Educación Química (2017) **28**, 302–303

educación Química

www.educacionquimica.info

LETTER TO THE EDITOR

Letter to the Editor

Carta al Editor

Dear Editor,

My purpose in writing this letter is to open dialogue about the question, ''What is chemistry education research (CER)?''. This letter is in response to the article by Keith Taber published online 2 January 2017 (Taber, 2017). I hope to provide new insight and offer an alternative.

In this recent article in *Educación Química*, Taber presents a view of CER as residing within the larger field of science education research, which in turn resides within education research. He calls for clarifying CER by focusing on specific pursuits, which he calls ''intrinsic foci'' that rest at the core of CER. He proposes that journals dedicated to CER should publish papers primarily in these areas. He has presented a development of these views through a series of three editorials in *Chemistry Education Research and Practice* (Taber, 2012, 2013, 2015). Others in emerging fields have also sought to define their disciplines, including engineering education (Jesiek, Newswander, & Borrego, 2009), geosciences education (Libarkin, 2014), and environmental sustainability (Broto, Gislason, & Ehlers, 2009).

In contrast to Taber's proposal of positioning CER, I propose instead that we consider ''What is CER?'' as a question of the degree to which it is a discipline. In an article about how scientific disciplines emerge as frameworks of consensus, Good (2000) argues for considering ''assembly'' (p. 263):

> Rather than explain scientific disciplines as determined by nature or by a necessary development from amateurism to professionalisation, I offer an alternative I call **assembly**. In assembly, scientists bring together disjoint elements to order them within frameworks of higher organisation. These elements may be conceptual, methodological, practical, or institutional. They include theories, instruments, and research problems. The builders of frameworks, motivated by curiosity or ambition, organise individual activity, collective activity in somewhat restricted settings such as a lab or agency, and in larger settings of several types. They emphasise congruencies and utilities, convince themselves and their colleagues of the legitimacy of the assembly, and thereby produce larger frameworks. Individuals or teams at multiple sites might investigate a single research problem. Or, previously separate research problems might be brought under one heading for a limited purpose. Phenomena are converted to research problems, research problems are treated collectively in a research school or tradition, and research schools or traditions are brought together as a larger framework, often called disciplines. Disciplines, then, form frameworks of association, both intellectually and practically. These larger frameworks are only partly constrained by natural phenomena. They order or discipline both scientific work and workers. Sometimes we call these disciplines, sub-disciplines, transient institutions, or interdisciplinary fields, qualifications that reflect the level of acceptance of the framework by practising scientists. This is more a matter of degree than of kind. Frameworks vary in extent and depth of integration by a wide variety of factors. How is this integration achieved? Not as the unfolding of a teleological process, but rather as the result of contention, consensus-building, and negotiation, some of it self-consciously pursued, some of it perhaps unintended.

I propose that we consider CER as a discipline that has emerged through interdisciplinarity that intersects with chemistry, science education research, learning sciences, education research, cognition, philosophy, psychology, sociology, informal science, biology, physics, geosciences, environmental science, and others. The emergence of CER involves developing research specializations and various different centres of consensus.

I am concerned that Taber's call for narrowing CER to specific pursuits runs the danger of constraining the emergence of CER as a discipline. What he argues to be ''collateral CER'' could be viewed as excluding researchers whose theoretical frames and research bases are, for example, more influenced by education research and less influenced by chemistry. He draws a line by clarifying what problems count as CER. As Good (2000) points out, this also happened in geophysics, when particular journals narrowly defined what content could be included.

Peer Review under the responsibility of Universidad Nacional Autónoma de México.

http://dx.doi.org/10.1016/j.eq.2017.06.002

According to Good (2000), geophysics began to emerge as a discipline when a new professional society was formed to represent it. CER does not have its own professional society. It has homes in chemistry societies (e.g., Royal Society of Chemistry, American Chemical Society, Mexican Chemical Society) and in science education societies (e.g., NARST, European Science Education Research Association, Australasian Science Education Research Association). Because of this, CER has no single home base, and in this lack, various journals serve this role, including *Educación Química*, *Chemistry Education Research and Practice*, the *Journal of Chemical Education*, and the *African Journal of Chemistry Education*. The journals in which CER is published are the bodies that represent the emergent discipline of CER, and these journals have an important decision to make which will influence the course of emergence of this discipline. Each must decide whether to be a comprehensive journal and take CER forward in its emergence, or whether to be a restrictive journal and try to narrowly define what counts as CER.

Considering the question of what is CER in the light of Good's notion of assembly has some affordances. More creative and far-reaching research can be explored if a more comprehensive nature of the discipline is embraced. CER is more likely to grow rather than recede. There are also challenges that face CER as an emergent discipline, such as acceptance by more established disciplines, since researchers reside in home departments (e.g., Chemistry, STEM Education, Teacher Education). I think that the affordances far outweigh the challenges.

References

Broto, V. C., Gislason, M., & Ehlers, M. H. (2009). Practising interdisciplinarity in the interplay between disciplines: Experiences of established researchers. *Environmental Science & Policy*, *12*(7), 922–933.

Good, G. A. (2000). The assembly of geophysics: Scientific disciplines as frameworks of consensus Studies in History and Philosophy of Science Part B. *Studies in History and Philosophy of Modern Physics*, *31*(3), 259–292.

Jesiek, B. K., Newswander, L. K., & Borrego, M. (2009). Engineering education research: Discipline, community, or field? *Journal of Engineering Education*, *98*(1), 39–52.

Libarkin, J. (2014). The role of scholarly publication in geocognition and discipline-based geoscience education research. In V. C. H. Tong (Ed.), *Geoscience research and education* (pp. 69–76). Netherlands: Springer.

Taber, K. S. (2012). The nature and scope of chemistry education as a field. *Chemistry Education Research and Practice*, *13*, 159–160.

Taber, K. S. (2013). Three levels of chemistry educational research. *Chemistry Education Research and Practice*, *14*, 151–155.

Taber, K. S. (2015). Advancing chemistry education as a field. *Chemistry Education Research and Practice*, *16*, 6–8.

Taber, K. S. (2017). Identifying research foci to progress chemistry education as a field. *Educación Química*, http://dx.doi.org/10.1016/j.eq.2016.12.001

Hannah Sevian

University of Massachusetts Boston, 100 Morrissey Boulevard, Boston, MA, USA
E-mail address: Hannah.Sevian@umb.edu