Pedagogical Content Knowledge and the Affective domain of Scholarship of Teaching and Learning

Andoni Garritz
Universidad Nacional Autonoma de Mexico
Mexico City, México
andoni@unam.mx

Abstract

The question of these reflections is if among those content-dependent instructional conditions necessary to attain conceptual understanding, those belonging to the affective domain of teaching and learning must be included in Pedagogical Content Knowledge (PCK), the special amalgam of content knowledge and knowledge of general pedagogy that a teacher needs to be the best possible teacher (Shulman, 1986). The author of these reflections has not developed the research needed yet, but suggests finding out a solution for that question is important for the PCK construct and for the Scholarship of Teaching and Learning (SoTL).

The Forgotten Affective Domain Research

The learning of scientific concepts is more than a cognitive process. Teaching is highly charged with feeling, aroused by and directed towards not just people, but also values and ideals. Nevertheless, in schools and universities, for the most part, science is portrayed as a rational, analytical and non-emotive area of the curriculum, and science teachers, texts and curricular documents commonly present images of science and scientists that embody a sense of emotional aloofness (Nieswandt, 2007).

> "Affect has been neglected in education and this neglect reduces the engagement of both students and teachers in their studies… For the past 200 years, philosophers have emphasized reason over affect… Emotion has, for the most part, been dismissed as unreliable." (Noddings, 1996; P. 435-6)

Specifically in science education, affective aspects have often been forgotten and diminished in light of others, generally relating them more to attitudes than to emotions. Nevertheless, they have been addressed in two chapters in the three published *Handbooks of Research in Science Education* (Gabel 1994; Fraser & Tobin, 1998; Abell & Lederman, 2007). For the conceptual change theory, the contribution of Pintrich, Marx & Boyle (1993) centred on four general motivation constructs of the affective type (goals, values, self-efficacy, and control beliefs), work that was further developed by Eccles & Wigfield (2002).

In this Journal, there have been recent papers related with the affective domain (Elton, 2008; Evans & Bertani Tress, 2009; Fleisher, 2009 comments on the book *Motivation and Self-Regulated Learning* of Schunk and Zimmerman, focusing on the role of motivation), so it may be said that this facet of education is recognized now as part of the SoTL. There has been a tendency to view SoTL exclusively as discipline-specific pedagogical inquiry into how students learn, but now it is increasingly recognized that it is equally important that SoTL engage with broader agendas and consider questions relating to the larger learning experience of students (Kreber, 2007). The article by Elton (2000) analyses the different

meanings of the word `love' and uses this analysis to demonstrate that good teachers love both their subject and the teaching of it, and that this involves them in respecting researchers in both their subject and in pedagogy, following a debate started by Rowland et al. (1998), and commented by Carrotte (1999), who says "For the academic worker, a love of the subject is foremost. Without this, our engagement with students is, at best, patronizing and, at worst, a deceit. If academics are to become better teachers, it must be built upon this love." Elton (2008) points out the controversy between Research and Teaching and insists that research into teaching and learning is as important as research in the disciplines.

Shulman's Expressions Related to the Affective Domain

Lee Shulman (1986; 1987) presented the PCK construct as "instructional conditions necessary... as important components of the pedagogical understanding of subject matter" (Shulman, 1986, pp. 9). The question engaged in these reflections is if one must include those instructional conditions belonging to the affective domain of teaching and learning which have been ignored by all reviews written on this concept (Gess-Newsome & Lederman, 1999; De Jong, Veal & Van Driel, 2002; Hashweh, 2005; Abell, 2007; Miller, 2007; Kind, 2009), with the exception of only one (Park & Oliver, 2008).

In his second paper, Shulman included a "Model of Pedagogical Reasoning and Action" where in the point concerning "Adaptation and Tailoring to Student Characteristics," he encompasses several topics that are considered today as part of the affective domain: "motivations,… interests, self concepts and attention" (Shulman, 1987; p. 15). Shulman (1999) said there was a "missing paradigm in research on teaching" (as was the title of his 1983 conference in Austin at the University of Texas) and the reason was that the centrality of "the study of subject-matter content and its interaction with pedagogy" (P. ix) had been consigned to oblivion.

Shulman (1993) was invited to Spain to give a conference on PCK where he admitted to having contributed to some confusion on three distinctive (albeit interrelated) conceptions to which the notion relates (the italics are from the original, but the author of these reflections has added bold face types in those claims where the affective domain might be hidden):

> 1) a *form of understanding* that teachers possess (or should possess) that distinguishes **their thinking and reasoning** from that characteristic of mere subject-matter experts;

> 2) part of the *knowledge base of teaching*, a body of understanding, **skill and — to some extent — disposition**, that distinguishes teaching as a profession and which includes aspects of both technical rationality and those **capacities of judgment, improvisation and intuition** Schon has dubbed "*reflection in action*";

> 3) a *process of pedagogical reasoning and action* through which teachers bring their understanding to bear on the problem of **teaching something in a particular context**, thoughtfully enact their plans and **spontaneously amend and improvise**

around them as the inevitably unpredictable moments of teaching arise, and by means of which these teachers **develop new understanding, intuitions and dispositions**. (Pp. 56-57).

In his book on *Teaching as Community Property*, Shulman (2004) analyzes Jaime Escalante's excellent way of teaching. "The first thing we learn is a good pedagogue understands the subject matter." The second is "that the outstanding pedagogue recognizes that you can't teach everything." "The third thing that Escalante understands is that the head of students are full, are rich, and are variegated. And that teaching involves connecting not with their ignorance but with their prior knowledge"...and Shulman traces the affective domain on Escalante by saying "**He makes an extraordinary human connection with his students, a connection that is initiated by the expectation that they can and will learn.**"

Shulman (2007) refers directly to the affective domain of teaching when he recollects his adventures on the creation of the PCK concept and says "It's treated as a given, and if there is anything you can absolutely count on, and I'll say this dogmatically, a teacher who does not both understand and have **a real affection for a subject** will never be able to teach it well" (Bold face is from the author).

Other Suggestions on the Affective Domain and PCK

It is Zembylas (2007) who emphasizes the necessity of expanding current conceptions of PCK and has acknowledged the role of emotional knowledge because the literature on PCK and that on emotions in teaching and learning remain unconnected. Another example is the claim of McCaughtry (2004; 2005) and Rosiek (2003) of the underrepresented form and needed reconstruction of PCK.

I will say that among "the most powerful analogies, illustrations, examples, explanations, and demonstrations" (Shulman, 1986, p. 9) there are emotions embedded inside subject matter examples with which the teacher accomplishes his/her assignments. The affective domain of teaching is often included in the general PK, but a portion of it has to do with the content, it is content dependent, so it must belong to PCK, as is the case of disciplinary "love" mentioned by Elton (2000). Now that research on teaching and teacher education has shifted from observable behaviours or teaching skills to teachers' knowledge and beliefs, it is important to weigh up the pros and cons to include the content-oriented affective domain inside PCK. A critical review of the literature has been done by the author to base his claim.

Magnusson et al. (1999) defined PCK as consisting of five components (none of them related with the affective domain): (a) orientations toward science teaching; (b) knowledge and beliefs about science curriculum, including national, state, and district standards and specific science curricula; (c) knowledge and beliefs about student understanding of specific science topics; (d) knowledge and beliefs about assessment in science; (e) knowledge and beliefs about science instructional strategies for teaching science. Park and Oliver (2008) explicitly included as a sixth element, the affective domain, named "Teacher Efficacy", an affective affiliate of PCK, which appeared to be domain specific. The notion of teacher efficacy is derived from the concept of self-efficacy from Bandura's (1986) social cognitive

theory, one main idea of which is that individuals' perceptions of themselves mediate their behaviors. Thus, individuals pursue activities and situations in which they feel competent and avoid situations in which they doubt their capability to perform successfully.

I insist that the set of knowledge and beliefs necessary for students to attain understanding of specific topics must include the affective ones, and that they have to be contemplated in PCK by adding an explicit sixth component: (f) knowledge and beliefs about the affective domain related to the specific subject matter content. The following subcomponents can be included: motivational beliefs; goal orientation beliefs; interest and value beliefs; self-concept, self-efficacy, self-esteem, and control beliefs. All of them must be related to the teachers' interests, attitudes and emotions about their own ways of teaching; the subject matter they are teaching; and their knowledge related to the attitudes that students adopt when they are learning. This knowledge of PCK will complete the SoTL.

References

Abell, S. K. & Lederman, N. G. (2007) (Eds.) *Handbook of Research on Science Education* (See Chapters 4 and 35), Mahwah, N.J.: Lawrence Erlbaum.

Abell, S. K. (2007). Research on Science Teaching Knowledge. In S. K. Abell & N. G. Lederman (2007) reference (Chapter 36, pp. 1105-1149).

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Upper Saddle River, NJ: Prentice-Hall.

Carrotte, P. (1999), Turning academics into teachers: S. Rowland *et al. Teaching in Higher Education*, 4(3), 411-413.

De Jong, O., Veal, W. R. & Van Driel, J. H. (2002). Exploring Chemistry Teachers' Knowledge Base. In J. K. Gilbert, et al. (Eds.), Chemical Education: Towards Research-based Practice (pp. 369–390). Dordrecht: Kluwer.

Eccles, J. S. & Wigfield, A. (2002). Motivational Beliefs, Values, and Goals, *Annual Review of Psychology*, 53, 109–32.

Elton, L. (2000). Turning Academics into Teachers: a discourse on love, *Teaching in Higher Education*, 5(2), 257-260.

Evans, L. & Bertani Tress, M. (2009). What Drives Research-focused University Academics to Want to Teach Effectively?: Examining Achievement, Self-efficacy and Self-esteem. *International Journal for the Scholarship of Teaching and Learning*, 3(2), 1-17.

Fleisher, S. (2009). Review on *Motivation and Self-Regulated Learning: Theory, Research, and Applications* by Dale H. Schunk and Barry J. Zimmerman, in *International Journal for*

the Scholarship of Teaching and Learning, 3(1), 1-2.

Fraser, B. J. & K. Tobin, K. (1998) (Eds.). *International Handbook of Science Education* (See Chapters 5.2 and 6.3). Dordrecht: Kluwer.
Gabel, D. (1994) (Ed.) *Handbook of Research in Science Teaching and Learning*. (See Chapters 6 and 17). New York: Macmillan.

Gess-Newsome, J. & Lederman, N. G. (1999, Eds.). *Examining pedagogical content knowledge: the construct and its implications for science education.* (Dordrecht: Kluwer)

Hashweh, M. Z. (2005). Teacher pedagogical constructions: a reconfiguration of pedagogical content knowledge, *Teachers and Teaching: theory and practice,* 11(3), 273–292.

Kind, V. (2009). Pedagogical content knowledge in science education: perspectives and potential for progress. *Studies in Science Education*, 45(2), 169-204.

Kreber, C. (2007). What's it really all about? The Scholarship of Teaching and Learning as an Authentic Practice, *International Journal for the Scholarship of Teaching and Learning*, 1(1), 1-4.

Magnusson, S., Krajcik, J. & Borko, H. (1999). Nature, sources, and development of the PCK for science teaching. In J. Gess-Newsome & N. G. Lederman (Eds.). *Examining pedagogical content knowledge* (Chapter 4; pp. 95-132) Dordrecht: Kluwer.

McCaughtry, N. (2004). The emotional dimensions of a teacher's pedagogical content knowledge: Influences on content, curriculum, and pedagogy. *Journal of Teaching in Physical Education*, 23, 30–48.

McCaughtry, N. (2005). Elaborating pedagogical content knowledge: what it means to know students and think about teaching. *Teachers and Teaching: theory and practice,* 11(4), 379–395.

Miller, M. L. (2007). Pedagogical Content Knowledge. In George M. Bodner & MaryKay Orgill (eds.) *Theoretical Frameworks for Research in Chemistry/Science Education* (Chapter 5, pp. 86-106) Upper Saddle River, NJ, USA: Pearson Education.

Nieswandt, M. (2007). Student Affect and Conceptual Understanding in Learning Chemistry. *Journal of Research in Science Teaching*, 44(7), 908-937.

Noddings, N. (1996). Stories and affect in teacher education. *Cambridge Journal of Education*, Vol. 26 Issue 3, Pp. 435-647.

Park, S. & Oliver, J. S. (2008). Revisiting the Conceptualisation of Pedagogical Content Knowledge (PCK): PCK as a Conceptual Tool to Understand Teachers as Professionals. *Research in Science Education,* 38, 261–284.

Pintrich, P. R., Marx, R. W. & Boyle, R. A. (1993**).** Beyond cold conceptual change: the role of motivational beliefs and classroom contextual factors in the process of conceptual

change, *Review of Educational Research*, 63(2), 167–199.

Rosiek, J. (2003). Emotional scaffolding: An exploration of the teacher knowledge at the intersection of student emotion and the subject matter. *Journal of Teacher Education*, 54, 399–412.
Rowland, S. Byron, C., Furedi, F., Padfield, N. & Smyth, T. (1998). Turning Academics into Teachers? *Teaching in Higher Education*, 5(2), 257-260.

Shulman, L. S. (1986). Those Who Understand: Knowledge Growth in Teaching. *Educational Researcher*, 15(2), 4–14.

Shulman, L. S. (1987). Knowledge and Teaching: Foundations of the New Reform, *Harvard Educational Review,* 57(1), 1–22.

Shulman, L. S. (1993). Conference presented at the University of Santiago de Compostela, Spain, July 6-10, 1992. Published as "Renewing the pedagogy of teacher education: the impact of subject-specific conceptions of teaching". In L. Montero & J. M. Vez (Eds.) *Las didácticas específicas en la formación del profesorado* (pp. 53-69). Santiago, Spain: Tórculo.

Shulman, L. S. (1999). Foreword. (In Gess-Newsome, J., Lederman, N. G. (Eds.), *Examining Pedagogical Content Knowledge*. (pp. ix–xii). Dordrecht: Kluwer).

Shulman, L. S. (2004). Toward a pedagogy of substance. In *Teaching as Community property*, (Chapter 7, Pp. 128-138), San Francisco, CA: Jossey Bass.

Shulman, L. S. (2007). Interview conducted at the Annual Meeting of the American Educational Research Association, in Chicago, April. Part of the text is reproduced in Berry, Loughran & van Driel (2008) reference.

Zembylas, M. (2007). Emotional ecology: The intersection of emotional knowledge and pedagogical content knowledge in teaching. *Teaching and Teacher Education*, 23, 355–367.