You Can’t Fix by Analysis What You’ve Spoiled by Design:
Survey Design Tenets Applied to Evaluations

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— Learning to Care for Those in Harm’s Way —
Disclosures

- None

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Learning Objectives

- Recognize a systematic framework for survey design
- Demonstrate how to apply survey design tenets to the development of evaluations
- Identify common item-writing pitfalls
- Define the purpose of expert validation, cognitive interviews, and pilot testing

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Consider this…

- The puppy problem

- The poodle has 9 puppies.
- The collie has 5 puppies.
- How many more puppies does the poodle have?

- Students’ common response…
  “None”

- Why?
  “It said she had 9 puppies, but it didn’t say she had any more, so it’s none.”

Revised item…

- The poodle has 9 puppies.
- The collie has 5 puppies.
- How many more puppies does the poodle have than the collie?
And this...

Your opinion is that the global economy is the second most important issue in the world today.

The global economy is the most important issue in the world today.

<table>
<thead>
<tr>
<th>strongly disagree</th>
<th>disagree</th>
<th>neither agree nor disagree</th>
<th>agree</th>
<th>strongly agree</th>
</tr>
</thead>
</table>

How important is the issue of the global economy in the world today?

| not at all important | slightly important | moderately important | quite important | extremely important |
Evaluations as Surveys

- **Survey**
  - Abstract concepts
    - Attitudes
    - Opinions
    - Beliefs
  - Create action items
    - Improve attitudes
    - Understand deficits
  - Conversation
    - With respondents

- **Evaluations**
  - Abstract concepts
    - Communication skills
    - Clinical reasoning
    - Professionalism
  - Create action items
    - Improve skills/abilities
    - Provide feedback
  - Conversation
    - With faculty
Principle #1: You can’t fix by analysis what you’ve spoiled by design.

- Critical to get it right at the design phase
  - Measure multi-dimensional concepts

- Poorly written items lead to “bad data”
  - Inconsistent results – fairness issues

- Difficult to develop actionable items
  - Appropriate feedback
Common Language

- **Construct or Concept**
  - Communication Skills

- **Dimension or Facet**
  - Major components of your *construct*, e.g.
  - Communication Skills
    - Opening the discussion, Gathering information, etc…

- **Items (or “indicators”)**
  - Individual questions/statements

- **Scale**
  - > 3 items intended to measure a *construct/dimension*
Common Language

- **Response anchors (aka, “response options”):**
  - All the named points along the response scale

<table>
<thead>
<tr>
<th>Clear fail</th>
<th>Borderline</th>
<th>Clear pass</th>
<th>Exceeds expectations</th>
<th>Exceptional</th>
</tr>
</thead>
<tbody>
<tr>
<td>never true</td>
<td>rarely true</td>
<td>sometimes true</td>
<td>often true</td>
<td>true nearly all of the time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Poor FOK</th>
<th>Limited FOK</th>
<th>Solid FOK</th>
<th>Outstanding FOK</th>
<th>Not observed</th>
</tr>
</thead>
</table>

- **Satisficing:**
  - Respondents compromise standards
    - Don’t put forth effort to answer thoughtfully
1. Manage a hospitalized patient with common infections
2. Discharge a patient safely by coordinating care with the primary care manager.
3. Assess the risk for venous thromboembolism for a hospitalized patient and develop an appropriate prevention plan.
4. Diagnose the cause of altered mental status in a hospitalized patient.
5. Effectively ensures that their patients comprehend the plan of care by avoiding the use of medical jargon.

1. Resident cannot perform this skill even with assistance
2. Resident should perform this skill under direct supervision of a senior resident or fellow
3. Resident can perform this skill under indirect supervision of the attending
4. Resident can perform this skill independently
5. Resident can act as an instructor or supervisor for this skill (aspirational)
Step 1: Literature Review
Step 2: Interviews & Focus Groups
Step 3: Synthesize
Step 4: Develop Items
Step 5: Expert Validation
Step 6: Cognitive Interviewing
Step 7: Pilot Test
Step 1: Literature Review

- Critically evaluate the literature
  - How is the construct defined in prior studies?

- Identify existing scales
  - What items/scales currently exist?
  - Appraise quality
Step 2: Interviews & Focus Groups

- **Goal**
  - Identify initial dimensions of the construct

- **Interview experts**
  - Local faculty

- **Apply open-ended questions**
  - Avoid yes/no, multiple-choice questions
Step 3: Synthesize Literature & Interviews

Goal: Arrive at consensus/agreement
Step 4: Develop Items

Goal: Develop items using vocabulary your target population can understand

- Considerations
  - Vocabulary and wording
  - Response anchor selection
    - Ratings vs. rankings; Likert-scale items; yes/no items?
  - Item formatting
    - Visual design, item order, instructions, etc.
Step 4: Develop Items (examples)

Communication Skills – Standardized Patient Encounter (full scale = 7 items)

Rate the student on the following communication skills:

1. The student introduced themselves properly
2. The student treated you with respect
3. The student used appropriate, open-ended questions
4. The student listened intently, and let you tell your story
5. The student showed interest in your symptoms and concerns

response anchors

<table>
<thead>
<tr>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Step 4: Develop Items (examples)

Course Importance (a belief; the full scale = 6 items)

1. How important was it for you personally to perform well in this course?
2. How important were the practical applications of the information provided in this course?
3. How important was the content of this course?
4. How important was it for you to learn the material in this course?

response anchors

<table>
<thead>
<tr>
<th>not at all important</th>
<th>slightly important</th>
<th>moderately important</th>
<th>quite important</th>
<th>extremely important</th>
</tr>
</thead>
</table>
Principle #2:
The questions guide the answers.

9) What topic(s) of study are you most interested in pursing while at USU? (Total $N = 11$)

Ver 1: Lots of Space
(5 lines)
(n = 5)
-Financing of health care
-Global health, joint operations
-Policy development with regard to military and operational
-Health policy, health economics
-Health care admin and policy

Ver 2: Small Amount of Space
(1 line)
(n = 6)
-Public health
-International health
-(blank)
-(blank)
-Health insurance
-Policy

Total Word Count = 25
Mean Word Count = 5.0

Cohen’s $d = 2.62$
$t(9) = 4.63, p < .001$
Principle #2: The questions guide the answers.

% Answer = Fire Professor

N = 91 Faculty

Pearson $\chi^2(1) = 4.90, p < .05$
Principle #3: A survey is a conversation between you and your respondents.

A note about providing a reason

“because…” or “so that…”

8) As some of you may know, the university is debating whether to move some parts of the university to a new section of campus in Rockville. Do you think the university should move to Rockville?

8) As some of you may know, the university is debating whether to move some parts of the university to a new section of campus in Rockville. Do you think the university should move to Rockville so that the school can have more space?

---

Yes = 12.5%

No

Yes

Pearson $\chi^2(1) = 3.44, p = .06$

n = 8

Yes = 55.6%

No

Yes

n = 9
Common Pitfalls

Creating double-barreled items

- Example Item: “Assess the risk for venous thromboembolism for a hospitalized patient and develop an appropriate prevention plan?”
  - What if one is good and the other is bad?

- Solution: split into two items
  - “Ability to assess risk…?”
  - “Ability to develop a prevention plan…?”
  - Create a double-barreled response anchor??
Common Pitfalls

- **Creating double-barreled items**
  - Construct = *Elaboration*

  ![Inter-Item Correlation Matrix]

  - Item 40. When I study for this course, I write brief summaries of the main ideas from the readings and online discussions

  ![Item-Total Statistics]

  - Cronbach’s alpha = 0.546
Common Pitfalls

- Creating negatively worded items
  - Unnecessary cognitive burden
  - Promotes satisficing
    - “In an average week, how often are you unable to start rounds on time?” (rarely-often)

- Solution: make sure “yes” means “yes” and “no” means “no”
  - “In an average week, how often do you start rounds on time?”
Common Pitfalls

- Using statements instead of questions
  - Example Item: “The learner is respectful to patients based on their gender.”
  - People are better at answering questions
  - Use questions with construct-specific anchors
    - “How often is the learner respectful to patients based on their gender?”
      - Rarely to Always response anchors (frequency)
Common Pitfalls

- What does it mean to “strongly agree” anyway?

Section II: In this section, each question will ask you to indicate how you understand a commonly used phrase by marking an “X” at the appropriate place on the line.

25) When you say that you “strongly agree” with somebody else, what do you mean? Indicate on the line below where “strongly agree” is by marking an “X” on the line.

100% Disagreement

100% Agreement
Strongly Disagreeable Ranges
Common Pitfalls

- **Using too few or too many response anchors**
  - Influences reliability within a set of survey items
    - Too few (<4) → less reliable
    - Too many (>7-9) → diminishing return; false impression of precision
  - Example Item: “How useful was the rotation in emergency medicine?”
Survey Design: 7-Step Process

- Step 1: Literature Review
- Step 2: Interviews & Focus Groups
- Step 3: Synthesize
- Step 4: Develop Items

  - Step 5: Expert Validation
  - Step 6: Cognitive Interviewing
  - Step 7: Pilot Test
Step 5: Expert Validation (aka, content validation)

**Goal:** Make sure the items “ring true” to experts

- Depending on your needs, experts can consider the following for each of your survey items…
  - Clarity
  - Construct relevance
  - Language level
  - Missing facets/aspects
  - Difficulty
Step 6: Cognitive Interviewing

**Goal:** Make sure respondents understand the items as intended by you (the developer)

- Recruit members of the targeted population
  - e.g., students, teachers, patients, locals, etc.
- Conduct one-on-one interviews, in “laboratory” or other location
- **THEN:** Make informed decisions, with cognitive interview as one source of input
Step 6: Cognitive Interviewing

Example

“In the last year, have you been bothered by pain in the abdomen?”

- What problems do you anticipate?
  - What time period are you thinking about?
  - What does “bothered by pain” mean to you?
  - Where is your “abdomen?”
Step 6: Cognitive Interviewing

Example

“Please look at this diagram. During the past 12 months, have you had pain in this area (the area shaded on the diagram)?
Step 7: Pilot Testing

“Get to know” your descriptive statistics

- Do individual survey items “hang together”?
  - Factor analysis and reliability analysis

- Scale #1
  - Item 1
  - Item 4
  - Item 7
  - Item 8
  - Item 10
  - Item 15

- Relation to other dimensions as you would expect?
  - (+) correlations with Clinical Reasoning
  - (-) correlations with Clinical Exam Skills

Patient Care

calculate a mean score
Questions?

If you remember nothing else, remember…

**Principle #1:** You can’t fix by analysis what you’ve spoiled by design.

**Principle #2:** The questions guide the answers.

**Principle #3:** A survey is a conversation between you and your respondents.

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