

Editorial

The world is changing rapidly, bringing with it complex scientific, technical, ecological, economic, and societal challenges – challenges that our graduates must be prepared to face and solve. Today, graduates require not only deep expertise in their subject areas but also broader competencies – such as problem-solving, critical thinking, and adaptability – that enable them to effectively engage with real-world problems across disciplines. In response, Project-Based Education (PBE) connects theoretical insights and practical experiences. This strong connection between solid foundations and practical application promotes the range of competencies that students will require to make valuable contributions to science, industry and society. This issue of the ETH Teaching and Learning Journal, titled *‘Learning through projects and practical work: Preparing students for a future we do not yet know’*, places project- and practice-based education into the spotlight.

Learning through projects and practical work has a long and distinguished tradition at ETH Zurich, dating back to its foundation in 1855. Elsner et al. highlighted several teaching initiatives, such as the *Projektorientierter Studiengang* (POST) from the 1970s or *River Restoration*, a recently redesigned project-based course, that exemplify this tradition and provide a framing of Project-Based Education (PBE) for ETH Zurich in this issue. Recognizing the enduring relevance of this educational model, the Rector reaffirmed the commitment to project-based teaching and learning by designating it as a strategic teaching initiative in 2022, leading to the establishment of PBLabs (Project-Based Labs), whose mission is to promote and enable PBE across the university. Project-oriented and competency-based teaching remains central to the Vision for Teaching at ETH Zurich, as exemplified by the excellent teaching practices featured in this journal, each highlighting key aspects of learning through projects.

Project-based courses are embedded in relevant, practice-oriented contexts and closely linked to real-world applications. Several contributions in this issue vividly illustrate how lecturers design their courses to give students a tangible insight into the kinds of challenges and work they may encounter after graduation – whether in designing assistive technologies (Gantenbein & Gassert) or physics experiments (Eggenberger et al.). Other contributions more generally address the design of project-based formats and the integration of real-world practice (Hischier et al.; Dorn et al.).

Other author teams focus on how their courses foster transferable competencies and how they evaluate students’ development in this area. Two contributions demonstrate how such competencies can be promoted in very different settings – from large, structured bachelor courses (Köhler & Tobler) to small, agile exploratory projects (Gisler et al.). Another contribution describes the use of Design Thinking as a methodology to cultivate a broad range of methodological and social skills (Benabderrazik et al.). Brüggemann & N’Guyen present an approach to assessing students’ competence development through the analysis of written reports.

Embedding projects in real-world contexts often requires extending teaching and learning beyond the traditional classroom. Thurn et al. present an outdoor education project in which students design and implement their own teaching units. Walker et al. demonstrate how a field trip to a museum can help engineering students connect technical knowledge with complex societal contexts. Other contributions explore how external stakeholders can be actively integrated into teaching (Mader et al.), or how virtual representations such as digital twins can simulate real-world environments in urban design education (Pagani et al.).

The last contribution in this issue is an invited contribution. It provides a highly relevant account of how to make Mathematics education scalable (Akveld et al.).

We would like to thank all authors for their valuable contributions to this issue of the *ETH Teaching and Learning Journal*. The diverse experiences shared here illustrate the many facets of project-based education, offering insights and inspiration for teaching practice across disciplines. We hope that their experiences inspire and encourage you – the teaching community at ETH Zurich and other research-intensive universities – to explore and expand your approaches to project-oriented and practice-based education. Let us continue working together to shape the future of higher education, preparing our students to not only navigate but actively contribute to a world full of unknown possibilities and challenges.

Florian Rittiner, Pia Scherrer, Benno Volk
Issue editors