Enhancing Debugging Skills in Education: From Task Design to Learning Analytics

Professor:	*Francesco Mondada*	*ME B3 426*	*francesco.mondada@epfl.ch*
	Engin Bumbacher	*HEP Vaud*	*engin.bumbacher@hepl.ch*
Scientific Assistant Contacts:	*Jérôme Brender*	*ME B3 435*	*jerome.brender@epfl.ch*

Project Type:	**Semester Project (Spring)**	*Section: Micro, Robotics, Computer Science (STI, IC)*
Official Start Date:	*19.02.2025*	

In today's rapidly evolving educational landscape, programming skills are more essential than ever, yet the critical aspect of **debugging** is often undervalued.

Our project aims to create effective debugging tasks and assess debugging skills using tools like Karel programming environments and paper-based assessments.

This project offers you the chance to engage in the full development cycle: designing tasks, testing them through our PISA network, and performing analytics to evaluate their effectiveness. You will gain hands-on experience with learning analytics and applying statistical methods in practice, contributing to systems and teaching approaches that empower learners worldwide.

Your mission:

1. **Development of Debugging Assessments**: Create tasks designed to assess and improve debugging skills in educational settings.

   Conduct small-scale tests to refine the tasks and enhance their effectiveness.

2. **Develop a study**

   i. Design a study to evaluate the tasks.

   ii. Perform statistical analysis of test properties.

   iii. Conduct a comparative evaluation with interactive debugging tasks.

   Learning analytics on the data (user's action sequences in the system) collected from the study to understand how different users approach debugging across the tasks. Develop rubrics for partial scores.
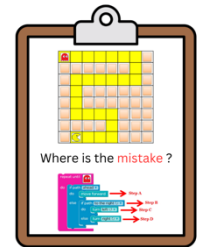
This multidisciplinary project integrates Learning Sciences and Computer Science. You will have the opportunity to work with people who have experience in similar projects for guidance and brainstorming. You will be given freedom in terms of proposing tasks, designing systems, and conducting analyses.

This project is ideal for students interested in pedagogy and computer science with real-world impact.

Helpful (but not mandatory) prerequisites:

- Interest in pedagogy and learning activity design
- Good coding skills, data analysis, human-computer interaction (HCI)
- Proficiency in English; knowledge of French is a plus

Collaboration with:

PILA The Platform for Innovative Learning Assessments

PISA Programme for International Student Assessment ‑ OECD