

Teacher training for a language-aware elementary science education

In this paper the concept and evaluation of a teacher training to enable a language-aware elementary science education will be presented. The concept of a language-aware elementary science education is very complex (Archie 2013), because it requires considering the students' science abilities and schemas and equally their existing language competencies (based on scaffolding language-scaffolding learning, Gibbons 2002). On this knowledge the expectations of the science aspects as well as the anticipated language competencies need to be adapted in the planning of a successful language-aware science class. An overall principle in the language-aware elementary science education considers metacognitive and metalinguistic skills by using language awareness and language reflection. Planning in this context requires a high content knowledge and pedagogical-content-knowledge of the teachers in the fields of elementary science education as well as language skills and how to advance them. Research shows that elementary school teachers do not possess sufficient knowledge in these areas (Tracy 2010; Appelton 2007). An upgrade of this knowledge could be achieved through an in-service teacher training.

The training has been evaluated on three levels (based on Lipowsky's concept of evaluation of teacher trainings, 2010) with open and closed questions as well as videotaped lessons of the participating teachers in a prae-post-design. The questionnaires were developed based on theories of science and language teaching competencies to assess the teachers' prior knowledge and attained knowledge. Existing tools (e.g. Kleickmann et. al. 2005) were adapted to show the changes in the teachers' interests and self-assessment on the aspects of a language-aware classroom. The concept of the language-aware elementary science education has been proven stable and valid. Internal consistency of the instruments are adequate, the sub-categories of the pedagogical-content-knowledge necessary for planning language-aware elementary science lessons are stable and sensitive enough to assess achievement. The findings from the questionnaires will be presented in the paper with regards to possible achievements and challenges of an teacher training for an language-aware elementary science education.

references:

- Appelton, K. (2007). *Elementary Science Teaching* (pp.493–534).
- Archie, C.; Rank, A. & Franz, U. (2014). *Sprachbildung im und durch Sachunterricht*. In Hartinger, A. & Lange, K. (Hrsg.). *Sachunterricht (Didaktiken der Grundschule)*. Cornelson.
- Gibbons, P. (2002). *Scaffolding language, scaffolding learning. Teaching second language learners in the mainstream classroom*. Portsmouth, NH: Heinemann.
- Kleickmann, T., Gais, B. & Möller, K. (2005). *Lehrervorstellungen zum Lehren und Lernen im naturwissenschaftsbezogenen Sachunterricht - Gibt es einen Zusammenhang zwischen Vorstellungen und Lehrerbildung?* In D. Cech & H. Giest (Hrsg.). *Sachunterricht in Praxis und Forschung* (pp. 167-176). Bad Heilbrunn: Klinkhardt.
- Lipowsky, F. (2010). *Lernen im Beruf` Empirische Befunde zur Wirksamkeit von Lehrerfortbildung*. In Müller, F., Eichenberger, A., Lüders, M. & Mayr, J. (Hrsg.), *Lehrerinnen und Lehrer lernen` Konzepte und Befunde zur Lehrerfortbildung* (pp. 51- 72). Münster: Waxmann.
- Tracy, R., Ludwig, C. & Ofner, D. (2010). *Sprachliche Kompetenzen pädagogischer Fachkräfte – Versuch einer Annäherung an ein schwer fassbares Konstrukt*. In M. Rost-Roth (Hrsg.), *DaZ-Spracherwerb und Sprachförderung Deutsch als Zweitsprache. Beiträge aus dem 5. Workshop "Kinder mit Migrationshintergrund"* (pp. 183–204). Freiburg im Breisgau: Fillibach.