Making Sense of Assessment Data

What should a program do after assessment data collection (e.g., after administering a test, after evaluating using a rubric, after receiving questionnaires)? This workshop talks about how to use meaningful questions to guide data analysis. It offers practical techniques to summarize and synthesize assessment data that are numeric and text-based. With hands-on exercises and small group discussions, the participants will be able to apply different data summarization techniques to turn raw data into meaningful information.

Level: Beginner
Format: Presentation + interactive activities
Date/time/location:
Friday, Sep 27, 2013, 1:30 pm - 3:00 pm, QLC 208
or
Thursday, Oct 3, 2013, 9:00 am - 10:30 am, QLC 208
We believe assessment is a tool to improve student learning. This workshop is to support our office’s mission.
Program assessment is iterative and involves five steps. First, the program establishes learning outcomes, which describe what successful students know, do, and value at the end of the program. Second, the program creates learning opportunities for students such as projects, writing assignments, oral presentations, etc. Third, the program collects and analyzes student work in order to determine how well students are meeting the learning outcomes. Fourth, the data is summarized and presented in meaningful ways to support decision-making. Fifth, using those assessment results, the program develops and implements an improvement plan to evolve the program so that student learning is improved. The program also celebrates success when its assessment results indicate that students are meeting the learning outcomes at a high standard. This workshop focuses on summarizing and presenting data results.
Learning Outcomes

1. List considerations for planning a summary & an analysis
2. Use basic statistics in data summarization
3. Describe the audience and purposes for different summary techniques
4. Plan to apply at least one technique to summarize numeric data and one technique to summarize open-ended text data

To make sense of data, we need to summarize data in a meaningful way and present data to tell a story. Much of this workshop will focus on data summarization techniques. Here is the list of the learning outcomes.

Agenda

• Planning a summary and an analysis
• Basic ways to summarize data
  – Achievement question (from 1 or more data sources)
  – Change over time
  – Difference between groups
  – Summarizing comments/open-ended responses
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Planning a Summary & an Analysis

• Questions to be answered
• Audience
• Standards or Benchmarks

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Questions to be Answered

Questions to be answered:
• Achievement – Did we meet the target?
• Change across time – did we get better over time? Do we have more students meeting expectations over time?
• Difference across group – Did all students learn? Do Native Hawaiian students learn as well as other students?

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Internal audience includes
• Assessment development partners
• Assessment committee
• Curriculum committee
• Faculty in the program
• Deans and administrators

External audience includes
• Students (can also be internal audience, depends on level of involvement in the assessment process)
• Parents
• BOR
• Accrediting agency
• Program review visit team
• Perspective students

In general, there are two purposes for conducting assessment:

• Curriculum improvement, and we want the major purpose for assessment activities on this campus to be for improvement purposes
• Demonstration of accountability

All audiences are interested in both purposes but the internal audience plays a bigger role in improvement and the external audience is more interested in accountability related questions, such as “Do most of the students achieve learning outcomes of the program?”

As a rule of thumb, results for improvement purposes and for the internal audience can be more detailed, and results for accountability purpose and for the external audience are more general, succinct, and to the point.
Standards/Benchmarks

- 80% of the students will achieve the minimum performance level on all outcomes
- The average score on the national licensure exam will be above national average

Benchmarks are expressed in different ways. They themselves dictate how we should summarize data and present the results. If the benchmark is stated in the form of a percentage, then provide percentages in data summary. If the benchmark is about the average test score, then we need to summarize data in the form of averages.
1. Tallies give us numbers in different categories: how many met the expectation and how many failed. When our data involve a small number of sample (like students or comments), it is sufficient to provide just the tallies or counts.
2. Percentages are good in showing us the patterns and trends in data, especially when we compare data sources that involve different number of participants. Percentages are also good in telling a story when we deal with a large number of students or comments. However, even when we provide percentages, we should also provide the total number of the analysis units, be it students, faculty, questions, or comments.
3. Averages are very useful as well, especially when dealing with test scores. If our sample is big enough, averages tells what is typical.
4. When we deal with open-ended survey questions, or student comments, we can analyze the tests in various ways and present a summary of the themes that we identified.
This presents the results from a rubric evaluation of student research papers. We can see the number of students received each level of rating under different criteria. For example, there are 20 students who performed below expectation in terms appropriately using sources. There are also 20 of them exceeded the expectation.

This showed how many participants at different agreement or disagreement levels regarding the self-perceived learning of techniques in this workshop.
This are the same rubric evaluation results summarized in percentages. The patterns are the same here as the one presented in tallies because the total number of papers rated is 100. So the tallies equal percentages. But when the total number papers is a different number, say 85, percentages would be much more revealing than simple tallies.

Same perceived learning survey data, but presented in percentages.
### Averages for Test Scores

**Scientific Method (Average = 85%)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Average % Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>80%</td>
</tr>
<tr>
<td>Item 4</td>
<td>90%</td>
</tr>
<tr>
<td>Item 7</td>
<td>80%</td>
</tr>
<tr>
<td>Item 10</td>
<td>90%</td>
</tr>
</tbody>
</table>

**Quantitative Reasoning (Average = 43%)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Average % Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 2</td>
<td>20%</td>
</tr>
<tr>
<td>Item 3</td>
<td>30%</td>
</tr>
<tr>
<td>Item 6</td>
<td>80%</td>
</tr>
</tbody>
</table>

In addition to tallies and percentages, averages are another way to present data. They are particularly useful to summarize test scores. This example shows that we are assessing two competencies in this test: identifying appropriate scientific method and quantitative reasoning. Under each competency, we used multiple items to assess it. For each item, we calculated average student % score. Some items may worth 1 point, and other points worth 2 points. Using % scores puts item scores on a equal scale.
SUMMARIZING ACHIEVEMENT WITH A SINGLE DATA SOURCE
(TASK A & B ON HANDOUT)

SUMMARIZING ACHIEVEMENT WITH MULTIPLE DATA SOURCES
(TASK C ON HANDOUT)
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Tips in Summarization

- Sort the results in a meaningful order
- Present only the information necessary for the intended audience
- Be concise. Consider putting the detailed raw summaries in the appendix
- Avoid decimals in the percentages
- Calculate valid percentages: use question completers as denominator
- Consider visuals: graphs/charts (see an example)

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CHANGE OVER TIME
This table presents the achievement data across three years and the 3-year percent change. For example, only 5% of the students achieved SLO 4 in Year 1 compared to 15% students that achieved SLO 4 in Year 3, we witnessed a 300% increase in Year 3. We can emphasize the change of a particular SLO that can be a cause for concern. In our case, the achievement on SLO 3 decreased by 13% in Year 3. We can present this percentage in red.
Graphically, I can present the data using 4 data lines. Each line represents a SLO, and each dot represents a year. We use line charts to present time-series data. The first step in formatting this chart is to make sure that the scale on the Y-axis ranges between 0 and 100%. Then we can add data labels to make information available in the chart. We can delete all the grid lines and Y-axis to make useful information clean and “pop out.”
To some individuals, processing one outcome at a time is easier. Since I present 4 charts here, I eliminated even more lines. That being said, I maintained the same scale of Y-axis (i.e., between 0 to 100) to make the comparisons possible.
This table compares the achievement between Native Hawaiian Students (NH) and Non-Native Hawaiian (Non-NH) students under each outcome. It ordered the outcomes from the ones that NH under-performed to the ones that they over-performed their counterparts. I put the number that can be a cause of concern in red.

Group comparisons are often presented in bar charts. If we use data labels, we can eliminate grid lines to make it cleaner.
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Percent of Students Who Met the Expectation on Each SLO: Comparisons between Native Hawaiian (NH) and Non-Native Hawaiian (NON-NH)

- Analysis: NH 5, NON-NH 10
- Use Sources: NH 60, NON-NH 60
- Literature review: NH 35, NON-NH 31
- Methodologies: NH 90, NON-NH 80

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A Brief Review

- Three guiding questions
  - Achievement
  - Change over time
  - Difference across groups

- Three basic statistics
  - Tallies/Counts
  - Percentages
  - Averages

- Considerations
  - Audience
  - Useful for decision-making
  - Benchmarks

- Source
  - Single
  - Multiple
SUMMARY OF THEMES

Text Data

• Open-ended survey questions
• Focus group records
• Reflection papers
• Student feedback minute papers
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Theme Summary Strategies

• Narrative of trends and patterns
• Grouped listings
• Theme and category counts + quotes

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Narrative of Trends and Patterns

Example
“The most prominent suggestion raised by the participants is to increase the length of the workshop, followed by the suggestion to post the material online. A few participants mentioned the following . . .”
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**Narrative of Trends and Patterns**

Useful phrases to use in a report:

- “The greatest strength of the department recognized by the respondents is . . .”
- “XXX is another common theme raised by the students.”
- “The main issues mentioned are . . .”
- “The most prevalent theme/factors are . . .”
- “To a lesser extent, X and Y are mentioned.”

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**Narrative of Trends and Patterns**

**Analysis Strategies**

- Quick read-throughs
  - Random sampling to make it manageable
  - Find a peer to do it too – member check
- Thematic analysis
  - Refer to the resource list

Quick read-throughs can be used to go through text materials quickly to get a general impression. Use quick read-throughs strategy when you are not looking for generalizability or reaching firm conclusions. It is a method to explore, to provide ideas, to generate hypothesis.
See an example on next slide.

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What was the one thing you learned in this workshop that you’ll find most useful?

**Rubrics (13 comments)**
- Characteristics and advantages of different types of rubrics
- Descriptive rubrics seemed useful
- Examples of rubrics

**Multiple Choice (9 comments)**
- Creating multiple-choice questions
- The criteria for writing good MC tests
- Tips for writing multiple choice

**Self-Reflection (5 comments)**
- Reflective writing-I think these will be most useful.
- The self-reflection info will really work for my students.

**General and Miscellaneous (3 comments)**
- Great tips and tools
- How to process and assess the assessment tools we use
- That assessment encompasses test design and grading

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Grouped Listings

Considerations

• Use when statements fall into a few discrete categories.
• Mind the unit of analysis: comments or people?
• Still need to interpret: “Participants mentioned rubrics most often as the most useful thing they learned at this particular workshop, with multiple-choice tests coming in second.”

Theme/Category Counts + Quotes

Table X. Most Useful Workshop Elements

<table>
<thead>
<tr>
<th>Categories</th>
<th>Count of Comments</th>
<th>Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubrics</td>
<td>13</td>
<td>- Characteristics and advantages of different types of rubrics&lt;br&gt;- Creating rubrics is an excellent collaborative exercise by which department colleagues establish common goals</td>
</tr>
<tr>
<td>Multiple Choice</td>
<td>9</td>
<td>- The criteria for writing good MC tests&lt;br&gt;- Creating multiple-choice questions</td>
</tr>
<tr>
<td>Self-Reflection</td>
<td>5</td>
<td>- Reflective writing-I think these will be most useful.</td>
</tr>
<tr>
<td>General and Miscellaneous</td>
<td>3</td>
<td>- Mahalo for the coffee and snacks</td>
</tr>
</tbody>
</table>

When we have a lot of comments, group listing can go on forever. Readers may get lost in trees rather than seeing the forest. Presenting the themes or categories with the count of comments can quickly provide an overview of the kinds of ideas emerged and their relative importance. We can use representative quotes to bring our themes alive. An alternative way of presentation is to not include the quotes in the table, but present them in the summary narratives. For example, “The most mentioned useful thing learned is rubrics. One participant said [put a quote here]. Another participant reported…”
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**Theme Summary Strategies**

- Narrative of trends and patterns
- Grouped listings
- Theme and category counts + quotes

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**Review**

**Considerations**

**Techniques**
- Tallies
- Percentages
- Averages
- Summary of themes
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Source


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Thank you and Questions!

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