



Research paper

Linking practice to theory in teacher education: A growth in cognitive structures

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HIGHLIGHTS

- Pre-service teachers' cognitive schemes had grown and their conceptual knowledge had expanded.
- Pre-service teachers experienced a linkage of practice to theory within the program.
- A good preparation for the practicum includes sufficient, useful and enforceable assignments and suggestions.

ARTICLE INFO

Article history:

Received 8 December 2015

Received in revised form

23 December 2016

Accepted 9 January 2017

Keywords:

School-based

Curriculum

Pre-service

Theory vs. practice

ABSTRACT

There are doubts about the effectiveness of teacher education regarding professional behavior of pre-service teachers. Theory is part of teacher education, but is not embedded in teaching practice. This research examines whether a curriculum succeeds in linking theory to preservice teachers' experiences. In this study, 136 first year pre-service teachers carried out a case test and a card-sorting task, both before and after a specific curriculum program. Measurements show that pre-service teachers' cognitive schemata had grown, that their conceptual knowledge had expanded and that they experienced a linkage of practice to theory to a reasonable degree within the program.

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1. Introduction

Teacher education programs are often criticized (Darling-Hammond, Holtzman, Jin Gatlin, & Vasquez Heilig, 2005), because there are doubts concerning the quality of the teachers who have finished the programs. Grossman (2008) states that there is a crisis in teacher education, citing studies on the disappointing impact of teacher education on the professional behavior and the knowledge of pre-service teachers in educational practice. Korthagen (2010) concludes that there are serious doubts about the effectiveness of teacher education in general. Several researchers attribute this problem to the gap between theory and practice (Broekkamp & Van Hout-Wolters, 2007; Burkhardt & Schoenfeld, 2003; Kennedy, 1997; Robinson, 1998). Pre-service teachers apply theory, as offered in curriculum courses at the

teacher education institute, only to a limited degree in educational practice. Theory is part of teacher education, but it is not embedded in teaching practice and not anchored in the actions of pre-service teachers.

Teacher educators are trying to find an effective way to bridge this gap between theory and practice (Haggar & McIntyre, 2006). Over the last decade more and more studies have emphasized the need for unity of theory and practice and have been focusing on the integration of theoretical and practical elements of studies (Burn & Mutton, 2015; Griffiths & Guile, 2003; Haggar & McIntyre, 2006; Heikkinen, Tynjälä, & Kiviniemi, 2011; Tynjälä, 2008). Little is known about the effectiveness of programs which link practice to theory. This research examines whether a curriculum succeeds in bridging the gap between practice and theory by linking pre-service teachers' experiences to practical and theoretical knowledge. Practical knowledge is gained through practical experiences concerning particular cases (Mattsson, Eilertsen, & Rorrison, 2011). Theoretical knowledge, or 'conceptual knowledge', is universal, formal and explicit in nature (Heikkinen et al., 2011).

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1.1. A gap

Several authors refer to the gap as a classical controversy between, on the one hand, Plato's conception of rationality, 'episteme', and, on the other hand, Aristotle's conception of practical wisdom, 'phronesis' (Fenstermacher, 1994; Kessels & Korthagen, 1996). 'Episteme' is the theoretical or conceptual knowledge that a teacher might use to analyse a situation with a set of general assertions that apply to many different situations and problems. 'Phronesis', or practical wisdom, is the knowledge that a teacher might use to recognize features of a practice situation and act on them in order to solve a problem. The gap in teacher education between practice and theory is essentially a gap between these different kinds of knowledge.

The gap between theory and practice has at least six different causes. Firstly, teachers possess strong and complex preconceptions about learning and teaching, developed over a long period of time, which shape their perceptions of practical situations and often do not match the theories of teacher education (Wubbels, 1992). Secondly, the type of information processing mostly focused on by teacher educators can be described as rational or cognitive. The impact of such an approach on the preconceptions of pre-service teachers is low, because dealing with situations in practice elicits many feelings, concerns and conflicts (Korthagen & Wubbels, 2001). Thirdly, pre-service teachers receive information they cannot transfer, because they lack relevant experiences. This is a feed-forward problem. Without personal needs, or the experience of concrete problems, pre-service teachers provide little input for theories. Emsheimer and Ljunggren de Silva (2011) warn that the limited experiences of pre-service teachers could make it difficult to induce correct theoretical awareness. Fourthly, theoretical or conceptual knowledge, by definition, is not directly applicable in workplace situations where rapid and specific answers are needed and little time is available (Mattsson et al., 2011). There is no fixed set of rules to apply to particular problems, because a problem is often too particular with too many details and exceptions (Kessels & Korthagen, 1996). Fifthly, from a sociological perspective, the learning of pre-service teachers is strongly influenced by socialization processes aimed at learning the existing practices at the school. A school context may be too limited or too broad (Anderson, Reder, & Simon, 1996) and may not match what is necessary to bridge the gap. Sixthly, from a cognitive psychological perspective, if theory is taught without a direct connection with teaching practice, this will result in compartmentalization in memory (Gagne & White, 1978), making the theories that were learned on campus difficult to access in practice.

Practical and conceptual knowledge remain unintegrated for many reasons and bridging the gap between them is not an easy task.

1.2. How to bridge the gap?

Traditionally, teacher education institutes based on the Herbartian view of education, are trying to bridge the gap using a deductive approach (Table 1, left column), and conceptual knowledge, as starting points for the learning process (Emsheimer & Ljunggren de Silva, 2011). Pre-service teachers are asked to integrate these concepts into their behavior during the practicum. Teacher educators often experience that 'theory first', and applying these theories in practicum later, is not very productive (Emsheimer & Ljunggren de Silva, 2011).

Since the 1980s, teacher education institutes have tried to develop alternative ways to bridge the gap, in particular by using an inductive approach (Table 1, middle column), and practice experiences, as starting points for the learning process of the pre-service

teacher (Korthagen, 2001; McIntyre & Hagger, 1992; Neapolitan, 2011). This is the so-called 'practicum turn in teacher education' (Mattsson et al., 2011).

There is some evidence that these alternative programs of teacher education show promise. Research within the professional development schools (PDS) in the US over a 25-year period (Neapolitan, 2011) shows that PDS teachers are better qualified than non-PDS teachers: more learner-oriented, more reflective, better prepared to handle daily problems, etc. These effects are due to factors such as: earlier, longer, and more structured learning experiences within practicum, an integrated curriculum (school-based and university-based), and training of mentor teachers. Based on a comprehensive quantitative and qualitative study of the relation between program design and effects of teacher education curricula, Brouwer and Korthagen (2005) show that transfer of teacher education to school practice is greatly enhanced by the extent to which theory and practice are integrated into the curriculum, by the extent to which theoretical elements are perceived by pre-service teachers as useful for practice, and by the degree of cyclical alternation between school-based and university-based periods in the program. In a small study among Flemish pre-service secondary teachers studying economy, Schelfhout et al. (2006) found that pre-service teachers did not change their behavior when the curriculum only offered theoretical topics that were unrelated to learning in practice. They also found that, if teacher educators paid more attention to theoretical aspects using an inductive approach, and started from the pre-service teachers' experiences, the pre-service teachers were able to integrate these theoretical aspects into their teaching practice (Schelfhout et al., 2006).

Table 1 visualizes two important aspects of bridging the gap. Firstly, it is important to start with the experiences in practice and link them to theory (inductive). Secondly, it is important to learn how to use the theory in practice (deductive).

According to Patry (2014) there can only be a relationship between theory and practice, when knowledge is integrated into the learner's own system of subjective theories, and when decisions on how to act are based on these subjective theories. Hagger and McIntyre (2006) added that these subjective theories should be under critical examination. This is what Mattsson et al. (2011) called 'professional practice knowledge', knowledge that professionals put into practice. Examples of theories concerning the integration of knowledge are the 'three-level theory' (Korthagen, Kessels, Koster, Lagerwerf, & Wubbels, 2001) and the 'knowledge creation theory' (Nonaka & Konno, 1998).

To connect practice to theory in an inductive way, Korthagen (2001) advocates an inductive method of training, called 'realistic teacher education', which starts the learning process from concrete experiences and from the concerns of pre-service teachers. These concerns are the basis for a systematic way of reflection, individually, and with other teachers or their supervisors. Without reflection, experiences and activities are deeply tacit, as Polanyi (2009) already noted. Hagger and McIntyre (2006) promote starting the learning process within the school. Learning to become a teacher can be encouraged by 'practical theorizing', which means looking for and using attractive ideas for practice, but also subjecting these experiences and ideas to critical examination using different kinds of criteria. Following Nonaka and Konno (1998), knowledge is created when tacit knowledge is made explicit by 'externalization'. It is a process that is characterized by growing consciousness (Eraut, 2004). On this level, people are conscious of their actions, are able to discuss, reflect (Schön, 1983), and write about their experiences. The knowledge on this level is called practical knowledge (Heikkinen et al., 2011), and can be understood by themselves and by other people.

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