

# Using the US standard system for measurement in Germany – Bilingual education in primary school

Eileen Baschek

Justus-Liebig-University Giessen, Germany; [eileen.baschek@math.uni-giessen.de](mailto:eileen.baschek@math.uni-giessen.de)

*Keywords: Bilingual education, primary schools, intercultural education, measurement.*

## Research aim

Advanced linguistic skills of bilingually taught students have been highlighted by Kersten et al. (2010) and justified by the higher frequency of language contact. In bilingual settings, *Cognitive/Academic Language Proficiency* (Cummins, 1979) is addressed in addition to *Basic Interpersonal Communication Skills* (ibid.), which are significant in traditional foreign language lessons. The presented research project aims to investigate the contribution of a bilingual *PrimarWebQuest* about lengths to the mathematical and linguistic learning of students. The research interest can be located on a subject-related level, a linguistic level, and a digital level, whereby their relationships are of particular interest: Which subject-related and technical competencies do students show while working on *PrimarWebQuests* in bilingual mathematics lessons at primary level?

## Measuring length

The measurement of lengths is usually more familiar to students than other areas and it represents the basis for the students' conception of numbers in general as well as other measurement areas (Franke & Ruwisch, 2010). For stimulating a deeper understanding, it is necessary to work with different materials or measuring tools and to compare units. Thus, in bilingual classes, dealing with other systems, such as the US standard system, lends itself to intercultural learning. Furthermore, there are numerous measuring tools which offer both systems. Students in the United States get to know both systems, learn about initial conversions and learn how to describe their relationship. Unlike the US standard system, the metric system follows a decimal structure. By comparing the systems, students can deepen their understanding of the metric system and its base 10 numeration (NCTM, 2000).

## Bilingual education

Bilingual education in Germany refers to settings in which a subject or a topic is taught in a different language for a fixed time. A link between linguistic-communicative and subject-related learning is already evident in monolingual mathematics classes. When mathematical terms are introduced, they are not automatically associated with a precise and technically correct conception. Such a conception is continuously developed and expanded through linguistic negotiation processes. This described linkage can find an extension in bilingual mathematics classes. Schubnel (2009) describes positive effects of such classes on the acquisition of mathematical knowledge. Technical terms can be built up in two language structures, whereby nuances and differences in meaning can support the learning of terms. One possible approach to those classes are *PrimarWebQuests*, an inquiry-oriented and web-based method for using internet sources. The diversity of the Internet can be a support as there is few materials for many topics. In Baschek (2022) is shown how the method can enable dialogues, which offer the possibility to investigate the students' understanding of mathematical terms.

## Research design

The study was conducted with two small groups of a 4th grade of a bilingual school in Germany. All children have been learning English since grade 1, one student grew up bilingual. Mathematics is taught in English or German, depending on the topic. The implementation took place with an English and a German speaking teacher. Since the metric units of length were already known by the students, the PrimarWebQuest<sup>1</sup> aimed at familiarizing them with the US standard system and developing ways of converting in and between both systems. Because of the authentic materials, students are expected to develop ideas of the new units of length as well as appropriate representatives.

For analysing the videographed data, excerpts of discussions about mathematical facts or language-sensitive activities have been transcribed and examined in a qualitative-reconstructive manner using interaction analysis (Krummheuer, 2002). Its aim is to reconstruct the way in which individuals create and negotiate taken-as-shared meaning. Every utterance is closely examined and analysed for providing multiperspectivity of developing conceptions. Preliminary results will be presented.

## References

- Baschek, E. (2022). WebQuests in content and language integrated learning classes on primary level. In J. Hodgen, E. Geraniou, G. Bolondi, & F. Ferretti (Eds.), *Proceedings of the Twelfth Congress of the European Society for Research in Mathematics Education (CERME12)*. (pp. 1501–1508). Free University of Bozen-Bolzano and ERME.
- Cummins, J. (1979). Linguistic interdependence and the educational development of bilingual children. *Review of Educational Research*, 49(2), 222–251. <https://doi.org/10.3102/00346543049002222>
- Franke, M. & Ruwisch, S. (2010). *Didaktik des Sachrechnens in der Grundschule* [Didactics of factual calculation in primary school] (2nd ed.). Springer Spektrum.
- Kersten, K., Rohe, A., Schelletter, C. & Steinlen, A.K. (Eds.) (2010). *Bilingual preschools. Vol. 1: Learning and development*. WVT.
- Krummheuer, G. (2002). Introduction of WG4. The comparative analysis in interpretative classroom research in mathematics education. In J. Novotná (Ed.). *Proceedings of the Second Congress of the European Society for Research in Mathematics Education*. (pp. 339–346). Charles University, Faculty of Education and ERME.
- National Council of Teachers of Mathematics (NCTM). (2000). *Principles and standards for school mathematics*. National Council of Teachers of Mathematics.
- Schubnel, Y. (2009). *Bilingualer Mathematikunterricht. Ein Beitrag zu einem zusammenwachsenden Europa* [Bilingual mathematics classes. A contribution to Europe growing together]. [Unpublished doctoral dissertation]. Pädagogische Hochschule Freiburg.

---

<sup>1</sup> <https://math-primwq-bilingual.sd.uni-frankfurt.de/length-laengen/introduction-einleitung/>