Joint Display Analysis for Mixed Methods Research

SAGE MethodSpace Live Webinar

Panelists:
Dr. Michael Fetters and Dr. Tashane Haynes-Brown

Moderators:
Michael Todd and Dr. Janet Salmons
Agenda

Introductions: Michael Todd

Overview: Janet Salmons

Michael Fetters

Tashane Haynes-Brown

Q & A: Continued on MethodSpace
MethodSpace.com, a blog community sponsored by SAGE Publications, offers original posts, guest contributions, interviews, and open-access resources. We focus on all phases of social research, and on ways to write about and share results.
A time for mixed methods & creative presentation of research findings

Our understanding of research problems, and research findings, is different when we use numbers versus pictures and stories. In times like we have with this current pandemic, we can grasp the meaning of the big numbers by hearing about personal experiences. Is this the time for mixed methods to offer more robust explanations that include multiple types of data?
Purpose: To help you to gain a greater understanding of mixed methods integration using joint display analysis.

Process: We will illustrate the iterative process involved in joint display analysis.
A table or figure that represents with structural features the qualitative or quantitative data collection procedures or findings in a juxtaposed representation.

THE ADAPT-IT study that used a joint display

- **Purpose**: assessment of key stakeholder perspectives about adaptive clinical trials for acute brain injury emergencies

- **Data collection**: Survey and Mini-FG interviews

- **Integration**: Merging in a joint display participant attitudes (visual analog scales) with qualitative interview data and free-text comments

13) Adaptive clinical trial designs pose ethical **advantages** from the **patients’** perspective.

<table>
<thead>
<tr>
<th>Definitely Not</th>
<th>Probably Not</th>
<th>Possibly</th>
<th>Probably</th>
<th>Definitely</th>
</tr>
</thead>
</table>

Why?

(U01NS073476) from the National Institutes of Health Common Fund
Quantitative findings presented using box plots

Qualitative findings presented as quotes

Metainferences—interpretation of both types of data

Color coding by group across the quantitative and qualitative data

Circular Joint Display

Theory driven, from mixed methods case study

Core illustrates theory linked to survey scales with statistical significance

1st white ring has qualitative themes

2nd white ring has illustrative quotes

Outside ring has fit

The process of identifying linkages between qualitative and quantitative constructs by developing multiple iterations of a table qualitative and quantitative findings, and organizing the structure to optimize understanding of the mixed findings.

Seven Core Steps in Mixed Methods Data Analysis

1) Enter data, clean the database
2) Frame the analysis according to study purpose
3) Conduct a preliminary analysis
4) Use organizational structure to summarize initial findings
5) Check for inconsistencies
6) Organize findings for dissemination
7) Interpret the findings and write up results

The Iterative Process of Joint Display Analysis

1. Decide on the most suitable numeric and text data to integrate.
2. Compare and contrast quantitative and qualitative case study data.
3. Identify themes, patterns, and anomalies in the results based on the findings of both data sets.

The use of joint display in a mixed methods study into how teacher beliefs shape use of Information and Communication Technology

Dr. Tashane Haynes-Brown

Dr. Michael Fetters

Explanatory Sequential Mixed Methods Design

### Study Overview:

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Who</th>
<th>How many (Response rate = 88%)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire</td>
<td>Teachers</td>
<td>300</td>
<td>To test the significance of beliefs in accounting for use of technology.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>To explore whether there is alignment between teachers’ pedagogic beliefs and use of technology.</td>
</tr>
</tbody>
</table>

Summary Of The Quantitative Results

• Positive significant relationship between the teachers’ pedagogic beliefs, ICT beliefs and use of ICT.

• This model explained 48% of the variance in teachers’ use of ICT.

ICT: Information and Communication Technology

Summary Of The Quantitative Results

- **ALIGNMENT**
  - 1. Highly teacher-centered beliefs + Highly teacher-centered use of technology
  - 2. Highly learner-centered beliefs + Highly learner-centered use of technology
    - **NON-ALIGNMENT**
  - 3. Highly learner-centered beliefs + Highly teacher-centered use of technology

Explaining the quantitative results

1. What are teachers’ understanding of how their beliefs shape their use of technology?
2. How consistent are teachers’ beliefs with their technology practices in the classroom?

### Follow-Up Case Study Phase

<table>
<thead>
<tr>
<th>Data Type?</th>
<th>How many?</th>
<th>Purpose?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews and Observation</td>
<td>9 teachers (1 withdrew)</td>
<td>Examine more in-depth teachers’ understandings of their beliefs and use of technology</td>
</tr>
<tr>
<td>-Semi-structured interviews</td>
<td>3 with highly learner-centred alignment in their beliefs and use of technology</td>
<td></td>
</tr>
<tr>
<td>-Video-recorded observation</td>
<td>3 Teachers with highly teacher-centred alignment in their beliefs and use of technology</td>
<td>To explore the extent that stated beliefs were consistent with actual use of technology observed</td>
</tr>
<tr>
<td>-Observation checklist</td>
<td>3 Teachers whose beliefs and use of technology did not align</td>
<td>To explain quantitative results showing alignment and non-alignment between beliefs and use of technology.</td>
</tr>
<tr>
<td>-Video-elicitation interview</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Purpose:
➢ To identify teachers’ pedagogic orientation to teaching with technology—based on the quantitative observation checklist data.
➢ To provide detailed descriptions of typical patterns emerging in how the teachers used technology—based on the qualitative observation field notes.

Research Question:
➢ How consistent are teachers’ use of technology with their stated beliefs?

# Teacher-centered Case

## Quantitative Observation Results on Use of Technology based on FIT:COM Instrument

![Roslyn's Use of Technology Scores](image)

<table>
<thead>
<tr>
<th>Lesson Design</th>
<th>Lesson Dynamics</th>
<th>Meaning &amp; Purpose</th>
<th>Content &amp; Knowledge</th>
<th>Technology as Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 1</td>
<td>Lesson 2</td>
<td>Lesson 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Qualitative Field Notes from Lesson Observations (Typical Pattern Exemplar)

**Technology as Tools:** The video showed an animated demonstration of how the engine of an automobile works. Students raised their hands at different points as they watched the video and asked the teacher questions (Field Notes of Lesson Observation 2, Roslyn).

**Lesson Design:** The design of the lesson did not include students’ use of technology for themselves. At no point in the lesson were the students allowed to touch the devices. The laptop, projector and speaker were handled only by the teacher (Field Notes of Lesson Observation 3, Roslyn).

### Early iteration

#### Teacher-centered Case

<table>
<thead>
<tr>
<th>Quantitative Observation Results on Use of Technology based on FIT:COM Instrument</th>
<th>Qualitative Field Notes from Lesson Observations (Typical Pattern Exemplar)</th>
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<tr>
<td><strong>Roslyn’s Use of Technology Scores</strong></td>
<td><strong>Technology as Tools:</strong> The video showed an animated demonstration of how the engine of an automobile works. Students raised their hands at different points as they watched the video and asked the teacher questions (Field Notes of Lesson Observation 2, Roslyn).</td>
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- **Lesson Design:** The design of the lesson did not include students’ use of technology for themselves. At no point in the lesson were the students allowed to touch the devices. The laptop, projector, and speaker were handled only by the teacher (Field Notes of Lesson Observation 3, Roslyn).

#### Challenges

- Quantitative & Qualitative data were underrepresented
- Case-oriented approach was not evident
- Concern for the reader was lost in presentation of the display

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Quantitative: Scores showing Teacher’s Pedagogic Orientation in using Technology based on Checklist Data (N=3 teachers)

![Bar chart showing average scores for teachers per dimension]

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Range of Scores and Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content &amp; Knowledge</td>
<td>0 – 10 Predominantly teacher-centered</td>
</tr>
<tr>
<td>Lesson Design</td>
<td>11 – 15 Progressively learner-centered</td>
</tr>
<tr>
<td>Lesson Dynamics</td>
<td>16 – 20 Predominantly teacher-centered</td>
</tr>
<tr>
<td>Meaning &amp; Purpose</td>
<td></td>
</tr>
<tr>
<td>Technology as Tools</td>
<td></td>
</tr>
</tbody>
</table>

Qualitative: Field Note Exemplars of Typical use of Technology (N=3 Teachers)

**CONTENT AND KNOWLEDGE: What is the nature of the content and technology expertise?**

The teacher was knowledgeable of the subject content and the technology in use—graphing software. He zoomed in and out of different sections of the graph projected as he explained how the points were calculated to get the visual displayed (Desmond, Lesson 1).

The teacher was knowledgeable of the subject content. She paused the PowerPoint presentation and provided explanations at different points. She also seemed comfortable with the use of the laptop and projector as she set up the devices on her own (Roslyn, Lesson 1).

**LESSON DESIGN: What is the purpose and design of this technology integrated lesson?**

The lessons integrated the use of a PowerPoint presentation on fire safety. The PowerPoint was used to provide notes on the topic (Roslyn, Lesson 3).

The lesson integrated the use of a video by the teacher and students’ use of cellphones and tablets. The video was used to introduce the lesson and students used their devices in groups to research additional information for class presentations (Richard, Lesson 1).

**LESSON DYNAMICS: How do student, teacher and technology interact?**

The students were asked to make predictions based on videos. Students asked questions to clarify their understanding of different concepts introduced in the video (Richard, Lesson 2).

Technology was used to project questions, students did the calculations in their notebooks and went to the teacher individually to check if their answer was correct (Desmond, Lesson 2).

**MEANING AND PURPOSE: How does the integration of technology enhance meaning and purpose for students?**

A graphing software was used by the teacher to replace the use of a graphing board/chart (Desmond, Lesson 2).

The videos were used to replace reading about the evolution of automobiles from the text book (Roslyn, Lesson 2).

**TECHNOLOGY AS TOOL: How are technologies being utilized by students?**

Students were assigned different topics in their curricula and then they used their cell phones and...
**Within Case Analysis**

<table>
<thead>
<tr>
<th><strong>Teacher-centered Case</strong></th>
<th><strong>Qualitative Field Notes based on Observations of Teachers using Technology</strong></th>
<th><strong>Interpretation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantitative Scores showing Teacher’s Pedagogic Orientation in using Technology</strong></td>
<td><strong>LESSON DYNAMICS: How do student, teacher and technology interact?</strong></td>
<td><strong>Richard:</strong> The typical technology teaching styles observed implied the dominance of learner centered ingrained beliefs. <strong>Desmond and Roslyn:</strong> The typical technology teaching styles observed implied the dominance of teacher centered ingrained beliefs. <strong>Overall Interpretation of the Case</strong></td>
</tr>
<tr>
<td><a href="image">Graph showing Teacher’s Average Scores per Dimension for Three Lessons</a></td>
<td>Students were observed searching for information on their cell phones and tablets, writing down information from their devices to their books and discussing what they had found and how they would present it. (Richard, Lesson 1). After showing the graph results from the software, the teacher asked the students to recall rules and principles previously taught while he did the calculations on the board, then he explained how the calculations resulted in points plotted by the software. (Desmond, Lesson 2). At the end of the videos the teacher asked the students a series of recall questions. The teacher provided most of the explanation for content, students had little opportunity to generate conjectures and to interpret the information presented in the videos for themselves (Roslyn, Lesson 2).</td>
<td><strong>Richard:</strong> His espoused beliefs were not consistent with his classroom practices. <strong>Desmond and Roslyn:</strong> their espoused beliefs were consistent with their classroom practices.</td>
</tr>
<tr>
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</table>
Overall interpretation of the findings across phases

Summary of the findings for phases one and two (metainferences).

Note: The teachers were identified for the cases based on the data collected from the self report survey conducted in the Quantitative phase.

The Iterative Nature Of Joint Display Analysis

Joint display analysis is rarely a one-time process where the quantitative and qualitative data are seamlessly integrated with the first attempt.

Owing to the multiple cycles, researchers generally have displays that aided in the analytic process that are not included in the final publication of the results.

Challenges

<table>
<thead>
<tr>
<th>Trying to accomplish too much with a single display.</th>
</tr>
</thead>
<tbody>
<tr>
<td>One strand (QUAN or QUAL) is underrepresented.</td>
</tr>
<tr>
<td>Lack of alignment to study design</td>
</tr>
<tr>
<td>Presentation is not reader friendly</td>
</tr>
<tr>
<td>Varying levels of abstraction in the data presented</td>
</tr>
<tr>
<td>Prioritizing the results to be included</td>
</tr>
</tbody>
</table>

Table 3. Photo Joint Displays Illustrating Dependence on Coffee.

<table>
<thead>
<tr>
<th>Label and photo</th>
<th>Corresponding quotes</th>
<th>Meta-inferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photo 1: Shade grown, 2.71 (83.3)</td>
<td>“well-cultivated and good quality” “good production” “clean” “good coffee” “no disease”</td>
<td>Place dependency Coffee demonstrates highest level of importance among participants compared with other landscapes Perceived attachment based on primarily economic and environmental factors Shade-grown coffee associated more with economic gain and high yields than sustainability</td>
</tr>
</tbody>
</table>

Photo 2: Coffee plantation, 2.38 (75.0) | “coffee plantation” “income” “economic possibilities” “well-managed” “more production” |

Note: Mean was calculated based on how participants ranked five photographs they chose in order of importance (i.e., 5 = most important; 4 = second most important; 3 = third most important; 2 = fourth most important; 1 = fifth most important; 0 = photo not chosen as one of top five most important). Percentage is the proportion of participants selecting the photo as important.

Table 4. Photo Joint Displays Illustrating Dependence on Ecosystem Services.

<table>
<thead>
<tr>
<th>Label and photo</th>
<th>Corresponding quotes</th>
<th>Meta-inferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photo 3: Logging shade, 1.46 (54.2)</td>
<td>“If you maintain, if you nourish the tree well, it will produce more for you. If it is lacking nutrients, I’ll be weak and not produce much. Therefore, when you feed it, it’s like a person, right? If you eat, you have energy and are happy. But, if it is lacking food, a nutritional deficiency, it is weak; it is sad.”</td>
<td></td>
</tr>
</tbody>
</table>

Photo 4: Hortilizes Laica Atitlan, 1.46 (50.0) | “I have this lake… for me, apparently it’s one of the biggest reasons that tourists come here, to the lake is our sister and our opportunity of development… so tourism represents to me this photo, and also (b) to preserve our culture of corn.” |

Photo 5: Treescape, 1.17 (37.5) | “This is the most important thing with many trees, the tree contributes with the environment, improves the fertility of the soils and helps to purify the environment.” |

Note: Mean was calculated based on how participants ranked photographs they chose in order of importance. Percentage is the proportion of participants selecting the photo as important.

Conclusion

- Compare and contrast the quantitative and qualitative data based on the findings of both data sets.

- Identify concepts, themes, patterns and anomalies in the results based on the findings of both data sets.

- Look for trends and patterns across displays created.

- Incorporate theory to structure the analysis and explore emerging findings.

Conclusion

- Decide on the most suitable numerical and text findings to integrate.

- Consider the best approach for presenting the quantitative data (numerical or other visual)

- Look for insights across the two types of data and draw meta-inferences.

- Examine the display for reader friendliness.

Joint Display Analysis

- Mixed methods researchers can use joint display analysis as a powerful tool applied to the integration and interpretation of quantitative and qualitative data.

Thank you!

Michael D. Fetters
Tashane Haynes-Brown

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