

## **LEGO building blocks sets, Arduino and Micro:bit as experimenting tools in Physics Classroom**

*Thursday 7 September 2023 15:00 (1h 20m)*

The joint research team of Department of Physics Education at Charles University and Department of Physics at Portland State University present a common work on the implementation of modern technologies in Physics Classroom. During the workshop the participants are going to try an acoustic experiment for secondary schools using three different equipment: LEGO sets, Arduino, Micro:bit programming boards and ultrasonic distance sensors. The participants will use block programming languages such as MakeCode, Snap4Arduino and LEGO Spike.

The current workshop is a part of a bigger project, that aims to assess the influence on technologies on overall digital literacy, self-confidence and self-image of the students as well as its potential to develop methodologies and tactics for fostering 21st-century knowledge and skills in students, stimulating their engagement and improving attitude towards science through presenting Physics in a frame of everyday life. The project is also able to stimulate the concept change process for a wide range of teaching professionals including teachers-to-be and experienced in-service teachers. Using multimedia and technologies brings teacher closer to students and let both parties speak a common language. Educators should also be able to reflect on the overall situation during the implementation of new technologies. Modern teachers are role models for the next generation to come. Technologies in education can be a support for developing different skills of learners and a tool promoting learners' autonomy, a shift towards learner-centered education, and support diversity.

The research underlying the project implies developing curriculum using collaborative tools and experimental setups for Physics classroom. For current pilot, the materials on the topic of waves and sound propagation were developed. In order to foster collaborative environment in the classroom, we use online tools for information presentation. Mainly, we implement the following: assessment tools Formative (formative.com), Wizer (wizer.me), and presentation tool Miro (miro.com). All together the tools were organized in Google Classroom (classroom.google.com). The curriculum also included practical part namely experiment on sound propagation. LEGO Spike Education set and Arduino Uno with ultrasonic distance sensor were chosen as hardware for the experimental setup. Overall, the goal of the curriculum is to be platform independent so that teachers can use what they already have or obtain the most suitable option for them from budget and availability perspective. Experimental part can potentially increase information comprehension levels due to higher engagement and improved attitudes toward science.

### **Contribution categories - primary focus**

Primary and secondary school

### **Contribution categories - type**

Application (shared experience, activity suggestions)

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**Session Classification:** Presentations/Workshops