TIMSS 2011
The TIMSS 2011 Instruction to Engage Students in Learning Scale, Fourth Grade

The Instruction to Engage Students in Learning (IES) scale was created based on teachers’ responses to how often they used each of six instructional practices described below. See Creating and Interpreting TIMSS and PIRLS 2011 Context Questionnaire Scales for more information on how the scales were formed.

Exhibit 1: Items in the TIMSS 2011 Instruction to Engage Students in Learning Scale, Fourth Grade

<table>
<thead>
<tr>
<th>Item</th>
<th>How often do you do the following in teaching this class?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every or almost every lesson</td>
<td>About half the lessons</td>
</tr>
<tr>
<td>ATBG15A</td>
<td>Summarize what students should have learned from the lesson</td>
</tr>
<tr>
<td>ATBG15B</td>
<td>Relate the lesson to students’ daily lives</td>
</tr>
<tr>
<td>ATBG15C</td>
<td>Use questioning to elicit reasons and explanations</td>
</tr>
<tr>
<td>ATBG15D</td>
<td>Encourage all students to improve their performance</td>
</tr>
<tr>
<td>ATBG15E</td>
<td>Praise students for good effort</td>
</tr>
<tr>
<td>ATBG15F</td>
<td>Bring interesting materials to class</td>
</tr>
</tbody>
</table>

Exhibit 2: Item Parameters for the TIMSS 2011 Instruction to Engage Students in Learning Scale, Fourth Grade

<table>
<thead>
<tr>
<th>Item</th>
<th>delta</th>
<th>tau_1</th>
<th>tau_2</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATBG15A</td>
<td>−1.35442</td>
<td>0.05798</td>
<td>−0.05798</td>
</tr>
<tr>
<td>ATBG15B</td>
<td>−1.05640</td>
<td>−0.26822</td>
<td>0.26822</td>
</tr>
<tr>
<td>ATBG15C</td>
<td>−1.92928</td>
<td>−0.10243</td>
<td>0.10243</td>
</tr>
<tr>
<td>ATBG15D</td>
<td>−2.08216</td>
<td>0.03918</td>
<td>−0.03918</td>
</tr>
<tr>
<td>ATBG15E</td>
<td>−2.28457</td>
<td>0.13759</td>
<td>−0.13759</td>
</tr>
<tr>
<td>ATBG15F</td>
<td>−0.05356</td>
<td>−0.60032</td>
<td>0.60032</td>
</tr>
</tbody>
</table>

1 For the purpose of scaling, the categories “Some lessons” and “Never” were combined because there were very few respondents in each of these categories.
Exhibit 3: Scale Transformation Constants

Scale Transformation Constants

\[ A = 10.13282 \]

\[ B = 1.70766 \]

Transformed Scale Score = 10.13282 \( + \) 1.70766 \( \times \) Logit Scale Score

Exhibit 4: Equivalence Table of the Raw Score and the Transformed Scale Score

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Transformed Scale Score</th>
<th>Cutpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2.95141</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>4.57134</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5.38004</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5.98412</td>
<td>6.0</td>
</tr>
<tr>
<td>4</td>
<td>6.50901</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6.99263</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>7.47172</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Transformed Scale Score</th>
<th>Cutpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>7.97126</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8.51259</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9.14128</td>
<td>9.1</td>
</tr>
<tr>
<td>10</td>
<td>9.93028</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>11.04307</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>13.17146</td>
<td></td>
</tr>
</tbody>
</table>

Exhibit 5: Cronbach’s Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2011 Instruction to Engage Students in Learning Scale, Fourth Grade

<table>
<thead>
<tr>
<th>Country</th>
<th>Cronbach’s Alpha Reliability Coefficient</th>
<th>Percent of Variance Explained</th>
<th>Factor Loadings for Each Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armenia</td>
<td>0.52</td>
<td>30</td>
<td>0.58, 0.61, 0.62, 0.45, 0.49, 0.51</td>
</tr>
<tr>
<td>Australia</td>
<td>0.62</td>
<td>36</td>
<td>0.64, 0.69, 0.70, 0.48, 0.45, 0.57</td>
</tr>
<tr>
<td>Austria</td>
<td>0.70</td>
<td>41</td>
<td>0.68, 0.72, 0.74, 0.64, 0.48, 0.52</td>
</tr>
<tr>
<td>Azerbaijan</td>
<td>0.40</td>
<td>26</td>
<td>0.69, 0.50, 0.57, 0.52, 0.25, 0.44</td>
</tr>
<tr>
<td>Bahrain</td>
<td>0.49</td>
<td>29</td>
<td>0.25, 0.57, 0.68, 0.47, 0.47, 0.67</td>
</tr>
<tr>
<td>Belgium (Flemish)</td>
<td>0.62</td>
<td>36</td>
<td>0.50, 0.73, 0.64, 0.73, 0.44, 0.52</td>
</tr>
<tr>
<td>Chile</td>
<td>0.53</td>
<td>33</td>
<td>0.41, 0.53, 0.62, 0.58, 0.58, 0.67</td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td>0.83</td>
<td>54</td>
<td>0.63, 0.69, 0.75, 0.79, 0.78, 0.75</td>
</tr>
<tr>
<td>Croatia</td>
<td>0.54</td>
<td>32</td>
<td>0.40, 0.67, 0.61, 0.57, 0.58, 0.55</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>0.53</td>
<td>30</td>
<td>0.42, 0.56, 0.62, 0.49, 0.55, 0.65</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.65</td>
<td>37</td>
<td>0.53, 0.68, 0.58, 0.62, 0.61, 0.60</td>
</tr>
<tr>
<td>England</td>
<td>0.44</td>
<td>30</td>
<td>0.68, 0.25, 0.46, 0.68, 0.66, 0.38</td>
</tr>
<tr>
<td>Finland</td>
<td>0.66</td>
<td>39</td>
<td>0.45, 0.69, 0.66, 0.66, 0.73, 0.48</td>
</tr>
<tr>
<td>Georgia</td>
<td>0.53</td>
<td>32</td>
<td>0.28, 0.49, 0.25, 0.81, 0.75, 0.57</td>
</tr>
<tr>
<td>Germany</td>
<td>0.64</td>
<td>36</td>
<td>0.52, 0.59, 0.43, 0.64, 0.72, 0.66</td>
</tr>
<tr>
<td>Hong Kong SAR</td>
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<td>39</td>
<td>0.49, 0.56, 0.66, 0.70, 0.73, 0.57</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.62</td>
<td>37</td>
<td>0.61, 0.51, 0.65, 0.64, 0.61, 0.61</td>
</tr>
<tr>
<td>Iran, Islamic Rep. of</td>
<td>0.60</td>
<td>34</td>
<td>0.49, 0.65, 0.61, 0.59, 0.52, 0.64</td>
</tr>
<tr>
<td>Ireland</td>
<td>0.51</td>
<td>30</td>
<td>0.58, 0.54, 0.56, 0.49, 0.48, 0.63</td>
</tr>
<tr>
<td>Italy</td>
<td>0.57</td>
<td>34</td>
<td>0.50, 0.55, 0.42, 0.66, 0.74, 0.57</td>
</tr>
<tr>
<td>Japan</td>
<td>0.69</td>
<td>40</td>
<td>0.38, 0.70, 0.52, 0.78, 0.76, 0.55</td>
</tr>
</tbody>
</table>
### Exhibit 5: Cronbach’s Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2011 Instruction to Engage Students in Learning Scale, Fourth Grade (Continued)

<table>
<thead>
<tr>
<th>Country</th>
<th>Cronbach’s Alpha Reliability Coefficient</th>
<th>Percent of Variance Explained</th>
<th>Factor Loadings for Each Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ATBG1SA</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>0.47</td>
<td>29</td>
<td>0.33</td>
</tr>
<tr>
<td>Korea, Rep. of</td>
<td>0.72</td>
<td>43</td>
<td>0.42</td>
</tr>
<tr>
<td>Kuwait</td>
<td>0.41</td>
<td>27</td>
<td>0.22</td>
</tr>
<tr>
<td>Lithuania</td>
<td>0.47</td>
<td>28</td>
<td>0.47</td>
</tr>
<tr>
<td>Malta</td>
<td>0.48</td>
<td>32</td>
<td>0.34</td>
</tr>
<tr>
<td>Morocco</td>
<td>0.55</td>
<td>32</td>
<td>0.53</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.59</td>
<td>34</td>
<td>0.69</td>
</tr>
<tr>
<td>New Zealand</td>
<td>0.57</td>
<td>33</td>
<td>0.62</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>0.61</td>
<td>38</td>
<td>0.60</td>
</tr>
<tr>
<td>Norway</td>
<td>0.62</td>
<td>35</td>
<td>0.60</td>
</tr>
<tr>
<td>Oman</td>
<td>0.52</td>
<td>31</td>
<td>0.48</td>
</tr>
<tr>
<td>Poland</td>
<td>0.48</td>
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<td>0.35</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.60</td>
<td>37</td>
<td>0.60</td>
</tr>
<tr>
<td>Qatar</td>
<td>0.63</td>
<td>36</td>
<td>0.53</td>
</tr>
<tr>
<td>Romania</td>
<td>0.50</td>
<td>32</td>
<td>0.44</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>0.61</td>
<td>36</td>
<td>0.43</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>0.53</td>
<td>31</td>
<td>0.45</td>
</tr>
<tr>
<td>Serbia</td>
<td>0.54</td>
<td>33</td>
<td>0.39</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.77</td>
<td>47</td>
<td>0.65</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>0.61</td>
<td>36</td>
<td>0.41</td>
</tr>
<tr>
<td>Slovenia</td>
<td>0.56</td>
<td>33</td>
<td>0.42</td>
</tr>
<tr>
<td>Spain</td>
<td>0.57</td>
<td>34</td>
<td>0.39</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.68</td>
<td>39</td>
<td>0.63</td>
</tr>
<tr>
<td>Thailand</td>
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<td>45</td>
<td>0.51</td>
</tr>
<tr>
<td>Tunisia</td>
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<td>0.61</td>
</tr>
<tr>
<td>Turkey</td>
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</tr>
<tr>
<td>United Arab Emirates</td>
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<td>30</td>
<td>0.36</td>
</tr>
<tr>
<td>United States</td>
<td>0.62</td>
<td>38</td>
<td>0.63</td>
</tr>
<tr>
<td>Yemen</td>
<td>0.54</td>
<td>31</td>
<td>0.45</td>
</tr>
</tbody>
</table>

#### Sixth Grade Participants

<table>
<thead>
<tr>
<th>Country</th>
<th>Cronbach’s Alpha Reliability Coefficient</th>
<th>Percent of Variance Explained</th>
<th>Factor Loadings for Each Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ATBG1SA</td>
</tr>
<tr>
<td>Botswana</td>
<td>0.51</td>
<td>31</td>
<td>0.60</td>
</tr>
<tr>
<td>Honduras</td>
<td>0.57</td>
<td>32</td>
<td>0.62</td>
</tr>
<tr>
<td>Yemen</td>
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<td>32</td>
<td>0.37</td>
</tr>
</tbody>
</table>

#### Benchmarking Participants

<table>
<thead>
<tr>
<th>Country</th>
<th>Cronbach’s Alpha Reliability Coefficient</th>
<th>Percent of Variance Explained</th>
<th>Factor Loadings for Each Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ATBG1SA</td>
</tr>
<tr>
<td>Alberta, Canada</td>
<td>0.40</td>
<td>26</td>
<td>0.60</td>
</tr>
<tr>
<td>Ontario, Canada</td>
<td>0.48</td>
<td>29</td>
<td>0.50</td>
</tr>
<tr>
<td>Quebec, Canada</td>
<td>0.57</td>
<td>33</td>
<td>0.53</td>
</tr>
</tbody>
</table>
### Exhibit 5: Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2011 Instruction to Engage Students in Learning Scale, Fourth Grade (Continued)

<table>
<thead>
<tr>
<th>Country</th>
<th>Cronbach's Alpha Reliability Coefficient</th>
<th>Percent of Variance Explained</th>
<th>Factor Loadings for Each Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ATBG1SA</td>
</tr>
<tr>
<td>Abu Dhabi, UAE</td>
<td>0.55</td>
<td>33</td>
<td>0.48</td>
</tr>
<tr>
<td>Dubai, UAE</td>
<td>0.48</td>
<td>30</td>
<td>0.40</td>
</tr>
<tr>
<td>Florida, US</td>
<td>0.51</td>
<td>32</td>
<td>0.37</td>
</tr>
<tr>
<td>North Carolina, US</td>
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<td>43</td>
<td>0.67</td>
</tr>
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### Exhibit 6: Relationship Between the TIMSS 2011 Instruction to Engage Students in Learning Scale, Fourth Grade, and TIMSS 2011 Achievement

<table>
<thead>
<tr>
<th>Country</th>
<th>Pearson's Correlation with Achievement</th>
<th>Variance in Achievement Accounted for by Difference Between Regions of the Scale (η²)</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>(r)</td>
<td>(r²)</td>
</tr>
<tr>
<td>Armenia</td>
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</tr>
<tr>
<td>Australia</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Austria</td>
<td>−0.01</td>
<td>−0.03</td>
</tr>
<tr>
<td>Azerbaijan</td>
<td>0.02</td>
<td>0.04</td>
</tr>
<tr>
<td>Bahrain</td>
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<td>0.05</td>
</tr>
<tr>
<td>Belgium (Flemish)</td>
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</tr>
<tr>
<td>Chile</td>
<td>−0.01</td>
<td>−0.04</td>
</tr>
<tr>
<td>Chinese Taipei</td>
<td>−0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Croatia</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>0.04</td>
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<tr>
<td>Denmark</td>
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<td>−0.02</td>
</tr>
<tr>
<td>England</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td>Finland</td>
<td>0.06</td>
<td>0.04</td>
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<tr>
<td>Georgia</td>
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<td>0.03</td>
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<tr>
<td>Germany</td>
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<td>Hong Kong SAR</td>
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<td>Hungary</td>
<td>−0.01</td>
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<td>Iran, Islamic Rep. of</td>
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<td>0.11</td>
</tr>
<tr>
<td>Ireland</td>
<td>−0.05</td>
<td>−0.04</td>
</tr>
<tr>
<td>Italy</td>
<td>−0.05</td>
<td>−0.04</td>
</tr>
<tr>
<td>Japan</td>
<td>0.00</td>
<td>−0.01</td>
</tr>
<tr>
<td>Kazakhstan</td>
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</tr>
<tr>
<td>Korea, Rep. of</td>
<td>0.06</td>
<td>0.07</td>
</tr>
<tr>
<td>Kuwait</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Lithuania</td>
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<td>0.02</td>
</tr>
<tr>
<td>Malta</td>
<td>−0.03</td>
<td>−0.08</td>
</tr>
<tr>
<td>Morocco</td>
<td>0.09</td>
<td>0.11</td>
</tr>
</tbody>
</table>
Exhibit 6: Relationship Between the TIMSS 2011 Instruction to Engage Students in Learning Scale, Fourth Grade, and TIMSS 2011 Achievement (Continued)

<table>
<thead>
<tr>
<th>Country</th>
<th>Pearson’s Correlation with Achievement</th>
<th>Variance in Achievement Accounted for by Difference Between Regions of the Scale ((\eta^2))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(r)</td>
<td>(r^2)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>-0.02</td>
<td>0.01</td>
</tr>
<tr>
<td>New Zealand</td>
<td>-0.02</td>
<td>-0.02</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>-0.01</td>
<td>-0.03</td>
</tr>
<tr>
<td>Norway</td>
<td>0.08</td>
<td>0.04</td>
</tr>
<tr>
<td>Oman</td>
<td>0.12</td>
<td>0.07</td>
</tr>
<tr>
<td>Poland</td>
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<td>-0.01</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Qatar</td>
<td>-0.01</td>
<td>-0.04</td>
</tr>
<tr>
<td>Romania</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>0.06</td>
<td>0.07</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>0.08</td>
<td>0.11</td>
</tr>
<tr>
<td>Serbia</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.00</td>
<td>-0.02</td>
</tr>
<tr>
<td>Slovak Republic</td>
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<td>-0.03</td>
</tr>
<tr>
<td>Slovenia</td>
<td>-0.04</td>
<td>-0.05</td>
</tr>
<tr>
<td>Spain</td>
<td>0.02</td>
<td>0.04</td>
</tr>
<tr>
<td>Sweden</td>
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Sixth Grade Participants

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Benchmarking Participants

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