

Georgios TSAPARLIS

University of Ioannina, Department of Chemistry (Greece)

HAS EDUCATIONAL RESEARCH MADE ANY DIFFERENCE TO CHEMISTRY TEACHING?

Educational research has or should have as one of its major goals, the improvement of education, otherwise, “there is little reason to do research, unless there is a pay-off in the classroom” (Hurd de Hart, 1991). According to Kempa (1992): “Chemical education research should (seek to generate) insights and information on the basis of which informed decisions can be taken about major aspects of the teaching of chemistry. Chemical education research should have then an impact on the practice of chemistry education.”

Chemistry education research focuses on “understanding and improving chemistry learning” by studying variables relating to “chemistry content” or to “what the teacher or student does in a learning environment.” It involves “a complex interplay between the more global perspective of the social sciences (i.e., the process of learning) and the analytical perspective of the physical sciences (i.e., the content)” (Herron & Nurrenburn, 1999). Johnstone (2000a, b) maintains that research has provided us with the tools “to harmonise a logical approach to our subject with a psychological approach to the teaching of our subject so that young people will catch our enthusiasm and enjoy the intellectual stimulus which our subject can, and should, offer.” Furthermore, according to Gabel (1999), “as the population becomes more heterogeneous and researchers learn more about how students of diverse backgrounds, learning styles, and ability acquire knowledge, the way chemistry content is structured will become increasingly important”.

“Despite the enormous growth of science education research during recent decades, its impact on the practice of science education has remained relatively low” (Kempa, 2002). This observation is also supported by Gabel (1999), who noted that “the changes that have occurred in textbooks during the past four decades have not been driven to any great extent by research findings”. Remarkable is the ignorance on the part of practitioners of “the findings from science education research and/or their willingness to take cognizance of them in the design and organization of their teaching strategies and procedures” (Costa, Marques, & Kempa, 2000). If the impact of science education research on the practice of chemistry education is to be increased, the various factors responsible for the current low level of research utilization need to be addressed. A key to achieving the foregoing is to bring researcher and practitioner closer together and, wherever possible, remove the traditional divide between the two.” (Costa et al., 2000 – see also De Jong, 2000).

Educational researchers, as well as educational and practitioners’ journals should pay more attention to connecting research and practice, and already there are indications toward this end. For instance, Taber (2002) has developed materials that aim to help teachers to “diagnose and cure” students’ alternative conceptions. Furthermore, Gilbert et al. (2003) have put together findings of educational research that contribute to “research-based practice”.

This Journal publishes work arising from both quality educational research and research-informed practice. The authors are both established and new educational researchers. Furthermore, starting with this Issue, there will be an invited special section containing *Contributions of Educational Research to the Practice of Chemistry Education*. Our aim has been to have distinguished chemistry education researchers giving accounts/reviews of their work, emphasising the implications and impact of that work on the practice of chemistry education. Priority is given to researchers who have not published in CERAPIE/CERP. Two such contributions appear in this Issue, and more are expected to be published in the future.

In the first paper, *John K. Gilbert, Rosária Justi, Jan H. Van Driel, Onno De Jong, and David F. Treagust* argue that for the ideas of chemistry to get the attention they deserve in education, further development is needed of the nature and quality of chemical education in the light of research. According to the authors, the range of types of chemical education research that has been conducted so far is too narrow to support this development. Finally, education through, with, and about chemical education research is needed in the professional development of chemistry teachers.

In the second paper, *Marykay Orgill and George Bodner* examine the role of analogies in chemistry teaching. Not all analogies, however, are good and not all “good” analogies are useful to all students. The authors interviewed biochemistry students, and found that most like, pay particular attention to, and remember the analogies their instructors provide. They use these analogies to understand, visualize, and recall information from class.*

REFERENCES

- Costa, N., Marques, L., & Kempa, R.F. (2000b). Science teachers' awareness of findings from educational research. *Chemistry Education: Research and Practice in Europe, 1*, 31-36.
- de Jong, O. (2000). Crossing the borders: Chemical education research and teaching practice. *University Chemistry Education, 4*, 31-34.
- Gabel, D.L. (1999). Improving teaching and learning through chemistry education research: A look to the future. *Journal of Chemical Education, 76*, 548-554.
- Gilbert, J.K., de Jong, O., Justi, R., Treagust, D., & Van Driel, J. (eds.) (2003). *Chemistry education: Towards research-based practice*. Dordrecht: Kluwer.
- Herron, J.D. & Nurrenburn, S.C. (1999). Chemical education research: Improving chemistry learning. *Journal of Chemical Education, 76*, 1354-1361.
- Hurd de Hart, P. (1991). Issues in linking research to science teaching. *Science Education, 75*, 723-732.
- Johnstone, A.H.. (2000a). Chemical education research: Where from here? *University Chemistry Education, 4*, 34-38.
- Johnstone, A.H. (2000b). Chemistry teaching: Logical or psychological? *Chemistry Education: Research and Practice in Europe, 1*, 9-15.
- Kempa, R. (1992). Research in chemical education: Its role and potential. In: M. Atley *et al.* (eds.), *Open chemistry*, p. 47. London: Hodder and Stoughton.
- Kempa, R. (2002). Research and research utilization in chemical education. *Chemistry Education: Research and Practice in Europe, 3*, 327-343.
- Taber, K (2002). Chemical misconceptions - Prevention, diagnosis and cure. Vol. I, Theoretical background; Vol. II, Classroom resources. London: Royal Society of Chemistry.

* This paper is followed by another reviewed one (authors: *P. Sarantopoulos* and *G. Tsaparlis*), reporting the results of a longitudinal study (with tenth- and eleventh-grade Greek students) of the use of chemical analogies with a strong and familiar social context, with emphasis on both cognitive and affective factors.