in a societal, practical, scientific, or other context.
	Optimizing Graphic Presentation	CCR-GL OPT 23. Optimize graphics to achieve a desired audience outcome.			CCR-GL OPT 9-12, 23.1. Understand and explain methods for measuring the effectiveness of a graphic (e.g., polls, a/b testing, comprehension quizzes). CCR-GL OPT 9-12, 23.2. Design a graphic to encourage a specific audience outcome (e.g., buy a product, understand societal trends, follow instructions) and measure the impact of graphic choice on that outcome. CCR-GL OPT 9-12, 23.3. Refine a graphic's design to optimize an audience outcome.

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