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Developing an instrument for measuring engagement among students aged 6-15

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Developing an instrument for measuring engagement among students aged 6-15

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Overview of the pilot questionnaire

The theoretical foundation for developing the questionnaire was found at Greene (2015) who distinguishes between engagement based on a performance orientation versus a mastery orientation. Therefore, the construction of our engagement tool took its starting point in different perspectives on student engagement. After reviewing different validated self-report scales, the framework of Tuan, Chin, and Shieh (2005) was chosen to measure learning environment stimulation (6 items), science learning value (5 items), active learning strategies (8 items), and self-efficacy (7 items). A goal orientation scale (18 items) was constructed with inspiration from Midgley et al. (1998) and Pintrich (2004). Finally, 7 items to measure students’ individual interest in science was adapted from Rotgans (2015).

<table>
<thead>
<tr>
<th>Category</th>
<th>Grade 7 items</th>
<th>Grade 4 items</th>
<th>Grade 1 items</th>
<th>Theoretical foundation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>Tuan et al., 2005</td>
</tr>
<tr>
<td>Goal orientation</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>Midgley, 1998; Pintrich, 2000</td>
</tr>
<tr>
<td>Active learning strategies</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning Environment stimulation</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>Tuan et al., 2005</td>
</tr>
<tr>
<td>Science learning value</td>
<td>5</td>
<td></td>
<td></td>
<td>Rotgans, 2015</td>
</tr>
<tr>
<td>Individual interest for science</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Possible answers</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total number of items</td>
<td>51</td>
<td>31</td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>

When piloting the questionnaire we found severe resistance towards asking 1st grader to the deconstructive performance orientation. Teachers and parents found it unethical to ask student at that age if the felt dumb in classes and had an avoidance behavior towards learning. Questions concerning this category were therefore excluded from the questionnaire. When also taking into consideration the enormous development the children undergo from age 6 to 15 it is questionable if the instrument should contain the whole age group or it should be split up in two. At first the whole age group was chosen to make longitudinal comparisons. This is though also questionable due to the different understanding of questions at age 6 and age 15.

The development of this instrument was at first carried out in the LEAPS project but due to change in positions and other circumstances the instrument was not taken to confirmatory factor analysis. This is a major future focus point while also considering splitting up the instrument into two parts.

Exploratory factor analysis

It turned out that especially learning environment stimulation items loaded into other factors and was therefore omitted. Thereby, the second version of the LEAPS questionnaire for 7th graders ended up with six scales. The categories mastery orientation, performance orientation, and individual interest were tested in the questionnaires for 4th and 1st graders. Both questionnaires proved suitable for factor analysis (p=0.813, p<0.000 for 4th grade; p=0.728, p<0.000 for 1st graders). A few items did not load above 0.40 and were excluded from the instrument.

Table 2: The modified questionnaire based on exploratory factor analysis

<table>
<thead>
<tr>
<th>Category</th>
<th>Grade 7 items</th>
<th>Grade 4 items</th>
<th>Grade 1 items</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>5</td>
<td></td>
<td></td>
<td>0.831</td>
</tr>
<tr>
<td>Goal orientation</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>- Mastery</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>0.872</td>
</tr>
<tr>
<td>- Performance</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>0.890</td>
</tr>
<tr>
<td>Active learning strategies</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science learning value</td>
<td>5</td>
<td></td>
<td></td>
<td>0.895</td>
</tr>
<tr>
<td>Individual interest for science</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>0.912</td>
</tr>
<tr>
<td>Possible answers</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total number of items</td>
<td>39</td>
<td>22</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

Theoretical approach

An explorative factor analysis was conducted using IBM SPSS. Since the questionnaire for 7th graders contained most constructs we choose this as the guiding questionnaire. KMO (p=0.770) and Bartlett’s test (p<0.000) indicated that the sample

Table 2: The modified questionnaire based on exploratory factor analysis

The theoretical approach

The work ahead and discussion of findings

Bibliography