

Fostering social and personal competencies in higher education: The ETH Competence Framework case

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Abstract

We describe the implementation of a competence framework comprising social and personal competencies and traditional subject- and method-specific competencies at ETH Zurich. We use mixed data to document the university's need for the framework. We find the incorporation of different perspectives about competencies pivotal for developing the framework, while joint information-sharing and competence-building enable the implementation of the framework within the university's services and educational offers. Our paper contributes to the debate in higher education on why and how universities change to prepare future-ready graduates. First, it elucidates the competencies becoming increasingly crucial for future graduates and how to conceptualise them. Second, it leverages examples showing how to promote a holistic set of competencies within the university, including the student support service, among more traditional implementation levels like degree programmes or courses.

Introduction

The world is becoming increasingly globalised, developing at a dynamic pace. To understand and interact with it, individuals must master changing technologies and process an increasing amount of information. At the same time, they face the challenge of balancing economic growth with environmental sustainability, prosperity and social equity as members of society. Literature in the future of work (e.g., National Research Council, 2012; OECD, 2013; WEF, 2020) outlines the main drivers for reconsidering future graduates' skills. For example, smart machines and systems are bringing automation into the workplace, nudging humans out of repetitive tasks, and leading to higher needs for critical thinking. A more globally connected world has created the need for intercultural skills (OECD, 2013). As society and economies rely on a competent workforce, higher education (HE) institutions are called to provide social and personal competencies, in addition to subject- and method-specific competencies (Sauter, 2018), by structuring their curricula to ensure that graduates are imparted with relevant competencies to meet the labour market (Okolie et al., 2019; Noah and Aziz, 2020) and needs

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of society (Cimatti, 2016). Since social and personal competencies can be developed in one context and transferred to others (OECD, 2013), these transferable competencies are of paramount importance. They facilitate the application of the subject- and method-specific knowledge (Kantrowitz, 2005), enhance employability, job satisfaction (Brall, 2009; Abelha et al., 2020), individual contribution to society (OECD, 2005; Cimatti, 2016) and the resolution of real-world problems.

Literature in HE provides examples of curriculum revisions to incorporate transferable competencies (e.g., Hagman et al., 2003; Wieser et al., 2020). These studies describe reasons for curriculum revisions like considerations of employability and the need to support students' studies and display how degree programmes identify competence gaps in their curricula. Yet, they remain silent about the motivations and processes prompting universities to identify and conceptualise new competence frameworks, intended as structures defining and describing a set of competencies (Voogt & Roblin, 2012), for revising their entire educational offer. Therefore, our first research question is: *what motivates HE institutions to identify and develop competence frameworks to define the competencies that are becoming increasingly important for future graduates?* We answer this question building upon the case of the ETH Competence Framework, developed by ETH Zurich (in short ETH) as part of the ETH Talent initiative⁴ to define the competencies becoming increasingly relevant for its graduates.

Fostering transferable competencies has benefits not only for a university's graduates, but also for its current students and lecturers. Students maximise their learning gains when they experience relevant competencies in the degree programme (Hansmann et al., 2019) or lecturers explicitly encourage competence development (Ngang et al., 2015). However, for benefits to happen, the fostering of transferable competencies must not be separated from the subject- and method-specific competencies (Leckley & McGuigan, 1997). Learning environments that activate students connect theory and practice. For example, project-based learning and real-world examples deepen learning and simultaneously allow the development of transferable competencies (Sá & Serpa, 2018; Nägele & Stalder 2017). Therefore, integrating transferable competencies into subject-specific courses benefits conceptual knowledge development in the discipline.

Furthermore, since students also gain knowledge and skills outside the classroom, universities should consider synergies between curricula, services, and extra-curricular offers when integrating new competencies. Thus, a comprehensive competence framework at the university level would help universities prepare graduates who can match societal, environmental, and economic changes (OECD, 2013). Our paper takes a university perspective beyond the dimensions of the course or the degree programme and also considers the dimension of students' support. Therefore, our second and practical question is: *how do HE institutions promote transferable competencies?* We draw upon the implementation of the ETH Competence Framework into ETH's existing educational offers and services to answer this second question.

⁴ The ETH Talent initiative was initiated in 2018 as a strategic initiative of the Rector to define and foster the competencies necessary to prepare future-ready graduates. The first author has led and developed the ETH Talent initiative since 2018 and is responsible for the overall strategy of the initiative and the development of myPath. She contributed to conceiving, designing, and writing the manuscript, including data gathering and analysis. The third author served as an advisor to the initiative from 2019 to 2022. Since 2022, the second and third authors have joined the initiative's team to implement measures in the student support service and teaching support areas. All the authors contributed to the revisioning of the manuscript. More information about the initiative can be found at <https://ethz.ch/en/the-eth-zurich/organisation/executive-board/rector/eth-talent-projekt.html>

A three-phase adoption of the ETH Competence Framework

Need assessment (2018)

The second half of the 2010s marked a trend in the Graduate Survey⁵ responses for ETH graduates. When asked to compare their employers' competence requirements to the competencies gained from HE, graduates who finished their studies between 2010 and 2016 reported feeling over-prepared in some subject- and method-specific competencies (e.g., theoretical knowledge, analytical competencies, problem-solving). Yet, the same graduates pointed out deficiencies in transferable competencies. For example, master graduates' responses (N=998) showed, on average, a lower preparation in the ability to clarify one's point of view, teamwork, and in taking responsibility at work than the preparation requested in their jobs. Doctoral graduates' responses (N=415) displayed a similar over-preparation in subject- and method-specific competencies and self-management while suggesting competence deficiencies in time management, negotiation, and teamwork. Consistent with the other graduate groups, the bachelor graduates (N=1,045), who were asked to assess only the preparation they received from the degree programmes, reported feeling less prepared in transferable competencies like negotiation and communication of own achievements. Our first research question is partially answered by the realisation that ETH gained from these results, which motivated the university to analyse its degree programmes to uncover potential competence gaps in the existing curricular offer in September 2018. We used the qualification profiles of these programmes to map the competencies fostered at the bachelor's and master's levels.

The qualification profile is a chapter of the diploma supplement describing the knowledge and skills that graduates are assumed to have mastered at the end of their studies and reflects the competencies that a degree programme intends to foster. We analysed the bachelor's programmes to better understand competence development across educational levels, as these programmes lay the foundations for higher educational levels. The analysis was not possible at the doctoral programmes' level as they do not have any qualification profiles. We combined inductive and deductive qualitative coding approaches (Miles et al., 2018) to detect which competencies were mentioned in the qualification profiles of sixty-nine degree programmes (28 bachelor's and 41 master's programmes).

Relying on a list of competencies derived from a summary of the latest competence frameworks for HE⁶, we used the software NVivo to assign text excerpts to codes (deductive approach) and to identify open codes to allow new competencies to emerge (inductive approach). As a proxy for competence gaps in the educational offer, the less frequently a competency appeared in all the degree programmes, the less the competency was considered as fostered in the programmes, indicating higher competence needs for graduates concerning the specific competency. The results confirmed the feedback received from the graduates in the Graduate Survey. Indeed, competencies like subject-specific concepts and techniques, analytical competencies, and problem-solving were the most fostered competencies at ETH as they appeared in more than half of degree programmes, while negotiation, self-presentation, social influence, customer orientation, leadership and responsibilities, and integrity and work ethics were among the least mentioned competencies in the qualification profiles (mentioned

⁵ The Graduate Survey (EHA), administrated by the Swiss Federal Statistical Office, focuses on the employment and education situation of graduates of higher education institutions one and five years after graduation. For the need assessment phase, we considered survey responses at one year after graduation. Survey results are accessible to the ETH Executive Board's staff members and to responsible persons for the degree programmes. More information about the survey can be found at <https://www.bfs.admin.ch>.

⁶ P21 Framework for 21st Century Learning (www.P21.org), the VITAE's Researcher Development Framework (www.vitae.ac.uk), OECD's Definition and Selection of Competencies Project (www.oecd.org), OECD's Competence Framework (https://www.oecd.org/careers/competency_framework_en.pdf), the Technical University of Munich (TUM)'s Competence Framework (www.prlhre.tum.de), and the Tuning Project (<http://www.unideusto.org/tuning>), to name a few.

in less than a third of degree programmes). Figure 1 shows the competencies distribution across the sixty-nine programmes analysed.

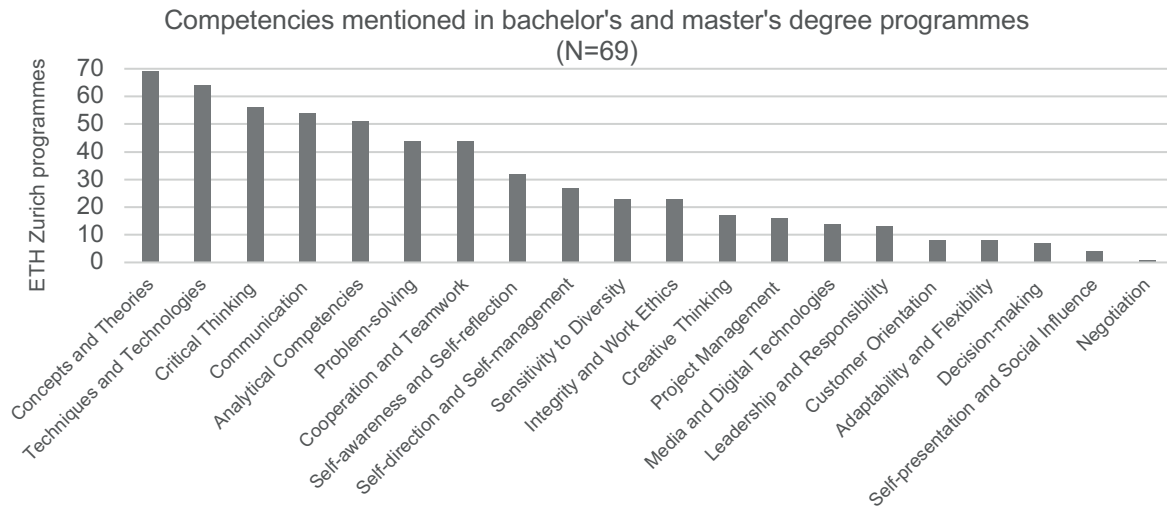


Figure 1: Competence distribution across degree programmes.

Since competence development is also relevant for employers (Deloitte, 2015) and competence requirements change over time, we complemented the need assessment phase with exploratory interviews with Swiss-based employers in October 2018. Interview questions concerned the main competence deficiencies of ETH graduates when applying for jobs, competencies becoming more relevant in the future, and employers' expectations for competence development at ETH. We deployed a mixed, intensity, and convenience sampling strategy (Flick, 2013) to select a sample of representatives from industry and academia. The final sample consisted of twenty-two organisations spanning eight economic sectors⁷ and employing ETH graduates from all educational backgrounds. We interviewed each organisation's profiler, recruiter or line manager (or full professor in the case of education). The results showed that subject-specific competencies, self-awareness, and self-direction were considered relevant for entry-level employment in all sectors, followed by communication and prior experience of leadership in extra-curricular contexts, which were mentioned by three quarters of the sample. For the education sector, we considered entry-level requirements for junior researcher positions.

Employers also revealed how these transferable competencies were difficult to assess in the job application process as graduates tended not to be aware of their holistic potential and limited themselves to promoting personal achievements in the educational background area rather than discussing their interests and work experience with peers, and their potential contribution to the new job, leading to more extended job assessment periods. Lastly, more than 62% of the sample projected that, within the coming five years, personal (e.g., adaptability and flexibility, and creative thinking related to solving complex problems) and social competencies (sensitivity to diversity, customer orientation, communication, teamwork, and leadership) would become the most in-demand competencies in the future's professional world, adding to the competence needs already identified through the analysis of the

⁷ The interviewees were from the following economic sectors classified according to the NOGA 2008 General Classification of Economic Activities (NOGA 2008): manufacturing; electricity, gas, steam and air conditioning supply; transportation and storage; information and communication; financial and insurance activities; professional, scientific and technical activities (e.g., management consultancy, architectural and engineering activities); education; and human health and social work activities.

qualification profiles and graduates' responses. Altogether, respondents expressed the wish for HE institutions like ETH to provide students room to experience a holistic set of competencies early on in their studies and in extra-curricular activities. To summarise, we find that incorporating the feedback from graduates, the overview of competencies to be fostered in degree programmes by lecturers, and the results of the interviews with the employers allowed ETH to identify the competencies becoming increasingly important for future graduates, answering our first research question.

Development (2019-2020)

The ETH Competence Framework⁸ lists the competencies that ETH aims to foster to ensure the best job, regardless of an academic or non-academic career, and civic engagement opportunities for its graduates while guiding and inspiring teaching at ETH. Its development started alongside the need assessment phase and included two editorial rounds, each supported by feedback from internal stakeholders⁹ to incorporate further needs and opinions. The first editorial efforts concerned the compilation of the first university's framework that placed subject-specific competencies at its core and identified three complementary competence domains (method-specific, social, and personal competencies)¹⁰ to support the assimilation and deployment of subject-specific competencies (Rothe & Hinnerichs, 2005). Each competence domain included two to seven competencies for a total of twenty, derived from the integrated results from the need assessment phase.

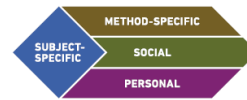
In the second editorial round, we described the expected knowledge, skills, and attitudes outcomes for each competency following the KSA approach (Child & Shaw, 2020; OECD, 2005; Anderson et al., 2013). The newly formulated competencies' descriptors have the advantage of using a language that employers adopt in job advertisements and with which graduates are confronted when applying for jobs. Similarly, KSA-formulated descriptors support lecturers when writing the learning objectives of their courses, designing the course's content, and identifying the competencies fostered in the degree programmes. Figure 2 shows an overview of the ETH Competence Framework. This section answers research question 1, by showing how ETH moved from identifying to defining the competencies to foster.

⁸ The ETH Competence Framework is available at www.ethz.ch/comp-teachingstaff

⁹ Stakeholders included the Executive Board, members of the *Rektoratsrunde* (i.e., an informal body consisting of the Rector, members of the Rector's Staff, Heads of the administrative departments within the Rectorate, Corporate Communications, and the President's Office), education specialists, lecturers holding expertise in education (learning, employability, and work psychology), and members of the initiative's Advisory Board, which includes students, lecturers, educational developers and specialists, career and student coaches, and a coordinator of studies.

¹⁰ Subject-specific competencies refer to knowledge of theories, concepts, and techniques and their application to specific disciplines; method-specific competencies concern the knowledge and application of methods to understand and operate in any context; social competencies are those competencies applied in the interaction with others; and personal competencies concern self-management in the context of own work.

COMPETENCE FRAMEWORK



SUBJECT-SPECIFIC COMPETENCIES (to be specified by individual degree programmes) Knowledge of theories, concepts, and techniques and its application to specific fields						
Concepts and Theories Ability to understand and apply the basic concepts and definitions that are relevant for a scientific subject or a field			Techniques and Technologies Ability to understand and apply techniques and technologies in use within a specific scientific subject or field			
METHOD-SPECIFIC COMPETENCIES Knowledge and application of methods to make sense of, and operate in, any context						
Analytical Competencies Ability to break down processes and systems into parts while understanding their interaction	Decision-making Ability to define a decision and a set of alternative actions from which to choose	Media and Digital Technologies Ability to access, evaluate, and use media and digital technology	Problem-solving Ability to define a problem and find solutions for it	Project Management Ability to manage projects and produce results		
SOCIAL COMPETENCIES Competencies applied in the interaction with others						
Communication Ability to communicate with others in different contexts and forms	Cooperation and Teamwork Ability to build relationships with others to pursue common goals and achieve results in a constructive atmosphere	Customer Orientation Ability to approach relationships with others and society in terms of what you have to offer rather than what you need or want	Leadership and Responsibility Ability to motivate and inspire others and support others' achievements	Self-presentation and Social Influence Ability to present an authentic and professional image of self to others and motivate others to the adoption of a specific behaviour	Sensitivity to Diversity Ability to recognise differences among people and work with them	Negotiation Ability to advocate positions with an open mind and try to synthesise ideas from all viewpoints best
PERSONAL COMPETENCIES Competencies concerning self-management in the context of own work						
Adaptability and Flexibility Ability to adjust effectively to a changing environment and deal well with changes	Creative Thinking Ability to produce and implement novel and useful ideas	Critical Thinking Ability to analyse and evaluate situations and recommend courses of action	Integrity and Work Ethics Adherence to moral and ethical principles in the conduct of own work and in the relationship with others	Self-awareness and Self-reflection Ability to understand own strengths and weaknesses and enhance self-development	Self-direction and Self-management Ability to motivate oneself and organise own work in order to achieve results	

Figure 2: The ETH Competence Framework.

Implementation (2021 to date)

To answer research question 2, we observed how ETH introduced the framework into the university's operations gradually as of mid of 2021 after having compiled the final framework. The implementation phase is still ongoing and involves a mix of strategic and operational measures. While strategic measures (e.g., policy development) aim to create a sense of urgency for changing the educational offer within the university and build consensus on change (Kotter, 2012), operational measures aim to enable change in day-to-day activities (Adler & Borys, 1996).

Specifically, at a strategic level, in July 2021, the university's Executive Board formulated the policy for promoting a holistic set of competencies for future-ready graduates. The policy was later shared with the degree programmes¹¹. For the first time, the degree programmes were called to integrate the fostering of transferable competencies alongside the more traditional subject-specific competencies into their curricula. The selection of the specific competencies within these competence domains was left to the autonomy and specificity of the degree programmes. In parallel, two websites, one directed to lecturers and teaching support personnel¹² and the another to students¹³, were created to share the policy and underlying motivation to foster a holistic set of competencies. For example, to share the motivation, testimonials of the university's employees, Rector and graduates about the benefits of a holistic set of competencies for learners complemented a more descriptive presentation of the framework. Similarly, to motivate the university's members to use the framework, these

¹¹ Conference of the Directors of Studies, October 2021.

¹² www.ethz.ch/comp-teachingstaff

¹³ www.ethz.ch/competencies-for-students

websites shared information on how to use it to support teaching or the students' studies and learning experience.

The second set of implementation actions aims to guide the university's members in adopting the framework in daily activities. We found that ETH is promoting transferable competencies on three dimensions: degree programmes; course teaching and administration, and student support. Table 1 provides an overview of the implementation measures.

Measures	Degree programmes	Courses	Student support
Policy	– Website for lecturers	– Website for lecturers	– Website for students
Educational offers	– Curriculum mapping tool – Past revisions catalogue – Ongoing revisions pitches – Graduates survey	– Teaching examples catalogue – Course catalogue – Course evaluation	– Educational offer catalogue
Services	– Counselling and coaching	– Counselling and coaching – Workshops on teaching	– Information events – Counselling and coaching

Table 1: Overview of the implementation measures.

The degree-programme dimension

At the degree programme level, these measures aim to support academic departments to identify competencies fostered in their curricula, exchange with other programmes on curriculum revisions, and receive competence-oriented feedback from graduates on their programmes. A curriculum mapping tool is under development. It will support degree programmes in tracking competence development throughout the curriculum, allowing users to manually link competence development to individual courses and visualise the fostered competencies in the degree programme. Competence-oriented mapping efforts are not new at ETH (e.g., Jödicke et al., 2016; Wieser et al., 2020).

To develop the curriculum of the Bachelor of Human Medicine, LOOOP¹⁴, a mapping tool from Charité Berlin was used to map learning objectives (Weissmann et al., 2020). The new mapping tool will support degree programmes in tracking the fostering of transferable competencies throughout the curricula and can help to evaluate the alignment between the programme's intended learning outcomes stated in the qualification profile and the courses' content across academic semesters. Thus, the tool is especially useful for newly developed curricula and those under revision. In the future, older degree programmes could potentially use it to identify potential needs for change and draft a qualification profile to initiate a curriculum revision¹⁵. Moreover, degree programmes can exchange on ongoing and past curriculum revision projects at the Conference of the Directors of Studies. Invited directors of studies or curriculum revisions teams share their insights into the revisions, describing their motivation for the change, their approach, and their learnings, ultimately promoting a discussion on curriculum revisions among degree programmes. Past curriculum revision projects are also available for consultation on the Educational Development and Technology (LET) webpage¹⁶.

Furthermore, from mid 2023, all degree programmes will also benefit from more competence-based feedback on their offers from ETH graduates, thanks to the integration of survey

¹⁴ Learning Opportunities, Objectives and Outcomes Platform, <https://loop.charite.de/>

¹⁵ <https://ethz.ch/content/dam/ethz/common/docs/weisungssammlung/files-de/curriculumsentwicklung-rechtsetzung-lehre.pdf>

¹⁶ <https://u.ethz.ch/k1ail>

questions in the Graduates Survey administrated by the Swiss Federal Statistical Office¹⁷ to cover the competencies described in the ETH Competence Framework. Degree programmes could use the survey to monitor possible long-term effects of curriculum revisions or to anticipate future trends in competence requirements or mismatches with their educational offers. Lastly, LET¹⁸ has extended the support for degree programmes in curriculum development topics and clarify misunderstandings about the framework and its implementation at the degree programme level.

The course teaching and administration dimension

Gaining an overview of the competencies fostered at the degree programme level has implications for teaching at the course level. For this reason, ETH has planned different measures to support lecturers in using competence-oriented language when promoting their course's content to students, structuring their courses from scratch, revising courses, or even finding inspiration from peers about new ways of fostering competencies. For example, since 2021, the ETH Course Catalogue¹⁹ includes a feature to signal the competencies explicitly promoted in a course, and students are better aware of what to expect to learn from the courses thanks to the information contained in the Course Catalogue. The lecturers could select the competencies during the revision phase for curricular activities of the coming academic semester by indicating on the teaching application eDoz²⁰ the competencies that they explicitly fostered in their courses and to what extent these were part of a formal assessment (i.e., assessed competencies) or fostered through ungraded activities like exercises, course design factors, or feedback sessions (i.e., fostered competencies). The competencies selection will become compulsory in autumn 2023.

Competence View²¹ (launched in 2020) is a collection of good practices where lecturers can find inspiration for integrating transferable competencies into courses. Currently, it hosts a collection of twenty-two courses described in various formats, ranging from cookbooks to interview transcripts. Figure 3 displays Competence View.

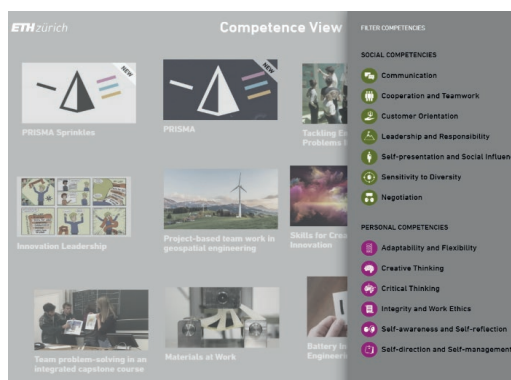


Figure 3: Competence View.

¹⁷ The modifications of the Graduate Survey consisted in the creation of additional questions in the ETH-specific section H of the survey and coding of questions administrated to all higher education graduates in Switzerland (i.e., section D of the survey). These questions were formulated using the ETH Competence Framework's descriptors. Overall, responses to these survey items will concern the competencies levels that graduates declare to have gained from the programme attended and the competencies requirements of these graduates' employers. The results from the Graduate Survey are available on ETHIS, which is the ETH Zurich web portal for personalised access to date and evaluations of studies processed by the Institutional Research administrative department. At the degree programme level, Head, Deputy Head, Controller, Coordinators, Educational Developers, and Secretaries hold access rights to the Graduates Survey reports on this portal. The first feedback on transferable competencies will come from the cohort of students who graduated in 2021.

¹⁸ <https://ethz.ch/en/the-eth-zurich/education/educational-development/curriculum-development.html>

¹⁹ The Course Catalogue is a publication listing the range of courses available per academic semester.

²⁰ eDoz is an academic application that supports the lecturers at ETH Zurich with the administrative tasks connected with their teaching.

²¹ Competence View is a website developed by LET, in collaboration with the ETH Talent Lead and the network of Educational Developers at ETH. More information can be found at <https://www.competenceview.ethz.ch/>

LET plans to offer a teaching lab to support lecturers in fostering transferable competencies from autumn 2023. An open, self-paced online course will provide lecturers with concepts of transferable competencies and how their development can be fostered in various teaching formats. Participants will be able to identify and reflect on transferable competencies fostered in their courses. An optional follow-workshop will offer the opportunity to dive deeper by explicitly planning the integration of transferable competencies into a course and exchanging and reflecting on experiences with other lecturers.

Lastly, further work is needed to enable lecturers to receive timely feedback from students on the competencies they foster in the courses.

The student support dimension

Finally, a set of measures was developed for student support. The measures aim to promote the use of the framework as a language by integrating the promotion of transferable competencies in the existing onboarding and new information events, services, and software applications for educational offers.

For example, in 2021, the university's Student Services administrative department (StS) presented the framework to incoming bachelor's students at the Prestudy Event²². This yearly event series is offered to students about to start their bachelor's programmes at ETH and provides information, orientation and networking to help students transitioning into HE. At these onboarding events, a game for the students, touching upon anecdotes from a day in a student's life (e.g., creating a study plan, getting involved in a study association), complemented a more general presentation of the ETH Competence Framework made on slides. The game consisted of connecting sentences to competencies. The solutions to the game were linked to a website with information about the competence framework. With a similar idea of sharing a competence-oriented language with students arriving at ETH, a new event, the Check-in Event²³, took place in 2022 to onboard master's students who had not yet studied at ETH and introduce them to the new academic culture. At this online onboarding event, students could learn about the framework and motivation for developing a holistic set of competencies and receive practical information on how to search for courses or extra-curricular activities. A similar event exists already for doctoral students at the start of their programmes²⁴ and is offered by the Doctoral Administration. Doctoral students who have just joined ETH can learn about the framework and discover how to use its competencies to search for ETH's curricular and extra-curricular offers. Specifically, this search is facilitated by the introduction of myPath²⁵, a new catalogue to allow ETH students to search for extra-curricular activities and services.

The catalogue gathers information about extra-curricular educational offers from different ETH Zurich organisers. A search engine and filters, including a filter by competencies, enable the search of the extra-curricular offer that can support students develop competencies they need to thrive in their studies and student lives at the university. Each activity or service is labelled with the competencies it promotes and presents further details concerning, for example, the learning objectives, the logistics, and the enrolment procedure. A new version is under development to enable students to enrol to activities directly on myPath, receive suggestions of educational offers (including the curricular offer) based on their interests and profile, and keep track of their engagement in competence development activities thanks to a documentation feature. The new catalogue will be released at the end of 2023. Figure 4 provides an overview of the current myPath.

²² <https://ethz.ch/en/studies/bachelor/beginning-your-studies/prestudy-events.html>

²³ <https://ethz.ch/en/studies/master/beginning-your-studies-master/check-in-master.html>

²⁴ Orientation Event. More information can be found at <https://ethz.ch/students/en/doctorate/introductory-programme/Orientation/OrientationEvent.html>

²⁵ <https://mypath.ethz.ch/en/>

myPath

myPath is a catalogue for extracurricular activities and initiatives at ETH Zurich. It offers you the opportunity to support your studies or work at ETH. Use the filters or the search engine below to find the activities and initiatives that suit you best!

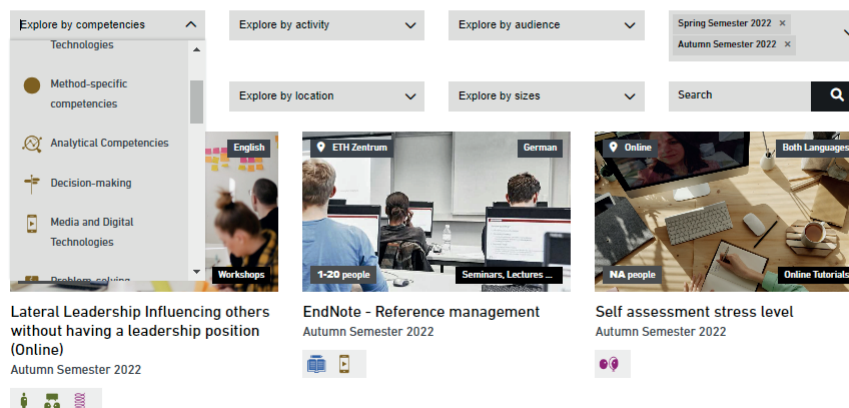


Figure 4: myPath homepage.

Furthermore, a new information event is planned to launch as a pilot at the end of 2023 to guide second-year bachelor's students, who have passed the entrance exams, to navigate ETH's educational offers. The event will allow second-year bachelor's students to reflect on themselves and become aware of their potential and competence needs by visualising the competencies already fostered in the degree programme.

Lastly, further work is needed to integrate a competence-oriented approach into the counselling and coaching service for students to guarantee tailored and in-person support for the students. In this regard, the StS Counselling & Coaching team is currently analysing the existing service and plans to train their staff in using the framework to praise the competencies of bachelor's and master's students as they arise in the counselling sessions. Praising will help the students draw a direct connection between competencies and their experience with them, ultimately leading to a deeper understanding of specific competencies and higher awareness about their potential. Despite its relevance, the offer of in-person counselling sessions for doctoral students at ETH limits itself to specific topics. For example, the university's association of scientific staff at ETH Zurich (AVETH)²⁶ offers counselling on academic, administrative and personal issues, and the ETH Career Center²⁷ provides doctoral students with counselling on career-related topics. There is a risk of overlooking the fostering of crucial transferable competencies for these students. Therefore, we see the need for further work to extend the support offered to doctoral students to guarantee a comprehensive development of transferable competencies for all ETH students.

Discussion

The previous section addressed the research questions by showing how ETH Zurich identified and defined transferable competencies (first research question) and has leveraged the ETH Competence Framework to start to foster them on three levels (degree programmes; course teaching and administration, and student support) for educating future-ready graduates (second research question) Our results extend the literature in HE in three ways. First,

²⁶ <https://www.aveth.ethz.ch/>

²⁷ <https://ethz.ch/en/industry/industry/attract-eth-talents/career-center.html>

Hansmann et al. (2019) described how graduate survey responses initiate an internal analysis of competencies fostered in degree programmes and ultimately lead to curriculum revisions. We extend this work by showing that employers' feedback on graduates' preparation and future competence requirements (Leckey & McGuigan, 1997) helps universities gain a comprehensive view of their graduates' needs. Secondly, consistent with the work by Wieser et al. (2020), we outline the need for multiple editorial rounds and stakeholder engagement in defining new competencies.

Our paper extends this work by shedding light on the stakeholders necessary to ensure feedback exchange across academic and administrative departments to seek consensus at the university level. Lastly, in describing the implementation phase of the ETH Competence Framework, we argue that synergies across students' support, extra-curricular activities, teaching support and degree programmes are pivotal to (starting to) implement measures within the university. This university perspective enriches prior research showcasing the implementation of new competencies at the degree programme (e.g., Wieser et al., 2020; Weissmann et al., 2020) or course levels (e.g., Bailey et al., 2012).

However, enacting university-wide change requires time. We estimate ETH Zurich will need five to ten years to complete the implementation stage. By then, thanks to greater awareness of competencies and more experience with developing them across disciplines, we wish to see graduates able to communicate their potential convincingly during recruiting and identify organisations matching their holistic profiles, leading to shorter unemployment duration and better placement (Brall, 2009). We know that these outcomes could be delayed in the future as we anticipate adjusting the implementation measures and timeline in the face of possible resistance from the degree programmes that could fear neglecting subject-specific competencies or raise new needs. Still, we wish to observe better research implemented with former students inspired by lecturers who were engaged in and enjoyed fostering competencies through different ways of teaching (e.g., project-based learning), ensuring that the students experienced the connection between disciplinary knowledge and transferable competencies. Lastly, we envision more graduates proactively resolving global problems (OECD, 2005) and contributing to a more cohesive society (Cimatti, 2016).

To conclude, this paper describes how ETH Zurich identified, conceptualised, and started to integrate the fostering of transferable competencies for educating future graduates. We hope our lessons learned can inform future university-wide initiatives. We observed that incorporating three distinct perspectives on competence development (i.e., lecturers', students', and employers' perspectives) was pivotal to depicting a comprehensive picture of graduates' competence needs and building consensus for integrating new competencies within the university. Moreover, using the KSA approach to describe competencies enabled the ETH Talent Initiative to reach early adopters among lecturers and administrative personnel who voiced that tangible performance outcomes helped them connect abstract concepts (competencies) to concrete examples of competence application in practice (descriptors). However, incorporating different perspectives and additional editorial efforts required more time than anticipated.

We also found the combination of information-sharing and competence-building measures necessary for the implementation of the ETH Competence Framework. While information-sharing channels and events (e.g., websites, information events) helped draw attention to the ETH's policy and teaching culture, they have also encouraged university members and students to reach out to ask clarifying questions (e.g., about the framework) or suggest further requirements for implementing the framework in their daily activities (e.g., specifications for myPath or for the Course Catalogue). In this sense, linking information with concrete offers and competence-building opportunities to benefit from them has shown some positive effects on inspiring people and prompting their initial action. Lastly, we anticipate that further needs for additional (or modified) measures will arise when moving towards a university-wide implementation. However, we trust that flexibility in the implementation will help engage the

university's community, uncover needs, and achieve full promotion of competence-oriented teaching.

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