

# Conflictive animations support the development of programming skills

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Traditional educational tools present information to students in a conventional way: what they present is true and students are expected to learn what is presented. In a PhD study completed recently at the University of Eastern Finland, Andrés Moreno, MSc, developed a tool, Jeliot ConAn, that tricks students during their learning process. Jeliot ConAn uses "conflictive animations" to teach computer programming, which is a very challenging topic for students due to its abstract nature.

The animations in Jeliot ConAn have intentional [errors](#) in them. The possibility of errors creates a new set of activities that [students](#) can engage with when learning. In Jeliot ConAn, students need to find the error in the animation and signal it in the application when they find it. If successful, the tool will let them know, if not, they will have to keep trying.

The idea of conflictive animations came out when Moreno was discussing his observations regarding Jeliot 3, a programming visualisation tool, with UEF Professor Erkki Sutinen. In Jeliot 3, students did not pay attention to classical animations that do not have any errors in them. The idea to design conflictive animations was created from the need to engage students with animations, thus helping them understand difficult topics. During programming, students need to keep check of Jeliot ConAn in case the tool behaves in an unexpected way.

Errors and conflicts play a key role in the development of students' programming skills and learning skills in general. The idea of mastering

the tool and having to keep check of it can be very empowering for students who find computers unapproachable. Students' skills of critical thinking also get improved, as they are not able to trust the tool.

The evaluation of Jeliot ConAn has led to mixed results and its benefits over classical animations are not fully confirmed yet. Further research involving a larger set of students and a longer time span is needed. However, the study offers a new set of activities that teachers can prepare for their students; these activities have a playful component in them, as students look for errors.

Moreno collected the data for the study in England, Tanzania, Mozambique and South Africa, where students were asked to use both the Jeliot 3 and Jeliot ConAn tools. Jeliot 3 was developed by Moreno and Niko Myller, PhD, at the University of Joensuu (now known as the University of Eastern Finland) under the lead of Professor Sutinen and Professor Moti Ben-Ari, and the tool has been in use all over the world for a decade already.

The results were originally published in *IEEE Transactions on Learning Technologies* and Proceedings of the 45th ACM Technical Symposium on Computer Science Education, SIGCSE.

Provided by University of Eastern Finland

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