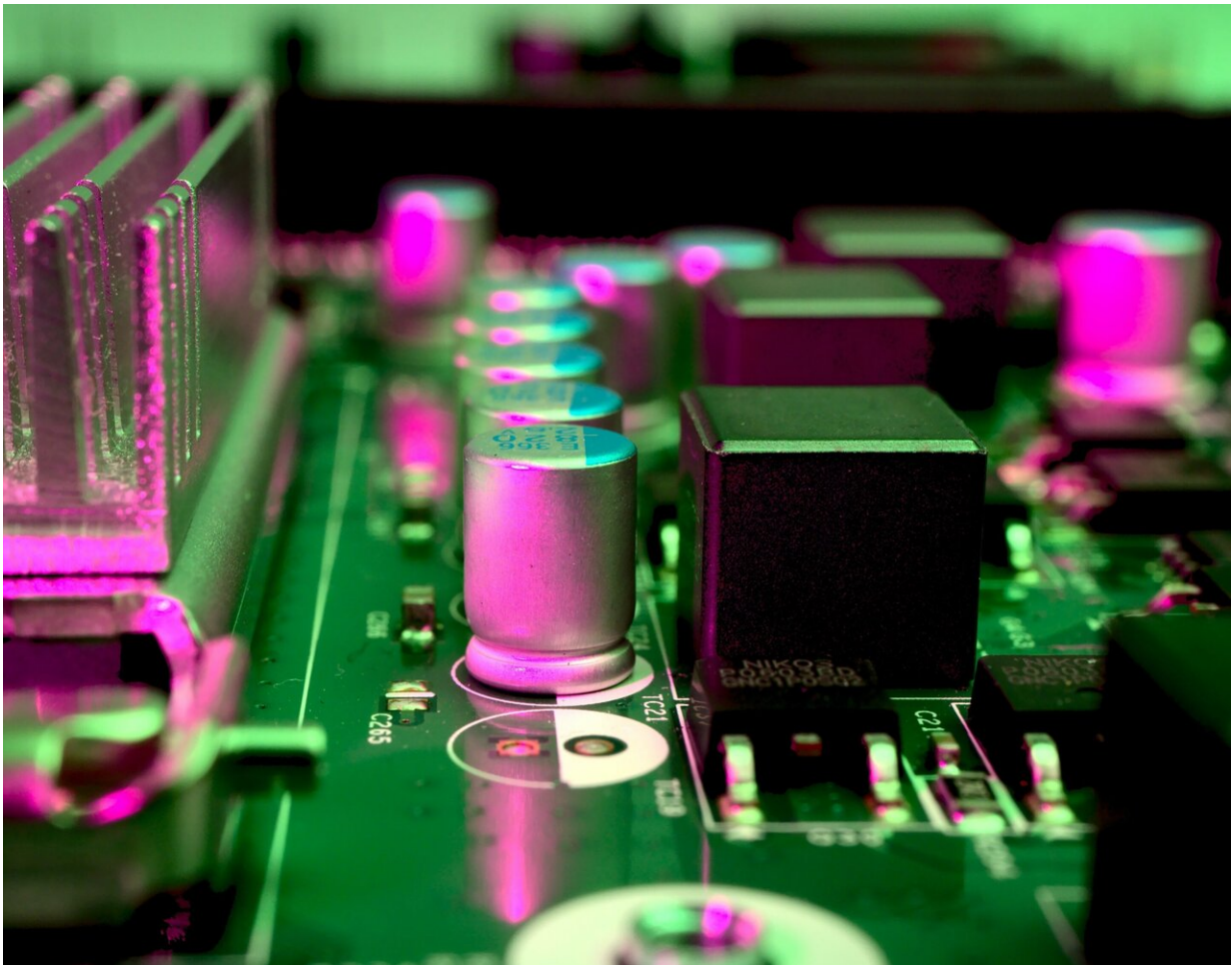


New curriculum improves students' understanding of electric circuits in schools

December 18 2020



Credit: Unsplash/CC0 Public Domain

Life without electricity is something that is no longer imaginable.

Whether it be a smartphone, hair-dryer or a ceiling lamp—the technical accomplishments we hold dear all require electricity. Although every child at school learns that electricity can only flow in a closed electric circuit, what is actually the difference between current and voltage? Why is a plug socket a potential death-trap but a simple battery is not? And why does a lamp connected to a power strip not become dimmer when a second lamp is plugged in?

Research into [physics education](#) has revealed that even after the tenth grade many [secondary school students](#) are not capable of answering such fundamental questions about simple electric circuits despite their teachers' best efforts. Against this backdrop, Jan-Philipp Burde, who recently became a junior professor at the University of Tübingen, in the framework of his doctoral thesis supervised by Prof. Thomas Wilhelm at Goethe University, developed an innovative curriculum for simple electric circuits, which specifically builds upon the everyday experiences of the students.

In contrast to the approaches taken to date, from the very outset the new curriculum aims to help students develop an intuitive understanding of voltage. In analogy to air pressure differences that cause an air stream (e.g. at an inflated air mattress), voltage is introduced as an "electric pressure difference" that causes an electric current. A [comparative study](#) with 790 school pupils at [secondary schools](#) in Frankfurt showed that the new curriculum led to a significantly improved understanding of electric circuits compared to traditional physics tuition. Moreover, the participating teachers also stated that using the new curriculum fundamentally improved their teaching.

More information: Jan-Philipp Burde et al, Teaching electric circuits with a focus on potential differences, *Physical Review Physics Education Research* (2020). [DOI: 10.1103/PhysRevPhysEducRes.16.020153](https://doi.org/10.1103/PhysRevPhysEducRes.16.020153)

Provided by Goethe University Frankfurt am Main

Citation: New curriculum improves students' understanding of electric circuits in schools (2020, December 18) retrieved 25 April 2024 from <https://phys.org/news/2020-12-curriculum-students-electric-circuits-schools.html>

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