

### **SimSketch & GearSketch: Sketch-based modelling for early science education**

In this interactive demo, we will present two modelling and drawing applications - SimSketch & GearSketch, which exemplarily demonstrate our approaches to sketch-based learning and modelling in early (science) education. Since drawings and sketches denote a very basic and fundamental way of sharing ideas, of externalising and disambiguating mental models and conceptual understanding, they constitute a convenient tool in learning. Even more, creating and understanding drawings is a skill which is trained and used in very early education, and since drawings are free of syntactical constraints, they can be used in numerous domains and school subjects. Today, modern technology (tablet PCs, touchscreens, pen-based input devices) paved the way to go beyond the possibilities (and limitations) of pen & paper - to keep the feeling and practice but add computational components and features. The presented tools go further than simple drawing and sketching on a computer - SimSketch and GearSketch enable the learner to create drawings “that talk back”: The drawing software is able to give immediate feedback on the learner’s sketch by creating an executable model from the drawing which can be simulated - the drawing becomes “alive” and confronts the learner with the results and consequences of his externalised mental model.

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