The Transition from Primary to Secondary School in Science Education

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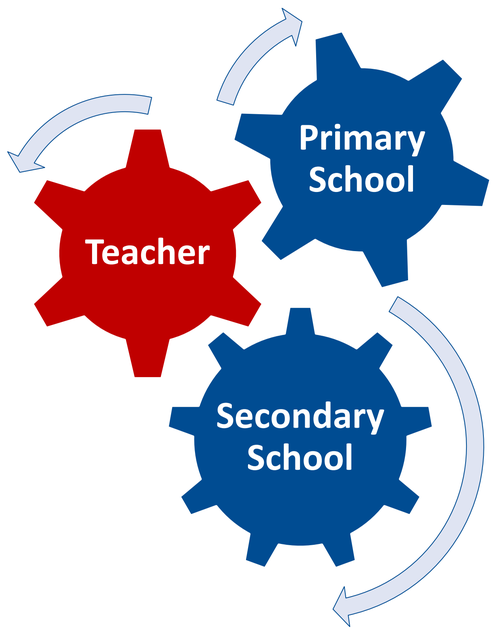
The aim of this study is to determine teachers' required competencies in order to ensure a continuous development of knowledge, interest and motivation during the transition in science education.

THEORETICAL BACKGROUND

- concerns about continuity and progression in students' learning in science education at key points of transition (Braund, 2007)
- cumulative learning should be supported by primary and secondary school teachers
  - ➢ didactical requirement: managing a transition that avoids discontinuity and enables students' cumulative learning (HMIe, 2006)
- transfer-related activities could support the transition process in science education
  - ➢ transfer-related activities require competencies of teachers, school's internal and external cooperation (Ophuysen, 2005)



STATUS QUO

- development and implementation of so-called bridging units or bridging materials in science education (Braund & Driver, 2002; Burr & Simpson, 2006; Burr & Simpson, 2007; McCormack, 2016)
- joint activities or projects in primary and secondary schools (Galton, Gray, & Ruddock, 1999)
- primary and secondary school teachers are using transfer-related activities to support the transition process but rarely in science education (Galton, Gray, & Ruddock, 1999; Rau-Patschke & Brüggerhoff, 2019)

RQ 1 Which competencies of primary and secondary school teachers do experts consider to be necessary in order to ensure continuity and progression in students' learning and in the development of interest and motivation during the transition in science education?

RQ 2 What recommendations can be derived from students' own experience during the transition in science education and which issues still need to be addressed to ensure the well-being of students?

METHOD I

Delphi Study (Linstone & Turoff, 1975)

- three-stage Delphi study (+ pilot study) based on an online survey
- identification and qualification of experts' opinions towards an uncertain situation
- round 1 (open-ended questionnaire; brainstorming session)
- round 2/3 (closed questionnaire; ratings on a 5-point Likert scale)

Table 1: sample size (*N*= 190)

	teacher	headmaster	teacher trainer	researcher in natural sciences
round 1	50	each 30		
round 2	100	each 60		
round 3	70	each 40		

METHOD II

Group Interviews

- guideline-based interviews with fifth grade students (*N*= 30)
- data-driven qualitative content analysis (Mayring, 2014)
- retrospective description of students' own transition from primary to secondary school with regard to science education
- interviews focus on aspects such as …
  - ➢ development of interest and motivation
  - ➢ learning experiences
  - ➢ school performance
  - ➢ teachers' image
  - ➢ experienced support while the transition

CURRENT STATUS

✓ **preparatory study**
- development of a category system describing teachers' transfer-related activities in science education
- categories: Knowledge of Curricula in Science Education, School Environment and Organisation, Assessment, Teaching Styles and Approaches, Cooperation (Rau-Patschke & Brüggerhoff, 2019)

✓ **pilot study**
- sample size (N= 16)
  - ➢ teacher: 4
  - ➢ headmaster: 4
  - ➢ teacher trainer: 4
  - ➢ researcher in natural sciences: 4
- revision of the category system

conducting the main study

FIRST RESULTS (Pilot Study) – Required Competencies Mentioned by Experts

Knowledge of Curricula in Science Education	Primary and secondary school science teachers are familiar with each others science subject structures.	Secondary school science teachers use well-known methods of science education of primary schools.	**Teaching Styles and Approaches**
School Environment and Organisation	Secondary school science teachers make the work in subject rooms a topic of discussion.	Primary and secondary school science teachers are aware of the benefits of cooperation between primary and secondary schools in science education.	**Cooperation**
Assessment	Primary and secondary school science teachers advise students regarding their performance at key points of transition in science education.	Primary and secondary school science teachers give attention to the differences between primary and secondary schools in science education.	**Empathy for Students' Transition Process**

Figure 1: Selected criteria mentioned by experts have been paraphrased

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