

1 - Learning Science: Conceptual Understanding | Empirical

SP - (15613) - DESCRIBING CHANGE: A MICROGENETIC MULTIPLE CASE STUDY OF CONCEPTUAL CHANGE RELATED TO FORCE

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Short Abstract

Studies in science education research often report changes to students' knowledge over time. Representing change in empirical data, however, is challenging because researchers must sample phenomena at sufficiently high rates to produce valid representations of change and distinguish change that has reached a relatively stable state from other forms of variability. These challenges mean that researchers and teachers may misinterpret data relating to learning. Microgenetic research, in which data are sampled at a rate assumed to be high compared to the rate of phenomenon of interest and session-by-session analysis is attempted, can be used to validly represent change. The challenges of representing change are illustrated with data collected from a microgenetic multiple case study of four purposefully sampled 16-17-year-old students learning about forces in a school in England. The participants were interviewed weekly for twenty-two weeks using probes related to force, including multiple choice questions and discussion stimulated by practical equipment. Representations of the participants' activation of two force conceptions were produced and three different patterns of conceptual change inferred: a) change to a relatively stable application of the scientific concept of force; b) an increasing likelihood of the activation of the scientific concept without reaching a stable state; c) a stable state in which two conceptions of force are activated with approximately equal likelihood. It is recommended that researchers seeking to represent conceptual change state assumptions about the rate of change of the phenomenon of interest and, if claiming learning has occurred, should present evidence of change reaching a relatively stable state. Teachers should be introduced to potential patterns of change to avoid erroneous conclusions about learning that impact pedagogy.