



The Stack of Unplugged Activities for Teaching CS

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Unplugged activities — for adult learners — tested in practice — freely available online.

Computing principles without a computer

Inspired by the classic resource CS Unplugged [1], we started creating activities to motivate students and illustrate abstract principles.



Hands-on approach

Using well-designed activities in the classroom promotes deeper understanding, stimulates discussion, and engages students to interact with the content and among themselves.

Most unplugged activities are for children

CS Unplugged activities were shown to positively impact middle school students' learning [2]. Can the unplugged approach work for adults too?



We cover advanced concepts

Activities aimed at adults can assume more prerequisite knowledge. Therefore, they can dive into advanced and more complex computer science concepts.

University CS courses

The Stack activities have been used by teaching assistants (TAs) of courses on programming, automata, and network security at our university.



Teaching lab, outreach events

We have successfully used the activities as a part of the Teaching Lab (the TA training initiative) [3] and during outreach events with high-school students.

Multiple CS subfields

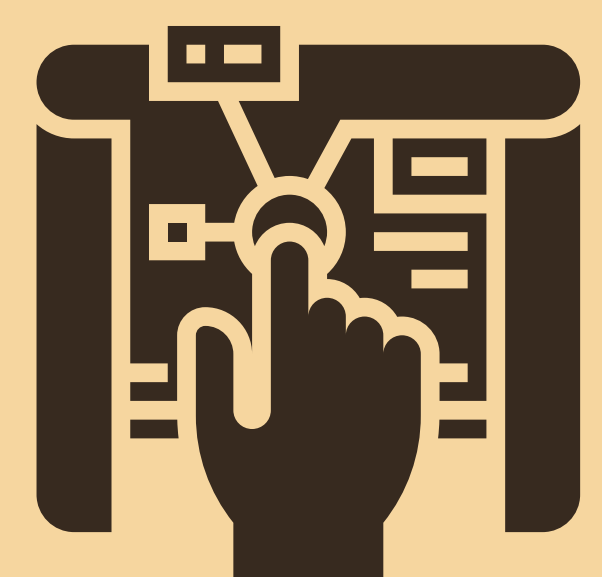
Current 27 activities range from theoretical computer science, algorithms and data structures, programming, software engineering and networking to cybersecurity and generic activities.



Sharing of teaching content

An easily accessible open repository for the activities [4] encourages sharing of created content and collaboration on better teaching environment.

1. Engage with an example activity



“Encryption Modes” activity online

This card-matching activity targets students learning cryptography. Students work in groups to solve multiple tasks on different levels of Bloom's taxonomy.

Learning outcomes:

- Understand why different encryption modes are needed.
- Analyze their relationships, benefits, drawbacks, and use cases.

Try it yourself on the link below!

<https://stack.fi.muni.cz/sigcse2021>



2. Discuss the use of unplugged activities



Visit the link below and add your opinions

Do you use unplugged activities?

Why? (Why not?) On what educational level?

Share your ideas with the authors and other conference participants before and during the event.

For sharing, use “virtual sticky notes” in our Mural board on the link below.

<https://stack.fi.muni.cz/sigcse2021>

1. Do you use unplugged activities in your classroom? Why or why not?	2. What do you think are their benefits or drawbacks?
<div>Yes, I teach middle school and use CS Unplugged!</div> <div>No, I don't have the time to prepare them.</div>	<div>It takes a lot of extra time to set up.</div> <div>It keeps the students engaged and makes them interact with the topic.</div>
3. Is differentiating them by age or educational level appropriate?	4. Is there anything else you would like to tell us?
<div>Yes. Primary schools, high schools, and universities teach at different levels of complexity.</div> <div>I don't think it's necessary, the basic principles work the same way.</div>	<div>Do the activities work for online/distance education as well?</div> <div>Do you plan to conduct a research study with students who participated in the activities?</div>

We are grateful to all the Teaching lab lecturers, including Ondráš Přibyla, Martina Cvinčková, Jan Koniarik, Imro Nagy and Tom Effenberger. Thanks is also due to the faculty for its continuous support.

3. Add your own activity to the Stack



Each activity has a structured template with learning outcomes, prerequisites, execution, and other materials [4].

<https://stack.fi.muni.cz>

- [1] T. Bell and J. Vahrenhold. 2018. **CS Unplugged—How Is It Used, and Does It Work?** Springer, Cham, 497–521. URL: <https://csunplugged.org>
- [2] B. Rodriguez, S. Kennicutt, C. Rader, and T. Camp. 2017. **Assessing Computational Thinking in CS Unplugged Activities**. In Proceedings of the 2017 ACM SIGCSE Technical Symposium on Computer Science Education. Association for Computing Machinery, New York, NY, USA, 501–506. URL: <https://doi.org/10.1145/3017680.3017779>
- [3] M. Ukrop, V. Švábenský, and I. Nagy. 2020. **Teaching Lab: Training Novice Computer Science Teachers**. In Proceedings of the 2020 ACM Conference on Innovation and Technology in Computer Science Education. Association for Computing Machinery, New York, NY, USA, 561. URL: <https://doi.org/10.1145/3341525.3393967>
- [4] Teaching Lab. 2020. **The Stack of Activities for Teaching Computer Science**. Masaryk University. URL: <https://github.com/teaching-lab/stack-cs-activities>