Julia Shaftel, Ph.D.  Em Meyer
Principal Investigator  Graduate Research Assistant

The contents of this presentation were developed under a grant from the U.S. Department of Education. However, those contents do not necessarily represent the policy of the U.S. Department of Education and you should not assume endorsement by the Federal government.
Purpose of the ATEA Project

• Make innovative, technology-enhanced assessment items accessible and equitable for students with vision and motor disabilities

• Project activities:
  • Expert Review: spring 2013 and fall 2014
  • Teacher Panels: fall 2013
  • Cognitive Labs: fall 2013
  • Field Tests: spring 2014 in Kansas
  • Item Tryouts: fall 2014
Goals for Creating Accessible Items

- Remove inaccessible actions like dragging and dropping
- Create static alternatives for print and braille test forms
- Maintain content and wording of original TE items
- Use vocabulary that represents cognitive task requirements (choose, compare, sort) rather than physical requirements (click, open, move)
- Maintain construct consistency with original TE items
- Enable computerized accommodations such as screen magnification, text-to-speech audio, and switch support
Select the $x$ value that makes each equation true.

<table>
<thead>
<tr>
<th>$x = -3$</th>
<th>$x = -2$</th>
<th>$x = -4$</th>
<th>$x = -1$</th>
</tr>
</thead>
</table>

- $x^2 - x - 6 = 0$
- $3x^2 - 12x - 15 = 0$
- $6x^2 - 6x - 72 = 0$
- $6x^2 + 18x - 24 = 0$
Accessible Alternative: Matching

Select the $x$ value that makes each equation true.

- $x = -3$
- $x = -2$
- $x = -4$
- $x = -1$

- $x^2 - x - 6 = 0$
- $3x^2 - 12x - 15 = 0$
- $6x^2 - 6x - 72 = 0$
- $6x^2 + 18x - 24 = 0$
Drag and Drop: Labeling (unlimited)

Compare the fractions below using the correct symbol for each pair of fractions. A symbol may be used more than once.

\[
\begin{align*}
\frac{7}{8} &> \frac{5}{6} \\
\frac{4}{4} &> \frac{3}{2}
\end{align*}
\]
Compare the fractions below using the correct symbol for each pair of fractions. A symbol may be used more than once.

<table>
<thead>
<tr>
<th></th>
<th>=</th>
<th>&gt;</th>
<th>&lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{7}{8}$ ? $\frac{6}{8}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{5}{6}$ ? $\frac{5}{4}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{4}{4}$ ? $\frac{6}{6}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{6}{4}$ ? $\frac{3}{2}$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Drag and Drop: Ordering

Read the sentences below. They are not in the correct order. Put the sentences in the correct order.

"Next time let's come earlier and catch even more fish!" Andy added.

"That sounds like a great idea," said Grandpa Bill.

"Anytime, buddy," his grandpa answered.

"Thank you, Grandpa Bill, for helping me learn to fish!" Andy exclaimed.
Accessible Alternative: Matching

Read the sentences below. They are not in the correct order. Put the sentences in the correct order.

1. "Next time let's come earlier and catch even more fish!" Andy added.
2. "That sounds like a great idea," said Grandpa Bill.
4. "Thank you, Grandpa Bill, for helping me learn to fish!" Andy exclaimed.
Drag and Drop: Sort into Two Categories

Read the sentence below.

Sally ran to look for her pair of skates.

Sort the words from the sentence into the correct noun or verb box.
Accessible Alternative: Matrix Online

Read the sentence below.

Sally ran to look for her pair of skates.

Sort the words from the sentence into the correct noun or verb box.

<table>
<thead>
<tr>
<th></th>
<th>Noun</th>
<th>Verb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sally</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>ran</td>
<td></td>
<td></td>
</tr>
<tr>
<td>look</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>skates</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Drag and Drop: Sort into Three Categories

Read the sentence below.

The storms form over warm waters and sometimes strike land.

Select the correct part of speech for each of the words below.

<table>
<thead>
<tr>
<th>Word</th>
<th>Noun</th>
<th>Verb</th>
<th>Adjective</th>
</tr>
</thead>
<tbody>
<tr>
<td>storms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>form</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>warm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>waters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>strike</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>land</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Read the sentence below.

The storms form over warm waters and sometimes strike land.

Select the correct part of speech for each of the words below.

<table>
<thead>
<tr>
<th></th>
<th>Noun</th>
<th>Verb</th>
<th>Adjective</th>
</tr>
</thead>
<tbody>
<tr>
<td>storms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>form</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>warm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>waters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>strike</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>land</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
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Read the sentence below.

The storms form over warm waters and sometimes strike land.

Select the correct part of speech for each of the words below.

<table>
<thead>
<tr>
<th></th>
<th>Noun</th>
<th>Verb</th>
<th>Adjective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. storms</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>2. form</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>3. warm</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>4. waters</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>5. strike</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>6. land</td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>
Item Pair Comparisons: Labeling with Matching

Item Difficulty (p-value): Labeling v. Matching

- Linear Regression
- Standard Major Axis Regression

$y = 0.042 + 0.81x$

$R^2 = 0.942$

Number of item pairs = 5
Item Pair Comparisons: Labeling with Matrix

Item Difficulty (p-value): Labeling v. Matrix

- Linear Regression
- Standard Major Axis Regression

\[ y = 0.001 + 0.901x \]

\[ R^2 = 0.966 \]

Number of item pairs = 4
Item Pair Comparisons: Ordering with Matching

Item Difficulty (p-value): Ordering v. Matching

- Linear Regression
- Standard Major Axis Regression

Equation:

\[ y = -0.01 + 0.927x \]

\[ R^2 = 0.959 \]

Number of item pairs = 30
Item Pair Comparisons: Ordering with Matrix

Item Difficulty (p-value): Ordering v. Matrix

- Linear Regression
- Standard Major Axis Regression

$y = -0.02 + 0.917x$

$R^2 = 0.964$

Number of item pairs = 8
Item Pair Comparisons: Sorting with Matrix

Item Difficulty (p-value): Multiple drop buckets v. Matrix

- Linear Regression
- Standard Major Axis Regression

Equation:
\[ y = -0.014 + 1.074x \]

\[ R^2 = 0.973 \]

Number of item pairs = 5
Item Pair Comparisons: Matrix with Matching

Item Difficulty (p-value): Matrix v. Matching

\[ y = 0.003 + 1.043x \]

\[ R^2 = 0.994 \]

Number of item pairs = 9