

Best Use of Data Charts and Graphs

Time

45 minutes.



Materials

Resources

TR1—Data Set Cards

TR2—Data Display Cards

Handouts

TH1—Using Data Charts and Graphs

TH2—Data Displays: Some Possible “Best” Matches

General

Card stock

Scissors

Purpose

To help Data Team members understand a variety of data displays and their appropriate use, especially for going visual with data.

Overview

Best Use of Data Charts and Graphs is an activity in which Data Team members engage in dialogue about different data displays and their appropriate use by matching data sets and data displays and providing rationale for their matches.

Audience

Data Team.

Use

Primary Task: Task 5.

Advance Preparation

1. Make one copy for each Data Team member of Handout TH1 (Using Data Charts and Graphs).
2. Make two copies of Handout TH2 (Data Displays: Some Possible “Best” Matches).
3. Make enough copies of Resources TR1 (Data Set Cards) and TR2 (Data Display Cards) so that each pair of participants will have one set of both cards. Use card stock (suggested) or paper and cut along the lines provided to make the card sets.

Procedure

1. Explain that the purpose of the activity is to help the team understand various data displays and how to use them appropriately.
2. Ask the Data Team to consider why it is important to go visual by using a data display. Chart their responses and comment as appropriate in terms of how going visual helps Data-Driven Dialogue.
3. Ask the Data Team to brainstorm various specific types of data displays that they have used or seen. Chart their responses.
4. Distribute Handout TH1 (Using Data Charts and Graphs) to each team member and ask them to quickly scan the types of data displays. Which ones were on their brainstormed list? Which ones were not?

5. In a read-pair-share, ask team members to review the handout, looking for ideas that are new for them or ideas that raise questions for them, and then have members partner to share their ideas and questions.
6. Debrief the result of their conversations with the entire team by asking, “What were some of your new ideas? What were some of your questions?” Chart the questions that team members had and clarify as needed, using other team members as a resource when possible.
7. Have the Data Team return to their pairs and give each pair one copy each of Resources TR1 (Data Set Cards) and TR2 (Data Display Cards). Explain that each pair is to review the Data Set Cards and discuss which type of data display illustrated on the Data Display Cards would be most appropriate for that data. What is their rationale? What other displays might also be appropriate for each data set?
8. After the groups have had an opportunity to explore all of the cards, distribute one copy of Handout TH2 (Data Displays: Some Possible “Best” Matches) to each group. Have them review the sheet and discuss how their responses matched up with these. Remind them that there may be more than one “best” response.
9. At the conclusion of the activity, ask the team for any insights they gained from the activity.

Contributed by Jennifer Unger, The GroupWorks, LLC, Grafton, Massachusetts.

Data Set Cards

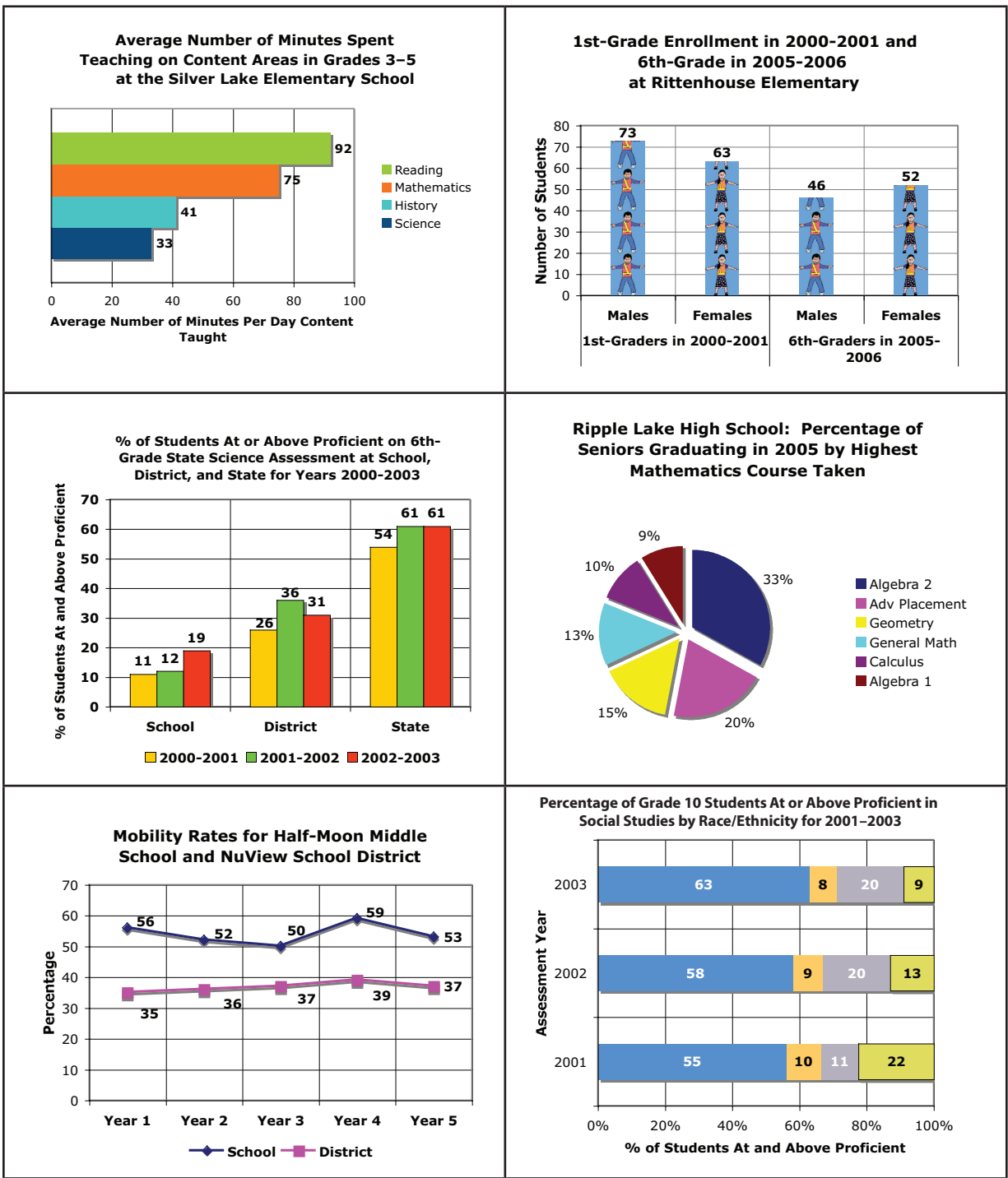
(cut before distributing)

Percentage of students at Cook Elementary School at each grade level	Percentage of elementary students at each performance level on state criterion-referenced tests in ELA, mathematics, and science
Number of teachers (n = 432) highly qualified in each core subject area districtwide	Raw scores of students in Ms. Green's 8th-grade English class (n = 21 students) on pre- and post-unit tests (n = 5 units) from September 2005 through April 2006
Number of dropouts and suspensions for the past five years	Distribution of students (n = 210) at Memorial High School at four levels of proficiency on 10th-grade local criterion-referenced exam
Student enrollment by grade level K-12	Number of violent acts by four categories: abusive language, threats, physical assault, assault with a dangerous weapon
Status of 15 district schools by AYP classification	Number of students (n = 612) at Idylwilde Elementary School eating breakfast every morning
Number of students in Lake Wobegone School District arriving by different means of transportation (i.e., school bus, car, walking, city transportation)	Number of students graduating from high school each year for the past five years

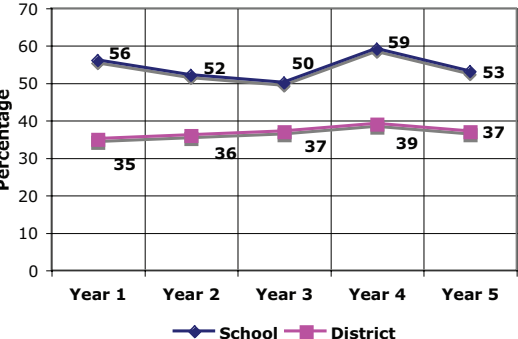
<p>Numbers of teachers at Meadowlark Middle School who took part in four professional development opportunities: Best Math Program Training, Conflict Management, Writing Portfolio Training, Cultural Proficiency Training</p>	<p>Number of students enrolled in chemistry for the past three years disaggregated by race/ethnicity and gender</p>
<p>Percentage correct on each strand of state mathematics exam for grades 6, 7, and 8</p>	<p>Ethnic diversity of staff by percentage</p>
<p>Percentage of students at proficient and above on state assessment in mathematics disaggregated by race/ethnicity (White, African American, Latino/a, Asian)</p>	<p>Percentage of students at proficient and above on state assessment in science for the past four years</p>

Data Display Cards

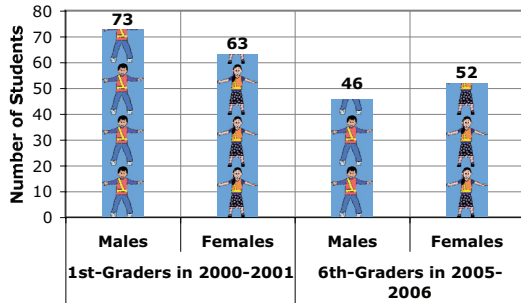
(cut before distributing)



Using Data Charts and Graphs

<p>Average Number of Minutes Spent Teaching on Content Areas in Grades 3–5 at the Silver Lake Elementary School</p>  <p>Average Number of Minutes Per Day Content Taught</p> <table border="1"> <thead> <tr> <th>Content Area</th> <th>Average Number of Minutes</th> </tr> </thead> <tbody> <tr> <td>Reading</td> <td>92</td> </tr> <tr> <td>Mathematics</td> <td>75</td> </tr> <tr> <td>History</td> <td>41</td> </tr> <tr> <td>Science</td> <td>33</td> </tr> </tbody> </table>	Content Area	Average Number of Minutes	Reading	92	Mathematics	75	History	41	Science	33	<p>BAR GRAPH (HORIZONTAL)</p> <ul style="list-style-type: none"> • Illustrate comparison of performance • Use for a series with long labels • For example, displaying aggregated student achievement scores by content or (as in example) number of minutes subject is taught 								
Content Area	Average Number of Minutes																		
Reading	92																		
Mathematics	75																		
History	41																		
Science	33																		
<p>% of Students At or Above Proficient on 6th-Grade State Science Assessment at School, District, and State for Years 2000-2003</p>  <p>% of Students At and Above Proficient</p> <table border="1"> <thead> <tr> <th>Year</th> <th>School</th> <th>District</th> <th>State</th> </tr> </thead> <tbody> <tr> <td>2000-2001</td> <td>11</td> <td>26</td> <td>54</td> </tr> <tr> <td>2001-2002</td> <td>12</td> <td>36</td> <td>61</td> </tr> <tr> <td>2002-2003</td> <td>19</td> <td>31</td> <td>61</td> </tr> </tbody> </table>	Year	School	District	State	2000-2001	11	26	54	2001-2002	12	36	61	2002-2003	19	31	61	<p>BAR GRAPH (VERTICAL)</p> <ul style="list-style-type: none"> • Illustrate comparisons between or among groups • Emphasize variations and differences • Categories should follow a natural order or the bars should appear in order of height • Can also be displayed as a horizontal bar graph • When possible, the frequency axis (x) should include zero; otherwise it can be misleading • If including zero as the starting value is not possible, this should be clearly noted • All bars should be the same width and spaced evenly • For example, displaying trends in student achievement over time 		
Year	School	District	State																
2000-2001	11	26	54																
2001-2002	12	36	61																
2002-2003	19	31	61																
<p>Mobility Rates for Half-Moon Middle School and NuView School District</p>  <p>Percentage</p> <table border="1"> <thead> <tr> <th>Year</th> <th>School</th> <th>District</th> </tr> </thead> <tbody> <tr> <td>Year 1</td> <td>56</td> <td>35</td> </tr> <tr> <td>Year 2</td> <td>52</td> <td>36</td> </tr> <tr> <td>Year 3</td> <td>50</td> <td>37</td> </tr> <tr> <td>Year 4</td> <td>59</td> <td>39</td> </tr> <tr> <td>Year 5</td> <td>53</td> <td>37</td> </tr> </tbody> </table>	Year	School	District	Year 1	56	35	Year 2	52	36	Year 3	50	37	Year 4	59	39	Year 5	53	37	<p>LINE GRAPH (OR PLOT GRAPH)</p> <ul style="list-style-type: none"> • Show changes and trends over time • Display incidences, occurrences, and/or observations over time, etc. • Not necessary to put zero on y-axis • Multiple lines can be used to display more than one data set to explore relationships between the two over time • For example, aggregated data over three years or dropout rates over time
Year	School	District																	
Year 1	56	35																	
Year 2	52	36																	
Year 3	50	37																	
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Year 5	53	37																	

1st-Grade Enrollment in 2000-2001 and 6th-Grade in 2005-2006 at Rittenhouse Elementary

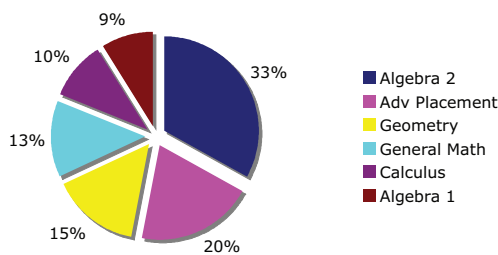


PICTOGRAPH

- Display data as symbols, pictures, or illustrations related to the information being conveyed
- Provides added interest to data displays
- Makes abstract comparisons more concrete; can be useful in working with children
- Image may be used to represent bars on a bar graph (in terms of both the length and width of the image) or an image may represent a specific number of units (e.g., one child could equal 10 students)
- For example, percentage of students that graduate from high school for a three-year period illustrated by a "bar" consisting of graduation hats (mortarboards)

(Chart adapted from Ruth Johnson, *Setting Our Sights: Measuring Equity in School Change*, 1996, p. 31. Los Angeles: The Achievement Council. Used with permission.)

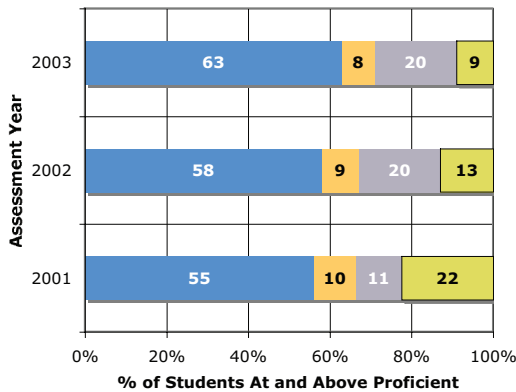
Ripple Lake High School: Percentage of Seniors Graduating in 2005 by Highest Mathematics Course Taken



PIE CHART

- Illustrate parts to the whole (100%)
- Show relative sizes of items or groups that make up the sum of the items
- Use for distribution or relation of parts to the whole (100%)
- Provide simple illustration for one data set
- Not recommended for more than six sections
- Very small sections can be misleading
- Sections should not be highlighted unless there is a very good reason
- For example, displaying the district or school demographic composition

Percentage of Grade 10 Students At or Above Proficient in Social Studies by Race/Ethnicity for 2001-2003



STACKED BAR GRAPH

- Illustrate comparisons between or among groups
- Show the relationship of parts to the whole (100%)
- Useful in bringing out the proportions in relation to the whole (100%)
- Can be easily read even though there may be four or five groups or proportions being displayed.
- For example, displaying the percentage of students at or above proficient by group

Data Displays: Some Possible “Best” Matches

DISPLAY	DATA SETS
Bar Graph (Horizontal)	<ul style="list-style-type: none"> • Student enrollment by grade level K-12 • Raw scores of student in Ms. Green’s 8th-grade English class (n = 21 students) on pre- and post-unit test (n = 5 units) from September 2005 through April 2006 • Status of 15 district schools by AYP classification • Numbers of teachers at Meadowlark Middle School who took part in four professional development opportunities: Best Math Program Training, Conflict Management, Writing Portfolio Training, Cultural Proficiency Training
Bar Graph (Vertical)	<ul style="list-style-type: none"> • Percentage of elementary students at each performance level on state criterion-referenced tests in ELA, mathematics, and science • Number of students graduating from high school each year for the past five years • Percentage correct on each strand of state mathematics exam for grades 6, 7, and 8 • Number of teachers (n = 432) highly qualified in each core subject area districtwide
Line Graph (or Plot Graph)	<ul style="list-style-type: none"> • Number of dropouts and suspensions for the past five years • Percentage of students at proficient and above on state assessment in science for the past four years • Number of students enrolled in chemistry for the past three years disaggregated by race/ethnicity and gender
Pictograph	<ul style="list-style-type: none"> • Number of students (n = 612) at Idylwilde Elementary School eating breakfast every morning • Number of students in Lake Wobegone School District arriving by different means of transportation (i.e., school bus, car, walking, city transportation) • Number of violent acts by four categories: abusive language, threats, physical assault, assault with a dangerous weapon
Pie Chart	<ul style="list-style-type: none"> • Ethnic diversity of staff by percentage • Percentage of students at Cook Elementary School at each grade level
Stacked Bar Graph	<ul style="list-style-type: none"> • Percentage of students at proficient and above on state assessment in mathematics disaggregated by race/ethnicity (White, African American, Latino/a, Asian) • Distribution of students (n = 210) at Memorial High School at four levels of proficiency on 10th-grade local criterion-referenced exam

* A number of responses may be possible.