Developing a code system with MAXQDA based on an expert’s concept map to determine the increase in knowledge of test persons using English textbook texts throughout their task-based elaboration process

Background
In the past few years research studies focused on modelling the competencies of teachers’ professional knowledge (vgl. [1, 2]). They revealed that pedagogical knowledge is a predictor of the degree to which learners are cognitively activated in class. Subject matter knowledge (knowledge of the subject and its organizing structures) is herein a moderating variable (necessary, however, not sufficient condition) [3]. The target group of my research are students who do a degree course in teaching chemistry or laboratory and process technology. They often have problems in deducing the steps of scientific reasoning from the textbook texts. What do the test persons identify as the relevant lines of arguments occurring in the English textbook texts? If the test persons identify the relevant lines of arguments, how do they apply these lines of arguments to discussing the analytical problem on which the tasks are based?

Research Questions
English texts are more addressess oriented than German texts with regard to readability, continuity of lines of argument and advance organizers (metalinguistic elements) [6].

From the results of my investigations, conclusions are drawn for the following research questions:

- What are text persons’ barriers to acquiring knowledge on the topic to be elaborated by working with English textbook texts?
- Do the test persons identify the relevant lines of argument occurring in the English textbook texts?
- If the test persons identify the relevant lines of arguments, how do they apply these lines of arguments to discussing the analytical problem on which the tasks are based?

Analytical problem
Experimental data to be interpreted

<table>
<thead>
<tr>
<th>Substances</th>
<th>Separation time</th>
<th>Velocity</th>
<th>Retention factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudan Red A</td>
<td>420 s</td>
<td>0.0091 cm/s</td>
<td>6.0 cm</td>
</tr>
<tr>
<td>Toluene</td>
<td>6.0 cm</td>
<td>0.0091 cm/s</td>
<td></td>
</tr>
</tbody>
</table>

Data analysis

<table>
<thead>
<tr>
<th>Code system based on expert’s concept map</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Substances</strong></td>
</tr>
<tr>
<td>Sudan Red A</td>
</tr>
<tr>
<td>Toluene</td>
</tr>
</tbody>
</table>

Result analysis

<table>
<thead>
<tr>
<th>Box plot diagram</th>
</tr>
</thead>
</table>

Conclusions
The use of MAXQDA in this context shows how test persons’ concept maps and lines of arguments can be standardised and evaluated by analysing and visualisation tools of the program to make the test persons’ increase in knowledge transparent throughout their task-based elaboration process. In addition, the contrasted results of the test persons’ prior knowledge of English (c-test) and the subject content (pre and post SC test) reveal that English is less of a barrier than the lack of prior knowledge of the subject matter.

References
3. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
4. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
5. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
6. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
7. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
8. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
9. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
10. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
11. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
12. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
13. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f
14. vgl. Buehner / Kernel 2000; Krause et al. 2000; Wodak / Rehbein / Ehlich / 2011 a, b, a, c, d, e, f

Technical University of Dresden
Fakultät Erziehungswissenschaften
Institut für Berufspädagogik und Berufliche Didaktiken, Berufliche Fachrichtung Labor- und Prozess-technik; Didaktik der Chemie

Dipl.-Berufspäd. Frauke Düwel
Lehrstuhl: Prof. Dr. Manuela Niethammer
frauke.duewel@tu-dresden.de