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Dialogic development of children's ideas using computation in the classroom: keeping it simple

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Computers can be usefully thought of as representation tools. Many demonstrated difficulties in learning physics depend on re-representing the world to yourself: imagining it as other than it appears. And then reasoning with that new representation, to develop new expectations about the lived-in world. To keep physics live in classrooms during this process requires the most responsive and adaptable tool we can lay our hands on, to encourage teachers to do physics with children. Rather careful thinking about matching the desirable affordances and resistances present in the practices enabled by any tool to the existing physics curriculum suggests casting the net more widely than numerical integration of differential equations. This paper draws on a number of years of working with computational modelling tools with teachers and with pupils (8-18), as well as significant work in constructing teaching sequences and supporting representations in the Supporting Physics Teaching initiative and Advancing Physics (both supported by the Institute of Physics). The foci are on exploiting flexible diagrammatic representations without being able to draw and on evolving responsive representations to support developing ideas during teaching sequences, whilst seeking also to exploit the new enthusiasm for coding in a culturally valuable way. And on keeping the implementation straightforward enough that teachers might be persuaded to use it.