

# The Effect of 'Computer Science Unplugged' Activities on Middle School Students' Conceptions and Attitudes towards Computer Science

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## Abstract

In recent years there has been a decline in the number of students enrolling in computer science (CS). One of the reasons is that many students hold incorrect and negative ideas on CS. In order to address these difficulties, a series of learning activities called Computer Science Unplugged was developed by Tim Bell and his colleagues (<http://csunplugged.org>). These activities expose young people to central concepts in CS in an entertaining way, *without requiring a computer*.

We examined the effect of the CS Unplugged activities on middle-school students' ideas about CS and their desire to consider and study it in high school. The results indicate that following the activities the ideas of the students on what CS is about were partially improved, but their desire to study CS lessened.

In order to provide possible explanations to these results, we analyzed the CS Unplugged activities to determine to what extent the objectives of CS Unplugged were addressed in the activities. In addition, we checked whether the activities were designed according to constructivist principles and whether they were explicitly linked to central concepts in CS. We found that only some of the objectives were addressed in the activities, that the activities do not engage with the students' prior knowledge and that most of the activities are not explicitly linked to central concepts in CS.

We offer suggestions for modifying the CS Unplugged activities so that they will be more likely to achieve their objectives.