

MAPPING THE KNOWLEDGE STRUCTURE OF PHYSICS

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ABSTRACT

Most of science education research focuses on how to best teach science, whereas research into understanding the structure of various disciplines is rarer. This paper presents the findings of a careful analysis of the physics knowledge covered in first year university physics at the University of Sydney. The knowledge is characterised in terms of Bloom's revised taxonomy, Bernstein's description of knowledge structures as either hierarchical or horizontal, and in terms of Legitimation Code Theory, which – among other things – classifies knowledge in terms of its context dependence.

We will discuss how and why first year students do not yet see physics as an integrated field, like their teachers do, and why Mechanics is the most suitable topic to begin the teaching of physics with – according to the knowledge structure of physics. I will also outline why we, in the sciences, have a spiral curriculum in which we return to the same topics year after year, unlike in the humanities.

Finally, we will discuss the educational implications of this research and briefly outline the development and success of an educational environment influenced by these ideas.

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