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Effects of opportunities to learn in teacher preparation on future teachers' general pedagogical knowledge: Analyzing program characteristics and outcomes

Johannes König[a,*], Rudy Ligtvoet[a], Stefan Klemenz[a], Martin Rothland[b]

[a] Empirical School Research, University of Cologne, Gronewaldstr. 2, 50931 Cologne, Germany
[b] Martin Rothland - University of Siegen, Adolf-Reichwein-Str. 2, 57068 Siegen, Germany

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ABSTRACT

Empirical studies in higher education are needed that systematically connect program characteristics to program outcomes. We therefore examine the effects of opportunities to learn in teacher preparation on future teachers' general pedagogical knowledge. A sample of 1347 student teachers from 37 teacher preparation programs in 18 universities and pedagogical colleges in Germany and Austria with two time points is used. Results using hierarchical linear modeling show that measures of learning opportunities related to pedagogical content and teaching practice influence the gain in knowledge. Whereas measures for pedagogical content related to areas of didactics (adaptivity in teaching, structuring lessons) show effects on the knowledge gain both on the individual and on the program level, teaching practice measures related to in-school opportunities to learn have effects only on the individual level of future teachers. Implications for the effectiveness of teacher preparation and research suggestions are discussed.

1. Introduction

The preparation of highly qualified teachers has been intensively discussed in the past decades (e.g., Cochran-Smith & Zeichner, 2005; Darling-Hammond & Bransford, 2005; National Research Council, 2010). The focus has been on the key questions of what could be learned from research about "the effects of teacher preparation program characteristics on the knowledge, skills, and performance of program completers" (Floden, 2015, p. 281). As, however, relevant research is comparatively scarce, empirical studies in higher education are needed that systematically connect program characteristics to program outcomes (e.g., Schmidt, Blömeke, & Tatto, 2011). The findings of such studies could help to inform educational policy and curriculum planning.

Teacher knowledge has increasingly become a research area of considerable interest, also as a relevant outcome of initial teacher education programs (Darling-Hammond, 2006). For example, in 2008 the International Association for the Evaluation of Educational Achievement (IEA) carried out the Teacher Education and Development Study in Mathematics (TEDS-M) using representative samples in 17 countries worldwide (Tatto, Schwille, Senk, 2008). The TEDS-M target population was mathematics teachers for primary and secondary schools in their final year of teacher education. A core aim of TEDS-M was an assessment that included direct measures of pre-service teachers' knowledge. It also collected data on the opportunities to learn (OTL) the pre-service teachers had been exposed to during their preparation. Empirical findings provided detailed insight into how such learning opportunities are correlated with the knowledge of pre-service teachers at the end of their training (König & Blömeke, 2012; Blömeke, Hsieh, Kaiser, & Schmidt, 2014; Schimdt, Cogan, & Houang, 2011).

Although a study like TEDS-M enriches our understanding, as a survey with one occasion of measurement, effects on the assessed knowledge are based on cross sectional data only. Higher education research is needed that accounts for longitudinal assessment data and allows the modelling of OTL effects on the learning gains towards the knowledge acquired by the pre-service teachers. Therefore, in this study, we draw on a sample of two measurement occasions of pre-service teachers from Germany and Austria whose general pedagogical knowledge was tested using the TEDS-M test at the entrance to their teacher preparation program in 2011 and two years after, when they were also asked to report about their OTL they had been exposed to during their bachelor's teacher preparation program.

Using the opportunities to learn concept, the present study's starting point is an investigation of structural components that have been

* Corresponding author.
E-mail addresses: johannes.koenig@uni-koeln.de (J. König), rudy.ligtvoet@uni-koeln.de (R. Ligtvoet), stefan.klemenz@uni-koeln.de (S. Klemenz), martin.rothland@uni-siegen.de (M. Rothland).

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identified as typical for teacher education in many countries (e.g., Flores, 2016), i.e., components related to general education studies and the practicum (besides subject-specific components). With our empirical analysis we specifically focus on the representation of content in general pedagogy as well as facets of teaching practice, as has been accounted for in previous studies as well (e.g., König & Seifert, 2012; König, Tachtsoglou, Darge, & Lünnemann, 2014; Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2006; Desimone, 2009). A comparative analysis of Germany and Austria is of great interest, since the majority of student teachers in Austria are fully certified to enter the teaching profession with a three-year bachelor's degree, whereas students in Germany still have to complete a master and the induction phase. Such variation in learning opportunities and potential learning outcomes serves as good reason for examination, and, additionally, features of the included programs are similar to features of teacher education programs more broadly, leading to findings that can be generalized and contribute to our knowledge base on teacher education. Therefore, in the present article we examine the connection between pedagogical learning opportunities in teacher preparation programs and pre-service teachers' general pedagogical knowledge. The overall aim is to contribute to a more precise outline of the role of the preparation of teachers through the learning opportunities provided and taken in developing pedagogical knowledge during the student teachers' first two years of higher education.

1.1. Teacher knowledge as an outcome of higher education

Research on teacher knowledge has increased during the past decade (König, 2014). It draws on the expertise research paradigm, which emphasizes the significance of teachers' professional knowledge for the successful mastering of tasks that are typical of their profession (e.g., Berliner, 2001; Bromme, 2001). Shulman (1987) provided an important heuristic to classify components of teacher knowledge, which has influenced the definition of teacher knowledge categories for teacher knowledge research. Especially when testing teachers, researchers tend to distinguish between content knowledge (CK), pedagogical content knowledge (PCK), and general pedagogical knowledge (GPK) (e.g., Baumert et al., 2010; Tatto et al., 2008). Whereas CK is the knowledge of the specific subject and related to the content teachers are required to teach, GPK is the knowledge which is not subject-matter related. PCK includes subject-related knowledge for the purpose of teaching. In the present article, our examination will focus on the GPK of pre-service teachers.

Shulman (1987, p. 8) argued that GPK involves "broad principles and strategies of classroom management and organization that appear to transcend subject matter" as well as knowledge about learners and learning, assessment, and educational contexts and purposes. Teachers need to draw on this range of knowledge and weave it into coherent understandings and skills if they are competent to deal with what McDonald (1992) called the "wild triangle" that connects learner, subject matter, and the teacher in the classroom. Against this background and following the concept of "competence" (see in general Weinert, 2001; specified for the teaching profession by Bromme, 2001), a theoretical framework of teachers' GPK that could be tested empirically across countries was developed in the context of TEDS-M (see for details, König, Blömeke, Paine, Schmidt, & Hsieh, 2011).

The framework focuses on the mastering of professional tasks and reaching important objectives of the teaching profession. This means that the theoretical framework of GPK is structured in a task-based way and explicitly not according to the formal structure of general pedagogy as an academic discipline. Furthermore, instruction is focused on as the core activity of teachers (Berliner, 2004; Bromme, 2001) serving as a heuristic to select topics of GPK. Findings from instructional research (Good & Brophy, 2007; Slavin, 1994) and didactics (Good & Brophy, 2007; Klafki, 1985) were combined to conceptualize GPK for teaching as is shown in Table A1 (see Appendix A; for more details, see König et al., 2011): Four dimensions of GPK are considered highly relevant. In-service teachers should have general pedagogical knowledge allowing them to account for the heterogeneity of their learning groups in the classroom ("adaptivity"), prepare, structure and evaluate lessons ("structure"), manage the classroom and motivate their students ("classroom management/motivation"), and assess students ("assessment"). In TEDS-M 2008, the GPK test was successfully validated through expert reviews in the participating countries and through confirmatory approaches based on large-scale data from these countries (see, for details, König et al., 2011; König & Blömeke, 2012). More recently, the conceptual differentiation into these four content dimensions has been compared with other conceptualizations of GPK tests: A systematic review conducted by the OECD (König, 2014) shows that the test developed in TEDS-M covers content that has also been focused on by other approaches assessing GPK, indicating agreement on the relevance of selected test dimensions and topics.

Scaling analysis in TEDS-M showed that it is legitimate to regard GPK as a homogenous construct. However, it is also possible to distinguish between the dimensions as outlined in the theoretical framework. This allows researchers to report both an overall test score and several test scores for each dimension ("adaptivity", "structure", and so on). In TEDS-M, strengths and weaknesses of different teacher education systems were evaluated by using scores for the different dimensions. Since then, several follow-up studies have been carried out to apply the GPK paper-pencil test again, using various samples of pre-service and in-service teachers in Germany and in other countries (such as Austria). All these studies report good psychometric properties of the GPK test. Reliability of the overall test score is good (e.g., .86 for pre-service elementary school teachers, .78 for pre-service middle school teachers in TEDS-M (see König et al., 2011; König & Blömeke, 2012) and .81 for in-service teachers in König, Blömeke, Klein, Suhl, Busse, & Kaiser, 2014). In accordance with assumptions of the acquisition of teacher expertise, in-service teachers outperform pre-service teachers who are at the end of their initial teacher education, whereas they in turn outperform future teachers just entering initial teacher education (König, 2013). However, it remains an open question whether higher GPK test scores of teachers are associated with the learning opportunities which the student teachers had been exposed to during their preparation program.

Moreover, GPK test scores have been analyzed as a predictor for the instructional quality delivered by teachers in order to provide evidence that teachers' GPK is indeed a premise for the performance in the classroom. Regarding the TEDS-M test, in a study of in-service teachers, their test scores are positively related to instructional quality as rated by their students (König & Pflanzl, 2016). Other studies using different test instruments measuring GPK of pre-service teachers come to similar findings of prognostic validity (Lohse-Bossenz, Kunina-Habenicht, Dicke, Leutner, & Kunter, 2015; Voss, Kunter, & Baumert, 2011). Moreover, evidence has been provided that GPK of in-service teachers may serve as a predictor to prevent them from experiencing teacher burnout (Lauermann & König, 2016; Dicke et al., 2015).

1.2. Opportunities to learn in teacher preparation

Higher education programs preparing students to become well-qualified teachers intend to support pre-service teachers' acquisition of professional knowledge for teaching. Thus, subject-related and pedagogical learning opportunities as well as in-school opportunities for teaching practice are provided by teacher education institutions (Cochran-Smith & Zeichner, 2005; Feiman-Nemser, 2001; Grossman, 1990). Opportunities to learn (OTL) is an important concept to describe and analyze learning and development in educational contexts (McDonnell, 1995). Deriving from IEA studies, the concept of OTL is central when investigating the impact of teacher preparation on teacher learning: It serves "as an indicator of curricular variation (…) and as a representation of the diversity of content" (Tatto et al., 2008, p. 44).