Classroom discourse in science learning - Students' participation and teachers' scaffolding strategies -

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Abstract
The interaction between teachers and students plays a crucial role in learning processes and can have a significant impact on the motivational and cognitive development of learners (see Hollo & Wheby, 2017). Especially an active participation of pupils in the sense of co-constructivist teaching can have a positive effect on learning (see Pfennigkühler, 2009). Likewise, the use of support strategies by the teacher should have a positive effect on the pupils’ understanding of concepts. The use of support strategies by the teacher can enable students to fulfill a task, help them to better understand a concept or to recognize and rethink a misconception (see Gillies, 2013; Gillies et al., 2012; Rogoff 2008; Leuchter & Saalbach, 2014). However, it is assumed that support strategies are only effective if they are applied adaptively (see van de Pol et al., 2011). So far, there is a lack of studies that simultaneously examine student participation, teachers’ support strategies, the extent to which they are used contingent and the effects on learners’ performance. This dissertation project aims to contribute to closing this gap in order to gain a deeper insight into the teaching discourse and derive practical implications for (future) teachers. In addition, these processes are compared in the classroom discourse for the social forms of class discussion and group work.

Research Questions
Students’ Participation
1. How is the number of utterances split up between teachers and students?
2. How extensive are the students’ utterances compared to the teachers’ utterances?
3. Is there a difference between the participation of students in class discussion and in group work?

Support Strategies
1. Which support strategies do teachers use?
2. Do teachers use different support strategies in class discussion and group work?

Contingency
1. How contingent are the support strategies applied?
2. Is there a difference of contingency in class discussion and in group work?

Effect on Learning
What effect do contingent support strategies have on
1. student performance?
2. student participation in class?

First results on student participation

Sample
• 54 4th grade classes

Number of utterances

<table>
<thead>
<tr>
<th>Students</th>
<th>Number of Utterances</th>
</tr>
</thead>
<tbody>
<tr>
<td>M = 387.78, SD = 133.25</td>
<td>n= 114</td>
</tr>
<tr>
<td>max = 734</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teachers</th>
<th>Number of Utterances</th>
</tr>
</thead>
<tbody>
<tr>
<td>M = 414.19, SD = 117.04</td>
<td>n= 130</td>
</tr>
<tr>
<td>max = 822</td>
<td></td>
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Method
• Reanalysis of the video study "PLUS" (Professionswissen von Lehrkräften und naturwissenschaftlicher Unterricht im Übergang von der Primar- zur Sekundarstufe; Tröbst et al., 2016)
• Data basis:
  - performance tests (multiple-choice test on aggregate states of water)
  - videos of the teaching units (90 minutes each)
  - transcripts
• Sample: 57 4th grade classes
  - 57 teachers
  - 83.3% female
  - Teaching experience: M = 14.28 years, SD = 11.14
• 1283 students
  - 46.3% female
  - Age: M = 10.25, SD = 0.62
• Differentiation of the teaching phases in group work and class discussion according to Ewerhardy (2016)
• Counting of utterances with MAXQDA (according to Diebl, 2017)
• Development of a coding system, to capture:
  - type and frequency of support strategies according to Studhalter (2017): e.g. focus of attention, activate prior knowledge, challenging conceptual change, etc.
  - Contingency according to van de Pol et al. (2011): matching the level of support to the competence level of the students
• Multi-level analysis with Mplus (Muthén & Muthén, 2017): association and interaction between student participation, support strategies (type and contingency) and students performance

References