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PCK for dummies

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ABSTRACT
The propaganda related with the title of this editorial work says: "With more than 250 million books in print and more than 1,800 titles, *For Dummies* is the most widely recognized and highly regarded reference series in the world. Since 1991, *For Dummies* has helped millions make everything easier". And that is what I want with the topic of Pedagogical Content Knowledge (PCK), to make it easier to understand it. We resume the recent definition of PCK in this abstract: PCK is a "personal attribute of a teacher, considered both a knowledge base and an action. It is the knowledge of, reasoning behind, planning for, and enactment of teaching a particular topic in a particular way for a particular reason to particular students for enhanced student outcomes". Those four times that "particular" is mentioned remark on how specific PCK can be.

KEYWORDS: Pedagogical Content Knowledge, for Dummies

Resumen (CPC para bobos)
La propaganda relacionada con el título de esta editorial nos dice: "Con más de 250 millones de libros impresos y más de 1,800 títulos, *For Dummies* es la serie más ampliamente reconocida y altamente contemplada en el mundo. Desde 1991, *For Dummies* ha ayudado a millones a hacer todo más sencillo". Y eso es lo que deseo que suceda con el tópico del Conocimiento Pedagógico del Contenido (CPC), hacer simple su entendimiento.

Resumimos en este apartado una reciente definición del mismo como: "Se puede pensar en el CPC como un atributo personal del profesor, considerado en dos aspectos: el conocimiento básico de un tema y cómo lo enseña en acción. Este conocimiento es producto del razonamiento, la planeación para enseñarlo y la forma de enseñar un particular tema, en una forma particular, por razones particulares también, para lograr incrementar el aprendizaje como resultado en un grupo particular de alumnos". Esas cuatro veces que se menciona la palabra "particular" comenta sobre lo específico que puede ser el CPC.

Palabras clave: Conocimiento Pedagógico del Contenido, para bobos

Introduction

For Dummies pretend that proven experts present even the most complex subjects in plain English. Whether that means directions on how to hook up a home network, carve a turkey, knit your first scarf, or understand the construct of Pedagogical Content Knowledge, as it is the case with this editorial. In this way, Dummies are helped to turn one "I can't" into "I can."

In 1987, new technologies were popping up all over the place. But computer manuals were dull and difficult to understand. A frustrated customer in a computer store, who knew nothing about computers, was looking for a simple, basic book about the difficult DOS operating system. "Something," he suggested, "like DOS for dummies." The editorial company John Wiley & sons knew that man's frustration was shared by many other computer users, and set out to do something about it. Thus, the *For Dummies* phenomenon began. In November 1991, *DOS For Dummies* by Dan Gookin was initially met with skepticism – most bookstore chains didn't want to carry the book at all – claiming that the title insulted their customers and readers in general. But it was responded to the critics by calling the title a "term of endearment" that readers would immediately relate to and identify with. After convincing the bookstores to give us a chance, consumers agreed, as evidences the selling.

The importance of teachers

It is important to remember that teachers are one of the main variables in the teaching/learning of science, primarily with students, but also with syllabus, textbooks, laboratories (Mellado, 1998), and now information and communication technologies. Present strategies used in the classroom currently recommend the teacher to be a mediator, a counselor, for his/her students to acquire knowledge meaningfully.

The teacher should organize and structure the program contents, select the representations to be used, choose the central ideas of the lectured topic, so that students – when introduced into a variety of strategies and processes – can generate and process information that ultimately are conducive to learning; that is, allowing their cognitive experience to

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further develop their ability to learn. The teacher should aim to achieve a goal of academic success for each one of their students and help them to find a full school meaning.

Teacher performance in the classroom is one of the most important factors in students' academic achievement, which in the short and medium term results in better life and job opportunities for them; this performance has become increasingly professionalized (Park and Oliver, 2008), and social transformations and the complex characteristics of teaching, require more preparation and pedagogical expertise to significantly impact their education.

Research on the conceptions and practice of teachers is one of the main topics of the research agenda in science education (Tobin, Tippens, and Gallard, 1994; Tobin, 1998; Mellado *et al.*, 2006, Porlán *et al.*, 2010; 2011). And since the presentation of the concept of Pedagogical Content Knowledge by Shulman (1986; 1987) it has been a topic not only for the research on teaching but also for teachers to enhance their performance (Hume and Berry, 2011; Bertram and Loughran, 2012; Williams, 2012).

The importance of teachers' PCK

Shulman (1986; 1987) defined PCK as the way of representing and formulating the subject content to make it more understandable to others, and he said it was the knowledge that goes beyond the subject matter *per se* and reaches the dimension of subject matter knowledge *for teaching*. PCK is different from general pedagogical knowledge for teaching, which includes generic principles of organization and management in the classroom, and knowledge of the general theories and methods of teaching.

PCK enables the teacher to answer questions like: "What analogies, metaphors, examples, laboratory demonstrations, simulations, are the most effective ways to communicate the appropriate understandings or attitudes of this topic to students with particular background?" (Shulman & Sykes, 1986, p. 9), that is, the effort made by the teacher to understand and make understand a particular topic. It also includes comprehension of what facilitates or hinders learning that specific content, and the conceptions and preconceptions that students of different ages and backgrounds have access to learning the topics most frequently taught in the lessons.

As Wolfgang Klafki (1958) anticipated in his book, one can summarize that PCK includes all of the representations mentioned in the following questions posed for the teacher's class preparation (see Klafki 1995 for an English written reference):

- What basic phenomenon or fundamental principle, what law, criterion, problem, method, technique or attitude can be grasped by dealing with this content?
- What significance does the content in question or the experience, knowledge, ability or skill to be acquired through this topic already possess in the minds of the children in my class?
- What facts, phenomena, situations, experiments, controversies, etc. in other words what intuitions are appropriate to induce the child to ask questions directed at the essence and structure of the content in question?
- What pictures, hints, situations, observations, accounts, experiments, models are appropriate in helping children to answer, as independently as possible, their questions directed at the essentials of the matter?

Shulman (1987, p. 8) said about PCK: "It represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction". He expanded the notion of basic knowledge that the teacher should have.

There is a treatise on PCK written by Julie Gess-Newsome and Norman Lederman (1999), an interesting book that joins the description of several visions of PCK, the ways of assessing and measuring the construct and the impact on science teacher education programs. After that book, there have appeared several papers and book's chapters on this concept as that of de Jong, Veal, and van Driel (2002), a review of the work written about PCK in the chemistry education context; Hashweh (2005), a paper conceiving a reconstruction or new conceptualization of PCK as teacher pedagogical constructions; Abell (2007), a throughout review written for the *Handbook of Research on Science Education*; Miller (2007), a review considering the history, the categories of teacher knowledge, the assumptions, and methodologies for investigating PCK; Park and Oliver (2008), a paper considering six explicit elements of PCK, one of them of the affective type; Sandra Abell (2008) one of the papers from a special issue of the *International Journal of Science Education* on PCK, in which she defends the actuality of research about PCK; and Kind (2009), the last review on the construct. The ways of capturing PCK has been developed by Loughran, Berry and Mulhall (2012). The instruments provided by these authors provide a vision of how teachers approach the teaching of certain subject to a specific group of students, it provides the reasons linking how, why and what of teaching that content. It includes the role of beliefs and contextual factors in the understanding and practice of teachers. The author of this editorial published two papers on the foundations of PCK and the PCK on the particulate structure of matter in this Journal (Garritz and Trinidad, 2004; 2006) and with Padilla *et al.* (2008) another one on the topic of «amount of substance», among others, including a chapter that is going to appear (Garritz, 2014).

Now it is considered that PCK is important not only for researchers but also for teachers in service or in the training period, as several authors have recently demonstrated (Hume & Berry, 2011; 2013; Bertram & Loughran, 2012; Williams, 2012; Williams, *et al.*, 2012).

In a recent meeting (The PCK Summit) in Colorado