Understanding Nonresponse Behaviours of Students with Disabilities in Alternate Assessments

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Nonresponse

- Nonresponse refers to items/questions/problems in tests which students skip without
  - selecting a response option (if multiple-choice item) or
  - typing the answer (if constructed-response item)

- Measurement terms related to nonresponse behaviours:
  - Skipped items
  - Omitted items
  - Item with no response (NR)
  - Items with missing
Impact of Nonresponse

- Measurement specialists, psychometricians, and test developers are often concerned about nonresponse because:
  - It may affect the estimation of item parameters (i.e., item difficulty, item discrimination, and guessing)
  - It may affect the estimation of students’ test scores

- How to treat nonresponse items?
  - Consider nonresponse items as wrong and assign zero points
    - Assuming the student did not know the right answer and so skipped the item
  - Consider nonresponse items as “not administered”
    - Assuming the student was only tested based on the items he/she answered.
Why students skip items?

- **Student characteristics**
  - Lack of content knowledge
  - Motivation or anxiety issues
  - Gender
  - Age level

- **Test characteristics**
  - Highly difficult or unclear items
  - Time constraints
  - Ability to skip items with no penalty
Nonresponse in Alternate Assessments

- In the context of alternate assessments, there is no easy answer for the question of why students with disabilities skip items.

- Student characteristics:
  - Disability type (Barton & Huynh, 2003)
  - Accommodations given before or during the test (Bolt & Thurlow, 2007)
  - Test anxiety (Fulk et al., 1998; Lufi et al., 2004),
  - Prejudice against testing (Mannamaa et al., 2008)
  - Motivation (Duncan & McKeachie, 2005).
Nonresponse in Alternate Assessments

- Test characteristics:
  - Students with disabilities struggle in completing tests and more frequently omit responses at the end of tests (Kato et al., 2009)

- Other factors (Barton & Huynh, 2003; Cawthon et al., 2012; Kato et al., 2007):
  - Linguistically complex wording
  - The number of questions on a test
  - Location of items on a page or in test
Purpose of Our Study

1. What is the impact of disability type on students’ nonresponse behaviours?

2. What is the impact of test content (reading, writing, listening, speaking) on students’ nonresponse behaviours?

3. Is there any interaction between test content and disability types?
Data

- The data for this study come from the 2014 administration of a statewide alternative assessment in the US.

- The assessment consists of four subject areas: reading, mathematics, science, and social studies. This study only focused on the reading test.

- Three grade bands:
  - grades 3 through 5 (3-5) → N=1081
  - grades 6 through 8 (6-8) → N=1003
  - high school (9-10): Not used due to very small sample size
Instrument

- The reading test measures four strands: reading (nearly 70% of the items), writing, listening, and speaking.

- Number of items:
  - Grade 3-5: 68 multiple-choice items
  - Grade 6-8: 65 multiple-choice items

- Test items are scored polytomously (i.e., 0 point, 1 point, 2 points, and so on)
Identifying Nonresponse

**Item Card**

*At the Library*

**Item Script**

**Say:** “We’re going to read a story about people in a library.”

**Do:** Read the story.

**Say:** “Tell (show) me how the sister found her brother: (indicate the hear card), calls him (indicate the call card), or asks a friend (indicate the friend card)?”

**Scoring**

**Try 1:**
- If correct → 2 points → Move to the next item
- If incorrect → Remove incorrect student response → Move to Try 2
- If no response → Remove → Move to Try 2

**Try 2:** Tell (show) me how the sister found her brother:
- If correct → 1 point → Move to the next item
- If incorrect → 0 point → Move to the next item
- If no response → Record “No response” → Move to the next item
Data Analysis

- **Data preparation:**
  - Valid item scores (0, 1, 2, or 3) are coded as “1”
  - Omitted items (NR) are coded as “0”
  - “1” indicates that the student attempted to answer the item, regardless of whether the response is correct or wrong
  - “0” indicates that the student did not attempt to answer the item, despite all clues given by the test administrator
Data Analysis

- Disabilities Education Act of 1990 (IDEA) identified 13 unique disability categories.

- Disability categories are combined into four groups in this study:
  1. Autism (A)
  2. Moderate intellectual disability (M)
  3. Physical disability (P)
  4. Severe intellectual disability (S)
1. **Diagnostic classification modeling:** We estimated latent classes of responsiveness for each of the four content areas (reading (R), writing (W), listening (L), and speaking (S)).

Student 1: [1 1 0 0]
Data Analysis

2. **Item response theory (IRT):**

\[
P(Y_{ij} = 1|\theta_i) = \frac{\exp(\theta_i - b_j)}{1 + \exp(\theta_i - b_j)}
\]

- **Y_{ij}:** Student responses (either 1 or 0 from the recoded data)
- **\theta_i:** Student i’s responsiveness level against reading, writing, listening, or speaking
- **b_j:** Item j’s responsiveness index. The higher \( b_j \) is for an item, the harder it is for students to attempt to answer the item.
### Results

**Table 1**

*Descriptive Summary of Missing Items in Grade Band 3-5*

<table>
<thead>
<tr>
<th>SPED</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Average Scale Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>70</td>
<td>6.83</td>
<td>7.42</td>
<td>428</td>
</tr>
<tr>
<td>M</td>
<td>107</td>
<td>7.94</td>
<td>8.88</td>
<td>416</td>
</tr>
<tr>
<td>P</td>
<td>36</td>
<td>11.31</td>
<td>10.33</td>
<td>393</td>
</tr>
<tr>
<td>S</td>
<td>107</td>
<td>14.44</td>
<td>9.57</td>
<td>362</td>
</tr>
</tbody>
</table>

**Note:** A: Autism; M: Moderate intellectual disability; P: Physical disability; S: Severe intellectual disability.
Results

Table 2

Descriptive Summary of Missing Items in Grade Band 6-8

<table>
<thead>
<tr>
<th>SPED</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Average Scale Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>33</td>
<td>9.12</td>
<td>10.415606</td>
<td>398</td>
</tr>
<tr>
<td>M</td>
<td>75</td>
<td>8.56</td>
<td>8.841304</td>
<td>413</td>
</tr>
<tr>
<td>P</td>
<td>19</td>
<td>13.47</td>
<td>10.895302</td>
<td>386</td>
</tr>
<tr>
<td>S</td>
<td>86</td>
<td>17.39</td>
<td>12.567258</td>
<td>364</td>
</tr>
</tbody>
</table>

Note: A: Autism; M: Moderate intellectual disability; P: Physical disability; S: Severe intellectual disability.
Results

Reading - Grade Band 3-5

- A
- M
- P
- S

Response | Unresponsive

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Results

Writing - Grade Band 3-5

<table>
<thead>
<tr>
<th></th>
<th>Response</th>
<th>Unresponsive</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>50%</td>
<td>40%</td>
</tr>
<tr>
<td>P</td>
<td>60%</td>
<td>30%</td>
</tr>
<tr>
<td>S</td>
<td>60%</td>
<td>40%</td>
</tr>
</tbody>
</table>
Results

Listening - Grade Band 3-5

A  M  P  S

Response  Unresponsive
Results

Speaking - Grade Band 3-5

A | M | P | S
---|---|---|---
Response | 60% | 70% | 60% | 10%
Unresponsive | 40% | 30% | 40% | 90%

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Table 3

*Descriptive Summary of Item Responsiveness Values*

<table>
<thead>
<tr>
<th></th>
<th>Grade Band 3-5</th>
<th>Grade Band 6-8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>SPED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>-0.13</td>
<td>0.95</td>
</tr>
<tr>
<td>M</td>
<td>-0.07</td>
<td>0.95</td>
</tr>
<tr>
<td>P</td>
<td>-0.06</td>
<td>1.14</td>
</tr>
<tr>
<td>S</td>
<td>0.61</td>
<td>1.21</td>
</tr>
</tbody>
</table>

**Note:** A: Autism; M: Moderate intellectual disability; P: Physical disability; S: Severe intellectual disability.
Conclusions

- Students with autism and physical disabilities seem to have similar levels of responsiveness across reading, writing, listening, and speaking items.

- Students with moderate intellectual disability are usually high in responsiveness, except for writing-related items.

- Students with severe intellectual disability remain unresponsive against most items in the reading test.

- The items require similar levels of responsiveness for A, M, and P but higher responsiveness for S.
Thank you!

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