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Flexible training models: a response to the current needs. Analysis of the teaching practices of chemistry: generating an innovative component in the initial teaching training from the school

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Abstract

We analyzed part of the pedagogical content knowledge (PCK) and its development in teachers and trainees of chemistry, and how the analysis of real teaching situations allows to innovate in the initial training teacher process. In order to gather data, in relation with the FONDECYT project (11130150), with a varied set of qualitative instruments we managed to create new instances of initial teaching training and collaboration with the school, achieving relevant changes in the way new teachers think and their knowledge in relation to the subject of teaching chemical dissolutions.

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Keywords: curricular thinking; curricular knowledge, disciplinary knowledge; PCK, initial training teacher, chemical dissolutions.

1. Introduction

The context of the current initial training teacher (ITT) necessitates well prepared professionals who should be able to tackle effectively new educational needs and demands. Accordingly, for Chilean higher education institutions, improving the quality of ITT has become a paramount objective and for that a variety of measures

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aiming at changing and improving have been designed and implemented. Standing out for instance, institutional performance agreements, curricular organization, and standardized graduation competencies that certify the quality of initial training teachers (INICIA), etc. However, such measures and in relation to the curricular organization, besides it is necessary that teacher training institutions, their programs, models and education programs, take into consideration ITT as a phase of a continual -including continual formation- which is dynamic and fosters with anfor the school (Mellado, 2003; Vezub, 2007).

In this context, the study that we present is related to the innovation in the training of future teachers when teaching chemistry at secondary level, specifically chemical dissolutions. We created a context for teacher trainees analyze their knowledge and thinking (both disciplinary and curricular) when teaching the chosen topic, taking into consideration information of classes developed by in service teachers. Therefore, in the first part we present the state regarding this type of innovations. Following that, we present in detail our methodological proposal, in order to facilitate replications in other contexts. In the third part, we present the main findings briefly, and finally conclusions and implications.

2. Analyze real teaching practices to improve initial teaching training

ITT needs to integrate practical knowledge into academic knowledge, so teacher trainees can generate their own pedagogical content knowledge. This entails having room for reflection, on thinking and performance, which should promoteself-awareness and the development of a personal didactic model (Bryan & Abell 1999; Sanmartí, 2001; Ballenilla, 2003). In this regard, this research shows that analyzing our own classes or classes of others, are excellent ways to piece together teaching theories and strategies when teaching sciences, due to the fact that it allows trainees to reflect on their knowledge, beliefs and their future practice, in other words, to integrate (Tobin, Roth & Zimmerman, 2001; Garritz & Trinidad-Velasco, 2004; Mansanilla & Beltrán, 2013).

This need for integration, is more relevant, especially when it comes to teaching a subject, given that the content exerts influence on, for instance, teaching strategies (Tobin & McRobbie, 1999). In other words, what is being proposed is an essential component for the development of a personal didactic model, the constant interaction between teaching practices and the subjects of didactic of the sciences (Mellado, 2000). Analyzing in-class teaching strategies, development of teachings, teaching resources, the sequencing of the contents, etc., through research activities, present in the science subjects, will be part of this important component (Bailey, Scantlebury & Johnson, 1999; Hewson et al., 1999).

We talk about important components of the pedagogical content knowledge, and that are developed during the teaching practice, thinking and curricular knowledge. Specifically, we refer to that thinking and knowledge related to aspects with which teachers deal with: what to teach (contents), how to teach (methodology) what, how, and when and what to evaluate (evaluation), the curricular aspects that are part of professional development (Martínez et al., 2001, 2002). These curricular aspects are studied in relation to specific contents (topics) when teaching sciences (biology, physics, chemistry, mathematics) both in teachers and in trainees, thus converting them in categories of analysis (Martín del Pozo, 1994; Gil & Rico, 2003; Moreno & Azcarate, 2003; Markic, Eilks & Valanides, 2008; Friedrichsen, et al. 2011; Markic & Eilks, 2010; Contreras, 2012).

Therefore, we deal with a component of general pedagogical knowledge and also specific didactic knowledge, which at the level of realization, is an organizational factor for teaching and its associated problems, because it comprises knowledge for the action and, in addition, it revitalizes and/or provokes changes, that can be seen in the classroom or in the didactic decisions, for instance, the selection of contents or resources (Solis y Porlán, 2003; Tardif, 2004). Similarly, it becomes relevant the importance of studying teacher`s beliefs when it comes to describing their way of thinking as well as to establish the way in which it relates to their teaching practices, given the fact that its study permits to explain, for example, the value given to strategies, the beliefs teachers have with respect to the subject they teach, describing teaching models, etc. (Woolley, Benjamin & Williams-Woo¬lley, 2004; Contreras, 2008, 2012; Hutchins & Friedrichsen, 2012; Garritz, 2014).

The investigation and the description of thinking and knowledge, in this case curricular, promotes not only the development of a didactic model, but also reflective thinking, self-knowledge, critic and innovative. Investigating and tackling real teaching situations during ITT with teacher trainees, is in itself a professional development strategy