

Practical Work, Cooperative Learning and Internet Forums – An example on Teaching about the Chemistry of Water

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Background

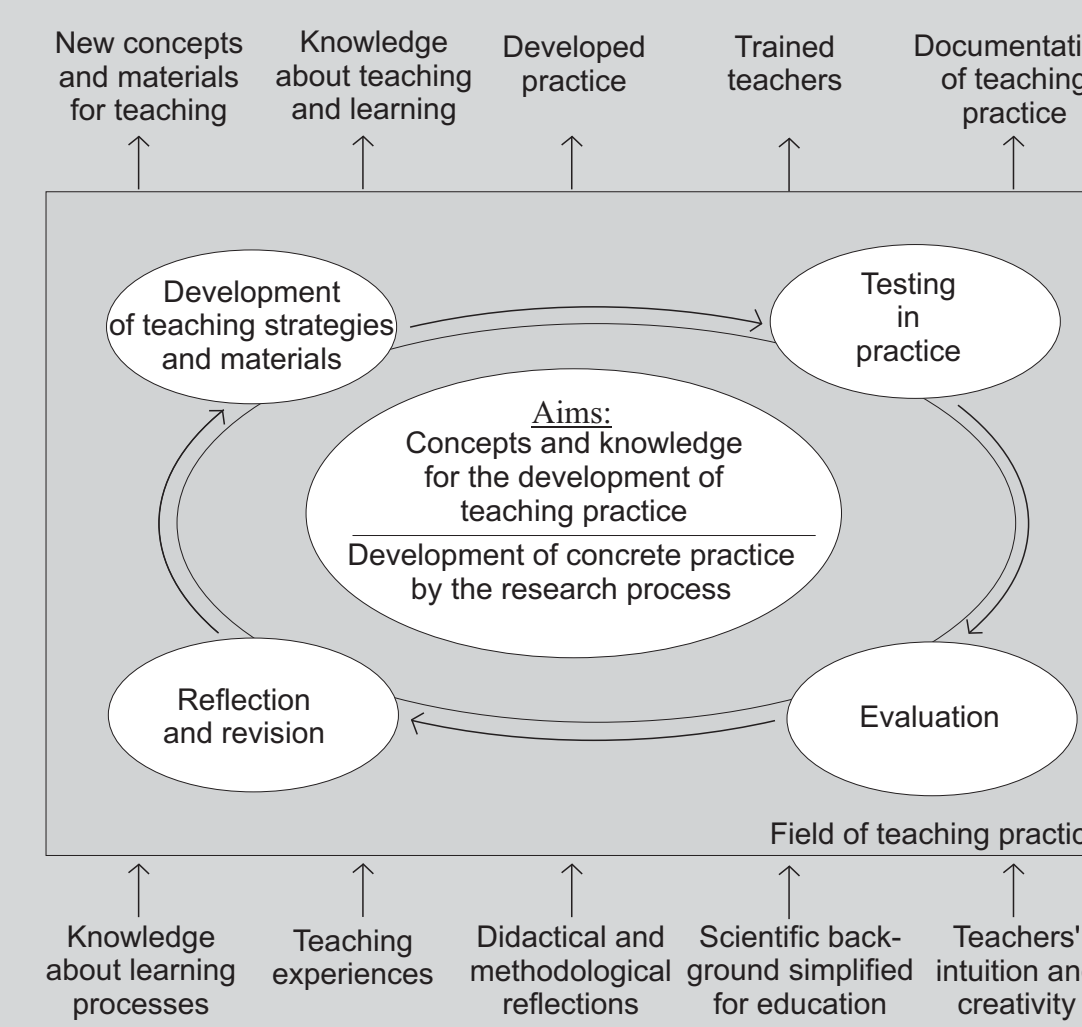
In today's society the importance of digital media is continuously increasing. E.g. in Germany, 92% of the young generation aged twelve to nineteen have own internet-enabled smartphones. For the young generation the Internet is the key to search for information about everyday problems or more general issues (mpfs, 2015). Information is mainly searched for by search engines, such as Google. Quite often links are provided by the search engines to Internet forums where everyday problems or general issues are discussed. In order to deal properly with this information, the UNESCO calls for the cross-curricular teaching of media literacy so that learners can deal skillful with the various services media types, self-determined and critically. Also the OECD names explicitly the interactive use of media as one of out of three key competencies for living self-determined in a modern society.

Framework and Obejctives

- Topic „Water“
- Grade 9 to 11
- The concept of the socio-critical and problem-oriented approach to chemistry teaching (Marks & Eilks, 2009)
- Cooperative learning
- Implementing the forum method
- Media education

Objectives	Criteria for selecting issues and approaches	Methods	Structure of the lesson plans
Allgemeinbildung/ education through science	Authenticity	Authentic media	1. Textual approach and problem analysis
(Multidimensional) Scientific Literacy	Relevance	Student oriented chemistry learning and lab-work	2. Clarifying the chemistry background in a lab environment
Promotion of evaluation skills	Evaluation undetermined in a socio-scientific respect	Learner centred instruction and cooperative learning	3. Resuming the socio-scientific dimension
Promotion of communication skills	Allows for open discussion	Methods structuring controversial debating	4. Discussing and evaluating different points of view
Learning science	Deals with questions from chemistry and technology	Methods provoking the explication of individual opinions	5. Meta-reflection

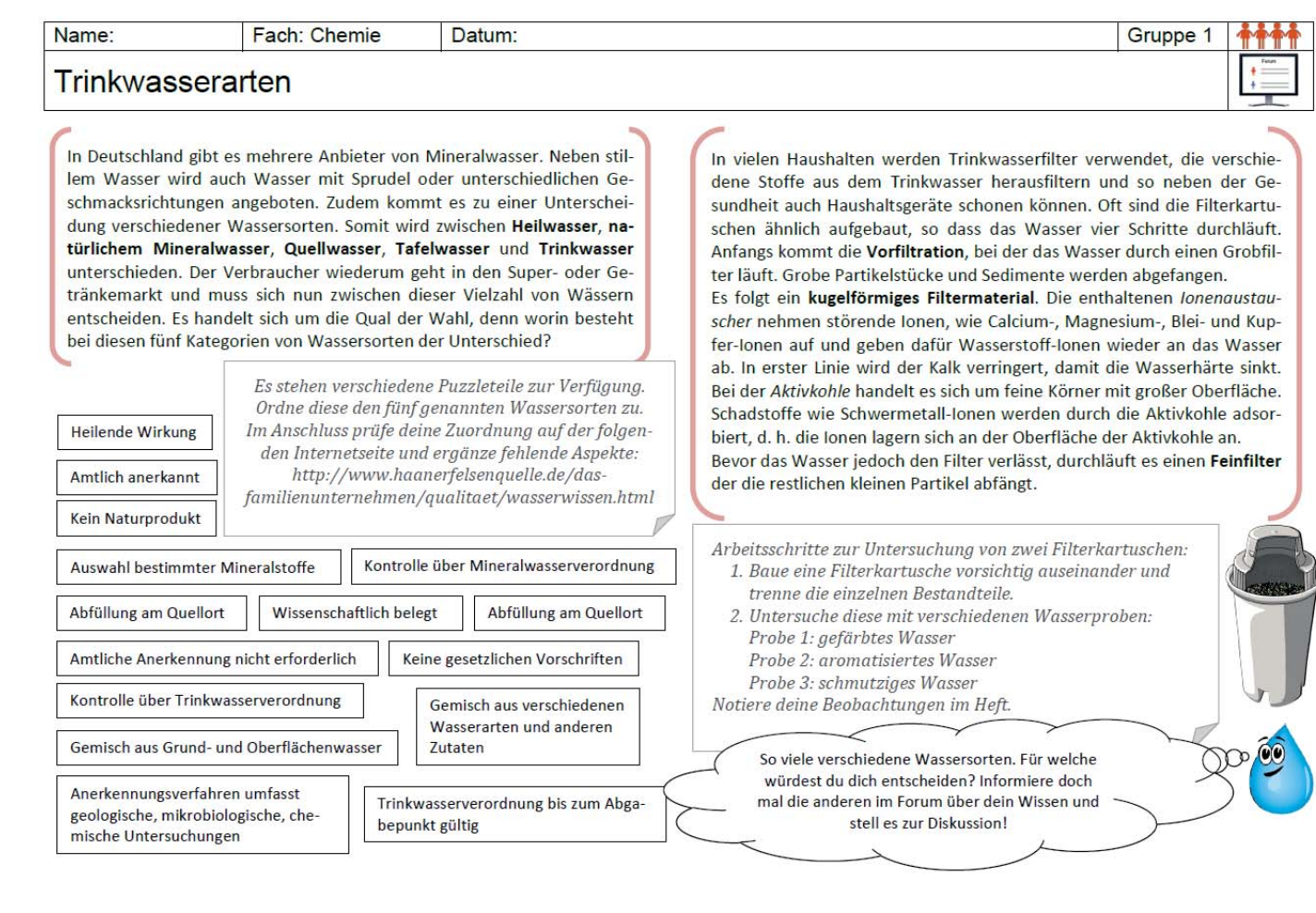
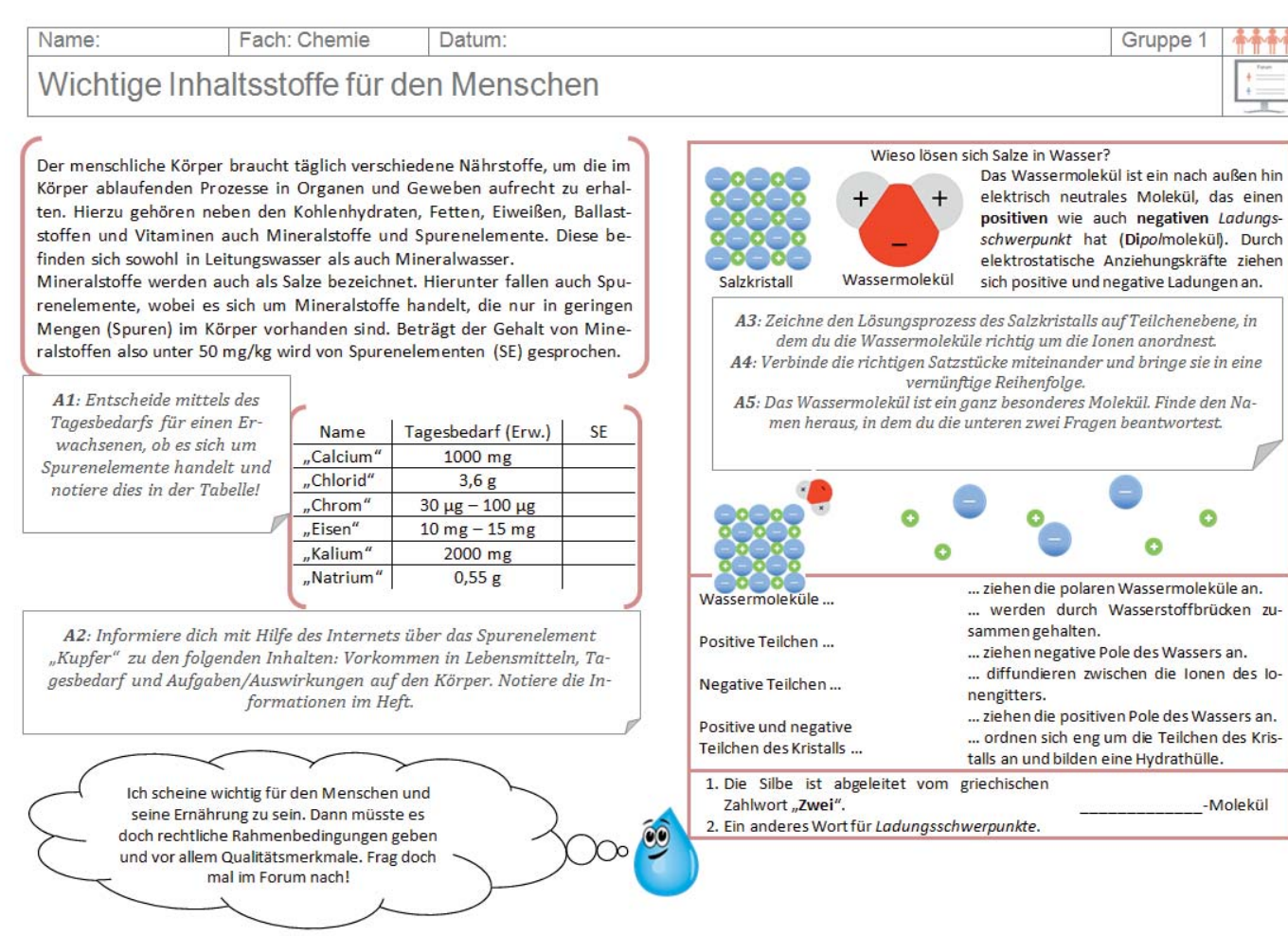
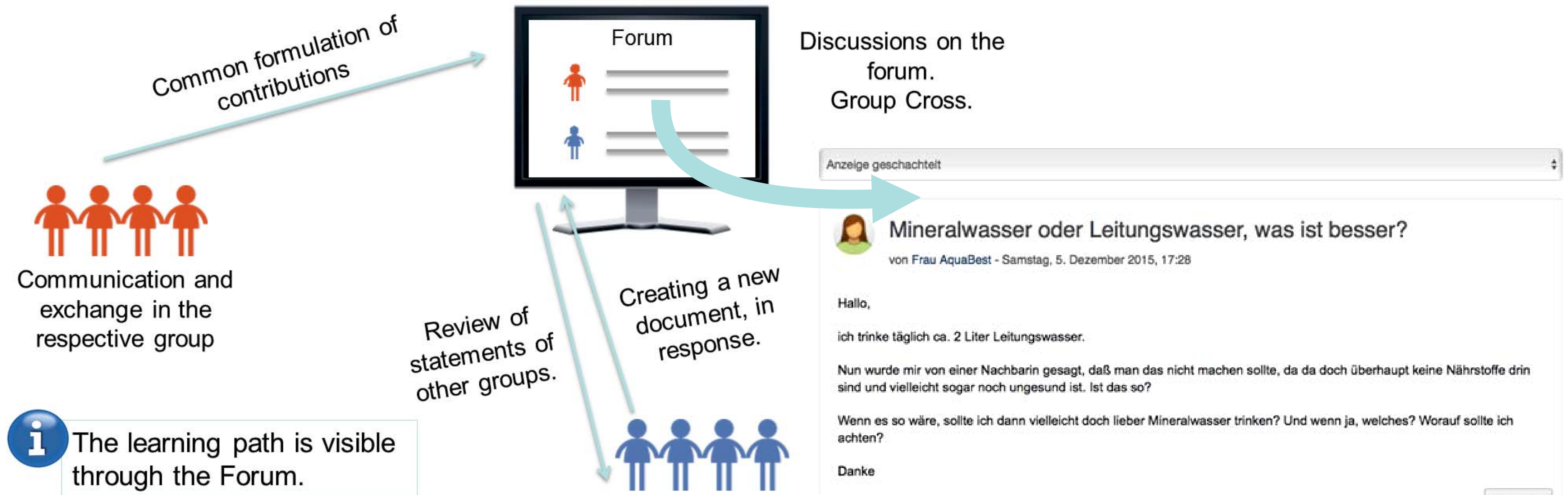
Method



- Participatory action research (Eilks & Ralle, 2002) as cyclical teaching development in cooperation of experienced teachers and educational researchers.
- Approximately 10 teachers of different types of school and schools in Western Germany
- Cyclical development and testing in different learning groups in Bremen
- Analysis of teacher feedback

The Forum-Method

1. Phase: Preparing the forum work
 - Confrontation with the forum question
 - Formation of heterogeneous small groups
2. Phase: Cooperative workphase
 - Information through materials
 - Exchange in the forum
3. Phase: Evaluation of workphase
 - Learning path is visible as forum history



Analyzing various forum courses:

- Each group has different sections of forum entries
- Elaboration of pro- and contra-arguments
- Developing questions
- Supports the subsequent discussion in the forum

Texts at different ingredients in water:

- Group 1: Key ingredients for humans
- Group 2: Foreign matter in water
- Group 3: Ingredients and water hardness
- Group 4: Ingredients according to the Drinking Water Regulation

Experiments:

- Group 1: Investigating a drinking water filter cartridge
- Group 2: Preparation of a water filter
- Group 3: Detection of nitrates, nitrites, copper and pH
- Group 4: Electrical conductivity and pH of various water samples

First experience

The lesson and methodology has so far been tested in five learning groups in lower and upper secondary education (age range 14-17). In total 86 students participated. The majority of students liked the exchange and debate in the forum and many of them had the feeling that working in the forum is an effective mode of learning. The students expressed that they liked the Internet forum work and found it challenging to discuss and develop interesting posts. The history of the forum proved itself to be an effective way to monitor and reflect cooperative learning activities.

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