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### Psychologie et pédagogie

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#### Education and the Problem of Conceptual Change

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Stella Vosniadou is professor of cognitive psychology in the *Department of Philosophy and History of Science* at the *National and Kapodistrian University of Athens*. She is the chair of an interdisciplinary graduate program in '*Basic and Applied Cognitive Science*' and director of the *Cognitive Science Laboratory* in the same university. She received her B.A. degree from Brandeis University, her M.A. degree from Columbia University and her Ph.D. degree from Clark University in 1979. Her research interests are in the area of cognitive development and learning with a particular emphasis on conceptual change. She has investigated the process of knowledge acquisition in many areas of physical science and mathematics and

has explored the implications of her psychological studies for education and the design of learning environments. She has about 150 publications in English and Greek and over 4000 citations. She has edited, amongst others, the '*International Handbook of Research on Conceptual Change*' (Routledge), and '*Re-framing the Conceptual Change Approach in Learning and Instruction*' (Elsevier Science). She has also edited '*Similarity and Analogical Reasoning*' (Cambridge University Press) with Andrew Ortony, '*Modeling Changes in Understanding: Cases Studies in Physical Reasoning*' (Elsevier) with Daniel Kayser, and '*International Perspectives on the Psychological Foundations of Technology-Based Learning Environments*' (Erlbaum) with Robert Glaser, Erik DeCorte and Heinz Mandl. She is the author of *How Children Learn*, published by the International Bureau of Education of the UNESCO

#### Résumé de la conférence

One of the most important missions of education is to enable students to understand the ways of thinking of the various disciplines, particularly disciplines such as the physical and biological sciences. Yet, this is the area where schools fail most. Many students do not succeed in acquiring basic science knowledge or cannot apply what they learned in school in everyday, out-of-school situations.



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[Résumé de la conférence de S. Vosniadou, suite]

An overwhelming body of educational research has also documented students' misconceptions, inert knowledge, lack of critical thinking, as well as low achievement motivation particularly in the learning of science and mathematics.

In this lecture I will argue that one important reason why schooling has not produced good results in the case of the learning of science is because it has not dealt adequately with the problem of *conceptual change*. Most theories of learning assume that learning is cumulative and domain general and that instruction should be based on the enrichment of prior knowledge. These theories find it difficult to explain the considerable re-organisation of conceptual knowledge that takes place with learning and development. In order to understand the advanced concepts in the various disciplines, however, students need to learn how to restructure their naïve, intuitive theories based on everyday experience and lay culture. In other words, they must undergo profound conceptual change. How does this change take place? What can schools do to make conceptual change easier and more accessible to most students?

In the pages that follow I will outline some of the basic tenets of the framework theory approach to conceptual change and discuss its implications for the design of instruction for young children. I will argue that teaching for conceptual change must be based on careful choices about the selection of curricula and requires systematic instruction that takes into consideration both individual and socio-cultural factors. Teachers must find ways to enhance individual students' motivation by creating a social classroom environment that supports the creation of intentional learners who can engage in the deep and enduring comprehension activities required for the revision of conceptual knowledge.

### Lecture proposée

Vosniadou, S. (2007). Conceptual Change and Education. *Human development*, 50, 47-54.