

Quality of Early Mathematics Education in an International Comparison – Austria and Switzerland

QUALITY IN EARLY CHILDHOOD MATHEMATICS

A general definition of the common quality in early childhood education is seemingly difficult, as the term can refer to different dimension such as the early childhood educators, the organisation as well as the institution (Isele & Fried, 2014, pp. 16). Tietze et al. (1998) describes pedagogical quality as interplay of the pedagogical orientation, the structures and processes that have an influence on the physical, emotional, social and intellectual wellbeing, development and education of the children (Tietze, 2008, pp. 17).

Children who have a lower level of mathematical abilities when they enter kindergarten are more likely to be outperformed by their peers in their later educational career (Brendefur et al., 2013; Choi & Dobbs-Oates, 2013; Hauser, Vogt, Stebler & Rechsteiner, 2014; Lehrl et al., 2016; Lewis Presser et al., 2015).

Studies from Lehrl et al. (2016) and Tresp et al. (2014) show that especially a high level of process quality has an positive influence on the learning outcomes on the level of early mathematics.

RESEARCH QUESTION

What differences and what common aspects can be recognised in the process quality in early math activities in kindergartens/preschools in Austria and Switzerland?

RESEARCH DESIGN

Early childhood educators from Austria and Switzerland prepared a specific math activity for two different age groups of children. These math activities were videotaped and analysed with the observational instrument COEMET (Sarama & Clements, 2009).

Groups	math topics	Austria (n)	Switzerland (n)
3-4 year olds	„Shapes and spaces“	14 sequences	6 Sequences
5-6 year olds	„Measurement“	12 sequences	6 sequences

The international study “BELMI 3-6”, from which this data was taken, is about the methodical and didactical approaches in early mathematics and the educational goals and performance expectations of the early childhood educators.

Therefore, early childhood educators from Switzerland, Austria, China (Shanghai), Vietnam (Hanoi) and the USA so far participated in this research.

RESULTS

Country comparison

The data shown here was analysed with the nonparametric test Mann-Whitney U-Test. Significant differences can be recognized in the categories:

- Mathematical focus (< 0.008)
- Eliciting children’s solution methods (< 0.001)
- Expectations (< 0.002)

Country		Mathematical Focus	Expectations	Eliciting childrens solution methods
Austria	Mean	5.04 (SD 1.87)	4.62 (SD 1.55)	6.65 (SD 1.52)
Switzerland	Mean	6.83 (SD 1.87)	6.67 (SD 1.56)	9.17 (SD 1.80)

Age group comparison between countries

The comparison between the age groups and the countries show significant results in the categories “mathematical focus” (< 0.001), “expectations” (< 0.007) and “supporting children’s conceptual understanding” (< 0.002). The Swiss early childhood educators scored a higher quality in the math activities than the Austrian early childhood educators.

Country/Age		Mathematical Focus	Expectations	Country/Age		Supporting childrens conceptual understanding
AUT 3-4	Mean	4.07 (SD 1.14)	4.21 (SD 0.80)	AUT 5-6	Mean	6.67 (SD 1.92)
CH 3-4	Mean	6.67 (SD 1.03)	6.67 (SD 1.03)	CH 5-6	Mean	8.33 (SD 1.51)

Maximum score within categories: Mathematical focus 10, expectations 10, eliciting children’s solution methods 15, supporting children’s conceptual understanding 15; p < .05

DISCUSSION

The comparison of the mean sum scores indicate that early math activities of Swiss early childhood educators show a higher process quality in the videotaped math activities.

- **Mathematical focus:** Swiss early childhood educators tend to have a better understanding of mathematical topics and choose activities that are consistent with the children’s level of mathematical development.
- **Expectations:** Swiss early childhood educators recognised the children’s efforts in the math activities as well as reinforced their efforts and concentrations more frequently than the Austrian early childhood educators. They also recognized the children’s efforts in the math activity as well as reinforced their efforts and concentration more frequently.
- **Eliciting children’s solution methods:** Swiss early childhood educators asked the children more frequently to explain their ideas and mathematical thinking, supported the children’s responses and encouraged the children to listen to each other as wells as consider and elaborate other children’s ideas and responses.

It is thought that the diverse professional development of the early childhood educators explains the observed differences in the level of the process quality of the early math activities.

LITERATURE

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AUTHORS & PARTNERS

Authors:

- Karoline Rettenbacher, University of Graz
- Mailina Petritsch, University of Graz
- Lars Eichen, University of Graz
- Manfred Pfiffner, PH Zürich
- Catherine Walter-Laager, University of Graz

Universities and Partners:

East China Normal University, Shanghai, China; Xin Zhou National College for Education of Ha Noi, Viet Nam; Nguyen Ngoc Linh University of Denver, Denver CO, USA; Doug Clements & Julie Sarama