# *Inclusion in Action*

## Fostering Empathy and Creativity with the CYBATHLON@school Contest

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### Abstract
The CYBATHLON @school Program, part of the CYBATHLON initiative, integrates STEM education with empathy-building by engaging students in creating prototypes of assistive technologies for individuals with disabilities. The CYBATHLON @school Contest invited school classes to tackle the challenges faced by real or hypothetical individuals with disabilities through design thinking and prototyping, fostering creativity and empathy. More than 300 students from 16 classes (Grades 4 to 9) submitted 125 posters showcasing their innovative solutions. Winning teams earned makerspace access and public recognition during the CYBATHLON 2024 competition. This poster presents the contest structure, materials, and early insights from student projects, offering a possible role model for combining STEM education with inclusion and creativity.

*Keywords and Phrases: Inclusion, STEM Education, Maker Education, K-12*

### 1. Introduction
The CYBATHLON @school program was developed as part of the larger CYBATHLON, which provides a platform for teams around the world to develop assistive technologies for people with disabilities and aims to promote the usability of assistive technology in everyday life. The process requires close collaboration between the pilots (people with disabilities) and the development teams to ensure that the prototypes developed are suitable for the pilots. Every four years, most recently in October 2024, the grand CYBATHLON competition takes place in a physical stadium in Switzerland and various remotely connected hubs from other parts of the world. Teams compete in tasks designed to simulate the everyday challenges of living with their respective disabilities. The school project explores different ways to combine engineering and empathy for people with disabilities and seeks to cultivate both a fascination with STEM professions and a sense of empathy in students. Notable examples include the design of programmable and expandable exoskeletons (T. M. Schifferle & Kollegger, 2021) and a newer, more scalable approach to programming prosthetic arms (T. Schifferle, 2024). The accompanying evaluation found, in a preliminary analysis, that girls liked the program even more than boys, and that there



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seems to be a positive short-term effect on the popularity of STEM careers, although it does not appear to be stable over time (Bolli et al., 2024). This seems to emphasize the need for even longer exposure to the topic in order to stabilize the positive short-term effects.


Figure 1:

## 2. CYBATHLON @school Contest

Because STEM projects have been shown to be more sustainable when they have multiple touch points with students rather than one-time exposures (Archer et al., 2021) technology, engineering and mathematics (STEM, CYBATHLON 2024 was a welcome opportunity not only to involve new schools, but also to continue the theme with existing schools. The competition was designed so that teachers did not need to have in-depth knowledge of engineering but still be able to complete the required tasks. Following our modular approach, we developed resources adaptable for 2 to 8 lessons and included lesson plans and slides as teacher resources. We recruited two "ambassadors" with arm prostheses, known on social media, to serve as challenge givers. We produced videos in which the two shared challenges related to their daily lives and asked students to think of similar ones. Using a simplified design thinking process, the students then ideated and created paper prototypes of their ideas for the challenge givers or a persona of their choice. Secondary school classes could rent a box for free containing a modified version of the existing STEM module series using our micro:bit-based programming tools to add their work to another level, as well as different prostheses to experiment with and evaluate (cf. T. Schifferle, 2024). All participants received complimentary tickets to the CYBATHLON 2024 on a dedicated school day where they could view the competitions, explore the hands-on exhibit area, and meet and discuss with the actual challenge givers. All poster submissions were publicly displayed in the exhibit. Four classes won a day in a makerspace, and with two projects a video was produced in advance to showcase their work and thoughts on the stadium screen. All this not only motivated the students but also created a recurring focus on the core themes of STEM and empathy for inclusion.

## 3. Data analysis

We received a total of 125 posters (scanned or photographed) from sixteen schools - twelve primary schools and four secondary schools. The structure varies heavily between schools and even classes. Qualitative content analysis is underway to categorize and identify selected challenges and solutions. We are particularly interested in which personas students chose, what challenges they identified, and how they solved them.

## 4. Conclusion and future work

We will present the structure and educational materials developed for the competition as potential blueprints for similar future projects. In addition, we will share insights from preliminary analysis of the work created by student participants to highlight their areas of interest. These findings will shed light on the students' perspectives on the challenges faced by people with disabilities. This analysis will guide future initiatives to foster empathy for people with disabilities and improve STEM programs in this field.

## References

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