Teaching and Learning Evaluation Exercise – TEE 2020

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Project Report

Editor Heidi Rontu

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Aalto University

Learning Services

List of abbreviations

AAC = The University Academic Affairs Committee
AACSB = Association to Advance Collegiate Schools of Business
AMBA = Association of MBAs (Masters of Business Administration)
ARTS = Aalto University School of Arts, Design and Architecture
AYY = Aalto University Student Union
BA = Bachelor of Arts
BIZ = Aalto University School of Business
BSc = Bachelor of Science
CEMS = The Global Alliance in Management Education
CHEM = Aalto University School of Chemical Engineering
DA = Doctor of Arts
DSc = Doctor of Science
ECTS = European Credit Transfer and Accumulation System
ELEC = Aalto University School of Electrical Engineering
ENG = Aalto University School of Engineering
EQUIS = The EFMD (European Foundation for Management Development)
Quality Improvement System
FINEEC = Finnish Education Evaluation Centre
KPI = Key Performance Indicator
LESG = Learning Steering Group
MA = Master of Arts
MBA = Master of Business Administration
MSc = Master of Science
OPLAA = Quality of Education Committee
PIM = The Partnership in International Management
PMT = President's Management Team
QA = Quality Assurance
RAI = Aalto University Research, Art and Impact Assessment
SCI = Aalto University School of Science
TEE = Teaching and Learning Evaluation Exercise
TF = Teknologförening (student union for Swedish-speaking students)
VTT = Technical Research Centre of Finland

Contents

Preface

Aalto University's educational evaluation, TEE 2020, was a broad assessment undertaken in a year of extraordinary challenges that have shaped the future of education.

The purpose of TEE 2020 is to stop and reflect on Aalto's education as a whole, examining it at all educational levels to identify the achievements made in the past decade and, in particular, to interpret what needs to be developed in order to prepare for the future.

Hundreds of Aalto members have made valuable contributions in this process, from self-evaluations and peer reviews to the phases of external assessment. The result is a vast array of materials on which to construct our future. We are deeply grateful to everyone for their important contributions!

The COVID-19 pandemic has called upon us to carry out teaching and learning under conditions that are trying for teachers and students alike. Digital tools and adapting teaching to circumstances where on-campus encounters cannot take place like before have forced us to think in a new way about learning and interaction in education. The measures implemented during the crisis are not all permanent, but some of them probably will be. Identifying and refining new ways of working that have proved good in practice is a task for all of us in the learning community.

At the same time, we are seeking to discern the long-term trends, how the growing volume of participants in degree education and in lifewide learning will shape our ways of operating. The new Aalto strategy sets the goal of developing competencies related to responsibility and broadening our societal impact. This means not simply increasing the student numbers but enhancing the quality of teaching, learning and the experience of being a student.

Internationalisation and global student mobility have also been transformed, with implications that will affect our operations for years to come. How we will continue learning from each other as we have through our experience with internationalisation is unclear in the new world, where physical mobility is no longer a given; the question will test our ingenuity and set ways of doing things.

Our operating environment is thus a rich network of interconnected dynamic changes.

Aalto University enjoys a strong starting position in a number of ways. The prominence and attractiveness of Aalto as a place to study has risen continually over its ten-year history. Within their fields, many of our programmes are the top draws in Finland and are gaining increasing recognition in the world at large. Aalto graduates report satisfaction with studies and their employment levels are high. Employers value an Aalto education.

However, we also recognise the big challenges before us. The well-being of students and teachers, the capacity to study, and the goals of achieving sustainable development and multidisciplinarity in a well-thought-out way, call for determination and continual follow-up.

We shall carry these forward in the work of designing the curriculum and in the development projects for the new strategy. In spring 2021, we will continue our dialogue on actions to take so that we can ensure the continued success of Aalto education through the years to come. Let's do this together!

Ilkka, Tiina, Petri

Executive summary

The target of the Teaching and Learning Evaluation Exercise 2020 was to identify the needs for future development in education at Aalto University and to evaluate and make visible the achievements of the past 10 years of Aalto's existence. TEE 2020 serves as a means for supporting the strategic development of education at all degree levels, i.e. the first, second and third cycle of education. TEE 2020 is part of an evaluation continuum in which the university conducted a more comprehensive evaluation of its education in 2011. The goal of the current evaluation was to discover both Aalto's strengths and its development needs, and to identify some of Aalto's good practices.

TEE 2020 resulted in a comprehensive evaluation of all degree education at Aalto, with substantial evaluation data from several perspectives, both internal and external. The evaluation required dedication and substantial input from the degree programmes and the schools. The level of motivation was high, and the different stages of the evaluation process attracted much interest and high expectations. The TEE 2020 project consisted of four evaluation phases. The first internal evaluation phase was a degree-programme self-evaluation. The second internal evaluation phase was a degree-programme peer review, resulting in a summary of the peer review and a vision for each degree programme participating in the evaluation. The first external phase was a stakeholder review with a remote visit by stakeholder panels to each Aalto school. The TEE 2020 project culminated in an international review, conducted by an international review panel. The panel had a pre-evaluation task, followed by a remote visit at the university.

This report outlines the evaluation project, presents the results of the four evaluation phases, summarises the main observations and recommendations, and provides a reflection on the findings and conclusions for moving forward. Besides the obvious results, it is important to understand the evaluation process as a result too. The process, which embodied collaborative self-evaluation, peer evaluation and reflection on the panels' recommendations at the school, degree-programme and university level strengthened, for its part, the culture of feedback and evaluation at Aalto and enhanced the university's renewal of education.

Levander, Leena & Koivisto, Reetta (eds.) 2011. Learning together – towards enhancing the co-creation of education. Aalto University publication series CROSSOVER, 6/2011.

TEE 2020 identified the following strengths in Aalto University's education:

- Aalto's reputation for excellence
- The close connection in its education to practice and to research
- Aalto's faculty
- Aalto's strong student-centric approach

TEE 2020 brought out the following development areas for Aalto's education:

- Aalto University relaunched
- Increase in student diversity and the diversity of the Aalto community
- Renewal of programme portfolios
- Programme organisation – appropriate mandate and conditions
- Student experience
- Student throughput
- Enhanced student recruitment
- Doctoral education
- Digital and hybrid learning environments
- Recognition of faculty competence
- Mechanism for sharing good practices
- Support for a systematic alumni network and for stakeholder collaboration

To promote the development work in education highlighted by TEE 2020, different action steps will be taken. Development actions can be divided into short- and long-term actions. The timeline for short-term actions is based on the curriculum cycle of the university, which is two years. The timeline for long-term actions extends through the strategy period of the university. Aalto has just launched its new strategy, and the first planning period is for 2021–2024.

The Learning Steering Group (LESG) has discussed the following themes as central for curriculum development during the next curriculum cycle (2022–2024), based on the results of TEE 2020:

- Assessment and development of the student workload in courses and programmes, based on the available feedback. In addition, ensuring that the content of the courses, the teaching methods, and the methods for evaluating teaching and learning support the completion of the learning outcomes within the target time.
- Enhancing planning and co-development cross-school and cross-unit.
- Advancing sustainability and other cross-cutting themes in the degree programmes.
- Implementing and boosting digital solutions in the pedagogical framework.
- Identifying lifewide learning perspectives and potential (elements within courses, micromodules, etc.) in the programmes.

Many of the educational development ventures and projects complementing curriculum work contribute to resolving the challenges brought up by TEE 2020. Schools are analysing the key findings in connection with their dialogue processes

and annual-clock activities during 2021, and LESG will continue the Aalto-wide coordination of the most prominent development activities within education. For the strategic planning period 2021–2024, the following key strategic projects are being considered:

- Education shaping a sustainable future – integrating cross-cutting themes and multidisciplinarity into the programmes
- OASIS – incubator of holistic wellbeing
- Developing our digital and engaged learning environment

In the longer term, an elemental part of the development of Aalto University's educational impact is systematic and evidence-based management of the educational portfolio. How to introduce new programmes and how to develop existing ones are important decisions that can benefit from cross-school discussions for identifying potential interfaces, synergies and meaningful associations. There is substantial untapped potential in the portfolio management practices for ensuring a balanced and attractive portfolio of educational programmes from the BSc level to the MSc and doctoral level.

Finally, not every important thing needs to be organised as a project or formal development venture. Open dialogue within the Aalto community, everyday actions that show the value of teaching and learning, and smaller steps taken to continue and further improve our ability to carry on high-quality education can make a big impact in the long term.

1. Description of the Teaching and Learning Evaluation Exercise process

Aalto University Teaching and Learning Evaluation Exercise (TEE) 2020 was set in motion in 2019 and carried out during the calendar year 2020. The evaluation was initiated and funded by Aalto University. The target of was to identify needs for future development in education at the university and make visible and evaluate the achievements of the 10 years of Aalto's existence. TEE 2020 serves as a means for supporting the strategic development of education at all degree levels, i.e. the first, second and third cycle of education. TEE 2020 is part of the university's evaluation continuum in which the previous, more comprehensive education evaluation was conducted in 2012. There was an external audit of Aalto's quality assurance system by the Finnish Education Evaluation Centre (FINEEC) in 2016, giving feedback on the quality system, including that of education. In 2018, the university conducted an internal mid-review of the strategic objectives in education (Educating Game Changers Mid-Review).

The focus areas of the evaluation, aligned with the strategic targets in education, were as follows:

- Programme (portfolio) management
- Anticipation of the future of work and knowledge requirements
- Competence accumulation in the degree programmes
- Ways of implementing multidisciplinarity in education
- Fluency in studies

The TEE 2020 project consisted of four evaluation phases. The first two evaluation phases were internal, and the last two phases external. The first internal evaluation phase was a degree-programme self-evaluation. The second internal evaluation phase was a degree-programme peer review, resulting in a summary of the peer review and a vision for each degree programme participating in the evaluation. The first external phase was a stakeholder review with a remote visit by stakeholder panels to each Aalto school. The TEE 2020 project was finalised by an international

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review, conducted by an international review panel. The panel had a pre-evaluation task, followed by a remote visit at the university.

The Organisation of TEE

The decision to organise the TEE 2020 project was made in autumn 2019 by President Ilkka Niemelä. The strategic steering group of the project was the President's Management Team (PMT), and the operational steering group was the Learning Steering Group (LESG). The operational head of the TEE 2020 project was appointed in December 2019 to co-ordinate the evaluation. The operational head called for a workgroup with representatives from each Aalto school, Learning Services and the Aalto University Student Union. The workgroup was approved by LESG. Vice President Petri Suomala was in overall charge of TEE 2020. The organisational structure of the evaluation is given in Appendix 1.

Implementation of the evaluation

Planning stage
The planning started in autumn 2019 and more detailed planning took place in December 2019. The actual evaluation process began in January 2020 with decisions about the programmes to be evaluated, instructions for the self-evaluations, and the starting of the recruitment of panel members for both the stakeholder review and the international review. Further stages were planned as the project proceeded. More details and the timetable of the evaluation are described in Appendix 2.

Programme self-evaluation
The degree programmes carried out the self-evaluation stage according to instructions, compiling a self-evaluation report based on thematically organised self-evaluation questions. The programme director had the main responsibility for the self-evaluation. The programmes were instructed to conduct their self-evaluations in the way that worked best for them individually in order to achieve comprehensive and analytical evaluation results. It was recommended that the assessment discussions concerning the self-evaluation questions involve an extensive number of teaching staff and students, who would take part in producing the degree programme. The self-evaluation instructions and the self-evaluation questions are presented in Appendix 3. Altogether, 61 programmes conducted the self-evaluation. The self-evaluation stage was initially planned to expire at the end of March, but due to the pandemic, the self-evaluation expired at the end of May. The programmes delivered their reports electronically by using a Webropol survey tool created for this purpose. The self-evaluation reports were made public on the internal webpages of Aalto University for the whole Aalto community (students and personnel) and on the Teams platform on dedicated areas for LESG and for the TEE 2020 workgroup. Appendix 4 provides a list of the programmes that conducted the self-evaluation.

Programme peer review

The purpose of the peer review was to share information on the current state and quality of the planning, management, implementation and development of the degree programme with another degree programme at Aalto. The peer review focused on the managerial procedures and practices of the programme. The target was to provide ideas and perspectives about how to develop the programme and offer an opportunity to learn from the good practices and development ideas used in the other programme, i.e. create a networking possibility between programme directors and other key persons involved in programme development, and in this way strengthen programme management skills through peer support. Moreover, the peer review offered an opportunity to rehearse for the audit of Aalto University due in to take place in 2022. The audit will include a mandatory benchlearning phase (see FINEEC guidelines[3]).

The peer review was a facilitated discussion between programme directors and 1–4 members of academic staff and other key persons involved in the programme development. The facilitation was provided by an external service producer. There were usually two facilitators in each peer discussion. The pairing of the programmes was conducted by the vice deans for education of the schools. The peer discussion was based on the questionnaire in the programme self-evaluation with the aim of identifying strengths and weaknesses, and good practices to share. The peer programmes concentrated on two or three themes in the discussion. The themes were agreed upon by the programmes prior to the discussion. The outcome was a summary of the peer discussion, compiled by the facilitators. The instructions for the peer discussion are presented in Appendix 5.

Programme vision

Each degree programme was instructed to comprise a short vision for the programme as a result of both the self-evaluation and the peer review. In the vision, the programme would describe the target state for the upcoming years. The vision was written according to a given template and returned by using the Webropol survey tool. The instructions for the programme vision are presented in Appendix 6.

Stakeholder review

The stakeholder review was carried out by a panel for each Aalto school. The panel consisted of representatives of the labour market, including third sector employers for which graduates of Aalto University are an important recruitment source. The panel members were chosen from a pool of candidates put forward by the schools. The number of panel members varied somewhat between the schools, depending mostly on the availability of the members. The panel members are presented in Appendix 7.

The purpose of the stakeholder review was to evaluate the current state of the degree programmes of Aalto University, reflect on the relation and relevance to the

needs in the labour market and in society at large. The review aimed at providing feedback and recommendations for future development of the degree programmes. The panels made a remote visit to the schools. Initially, the plan was to have site visits, but this was changed due to the pandemic. The length of the remote visit depended on the number of degree programmes of the school and varied between one to three days between 21 – 23 October 2019. The timetable of the stakeholder review is presented in Appendix 8. Before the remote visit, the panels received the programme self- and peer evaluations and the programme visions. In addition, the panels had a summary of the core statistics of the programmes and the schools, documented on the SharePoint platform. The panels received instructions for their own evaluation and access to the statistics at the beginning of October 2020. The instructions to the panels are presented in Appendix 9.

During the remote visit the panels interviewed the leadership and the representatives of the degree programmes of the schools. The schools had decided on who would represent the school's leadership. The selection usually included the dean, vice dean for education, vice dean for research, the manager of academic affairs, the manager/head of development, and could also include heads of departments. The schools had made internal decisions about the representation of the degree programmes in the interviews. The programmes were usually represented by the programme director, representation from the teaching personnel and a student representative. Before the remote review days, the schools and the programmes received the review instructions that had been sent to the panels (see Appendix 9). There was Aalto internal facilitation of the interviews with the purpose of ensuring a successful management of the interview schedule and the evaluation report of the panel. The facilitator was also responsible for writing the review report. The facilitators met a couple of times before the remote visit of the panels to plan the facilitation and the running of the review days and to ensure that the facilitation was synchronised. The facilitators are presented in the timetable of the stakeholder review (see Appendix 8).

International review
The target of the international review was an assessment of Aalto's degree programmes (programme portfolio) from an international perspective, i.e. a comparison of the programmes to international education within the same fields of higher education, keeping in mind the multidisciplinary focus/orientation/thrust of Aalto University's operations between arts, science, business and technology.

The international review focused on assessing i) the current state of education at Aalto and ii) the potential for future foresight and renewal, with special attention given to the stated focus areas of the Teaching and Learning Evaluation Exercise 2020 (TEE 2020):

- Programme (portfolio) management
- Anticipation of the future of work and knowledge requirements
- Competence accumulation in the degree programmes
- Ways of implementing multidisciplinarity in education

- Fluency in studies

The frame of reference for the international review was the strategy of Aalto. According to the strategy, the purpose of education is to spark the game changers of tomorrow, with a focus of development on future-led learning. The defined development items within education are the following:

- Renewing the university's educational offering
- Developing our digital and engaged learning environment
- Integrating sustainability and multidisciplinary studies into programmes
- Advancing learning-centric approaches and focusing on holistic well-being

The review was conducted by an international review panel. The panel had 16 members from 9 different countries, including 3 Finnish academic members. The panel members were appointed by the vice president for education, chosen from a pool of potential candidates put forward by the schools or, in the case of non-availability, by other recommending parties. The panel members represented the three academic fields of Aalto University: arts (2 members), business (3 members), and science and technology (11 members). The composition of the panel is presented in Appendix 10.

The international review consisted of a pre-task and a week-long remote visit by the review panel. The visit week was originally planned as a site visit, but it was conducted remotely due to the pandemic situation in 2020. The pre-task was planned by the TEE 2020 workgroup of the university and approved by the vice president for education. The initial plan for the remote visit week was also drafted by the TEE 2020 workgroup. The plan was finalised with support from the chair of the review panel and approved by the vice president for education.

The panel had access to all evaluation data previously produced in the TEE 2020 project, i.e. the programme self-evaluations, the programme peer evaluations, the stakeholder reviews of the programmes, and the programme portfolios of the Aalto schools. In addition, the panel had access to central numeric data on education performance at both the school and the university level.

In the pre-task the panel focused on the current state of education at Aalto University, working according to the eight themes of the programme self-evaluation of the TEE 2020. Each panel member worked on two areas in the pre task: the panellist's own education expertise area and a peer education expertise area. The panellists were asked to identify central issues, good practices and development needs with the support of the SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis tool in the assessment. The panel instructions of the pre-task are presented in the appendix 11.

Prior to the remote-visit week, the operational head of TEE 2020 and the chair of the panel had two preparatory online meetings, and the panel had one online meeting to introduce the goals, the programme and the division of work for the remote-

visit week. The remote visit took place from 14 to 18 December 2019. Due to substantial time-zone differences, some of the panel members were not able to be present during the working hours of the review days. These panel members were dedicated responsibilities for tasks that could be conducted outside the working hours of the review days. The overall programme and the schedule of the remote visit is presented in Appendix 13.

During the remote visit week, the panel interviewed the leadership of the university and the leadership of the schools. The leadership of the university included the president, the provost, the vice president for education and the vice president for research. The whole panel was present in the university leadership interview. The leadership of the schools varied somewhat depending on the invitation decision of the school. The school leadership was usually represented by the dean, the vice dean for education, the vice dean for research, the manager of academic affairs, and the manager/head of development, and it could also include the heads of departments. The vice president for education participated in all school leadership interviews. In the school leadership interviews, the panel was arranged in smaller groups according to the education expertise areas indicated in the pre-task completed by the panel. The school leadership interviews included panel members who had the school's education area as their primary or secondary area of expertise, creating school-specific groups of 4–6 panel members.

In addition to the leadership interviews, the panel interviewed students, programme directors, teaching personnel and support personnel. The interviews were organised as parallel sessions for the sake of efficient time-management during the review week. This meant that the panel was arranged in smaller groups for the parallel interview sessions. The panel groups were formed based in part on the expertise divisions used in the leadership interviews and in part on the panel members' preferences. All the interviews were facilitated by Aalto personnel. The facilitators were responsible for note keeping, time management and overall smooth conduct of the interviews. Altogether approximately 250 people were interviewed by the panel during the remote visit week.

The instructions for the international review and the template for the review report outlined the structure of the panel's evaluation report (see Appendix 12). The panel worked in field-specific groups (according to the primary and secondary expertise areas indicated in the pre-task) for the school-level reporting and in plenary form for the university-level reporting.

The TEE 2020 Report
The TEE 2020 Report introduces the Teaching and Learning Evaluation Exercise 2020 process and summarises the results. The operational head of TEE 2020 has compiled the Final Report. The report presents the evaluation process (Chapter 1), the results from the programme self-evaluation, the programme peer review, the stakeholder review and the international review (Chapter 2), and the compilation of the evaluation result summaries, with a main focus on the results from the two external-review phases, i.e. the stakeholder review and the international review at

the school and the university levels (Chapter 3). The review results in Chapter 2 have been produced in the following way: the programme self-evaluation results were compiled by a smaller task force of the TEE 2020 workgroup. The programme peer-review results were summarised by the external facilitators of the peer review together with the operational head of the TEE 2020 project. The stakeholder review results were produced concurrently with the remote-visit days, with programme review summaries and the overall school-level summary presented and agreed upon by the panel after each review discussion and/or at the end of the remote visit day(s). The operational head of the TEE 2020 project went through the school summaries with the facilitators of the school discussions to ensure a shared understanding of the school feedback. The university-level, condensed summary of the stakeholder review presents results that were included in the feedback by all the school panels. The international evaluation report was written in its entirety by the international panel. The appendices contain instructions, guidelines and background information about the TEE 2020 project. The programme self-evaluations (altogether 61), the programme visions (altogether 61) and the peer review summaries (altogether 28) can be found on the aalto.fi webpages (https://www.aalto.fi/en/programme-directors-handbook/teaching-and-learning-evaluation-exercise-tee). The reports are accessible for the Aalto community (students and personnel) for logged-in Aalto users.

2. The evaluation results

This chapter presents the results of programme self-evaluation, programme peer review, stakeholder review and international review phases of the TEE 2020 project. The results of the stakeholder review are presented following the template used in the panel interviews. Similarly, the results of the international review are presented following the template used by that panel. The results of the programme peer review are a summary of the most frequent issues in the peer discussions, and do not directly follow the template used in the discussions. The results of the programme self-evaluation are a summary of key observations identified in the self-evaluation reports and follow the template of the report.

The programme self-evaluation

The key observations presented here are issues that were frequently brought up in the programme self-evaluation reports. It should, however, be emphasised that the analysis of the reports is based on the efforts of a smaller task force with a limited amount of time at its disposal. Consequently, the results offer a general overview rather than an in-depth analysis of the programme self-evaluations. The observations are presented following the thematic structure of the self-evaluation questionnaire (see Appendix 3).

Purpose and overview
In the descriptions of the purpose and the overview of the degree programmes, the focus is often on detailed descriptions of the content of the programme, and the raison d'etre of the programme, i.e. the student, is not present. Also, many descriptions would benefit from including the bigger educational and societal context of the programme. The questions on self-assessment practices and past developments include many good practices concerning the systematic engagement of faculty, students and stakeholders. These could clearly be shared in the schools and throughout the university.

Objectives of the programme
There is great variation in the descriptions of the learning objectives of the programme, as is in the revision process of the objectives. There are programmes where the learning objectives and their revision is part of a systematic, holistic evaluation process, and there are programmes where the learning objective have been

known mainly implicitly or exist only 'on paper'. Consequently, there is substantial variation in how the programmes operationalise the learning outcomes in curriculum planning and in teaching, and how strategic targets – such as internationalisation, multidisciplinarity or future professional needs – are worked on.

Learning outcomes
The methods for evaluating the learning outcomes are many and focus dominantly on the feedback received from individual courses. Hence, the evaluation of the overall learning outcomes of the programmes is based on a compilation of the course feedback. Many programmes expressed a need for university-level, systematic evaluation processes.

Recruitment and intake
There are programmes that are highly attractive, and the recruitment of students is easy, and there are programmes struggling with visibility and application numbers. A shared challenge seems to be how to develop, if needed, the student profile of the programme. Many programmes also wish for support in increasing their programme attractiveness. Programmes would like to have more collaboration with Aalto's marketing and recruitment activities.

Learning
Many programmes recognise the importance of supporting students' learning by study guidance and academic advising. Students would clearly benefit from more and more systematic support. Teachers would also need more pedagogical support to develop student guidance and academic advising. Study guidance structures are also experienced as insufficient and would need to be more in line with the intake numbers of the programmes. In addition, students want to have more flexibility in learning and hence more personal study guidance.

There is great variation between schools and programmes in how professional development and transferable skills are implemented in learning goals. Sharing of good practices and peer learning could help many programmes in this work. Many programmes would also like to see a university-level strategy and systematic support for students' competence and professional development. Moreover, student career management is an issue where the role and responsibility of the programme is unclear, and more support is needed.

Teaching
The programmes are in different phases of understanding the relationship between study well-being, study success and curriculum-level pedagogical development. On the one hand, there is much variation, from basic to very advanced, between schools and programmes in how discussion, tasks and development of teaching are to be organised in a teacher community. The challenges in this work are, on the other hand, widely recognised and there is an understanding of the need to develop teaching and teaching communities. There are many good ways of working, and these good practices need to be shared actively within the Aalto teacher community and among education leaders.

Student, alumni and stakeholder communities

There is great variation among the programmes between more-established feedback and collaborations processes and those that are still emerging. Many programmes would like to have university-level guidelines and a strategy to support the establishment and development of these processes. There are also many good practices of well-functioning collaboration that could be shared and utilised in peer learning.

Management and operations

Educational leadership needs to be developed towards an established system with clearly defined and supported roles and responsibilities. Currently, there seems to be school and even department-specific ways of management and leadership; these can therefore be unclear, based on tacit knowledge and difficult to navigate. There is a need to develop structures that enable smooth programme resourcing and programme management and enhance collaboration, e.g. cross-school collaboration, and strategic human-resources planning. Many programmes would also like to have mechanisms to manage the student–teacher ratio to maintain a good quality of teaching.

The programme peer review

The general observations and development ideas presented here are themes that came up repeatedly in the programme peer discussions. Several of the themes were discussed in every peer discussion and were usually also documented in the summaries of the discussions.

General observations

Many programmes are proud of their strengths in teaching, research-orientation, the teachers' community and collaboration with industry and students.

Programmes have difficulties in operating in the university's complex management structure. More support is needed for the management of programmes, together with clearer communication and improvements in tools and processes.

There is high appreciation for the curriculum mapping tools for aligning programme-level learning objectives with the curriculum.

Systematic management operations are found useful, e.g. regular teachers' meetings and annual development workshops.

There is a strong student-centric approach. Student well-being is considered important. A lot of effort is put into providing individual support and high-quality teaching, despite the occasional scarcity of resources.

Development ideas

Monitoring student and programme-level progress
Need for a common process and/or tools to monitor student progress and learning outcomes at the programme level. This would also support programme development. For example, the doctoral programmes have identified a need for systematically following the progress of students' research processes and articles. A structured process makes it easier to offer support for the students.

Recognising the role of programme directors
A higher appreciation of the programme directors' role would incentivise programme development and support education development, e.g. inclusion of the programme director's role in tenure track criteria, compensation and other ways of recognition. Currently, the programme director's role does not receive the recognition due, in view of the demands of the administrative workload in management and development.

Clear marketing guidelines
Opportunities to market the programmes and their specialisation areas are limited. Students have difficulties in finding information about different study subjects. The programmes have asked for clear guidelines and a framework for programme-level marketing.

A student-centric admission process
More student-centric intake, guiding students to the right programmes for their preferences and interests. The admission process could begin with topics relevant or interesting to the student, to which suitable programmes or majors could then be suggested.

To increase the diversity of the study body, marketing efforts towards a broader audience by, for example, visiting schools in all parts of Finland. Students from different backgrounds could function as 'ambassadors' to encourage younger students.

Incentives for increasing multidiciplininarity between schools
Incentives to develop the collaboration between the schools and to enhance multi-disciplinary, e.g. by adding incentives to the tenure-track system.
Mitigation of practical obstacles that hinder collaboration between schools and programmes, e.g. involving the scheduling and the structure of courses. In addition, awareness of opportunities, including possible ways to combine studies from other schools, could be increased among personnel and students.

Alignment of decision making in teaching and resources
More synchronisation in curriculum processes and in decisions on resources. The annual decisions on resources within departments and the twice-a-year curriculum process within programmes would benefit from collaboration and alignment, e.g. a programme-level budget to mitigate the dependence on several departments for decisions.

Support for attracting international students
National legislation and residence permits cause obstacles for foreign students: the prolonged application processes, and when graduating, difficulties in getting residency permits or finding employment. Aalto-level support in collaborating with the Finnish Immigration Services to improve the study and employment possibilities for foreign students in Finland.

Assistance with alumni networks and industry collaborations
Systematic support in managing alumni networks and stakeholder collaboration. Currently, this is very much dependent on individual efforts.
To achieve more strategic and effective industry collaboration, the company partnerships in project courses and other real-life cases could be negotiated at the university level. Better alignment in compensation and a reduced risk of programmes approaching the same companies would ensue.

The stakeholder review

The review results presented here are a summary of the interviews the panels had with the leadership and the degree programmes of the schools. This Aalto University feedback is derived from the school summaries, and it presents issues that were brought up in the panel interviews with the schools. The school documentation is based on the review template for the panel interviews. The template had two focus areas: 1) the future of work, and 2) stakeholder collaboration. Moreover, within these focus areas, the target of the review was set on identifying strengths and development areas. There is some variation in the documentation of the review results between the schools. The organisation of the school documentation is presented in the introductions to the school chapters. Moreover, the school documentation has been edited, when needed, to create whole sentences and greater coherency.

Aalto University

Strengths

The faculty of Aalto University is highly motivated to teach. There is a strong student-centric approach to teaching and education.

The programme portfolio of Aalto University includes programmes that are highly attractive, successful and internationally unique.

Sustainability, digitalisation, and urbanisation are understood as key challenges and are being tackled in many programmes.

Aalto University's goal of a multidisciplinary approach is relevant and much needed in working life.

The overall level of education and teaching and the employment of graduates are good.

Mastering the fundamentals as well as a good core knowledge of the fields represents the competitive edge of Aalto University and its graduates.

There are well-functioning management processes in place, with advisory boards formed by stakeholders and programme representatives in many of the programmes.

Development ideas

Aalto University Relaunched
What is uniquely 'Aalto' about a degree from Aalto University if the programmes are mainly offering school-specific studies? There should be incentives to develop collaboration between the schools and to enhance multidisciplinarity, e.g. the incentives might be connected to the tenure track system. Practical obstacles that hinder collaboration between the schools and the programmes need to be mitigated, e.g. by scheduling and by modifying the structure of courses. In addition, awareness of the potential combinations and opportunities could be raised among personnel and students.

Increased diversity
There is a high need for an increased diversity, as well as for a broader understanding of different types of diversity (gender, nationality and other). Any obstacles to increased diversity should be identified and mitigated actively. It is essential to understand the role Aalto University has in producing professionals for top positions of the Finnish working life. Hence, the articulated responsibility to enhance diversity actively.

Enhanced student recruitment
To meet the workforce demands of Finnish working life, a substantial increase is needed in the student recruitment. It is important to tap the full potential of Finland. Currently, the focus is very much on the capital area. For enhanced student recruitment, a more attractive image of the fields and the education of Aalto University is needed. The profiles of the programmes could be clarified by envisioning the future on a global level, making use of emotive images on society, the world, and the global megatrends. More attention should also be put on attracting and retaining international students and integrating students into Finnish working life.

Recognising the role of the programme director
The programme director's role is critical for programme leadership. Currently, there is a large variance in the way programmes are managed. The role requires more authority and recognition. Internal benchmarking could be applied here.

Future proofing' in the development of education

Aalto has an excellent reputation, but instead of relying on the Aalto brand and past successes, the programmes should be constantly developing themselves. There is a need for a broader understanding of societal phenomena and context in the development of education. Cross-cutting themes in all fields – sustainability, internationality, entrepreneurship, digitalisation – should be integrated into the content learning, rather than taught as separate courses or programmes. Moreover, it is important to ensure that students learn working-life skills: business acumen, communication skills, teamwork and leadership. In the development of programmes, the T-model and its components are important, especially as student cohorts are growing. The quality of teaching and learning needs to stay in focus.

Mechanisms for sharing good practices

There are many good practices in teaching, digital learning, and stakeholder and alumni collaboration. There is a clear need for easily applicable, systematic ways of sharing these practices between programmes and schools.

Support for systematic stakeholder collaboration

The management of stakeholder collaboration needs systematic support. Currently, this is very much dependent on individual efforts. Partnerships could be negotiated at the university level, and consequently, compensation could also be aligned, and overlaps mitigated. Stakeholder collaboration could in this way become more strategic, e.g. by creating industrial networks for doctoral students.

School of Arts, Design and Architecture

The stakeholder panel of the school interviewed the school leadership. As for the degree programmes of the school, the panel interviewed the representatives of the bachelor's programme and the doctoral programme separately. Several of the master's programmes were combined in the interviews, mostly according to the departmental organisation of the school. This was done because of the high number of master's programmes (altogether 17), to create a manageable review schedule. The panel interviewed the representatives of the degree programmes participating in the TEE 2020 evaluation (see Appendix 3). In the review documentation, the strengths are presented under two themes: the future of the field, and stakeholder collaboration. The development areas are presented without any further thematic division.

Strengths

The future of the field
The School of Arts, Design and Architecture programme portfolio includes programmes that are internationally unique and successful, and the programmes have been successful at attracting prospective students. The fast development and changes in the field, in society and in working life have put pressure on teaching, and are also taken into consideration in the planning of teaching. At their best, the programmes both adjust to the changes in the operational environment and act as drivers for change. Many programmes described their goal as being to educate students to work in a changing environment and act as proactive game-changers. In these programmes, the emphasis is on learning working-life skills and new ways of thinking.

There is a demand in society for artistic know-how, even if there are not ready-made workplaces available for all graduates. Students have the mindset and readiness to create their own workplaces.

In teaching, the research approach has been strengthened. Moreover, Aalto University's goal of adopting multidisciplinary approaches is relevant, and cooperation between the different schools and fields has been utilised in teaching.

Stakeholder collaboration
The programmes have versatile cooperation with different stakeholder groups. Many programmes have long-term partners with strong collaboration. The study projects based on stakeholder collaboration offer students opportunities to experience practices in the field and, in addition, the projects support the development of student skills and knowledge for working life.

Development areas

The school needs to define its role for the changing operational environment of the future as well as its goals to act as an active change-maker in society. It is important

to analyse the changes in the operational environment and what they mean for the field of arts and, more specifically, at the programme level.

There is a need to analyse the competencies that graduates should have to act as game changers in the field of the arts and at the programme level.

The profiles of the programmes should be clarified in relation to the future vision at the global level. Moreover, it is important to recognise the special features of the programmes in relation to other programmes, and to define the strategic and philosophic bases that are shared between the programmes. The development of the programme portfolio needs to be based on shared values and on a shared understanding of the programmes, using e.g. value mapping and identifying special features of the programmes. The existing strengths of the programmes should also be recognised and supported.

It is also essential to define and communicate the differences between the different degree levels and their goals. It should be clearly communicated how the different degree levels prepare students for different workplaces and roles in the future. The learning outcomes of the different degree levels need to be clarified.

There needs to be a deeper understanding of future employment needs, changes in working life, graduates' employment rates and employment quality. The development of the education should respond better to future competence needs. It is essential to recognise the skills relevant throughout the field as a whole and to develop teaching in collaboration to better support students in gaining these skills. There were shared themes between many programmes, such as educating students to graduate as proactive change-makers with self-management skills, interaction skills, the ability to listen and to understand people from different backgrounds, develop a research-oriented approach to work and development of the field, and to hold realistic expectations of working life. The development of teaching and guidance ought to be systematic, so that the students can build the needed skills for typical work positions in the field and become change makers and proactive operators. In addition, teaching should be developed to support students in building up the required entrepreneurial skills to meet the challenges of e.g. self-employment in the job market.

The development of the stakeholder and alumni cooperation should be more strategic both at the programme and school level, e.g. by using service-design methods. There is a shared value in stakeholder collaboration that is important to recognise. Moreover, stronger stakeholder collaboration can also strengthen external funding. There needs to be support structures and services that enable long-term collaboration. Stakeholder and alumni collaboration should be utilised in developing the field. It is also important to enhance the communication of research results and knowledge relevant for the development of the field. International aspects in the development of stakeholder and business collaboration should also be strengthened.

The goals of lifewide learning need to be clarified. Central questions include what lifewide learning means to graduates, whether lifewide learning can be linked to students' work experience, and whether it can offer ways to recognise work experience as an accredited part of degree studies.

There are many good practices in programmes related to teaching, digital learning and stakeholder and alumni collaboration, such as the knowledge of strategic planning provided by the IDBM programme through its corporate partner projects. Currently, these are not effectively shared due to a lack of support and of systematic ways of sharing.

School of Business

The stakeholder panel of the school interviewed the school leadership and the representatives of the degree programmes participating in the TEE 2020 evaluation (see Appendix 3). The documentation of the review results is organised according to the themes identified in the review: portfolio management, programme management, the future of the field, and stakeholder collaboration. Strengths and development areas are included in each theme.

Strengths and development areas

Portfolio management
A central question concerns who is managing the programme portfolio and how. Better management would help students graduate faster. Product is king, but its management is deficient. Programme brands are mixed and unclear.

The programme portfolio offered currently seems too wide, especially regarding the master's programmes. Merges and changes are probably needed, keeping in mind the industry-wide themes. Programmes could perhaps be wider, and contain more options within.

Cross-cutting themes are seen in all areas – sustainability, internationality, entrepreneurship, digitalisation. It is important to clarify what the programmes focusing on these themes offer to the portfolio.

Long-standing programmes seem to succeed, as changing programmes and brands is confusing to employers. The portfolio could consist of fewer programmes with more freedom inside the programmes, enabling students to make more choices themselves.

The high quality of teaching should not be compromised. It is important to ensure this across programmes and support the faculty in this.

Programme management
Programmes must be developed with the customer in mind.

At Aalto, all of the School of Business programmes should have the ambition to amount the top of the list among Nordic countries.

Having a clear focus on education shows. Some programmes are great and well managed.

The programme director's role is critical for the program leadership, and internal benchmarking could be applied here. Currently, there is a large variance in the way programmes are managed. This role requires more authority and recognition.

There is a lot to be learned from each other. Mechanisms for sharing good practices need to be created.

Communication and cooperation need to be improved. It is not enough to be part of Aalto if it does not show in practice.

There is a need to clarify the different professional paths for students: specialists, generalists, or academics. The current programme portfolio might be confusing to an outsider.

Some programmes have issues with diversity, and it is not clear what the tangible actions could be implemented to improve this.

The future of the field
Many programmes need 'future proofing'. There is too much complacency and reliance on the past successes.

Aalto has an excellent reputation, but instead of resting on their laurels, the programmes should be constantly developing themselves.

It is interesting to see whether a bachelor's degree will open opportunities to enter the job market in the future.

It is important to make sure that the hard and soft skills are balanced within each programme to ensure sufficient skills. Moreover, graduates from the business school should know business, i.e. specialisation should not eat up the basic business skills. The T-model and its components need to be clear in all programmes.

People-management experts are needed in the job market. There is a new programme addressing this need.

Stakeholder collaboration
Aalto University would benefit from a relaunch. The integration within the university has just begun. Multidisciplinarity as well as actions to address the cross-cutting themes at the Aalto level offer an opportunity not to be missed. However, there are very different levels of implementation in practice. There are good collaboration opportunities in the Capstone courses of the current curriculum.

Benchmarking and following what other universities do in the field is important, but also listening to the needs of industry as well as to employees' expectations. Better communication is required with employers in terms of the content and the learning goals of the programmes. This applies to both current and new programmes.

It is also important to stay active in societal discussions in Finland and to bring the expertise of the school to bear in the discussions.

School of Chemical Engineering

The stakeholder panel of the school interviewed the school leadership and the representatives of the degree programmes participating in the TEE 2020 evaluation (see Appendix 3). The documentation presents a summary of the strengths and the development areas identified in the panel interviews.

Strengths

There is a strong team effort and team spirit present in the school.
Collecting feedback from students has improved.
There is progress in the academic performance.
There are many hands-on activities in teaching, and these need to be maintained.
The school has a clear view of its challenges, and risk-mitigation plans have been initiated.

Development areas

Enhancing the attractiveness of chemistry and chemical engineering is a shared challenge. Trusting "the brand" to attract and retain students may not be the best idea. There is a high dropout rate. More concrete actions are needed, and student engagement should be increased. It is also important to remember to attract and recruit Finnish students actively.

Overall, the future visions should be more explicitly expressed. There is a need to build research competence for the future and release it to companies. Moreover, horizontal themes, such as the circular economy, need to be integrated into programmes.

Stakeholder collaboration should be more systematic and based on strategic thinking. Concrete steps to reach the desired future targets and funding levels are needed.

In the review, questions were answered individually rather than discussed mutually. It would be important to join forces, rather than compete school-wise, university-wise, and within the field. This would also help with current problems of the industry.

School of Electrical Engineering

The stakeholder panel of the school interviewed the school leadership and the representatives of the degree programmes participating in the TEE 2020 evaluation (see Appendix 3). The documentation of the results is organised into three themes: the future of the work, stakeholder collaboration and other discussed topics. Under these themes, both strengths and development areas are presented.

The future of the work

Current competence of the graduates
The current core-competence level of graduates is good. Deep as well as general knowledge are both needed. Deep knowledge is needed at least in one field. Graduates need strong. basic scientific skills in mathematics, physics, chemistry, and programming in all ELEC programmes. These skills should be achieved during the bachelor studies. In addition, the education should include laboratory courses where theoretical knowledge can be applied in practice.

Students also need general skills and basic tools in some of the following:

- group working, networking and collaboration
- self-leadership
- 'learning to learn' skills
- holistic/systemic thinking
- agile thinking
- statistical analysis skills
- information search skills and data analysis skills
- the ability to apply mathematical theories (mathematics as an engineering tool)

Future competence needs in working life and society
When entering working life, ELEC graduates should understand business knowledge, value-creation chains, and customer or user-centric thinking and planning. Skills are also needed in the following areas: entrepreneurial skills and attitudes, agile software development, quality management, project management skills. Moreover, graduates need to have gained the ability to learn more during working life and to apply their skills in a variety of fields.

Students should have at least some knowledge and skills in the following current and emerging fields:

- Artificial intelligence
- Internet of Things
- Machine learning
- Automation
- Robotics
- Metrology

- Deep learning

These skills should be integrated into already-existing teaching and courses, and not introduced by establishing new courses.

Education development needs to meet the future of work
There is much collaboration with stakeholders, but it could be more systematically organised in the programmes and in the school. The major stakeholders need to be more visible to students, already during the bachelor's studies.

Foreign students need much more support and knowledge about Finnish stakeholders and employers, for instance, when looking for employment after graduation. Students need support in networking and in establishing contacts in working life. In addition, foreign students need to be encouraged and given support to learn basic Finnish. This would enable students to find employment in smaller companies, also.

Current graduates are lacking knowledge in planning and reporting on experiments. These skills should be better taught and implemented in the education. In addition, graduates should have better skills in following the proliferation of knowledge, i.e. keep a focus on their own core field while grasping the overall picture.

Students should be encouraged to include more diversity in their study choices and to strengthen their cross-disciplinary study choices. There needs to be a greater awareness and more information about these study possibilities. In addition, the school could develop modules for cross-school students, e.g. basic modules in engineering for business school students. Enhancing diversity in different ways also means creating more flexibility for choosing studies and courses.

There is a clear need and appreciation of the expertise of doctors in the industry. Students with an interest in pursuing doctoral studies should be encouraged. Currently a doctoral degree seems to be a standard or an expectation for many expert positions. In future, the need for postgraduate degrees will increase.

Stakeholders' help could be used in enhancing the attractiveness of the programmes. This applies to how to attract more women to the technology fields. The share of female students is too low in all the programmes.

It would important to identify fields that are in a blind spot, e.g. wind power in the field of energy. There is a need for a more systematic process to establish cross-school programmes and to avoid 'silos'.

There are clear needs for continuous learning among graduates and alumni in working life to meet the rapid changes in society.

Stakeholder collaboration

Current forms
The following current forms of well-functioning stakeholder collaborations were identified:

- Theses (bachelor's, master's, doctoral) completed in cooperation with stakeholders. The role of the instructor is important.
- Project-work courses
- Other types of courses, e.g. special assignments, and topics from stakeholders
- Guest lecturers in courses
- Other support, e.g. materials and equipment
- Summer jobs for students, with marketing via the ELEC departments
- Professors of Practice have a central role in connecting stakeholders and the university

New openings and concrete ways to collaborate
General
When there is collaboration in teaching between Aalto and stakeholders, the pedagogical approach should come from Aalto. There is also a need for a systematic framework for the collaboration. A good example could be a lecture series for bachelor students where the speakers would be newly graduated engineers. Another example could be laboratory work courses utilising stakeholder support.

Webpages with stakeholders' contact information should be made available for students. Students need to have more knowledge about the companies in the fields represented in ELEC. The contact information of both the stakeholders and the ELEC contact persons could be available on the webpages.

The marketing of the programmes is currently too fact-based. There is a need to build a more attractive image of the field. Descriptions of the fields could be much wider, including issues such as energy, climate change, and sustainability in electrical engineering.

The programmes would benefit from advisory boards with stakeholder representatives. There could be meetings with reasonable frequency, e.g. every six months or once a year. The focus of the meetings should be on teaching and education.

Students could be involved much more in the work of research groups. Professors and project managers should be encouraged to invite students to group meetings.

Bachelor-level studies
Stakeholders could support teachers of the basic courses, e.g. arrange course visits to tell why physics is important and what work it is needed. There could also be more collaboration in the bachelor thesis seminars, e.g. more bachelor thesis topics could come from stakeholders.

Master-level studies

The collaboration between VTT (Technical Research Centre of Finland) and the Master's Programme in Automation and Electrical Engineering is about to start. The Master's Programme in Automation and Electrical Engineering also needs more applicants, and the attractiveness of the programme needs more focus. Moreover, there is a need for topics for group work in the project-work course of the Master's Programme in Automation and Electrical Engineering.

Doctoral-level studies

There needs to be concrete information from industrial partners to master's level students to make doctoral studies more attractive. The information could include e.g. direct quotations from stakeholders about the importance of a doctoral degree in the industry. There could also be marketing videos attracting more potential doctoral students. In addition, there is a need for more possibilities to do industrial doctoral degrees in research projects with stakeholders. Finally, issues related to intellectual property rights in doctoral studies need to be handled well, particularly in smaller companies.

Other discussed topics

The dropout rate in the bachelor programme, approximately 30%, is relatively high. Possible reasons for this were discussed, such as different expectations, not the first choice/option, and motivation; in addition, ways to decrease the dropout rate were discussed.

There was some discussion about the key performance indicators of Aalto and the funding model of the Ministry of Education and Culture. It was emphasised that one-sided indicators may cause a risk of emphasising short-term benefits at the expense of long-term benefits.

School of Engineering

The stakeholder panel of the school interviewed the school leadership and the representatives of the degree programmes participating in the TEE 2020 evaluation (see Appendix 3). The documentation presents a summary of the strengths and the development areas identified in the panel interviews. The strengths are presented in the following themes: the future of work, and stakeholder collaboration. The development areas are presented according to the following themes: bachelor's programme structure and content, master's programme content, marketing and communication of study options, leadership, stakeholder collaboration, and other development areas.

Strengths

The future of work
The faculty is highly motivated to teach future game-changers. The school is encouraged to keep up the good work.

There is an overall good level of education, teaching and employment of graduates. The themes of sustainability, digitalisation, and urbanisation are understood as key challenges and are being tackled in many programmes. Moreover, there is a research- and future-oriented approach to teaching. The approach is supported by the latest and most relevant research publications. The programme curricula is flexible, which enables students to create personal study paths. Skills for lifelong learning are also supported in the studies. Furthermore, students are given both generic skills and in-depth specialisation skills.

Integrated joint master's programmes co-exist with the degree programmes. There is cross-programme and cross-school collaboration in some programmes, and this has been shown to support multi-disciplinary learning successfully.

The English-medium master's programmes with multicultural study environments are providing a good basis for international working life.

Broad international networks and research projects of the school and the programmes enable continuous benchmarking with other universities and support the development of teaching and education.

Stakeholder collaboration
There is a well-functioning process for thesis work, as well as real-life cases and collaboration with industry and the public sector in courses, excursions, guilds, and student organisations. Events such as Mechatronics Circus, PDP gala, the Marine Technology gala, the WAT Christmas party and seminar are all examples of good practices for all parties involved. Good stakeholder collaboration also improves students' employment possibilities during studies and after graduation.

There are advisory boards, formed by stakeholders and programme representatives, to discuss and develop programme content in relation to future competence needs. In addition, the professorship of practice is a flexible way to increase specific, industry and working-life related expertise as well as to increase practical skills in teaching and research.

Development areas

The stucture and content of the bachelor's programme
The structure of the bachelor's programme and the path to the master's programmes seem unclear, partly due to the naming of study options. The panel suggested the following improvements:

- The bachelor's programme could be advertised with the names of the master's programmes. Students could apply to a certain master's programme when applying to the bachelor programme.

- There could be more specific, bachelor-programme contents or separate programmes, as the current options are too broad and generic.

- There is a need for more marketing of master's level studies to bachelor's students to create a better understanding of what master's studies there are and what career opportunities they include.

- More real-life practices related to working life could be integrated in bachelor's level teaching, e.g. mathematics practices with case examples from industry and stakeholders.

The content of the master's programme
There is a need for a broader understanding of societal phenomena and contexts, concerning both the public and the private sector, in the master's programmes.

The themes of sustainability, digitalisation, and urbanisation could be tackled deeper in some fields and programmes, for example:

- Expertise in structural physics is needed in the programme in Building Technology
- Underground building expertise and collaboration with the programme in Geoengineering is needed in the programme in Spatial Planning and Transportation Engineering
- Secure teaching of long-term basic skills for maintenance and renewing of the built environment is needed

More collaboration is needed with existing incentives, such as the Aalto Ventures Programme and Start-up Sauna, to improve and encourage an entrepreneurial mindset and skills. There could also be more collaboration between the programmes within the school, as well as with programmes in other Aalto schools, such as ELEC, SCI), The collaboration is needed to support students' broader multi-disciplinary understanding and competence development, e.g. Digital Twins, Internet of Things, Smart Cities, Geographic Information System.

The teaching of visual skills could be conducted in collaboration with architecture. There could be studies together with the Department of Architecture to cover both the engineering and the aesthetic sides of projects and other study work, and the teaching of visual presentation skills, which are especially important in the field of geospatial information.

Marketing and communication of study options
The importance of marketing and clear communication must be highlighted. Many good practices and actions could be made more visible for potential applicants, enrolled students, and stakeholders. Different career paths could also be more visible during studies and in the marketing of programmes. Different aspects of urbanisation could be included in the marketing. Moreover, students could be engaged more in the marketing. Stakeholder events, such as Mechatronics Circus, are a good practice as students get to present their work to stakeholders. The combination of different specialisation areas could also be brought up more to show that students are part of a broader context and that their knowledge is needed, whether as experts with in-depth knowledge or as generalists to secure the future infrastructural development and maintenance of society. In addition, increasing participation in international research projects could improve visibility.

Leadership
There is a need for stronger educational leadership at the school level to support a more holistic and strategic approach to the development of education and to improve both top-down and bottom-up collaboration within the school. There could be concrete incentives to motivate and encourage collaboration and co-teaching between teachers and programmes.

Stakeholder collaboration
Systematic and strategic stakeholder collaboration at the school level is recommended to identify future competence needs at all the levels of degree education (BSc, MSc and DSc) as well as lifewide learning needs. Furthermore, there could be systematic and continual stakeholder collaboration at the programme level. The programme advisory board exemplifies a good practice for this. Stakeholder collaboration could also be improved between the bachelor's programme and the master's programmes, e.g. by joint advisory boards.

There could be more professors of practice and/or guest lecturers from the stakeholder community to bring working life closer to teaching. These possibilities need to be advertised more to stakeholders. The existing alumni network could also be utilised better and developed further to enable broader sharing of information and collaboration.

Different events, such as Mechatronics Circus, Product Design Gala, Master's Programme in Water and Environmental Engineering Christmas party and seminar, where students get to present their work to stakeholders, could be developed to raise the visibility of all programmes. In addition, presentations of master's thesis

work in companies and organisations could be used more as a concrete way to improve the visibility of the education and of students' competencies.

Other development areas

Development ideas for all programmes
There could be more support for the development of life-management skills and professional-identity building throughout the studies at all levels (BSc, MSc, DSc). There is also a need for a human-centric perspective to support broader expertise. Moreover, student feedback should be used more actively in programme development.

International students' employment
There are challenges in some programmes and fields in the employment possibilities of international students. There is a need to take actions such as more Finnish language skills teaching and providing more support to student integration in society. Stakeholder collaboration could be utilised to find solutions to these challenges.

School of Science

The stakeholder panel of the school interviewed the school leadership and the representatives of the degree programmes participating in the TEE 2020 evaluation (see Appendix 3). The review results present the strengths and the development areas identified by the panel. The development areas are presented according to the following themes: scaling up, gender balance and diversity, lifewide learning, cross-school collaboration, and ideas for stakeholder collaboration.

Strengths

Graduates and doctors from Aalto SCI are highly valued in the labour market. The school attracts the best students in Finland. Changes in the value of a bachelor's graduates in the labour market in the future was also discussed as a possible development scenario.

Lifewide learning could be utilised more extensively, including as an effective way for degree completion. For instance, smaller study modules could be arranged for students to complete towards their next degree.

Mastery of the fundamentals is a competitive edge provided by Aalto SCI to its graduates and this will continue to be so in the future. In addition, the multidisciplinarity of Aalto combined with in-depth disciplinary skills is a clear strength.

Students working during their studies is positive for their career development and for society. There could be collaboration between universities and stakeholders to influence the government not to penalise or create obstacles to students and universities for this. Moreover, studies could be developed to include systematically student learning from their work experience, giving credit points to students for this.

Development areas

Scaling up
A scale up in the production of graduates is much needed. This would not dilute the value of SCI graduates in the labour market. Finnish society needs more graduates from all SCI programmes, including:

- Information Networks
- Industrial Engineering and Management
- Life Science Technologies
- Mathematics and Operations Research

There needs to be a good management of growth so that the quality of teaching is maintained. New ways of teaching should be introduced to enable the upscaling. It is, however, important to maintain the sense of community in the programmes. The scaling up of graduate production also calls for additional resources, and here

stakeholder collaboration could give support in identifying possible resourcing channels.

Gender balance and diversity
There is a high need for increased diversity and a broader perspective on diversity (gender, nationality and other kinds) among personnel and students. It is important to understand the role of education in producing professionals to for top positions in Finnish working life, and hence, there is a responsibility to enhance diversity actively.

The master's programme in Life Science Technologies and the master's programme in Information Networks have a good gender-balance, and they could be used as a benchmark for other programmes. For the master's programme in Industrial Engineering, a good gender-balance would be especially important, since the programme is seen as producing leaders for Finnish working life. One obstacle identified as reducing the number of female applicants to the master's programme in Industrial Engineering is the entrance requirement of physics. It should be analysed whether the requirement is justified, as it is not required in the master's programme of Life Science Technologies and Information Networks, for example, nor in the master's programme in Data Science. The physics that is needed could also be taught during the studies, e.g. as part of lifewide learning. Currently, the decision to stud physics is made already in secondary school, when at age 15, students choose their study options for upper secondary school. There could also be better communication to upper secondary schools about the importance of physics, for example with a message like "Physicists save the world."

More attention should be put on attracting and retaining international students. There needs to be active support to help students integrate in Finnish society and Finnish working life.

Lifewide learning
Lifewide learning should be utilised actively to create study opportunities to maintain, optimise and upgrade competences throughout one's career. There could be modules, courses, and MOOCs for everyone, e.g. Elements of Data Science. There could also be various collaboration partners, such as AEE and Aalto Pro. The FiTech Network University has provided an excellent opportunity for anyone to participate, free of charge, and Aalto and SCI alumni have utilised this.

Cross-school collaboration
There seems to be very little cross-school collaboration at Aalto. The university often seems to be not one university, but a collection of different schools. Students should be encouraged to be active in choosing minors from other schools. It is also important to ensure that SCI students can freely choose courses from other Aalto schools, similarly to the way SCI courses are open to everyone. Moreover, synergies between the field of industrial engineering and the school of business should be utilised more, and possible overlaps existing now between the two need to be reduced. Cross-school collaboration could also be beneficial in identifying the best

experts for ensuring that SCI students learn working-life skills, such as business competences, communication skills, teamwork and leadership.

Ideas for stakeholder colaboration
It is important that there be an open and welcoming mindset towards stakeholder collaboration and development in the school and in all programmes. Moreover, the collaboration should be developed and sustained systematically at the school level, rather than be the result of individual efforts.

It is recommended that an advisory board of stakeholders be set up, at least at the school level, and that advisory boards also be introduced in the programmes.

There could be mutually beneficial collaboration between the university and stakeholders to influence the government not to penalise students and universities for working during studies.

Stakeholder collaboration can be helpful to communicate about employment prospects outside the university for doctoral students. Moreover, the diversity challenge can be worked on together, including the participation of secondary schools. International professors could also benefit from stakeholder collaboration in getting support for creating a network of international faculty in Finland.

Stakeholder collaboration should be actively introduced in teaching and education. Many companies are not mature enough for research collaboration but have much to offer to students (for example, case studies and projects).

The international review

The review panel greatly appreciates the well-formulated and detailed account of implemented processes and the reflective analyses provided in the self-evaluation reports, and we thank the participants from the various schools for the interesting and enlightening discussions during the interviews. All schools offer multidisciplinary programme portfolios across a range of subjects with a high potential to meet future societal needs and challenges. Overall, the programmes are well designed and managed with high accessibility and learning-path flexibility. As noted in the self-evaluations, students generally find the programmes attractive. We are pleased to learn that the university has quality-assurance systems for the continual and systematic follow-up and development of education at all cycles. (bachelor's, master's and doctoral degree levels). The programme directors and programme committees play central roles in the quality-assurance model, and many programmes are actively being developed. There are several excellent examples of good practices, some of which may benefit from greater sharing across schools, programmes and departments. We are also happy to note the university's commitment to understanding student well-being and to building structures and processes that promote this in an environment of teaching excellence. The university is to be commended for these efforts.

Feedback and recommendations to the university

Strengths

Aalto University was created in a big bang, to realise a radically creative multidisciplinary vision. Today, Aalto has a great reputation for excellence and strong connections to practice and professional communities. Importantly, the strengths of this environment are clear from our interactions with students, faculty, staff and leaders, and there is a strong sense of pride in belonging to this community. In the interviews and self-evaluation documents, university and school leaders demonstrated great awareness of possible problems and were unpretentious. Many potential areas for improvement have already been identified and are beginning to be addressed. In its ambitious new strategy, the university has very insightfully identified key aspects that need development. Likewise, the schools show a strong commitment on the part of faculty and staff towards excellence in education. Our recommendations are meant to validate and commend this ongoing work.

The connections to practice and to research in all schools ensure that programme development processes are attuned to the developing needs in industry and practice. This is supported by commitments to developing both disciplinary and interdisciplinary understandings, infused with skills, approaches, and judgement relevant for personal life and working life.

Aalto's faculty is a source of strength that is largely understated in the self-evaluation reports. Increasing international recruitment is extending this further, bringing additional diversity of perspective to the programmes and helping position the university in important global education networks.

We are pleased to note that Aalto recognises the variety possible in academic career paths. While examples were fewer, it was clear that teaching excellence has begun to be valued and rewarded and that faculty may build successful and fulfilling careers with a greater focus on pedagogy. There is still room for progress, and we return to potential areas for development and improvement in our recommendations.

The commitment to student well-being is commendable and necessary, given the high ambitions of students, faculty and university. It is a strength that student and faculty well-being have been identified as key goals to be monitored, not least in order to ensure that the institutional goals are realised in sustainable ways. The All Well? initiative has had clear and tangible impacts on educational practice in several schools and across several programmes. We are happy to note the development, with Helsinki University, of a complementary staff survey that will explore a similar range of issues. These are timely initiatives to ensure the quality of the learning and work environments for those studying and working at Aalto.

Aalto's commitment to a distributed model of innovation and entrepreneurship that engages as many students and faculty members as possible is clear and manifest in initiatives that transcend the school level (e.g. Aalto Ventures Program).

Aalto has responded well to the remote teaching challenges presented by the global pandemic. This was evident in interviews with students and staff, as Aalto made optimal use of its contemporary facilities and strong support services (e.g. Aalto Online Learning) and engaged faculty to meet the unexpected demands.

Consistent with Aalto's reputation for excellence and its distinctive identity, the university has benefited from strong student engagement in the development of its programme portfolio, with students represented in programme committees. While their role is also to contribute critical views, the student union and guilds mainly support the university's strategy and are enthusiastic participants where processes allow. The students state that their recommendations are taken seriously and that they have an impact on programme development.

Good practices
The university's commitment to embedding entrepreneurial skills in curricula and developing entrepreneurial skills in students, irrespective of their initial determination to start and grow new ventures, is a strength. The Aalto Ventures Programme, drawing on expertise from both within and without the university and engaging students and faculty members from across campus, is a model of good practice.

The AllWell? initiative is a considered response to the need for evidence-based development of programmes, supporting activities that recognise the variation in study ability patterns, and better positioning students for success in their studies. The value of the initiative is underscored by the tangible response of the schools (e.g. the Learning Cafe in BIZ, the teachers' lunch in ARTS, the offering of 'bottle-neck' courses more than once per year in ENG) and by the endorsement of the Aalto University Student Union (AYY).

Aalto Online Learning represents an excellent resource for faculty members to explore, expand develop materials for online and blended learning. In a relatively short space of time, it has managed to engage many faculty in pilot projects. This initiative is consistent with the university's ambition to "educate game changers" and is likely to be pivotal to capturing sustained value from the varied teaching responses to the pandemic.

The university provides a programme of pedagogical training to support faculty members in enhancing their course design and teaching skills. The training is well established at Aalto with strong faculty participation.

Openness and accessibility – Aalto University has an ambitious strategy to employ both physical and virtual learning environments providing flexible learning and teaching opportunities on and off campus for different needs and requirements. Building multipurpose and physically and pedagogically accessible learning facilities, integrating upper secondary schools on Otaniemi campus with shared-use learning and teaching facilities, and fostering multidisciplinary learning opportunities like Design Factory are guiding the educational ecosystem of Aalto towards co-creational future skills and competences.

Stakeholder engagement – Across Aalto Schools there is a long tradition of engagement with industry and stakeholders to benefit the strategic planning, teaching programme developments and study possibilities. Educational advisory boards tend to include stakeholder representatives, who are instrumental in developing "lifewide" learning and collaboration with companies. This manifests itself also in providing students with an effective means of entering working life since it creates a communication network between faculty, industry and alumni that supports knowledge sharing and cooperation in education and research, and provides possibilities for common projects, summer jobs and the co-creation of lifewide training.

Utilising student feedback – Across all schools, students are asked to give feedback on their learning experiences. What we found to be very good practice was when this feedback is systematically used to improve education. For instance, in the beginning of some courses, the teacher starts by showing the feedback from the previous group and how this is incorporated in the current holding of the course.

Recommendations for improvement

Programme portfolio – renewal and organisation
The schools understand the need to renew the educational offering. The current programme portfolio bears marks of the previous restructuring, which was incomplete, making programmes sometimes incoherent and fragmented. We recommend the use of modern curriculum development methods to design new programmes, starting with strong coherent visions of graduates' target competences, and ensuring progression of learning throughout the programme. Programme learning outcomes should include relevant personal, interpersonal and professional skills, consideration for ethics and societal context, sustainable development, interdisciplinarity and entrepreneurial skills. Such aspects are often underdeveloped in the current programmes.

It is also necessary to create appropriate conditions for leadership and management of educational programmes, both within and across the schools. The programme directors and their teams are dedicated to the students and committed to providing them with educational experiences of the highest quality. However, we find that the current programme organisation suffers from weak mandates and very limited influence over resources. These roles must be made much more robust, with a clear mandate, access to resources and appropriate levels of support.

Moving forward with interdisciplinartity and entrepreneurship
Interdisciplinarity and entrepreneurship are key ambitions of Aalto University, and many activities have been established with great success. Aalto's international visibility is exceptional, making the university a magnet for talent within Finland and from different parts of the world. Students often refer to interdisciplinarity as a main reason for studying here and appreciate the opportunity to take elective courses across the university. However, this is a limited strategy for implementing interdisciplinarity, since it is left up to each individual student to merge the understandings from what are still disciplinary courses taught by faculty, who largely stay in their own disciplines. Other strategies, including those that engage faculty, have potential for achieving more profound interdisciplinarity. While there are already several fine examples of such educational offerings, collaborations across the university must be enabled by conducive structures and support systems (or the removal of barriers). There is also a need to integrate some interdisciplinarity and innovation/entrepreneurship aspects into all programmes, to reach more than a minority of the students.

The desired development must be reflected in recognition of staff competence
How faculty merits are recognised and rewarded will enable, or, conversely, limit, which of the aspirations the university can achieve in education. Staff and career structures must be developed to value the capabilities that are needed, and thereby support the development that is desired. This includes making contributions to innovative teaching, integration of skills and professional preparation, sustainable development, interdisciplinarity, entrepreneurial skills and, not least, educational leadership. While the tenure track has emphasised teaching, a culture that values

research over teaching persists and needs to be addressed to create a more appropriate environment with stronger visibility and recognition of teaching excellence. It is important to avoid creating a two-tier system which purports to recognise teaching, but in effect cements the status differences. There are inspiring examples for evaluating and rewarding teaching excellence elsewhere in Europe, e.g. in the Netherlands.

Digital and hybrid learning environment
There is a need to develop an Aalto-level strategy for advancing and facilitating digital and hybrid education, considering the specific needs for future learners and learning throughout the diverse educational portfolio. Digitalisation should increase flexibility in time and space without losing the social aspects of education. The digitalisation journey that Aalto has embarked on during the ordeal of the pandemic needs to be developed further, utilising the experiences of the pandemic, but taking advantage of blended formats when that is possible again. Opportunities for innovation need to be promoted and good practice needs to be shared through cross-university forums and collaboration in order to ensure that the needs of a diversity of learners, now and in the future, are catered for.

Supporting the establishment of international students in Finland
Internationalisation is central to the Aalto identity. In this regard, the university may strengthen its contribution to Finnish society by better supporting the possibilities of international (master's and doctoral degree) students to establish themselves in Finland after graduation This is not a simple focus on finding employment when they graduate, but needs to include support throughout their studies to strengthen e.g. their Finnish language skills, contacts with companies, and a sense of belonging. In this context, industry-based doctorates are also a promising strategy. At the master's level, in addition to creating a good study environment for all, the systematic integration of Finnish and international student groups (systematic as opposed to ad-hoc voluntary collaboration) will also foster internationalisation-at-home for Finnish students.

Student experience
The Aalto student experience is in many respects very positive, but there are some aspects that need addressing. Multidisciplinary learning is valued, but the mechanisms that enable it are often unclear and students are often deterred from pursuing it. Programme management needs to provide better information at the course and curriculum level. Today, students mostly rely on word-of-mouth channels for this information, including from volunteers in the student guild. There are issues with the very variable workload between courses, which calls for greater consistency between actual study hours and the number of credits. There are scheduling conflicts and variable workload also over the academic year, especially caused by the five-period structure. Improvements here will better enable students to plan their schedules and progress in their studies more effectively. Developing an awareness of the value of efficient scheduling and helping students to engage in scheduling their studies should be considered.

Student throughput

There are concerns with long completion times. We recognise that there can be various reasons for prolonging study time, including negative factors such as poor student-experiences or challenges to well-being, and work should be done to eliminate those causes. Programmes should be managed in a way that students can take the necessary courses to complete the programme within the normative time. However, we also note that delayed graduation can also happen for positive reasons. Many students have work that is meaningful and relevant to their studies, making their entrance into working life effective and successful. For these students, the longer completion time is not a problem that should be "fixed". The fact that students work in tandem with university learning should be accepted and embraced. It could even be possible to use frameworks and tools to obtain evidence of work-based learning for recognition in a programme. Our conclusion is that, to some extent, the issue cannot immediately be characterised as a problem for educational quality, but more of a problem for Aalto University finances, given the government funding model.

Doctoral education

An Aalto graduate school should be established, ensuring a common doctoral student experience that enables both students and staff to benefit from being part of the Aalto community and fosters a sense of community across all graduate programmes. The emphasis should be on ensuring i) a consistent system of quality assurance throughout the student's doctoral studies, ii) a good and balanced study environment for all doctoral students, including well-being safeguards and rights, and iii) opportunities after graduation – whether in academia or industry/business – that students are made aware of. Common aspects include research methods, and ethics and integrity-training with the distinctive Aalto voice. With the increasing focus on completion in four years, a robust framework that supports the schools would be of benefit. While there are different models, it should be noted that a university-level graduate school does not run doctoral programmes, but rather is meant to support the schools.

Diversity, equality and inclusion

While there was much discussion about increasing diversity in the self-evaluation reports and interviews, the conception of diversity was often rather narrowly concerned with student distribution or international student numbers. We encourage the university to adopt a broader perspective that considers strategies for widening access to non-traditional student groups, such as those from specific socio-economic groups and mature learners. Also, there seems to be very gendered patterns across the various disciplines, as well as in leadership, professorship and support staff positions.

Feedback and recommendations to the schools

School of Arts, Design and Architecture

Strengths

The School of Arts, Design and Architecture (Aalto ARTS) was one of the founding institutions of Aalto. Over the years, Aalto ARTS has continued to build up a strong national and international reputation. In many of the fields of study, the university has a national "monopoly". It is particularly well known for the breadth of its programme offering, high degree of student autonomy, close relationship between students and faculty, and between the programmes and working life, and the professional experience of the faculty. This reputation has led to high student demand domestically and internationally.

There is a good culture and sense of community at Aalto ARTS, and the students experience meaningful personal development. There is good communication between students and teachers and programme directors. Close collaboration with companies and connections to "real life" give the students good networking opportunities. Students are encouraged to take courses at different programmes.

Individual MA programmes are very well established, highly relevant and adapting to the needs of industry and society. Teachers and programme directors mentioned that Aalto must be cautious not to "force" everyone into the same mould, for there is then a risk that quality and identity will be lost. A certain amount of autonomy should be allowed. The Aalto University management must trust the schools and the programmes. This comes back to the question of striking a balance between autonomy and centralised power.

Students are treated as individuals and create their own flexible learning packages, and they benefit from the lifewide learning approach.

There are strong links with other Aalto schools (e.g. Aalto BIZ, Aalto ENG and Aalto CHEM; Fashion, Clothing and Textiles includes collaboration with chemical engineering in developing new fibres) and with other local universities as well, which enables greater student choice in developing a multidisciplinary study package.

Good practices

Introduction of the lifewide learning approach to enable students to stay connected to Aalto, while also aiming to improve the rate of on-time completions.

The idea of developing the concept of 'Artrepreneurs' – which is relevant for students of the school – is especially innovative.

Aalto ARTS has two good joint programmes that are highly attractive to international students: International Design Business management MA, Creative Sustainability.

Aalto ARTS has created a portfolio of courses that are aimed at non-ARTS students. Generally, there is a good culture of trust, respect and collaboration between faculty and programme directors.

There are several forums for exchange of good practices within the school, and these should be shared across all of Aalto.

End-of-semester "quality party" with all faculty and students focusing on feedback discussions on the overall programme.

Recommendations for improvement

Review of the programme portfolio
Reform of the bachelor's and master's degree education undertaken since 2014 created one single BA with 17 majors; there is also a separate BA English programme. There are 16 master's programmes. However, the BA majors still operate almost like individual programmes. Doctoral education and training vary according to programme and supervisor. All this leads to considerable fragmentation across the breadth of the portfolio, constraints on resources (human, physical and financial), and challenges regarding the management of quality. Review of the programme portfolio should take account of the following issues – which would also aid student on-time completions.

Clarify the programme structure and learning pathways for faculty and students. This could include (i) evaluating the relevance of on-going programmes to society's needs in the near term and in the long-range future, and (ii) improving the coordination at the school level to provide more support for programme leaders and faculty concerning reaching programmatic targets and learning outcomes. The work should place a greater emphasis on developing a holistic and future-focused perspective on systematic portfolio/programme planning with a stronger focus on coherence between programmes and between BA/MA/DA and on developing efficiency/effectiveness and learning outcomes in the context of changes in Finnish society, the labour market and international trends.

The number and type of programmes are putting considerable strain on human, physical and financial resources and on the overall organisation and management capacity. These challenges are occurring while the pressure to increase student numbers at the BA level is rising, which will have a knock-on impact on master's programmes. Therefore, consideration should be given to streamlining – and perhaps reducing – the number of programmes to achieve greater coherence between them, perhaps with a sharper focus on fewer specialist areas. This would be a big step, but maintaining quality is fundamental.

Students could understand the available learning pathways more clearly if better structured integration across and between courses were provided. While there is something very attractive about encouraging as much student choice as possible, a large selection of electives may create too much choice and contribute to a situation

where too many students fail to complete on time. A student handbook given to students at the beginning of each year and setting out the different electives available in the school and in the other schools, as well as the learning outcomes, modes of assessment, assessment criteria and processes, etc., could also improve student progress.

Much more care should be taken to ensure that curriculum and learning outcomes are better aligned with ECTS to ensure that the workload is appropriate and consistent in all programmes of the school.

Multidisciplinarity

Multidisciplinarity is a signature feature of Aalto. It is appreciated by students and by faculty. However, the experience of multidisciplinarity and the process by which it occurs seems to vary, with information about other electives and opportunities often missing or depending upon being informed by peers. Students find it difficult to take courses from other departments or schools. In the absence of formal/structured mechanisms, responsibility for multidisciplinarity seems to have been outsourced to students. Hence, realising the Aalto vision and ambition for Aalto ARTS students is vital. Here are some suggestions which could be undertaken in tandem or separately:

- Ensure better coordination at the school level in terms of programme design and organisation to genuinely facilitate students in taking electives through other departments or schools.
- Establish clear learning pathways linked to career opportunities. This would help guide and support students when choosing courses and electives. This would also help students progress and graduate on time.
- An online tool could be developed to assist students in creating their personal study plans. This management system could also be linked to resource allocation and timetabling systems.
- Investigate more formal opportunities for multidisciplinary teaching between Architecture and programmes in Aalto ENG – particularly the Built Environment major and the masters programme in Spatial Planning and Transportation Engineering.

Entrepreneuralism

Entrepreneurialism is another significant opportunity and an Aalto signature, but once again, access to these opportunities and student experiences seem to vary across the university and between the schools. In any case, entrepreneurialism is especially important for arts-based students, given the often-precarious nature of their employment opportunities.

Entrepreneurship/entrepreneurial focus should be embedded in all programmes as a mandatory component. This should ensure structured linkages with the various 'factories' at Aalto, Aalto Ventures, initiatives such as Demola, etc. A requisite minimum number of ECTS credits should be determined, and the mechanisms by which students can and do participate should be established.

Counselling

Formal counselling or advising varies within the school, as well as across the university; it is highly dependent upon people being available and willing to perform the service. The experience is therefore uneven, and students are often left without adequate support. This has implications for student well-being, success and quality – and for ensuring that students have similar experiences of being a student at Aalto regardless of their programme of study. Hence, it is vital that more attention be given to this aspect.

The School of Arts, Design and Architecture is fortunate to have ambitious and passionate teachers and students, in addition to a fair amount of competition. This creates an attractive and vibrant culture; however, student well-being may suffer in this atmosphere. Counselling and support for students should be significantly strengthened, better organised and resourced; a much better alignment between academic advisors and central services should be established. This demand will increase in the coming years as student numbers increase. An on-line service platform is in development, but this is not by itself a sufficient response to the issues raised.

Student employment

Many students take up employment alongside their studies or for intermittent periods of time. While this can be an important learning opportunity if the work is directly related to their field of study, it also can delay the completion of studies and "clog up" the system, restricting capacity and opportunities for new/other students. Work experience should be embedded firmly within the educational framework; it should be linked to the study programme, strengthening the links between the school and working/professional life. It should have ECTS credits and be fully assessed so that the tradition of students working while studying and/or interrupting their studies for the sake of work can be evaluated appropriately.

Student feedback

Strengthen systematic student feedback systems and processes. There is an over-reliance on the low faculty/student ratio and on the close relationship between faculty and students. While this can be a real strength, it is also highly variable and is not equally distributed. A documented, more meaningful, and systematic approach to gathering student feedback, and a transparent approach to acting upon that feedback, would be beneficial.

Changing learner profiles

There is room for greater attention on the changing learner profiles – taking account of learners who are returning to studies and entering studies at different stages of life and as circumstances change. This involves the way in which the lifewide learning (LWL) approach is developed, and it is also about making the existing education portfolio open to new entrants. This entails new forms of credentials, micro-credentials, and stacked qualifications using ECTS to enable students to acquire credentials over time.

Advisory board for the school

Consideration should be given to establishing an advisory board for the school to support future scoping and forward-thinking. It should include stakeholders from industry, other academic institutions, alumni and international members. The intention is to provide an international academic and professional perspective regarding trends in the field and related aspects, good practice, proposed initiatives, etc.

Teacher support

There seems to be an imbalance between the appreciation given to teaching and that give to research. Teaching should be more highly valued and recognised in the career path development of employees and in salary equality. Pedagogical support and training for teachers should be offered and systematically carried out and prioritised as part of their working time.

Management and administrative support

The management of joint courses and programmes is demanding and requires extra support across Aalto. There seems to be a potential for better coordination between the departments at Aalto ARTS. The role of the programme directors as pedagogical leaders who lack resources is at times challenging. More power and appreciation of their role, together with more administrative support distributed more evenly across across the school, might be a good and worthwhile investment.

Reinforce the value of creative copetencies

Aalto is a world-leading university where business, science, engineering and the arts meet in a unique and timely education and research environment. In order to educate radical, creative and innovative game changers for the 21st century, creative methodologies and design-thinking skills are essential. More needs to be done to embed creative thinking across the Aalto community and curriculum –and in doing so, achieve Aalto's strategy.

School of Business

Strengths

Aalto University School of Business has a very strong brand in Finland and internationally, as is reflected in its rankings and international collaborations, e.g. The Global Alliance in Management Education (CEMS), The Partnership in International Management (PIM). The brand is strongly supported by the school's excellent faculty. The brand ensures that the school has little difficulty in attracting the best Finnish students.

It is very noticeable that the school takes great pride in being the Aalto University School of Business, indeed, a highly successful identity has been quickly formed following the merger of the former Helsinki School of Economics into the then new Aalto University and following the school's still relatively recent move to Otaniemi Campus.

Importantly, the school has a strong sense of itself as a school of high relevance for business and society. This is manifest in consistent and broad-based engagement with the business community and other external stakeholders, both as regards students and faculty members. This societal engagement appears well balanced with the school's commitment to internationally excellent research scholarship and, indeed, leverages the latter to support the former.

Overall, a well-established quality assurance and development culture, supported by many years of close interaction with the top international business school accreditation institutions (AACSB, EQUIS and AMBA), which in turn has reinforced the meaning and practice of the programme and course goals, as well as the learning goals and assurance of learning.

A very recently revised bachelor's portfolio and evidence of steps being taken to change the master portfolio bode well for accomplishing the expressed intention: to fundamentally revise the master's portfolio (in response to different quality indicators, including input from stakeholders). Indeed, the school's ambitious new strategy commits to the development of "a clear portfolio of multidisciplinary degree programmes … that simultaneously serve degree education and lifewide learning" by 2023–25.

Collaboration exists in selected areas with the University of Helsinki and Hanken, notably, in the establishment of the Helsinki Graduate School of Economics; collaboration also takes place with internationally renowned business schools and networks (e.g. CEMS).

Good practices

Supporting faculty in teaching and learning: The Learning Cafe was launched to regularly bring together those engaged in teaching and teaching development. This was a tangible outcome of the AllWell? process and it promises to be an important vehicle for learning development. Its 'mission' reflects student comments to the effect that, while there is 'a lot of good stuff going on' across the business school, sometimes good practices seem to have a hard time getting through.

The BIZ TEE 2020 Task Force: This is an interesting example of how to engage school-level participation in both school-level and university-level strategy work, quality assurance and development; and how to ensure that this comes together in specific plans that are ready to be put into action.

The success with offering an English-language bachelor's programme at Mikkeli, with three-week intensive courses, provides an excellent foundation for developing more internationally oriented, flexible and accessible programmes, which may well meet the needs of a growing and increasingly diverse student population. The development of micro-credit programmes (e.g. certificates and diplomas) that often comprise these kinds of intensive courses appears to be a developing trend that Aalto may be well placed to exploit. This would also allow the school to leverage additional faculty resources (tapping into its international business school networks) without the associated overhead commitments. That said, it would seem as if the valuable Mikkeli operation could benefit from closer integration with the main campus and from being assigned permanent faculty.

As indicated, the school is generally very well connected to practice and application, with the Aalto Economic Institute a particularly strong example of good practice, linking academic researchers and students to decision-makers in business and policymakers.

Recommendations for improvement

Multi- and interdisciplinary teaching and research
While the school approves of its students taking electives and minors at other Aalto schools, it also recognises the limitations that current budgeting processes place on developing cross-school interdisciplinarity activities. Following revisions to central budgeting, the school is committed to reviewing the processes at the school level. The BIZ Panel would strongly encourage consideration of interdisciplinarity as a key vehicle for 'educational renewal', as that will enable the school to bring its expertise to bear on broader societal challenges. Too often, academia finds itself isolated in disciplinary compartments and, if resources continue follow students in some simplistic manner, this is unlikely to change. While it is encouraging that BIZ contributes to the Master's Programme in International Design Business Management (offered jointly by all six Aalto schools), BIZ currently has no permanent teaching faculty assigned to it and notes that the programme confronts the hurdle

of differing school practices (in terms of the services provided to students, the financial model for doing joint programmes, etc.).

Multi- and interdisciplinarity
Aalto University was founded on the promise to harness the distinctive expertise of its constituent schools to address grand challenges that extend over disciplinary boundaries. Rather than merely promoting multi- and interdisciplinary per se, it might be worthwhile to more systematically pursue education-related initiatives in issue-specific areas that require multi- and interdisciplinarity, both at the school level and at the university level. The Peer Review Panel recognises that the School of Arts offers a Master's Programme in Creative Sustainability, but does not (yet) see BIZ very visibly engaged in the sustainability agenda. It is therefore exciting to note that BIZ, in its new BIZ Strategy, highlights sustainability as one of its four key strategic initiatives.

Students' part-time jobs
More needs to be done to treat students' part-time jobs (a structural feature of Finnish society) as a resource in the programme design, curriculum and the student's learning journey. The nature of business studies combined with the recent boost in online teaching and learning capabilities would suggest that BIZ would be in a good position to push this agenda.

Multiculturalism and international students
Multiculturalism and the integration of international students is addressed in the classroom and in putting them in contact with external partners in the private and public sector, e.g. through the assignment of business projects or through work on their master thesis. With two large English-medium bachelor's programmes and a strategic intent to grow international student recruitment, this is becoming increasingly important.

Evolution of learning goals
A priority should be to development a streamlined process that allows learning goals to evolve in a way where they can be identified, measured and evaluated by a recurring cycle. The establishment and review of learning goals often appears (or is perceived to be) burdensome. Without commitment to a repeatable process, however, there is a danger that faculty may become disengaged and cynical. Given the school's strengths, changes in learning goals are likely to be incremental. Moreover, minor, incremental adjustments in recurring courses and established programmes (following systematic feedback processes at the course and programme level) need to be reported to and shared with students each year.

Programme dirctor and prorgramme committee mandate
Review the mandate and responsibilities of the programme directors and the programme committees to ensure stronger programme-driven design and development in all degree programmes. Too often programme directors and committees appear to lack the power and resources to drive strategic development of goals and content, in particular, if a programme spans department and school boundaries; power and resources are also needed to ensure that the learning journey, from the

student's experience, is well-planned and executed. Directors and committee should also be empowered to address issues regarding the workloads that students have over the academic year, and regarding the perceived arbitrary assignment of ECTS credits to different study activities. They should also have the ability to integrate constructively and effectively into their programmes the academic adviser system as well as various Aalto- wide support initiatives.

Enhanced administrative support
Key administrative appointments to improve the school's ability to deliver on various aspects of its mission and better manage the anticipated growth, notably marketing support (both to secure increase in intake and good students) as well as support for coordinating interdepartmental and interscholastic programmes and modules; and the management of student projects (not least with regard to putting students in contact with corporate partners).

Lifewide and lifelong learning initiatives
More concrete initiatives and experiments that will help the school to develop, target and scale lifewide and lifelong learning. While a key objective in the school's 'fresh-off-the-press'' strategy (in anticipation of demographic developments and the ever- faster changing nature of work), it still appears to be mostly on the drawing board and as yet without clear ideas about sustainable business models.

School of Chemical Engineering

Strengths

Management
The Aalto University (Aalto CHEM) has a school-wide vision of its target status in the domestic and international context. Aalto CHEM has developed its education and operations to meet current and future needs in the industry and the job market.

Teaching programme
The education portfolio has been revised according to the changing labour market in collaboration with the stakeholders. The school has focused on attracting professors, lecturers and other professional talent to correspond to the developments in the research and education portfolios and to make the strategic changes viable.

Teaching programme
Bachelor's and master's level programmes are consistent and interconnected with clear learning paths and learning objectives. Recent revisions at the master's level, especially concerning the shift from pulp and paper to biorefinery and new bioproducts, have increased interest among potential students and strengthened the connection to research aimed at future innovations for sustainable societal development and to meet global challenges. Moreover, the students appear very confident about the quality of their education and the employment prospects it provides.

Teaching
The School has a very practical approach to teaching. It enables the use of distant and virtual learning, hands-on practices in laboratories and student-centred learning methods to achieve the learning objectives. The pandemic has underlined the need for well-developed and utilised virtual teaching methods. There is a high level of enthusiasm and skill among the teachers for developing virtual teaching methods further. The virtual laboratory at http://lab.aalto.fi is an excellent example of stepping up the distance-learning possibilities.

Stakeholders
The school has a long tradition of interaction with industry and stakeholders, which benefits the school's strategic planning, teaching programme developments and study possibilities. This translates to substantial opportunities for students to enter the labour market and finding employment after studies.

Good practices

Management
Management-level regular meetings by the dean and vice dean take place, and they are very tightly connected to the strategy work that has been streamlined and put into action and that sets the milestones to be reached.

An advisory group for full-time doctoral students

CHEM students invite student members to the advisory board. The committee members are from both industry and academia and help to address research challenges. The committee is also a platform for the student to discuss the academic and industrial aspects of their work. Based on feedback, the advisory board helps students to raise issues related to their research and study progress.

Working life connection

Students traditionally work 3–4 months in the industry, gaining knowledge and expertise in the field, for which they can get credit points if they report and record their learning. Summer jobs within the research groups in the school can also provide credit points when the learning is documented and recorded.

Student connections to industry

Master's level students relate to industry through projects, thesis work, and summer jobs. This is also emerging at the bachelor's level. These ties are valued by students and give valuable feedback to the study programmes about the skills needed in the industry.

Student study well-being

Focusing on student study well-being has led to positive trends and a decrease in the risk of burnout in the master's degree stage. One of the actions taken to support students has been an evaluation of the workload for different majors during the semester. The evaluations have been reviewed, and some majors have organised peer support events and meetings. Similar work could be performed at the bachelor's level.

Stakeholders

An advisory board at the master's level includes members representing important stakeholders. The stakeholders are instrumental in developing lifewide learning and collaboration with companies, which is enhanced by individual faculty members' collaboration with industry and research institutes. This creates a communication network between faculty, industry and alumni that supports knowledge sharing and cooperation in education and research.

Recommendations for improvement

Management

There is a need to enhance communication between programme directors and teachers to improve transparency and awareness of the contents, teaching methods and assessment practices, and to support the systematic development of programmes. This would also allow the sharing of good practices among teachers. Define a line of command with decision-making capabilities, management of resources, executive power and well-defined responsibilities for everyone. Strengthen the role of programme director as the primary officer defining the line of command and as a pedagogical leader.

Resources
Allocate resources directly to the development of courses, pedagogical development, human capital, and laboratory and virtual facilities.

Doctoral school
The School should develop a viable and managed doctoral programme with realistic, achievable and followed learning objectives that are followed and that are adapted to the research projects of doctoral students. The programme should also reflect ethical, employment-related and educational practice aspects.

Course responsibilities
During the interview, several teachers mentioned that one teacher is responsible for one course. This makes the teaching vulnerable, as any sick-leave or permission will leave a whole course without a teacher. Evaluation of courses, if it would be possible to share the teaching responsibilities between several teachers in one course more widely, could help address this.

Feedback
The school would benefit from more diverse and systematic ways to collect and share feedback to and from students concerning the success of the educational programme, workloads, learning difficulties and obstacles, and practical matters regarding studies. The accumulation of feedback should complement systematic practices of curriculum development that involve all players in the field. The practices also highlight the need for improved study guidance through all stages of education. Utilisation of feedback to develop course contents, learning outcomes, curricula and the learning environment should also be transparent. Provide meaningful channels for the students to see that their feedback is valued and used.

Assessment
Assessment methods should be reconsidered in order to meet the challenges posed by adopting hybrid and blended teaching approaches. Strengthen the connection between programme objectives, learning outcomes and assessment to bring greater transparency to the study programme in general for students and teachers alike.

Scheduling studies
There is a need for a strategy on how to adjust educational activities and resources for the increasing number of students, extended study times, and discrepancies of workload connected to ECTS points given for a course. The possibility of balancing teaching and learning options for the whole academic year would allow the students to adapt and combine their studies with the other responsibilities in their lives. Enabling industrial and stakeholder participation in these efforts could further enhance the flexibility and content development of study programmes by work-integrated learning.

School of Electrical Engineering

Strengths

Education at the School of Electrical Engineering is research-based and strongly connected to the dynamic industrial sector and the public sector. Students and graduates at all levels are attractive potential employees for employers, and the labour demand clearly demonstrates a potential for the school to educate more students.

Students' securing of employment is effective and successful. Many students get relevant work life experience through summer jobs, and some work part-time alongside their studies. Some industrial companies even have part-time employment formats for students. The companies serve the key stakeholders of the university as well, which from an international perspective is a coveted position to be in. This kind of arrangement has a long tradition in Finland, and we see it as a sign of a great university–industry ecosystem around Aalto University. While student work also contributes to extending their completion time, this is not problematic for the students, nor should it be for Aalto. Government pressure to see this as a problem to be "fixed" should be resisted.

The school has benefitted from the Aalto strategy of international recruitment of faculty in the tenure track, establishing new generations of faculty who are strong researchers who also have a demonstrated interest in teaching. The tenure track requirements, as they apply to both research and teaching, are slowly but surely strengthening the teaching culture and the collective teaching-competence level. Teaching is increasingly seen as a shared responsibility of faculty. There are internal groups and processes with a long tradition in the School of Electrical Engineering (for instance, Oplaa) that help create a good environment for education. This plays an important role in curriculum development and operations, and in evaluating and strengthening faculty teaching competence, case by case and year after year.

Student guilds have a tradition of being actively involved in programme development, in fine collaboration with faculty and support personnel.

We note the great awareness and honesty shown by educational leaders in their self-evaluation documents and interviews. Many potential areas for improvement are already identified and in many cases are beginning to be addressed. Our recommendations are meant to validate and commend this ongoing work.

Good practices

Courses with hands-on experience include ELEC-A4010, "Elverkstad", a first-year design-built course with groups of students working with projects. This course also

contributes to interdisciplinarity as it serves as an elective for many study programmes.

Student guilds collect student feedback through regular surveys. This collaboration with the guilds is mutually respectful and a great asset for the school.

Teacher coffee meetings (Opekahvit) are held several times per semester, with speakers and discussions on educational themes. The chair of the educational committee (Oplaa) opens the meeting and attends it. This tradition has been going on for many years, and impressively, has also continued in virtual format during the pandemic.

Student recruitment from universities of applied science for master's studies is working well. Active collaboration with Metropolia University of Applied Sciences in Helsinki serves this purpose, where Metropolia offers complementary courses preparing for entrance at Aalto.

Teaching at the Master's Programme in Electronics and Nanotechnology often takes place in small groups, and the programme offers a lot of hands-on activity and experience with realistic problems and professional equipment. The programme has two teachers in charge of every course.

Recommendations for improvement

Programme development
We note with satisfaction that a programme portfolio overhaul is planned. We recommend the use of modern curriculum development methods, rather than (once again) recombining existing courses and content. The starting point should be an analysis of societal and industry need as well as student attractiveness. This future-led vision for graduates' competence is expressed as programme-level learning outcomes, which are defined at the course level. Courses are designed to focus not only on the disciplinary content, but also on what engineers can do with that understanding to address societal needs. The learning outcomes should include integrated skills such as communication and collaboration, understanding of the sociotechnical context that problems are situated in, considerations for ethics and sustainable development. There is also great potential to integrate interdisciplinarity and entrepreneurial skills. By integrated skills, we mean skills not taught separately from the disciplinary fundamentals, but rather by using integrated learning approaches to give students opportunities to meaningfully express and apply their disciplinary knowledge. This applies to both the bachelor's and the master's level, because even if the bachelor's programme is seen as largely preparatory for the master's, competence development must continue in a smooth progression throughout the education as a whole.

Programme organisation
If the school wants strong programmes, we note that this requires a different kind of organisation. Strengthened programme leadership and organisation has been

identified as a need at the university- as well as the school-level. Programme leaders cannot just be given the responsibility without having the necessary conditions in place. They need a clearer mandate, and access to the resources. Examples of strong programme organisation can be seen, for instance, at Chalmers University of Technology in Sweden.

Interdisciplinary potential ni progarmme portfolios
We note that ELEC is involved in cross-school programmes with SCI, ARTS and ENG. In the ELEC programme portfolio, however, there is great potential for further interdisciplinary programmes, e.g. some variant of electrical engineering combined with sustainability – this could also attract other types of students.

Pedagogical development
While pedagogical competence has been much developed, we note that some challenges are still perceived as intractable, leading to some level of resignation. Pedagogical competence is not just about participating in pedagogical courses and developing one's own teaching. It is also about tackling the more complex challenges that the university is facing, and when necessary, seeking and developing one's own understanding. Some of the issues where we see opportunities are:

- Curriculum development
- Programme leadership
- Recruitment of female students – deeper analysis and effective measures are needed
- Organising various forms of teaching, such as project work, resource-effectively
- Integrated learning
- Mutually supporting courses

International students' establishment in finland
Strengthen the contribution of the school to Finnish society by supporting international master's and doctoral degree students to establish themselves in Finland. This is not so much about helping graduates find jobs upon graduation, but about supporting their integration throughout their education, including through Finnish language courses, contacts with companies, and creating a sense of belonging. Create a master's level study environment where Finnish students and international students work together, implemented systematically, not just voluntarily and piecemeal. Such integration of the student groups will also foster internationalisation-at-home for the Finnish students.

Workload and well-being
It is a strength that student and faculty well-being has been identified as a key target to be monitored, not least in order to ensure that the institutional goals are realised in sustainable ways. At ELEC, it should be possible to rework the schedule and improve coordination to get a a more evenly distributed student workload throughout the year. Students would also welcome efforts to monitor their workload to see that it become more consistent with the ECTS credits.

Programme structure

We note that students apply directly to and identify with a major, and curriculum development is done autonomously in each major. This makes it difficult to see the bachelor's programme as a programme. Similarly, master's programmes are to some extent reduced to being administrative shells for its majors, making the master's programme an unclear entity to communicate to prospective students. We are hypothesising that this structure could be a legacy from previous programmes that were merged in the latest programme reform. We also note that programme directors and their teams have limited opportunity to create coherent programmes. The majors are closer to the departments and seem to favour a disciplinary rather than holistic competence-based focus. Students perceive that lecture notes and disciplinary content define the objectives of courses, not the stated learning outcomes. The development of personal and work-life skills do not get the attention they need. Students could not detect that such skills were systematically addressed in the programmes, nor that sustainability, for instance, was addressed.

Notes to the current programme portfolio

It seems that the bachelor's programme is tailored mostly for the two master's programmes served by the school alone. In a revision of the bachelor's programme, one should consider whether the school's bachelor's programme provides a good background for the cross-school master's programmes the school is involved in. The master's programmes are not in balance with respect to the number of students, Automation and Electrical Engineering being the most popular programme. This difference exists despite the excellent employment opportunities related to the master's programme in Electronics and Nanotechnology. One possible reason for the low attractivity may be how the necessary theoretical disciplines are taught at the bachelor's degree level. It could be investigated whether more project orientation and hands-on experiences might enhance the learning of these difficult topics. Valuable work-life knowledge and development of an appropriate mindset comes from students' part-time work in industry. But it seems like this is unevenly distributed among the majors of the bachelor's programme. As such positions are highly valued among students, we recommend that collaboration with industry be strengthened with respect to getting more trainee positions. It should also be investigated why this difference between majors exists.

School of Engineering

Strengths

Programme structure
The education portfolio is wide ranging and extensive efforts have been made to create suitable pathways from the bachelor's to the master's programme. Therefore, students have many opportunities for their continuing education. Staff have met the significant challenge of creating multidisciplinary programmes and are overcoming the difficulties of finding a common language as they integrate topics. The bachelor's programme has a great potential to increase multidisciplinarity through linking with other schools at Aalto, such as Aalto ARTS and Aalto BIZ.

Objectives and learning outcomes
The courses are future-oriented, focusing on, for example, decarbonisation, digital technologies, the future of work, and well-being.

Recruitment and intake
Large intake and high-quality students. Increased internationalisation of intake and good international exchange programmes. Improvement in the gender balance (2% improvement per annum) with concrete actions being taken by, for example, promotion events at high schools.

Learning and teaching
Students' appreciate the diversity of perspectives and interests that are offered through the multidisciplinary approach. Highly motivated, knowledgeable and competent university lecturers and professors. Strong links with practice. Integration of real-world problems in teaching and in project work. An international outlook in course contents and learning.

Student, alumni and stakeholder communities
Strong student union and guilds, which provide help and support for students. Strong peer support amongst the staff in relation to both academic progress and well-being. Financial support for master's theses and subsequent career pathways from industry partners.

Management, operations and support to staff and students
A good programme of pedagogical support for staff at the Aalto level with each school having a pedagogical specialist. Investment in an academic advisor, who provides academic and pastoral support for students and assists in achieving improved on-time completion rates. Strong peer-support amongst the staff in relation to both academic progress and well-being. Awareness of the importance of valuing and recognising teaching.

Good practices

Dean's List initiative which leads to improved completion times.
The use of real-world problems as a focus for teaching and project work.
Introduction of transferable skills through collaborations with the School of Business on skills such as team working, communication skills, project management, etc.

Informal co-teaching with architects in the Built Environment department.
Studios and teaching forums for teachers, to help with coordination and collaboration.

The Dean's Christmas Lunch with student guilds in recognition of their contributions.

Moving towards a contextualization of 'technical' objectives within the broader socio-spatial context.

Recommendations for improvement

Programme structure
- Maintain the multidisciplinary bachelor's programme but develop a clearer professional identity at the bachelor's level by integrating 'signposts' such as internships, projects, etc., focusing on the majors.
- Further capitalise on the previous restructuring and merger of two schools to create a vibrant and collegiate environment.
- Broaden and deepen the progress towards co-creative and collaborative teaching across the school.
- Explore new opportunities in developing formal collaborations between Built Environment and Architecture.
- Include a social science prerequisite within the Built Environment BSc programme for students entering the MSc in Spatial Planning and Transportation.
- Critically review the content of the majors, considering the pathways and the common courses shared with other majors.

Objective and learning outcomes
- Make the existing transferable skills more visible, systematically taught, and assessed by an expert, and include them in the school's objectives and learning outcomes.
- Create more opportunities for the industry to collaborate in shaping the learning outcomes and in developing a professional identity for the different educational pathways.

Recruitment and intake
- Continue to improve the gender balance and diversity of the student intake.
- More flexibility regarding pre-requisites to accommodate students from both inside and outside Aalto in the master's programmes.
- Publicize and make visible the possible pathways that students can follow as they progress from the bachelor's to the master's programmes.

Learning and teaching

- Encourage English-speaking staff to learn Finnish to enable them to communicate with Finnish students.
- Enhance the sense of community for teachers at the bachelor's level to overcome the challenges of the large size of the school and the geographically dispersed buildings, for example, through more interactive and team-building events
- Develop a collaborative system (between staff and students) of gathering student feedback and to close the loop by using the feedback to improve the courses and programmes
- Address inconsistencies between workload expectations and course credits
- A better and more systematic doctoral research training programme and more systematic and consistent quality assurance throughout the doctoral studies at the school level
- Encourage professors to become fully engaged in the bachelor's programme.
- Establish advisory boards at the department and/or programme level Student, alumni and stakeholder communities
- Create more opportunities – over and above the guilds – for alumni and stakeholders to engage in teaching and learning activities.

Management, operations and support for staff and students

- Establish clear roles, responsibilities and mandates for the different management positions.
- Put in place a system of rewards and formal recognition for those responsible for majors and programmes.
- Provide enough resources and support for the major and programme management roles.
- Develop better connections between departmental structure and the educational programmes, particularly regarding resource allocation.
- Further improve the gender balance among the management and the teaching staff.
- Assign the same value and recognition to teaching as to research activities.

School of Science

Strengths

Focus on demand
The BSc programme is focused on areas of study that are expected to be in increasing demand in the future, e.g. Majors in Computational Engineering, Data Science, and Digital Systems and Design. In general, there is a high demand for the graduates of these programmes and the School of Science (Aalto SCI) has been responsive in creating new teaching activities.

Intake
Aalto SCI enjoys a good reputation with prospective students, and in general, the students admitted are motivated and talented. SCI does outreach to schools and special activities for particular groups, e.g. a girls' camp. There is a significant opportunity to recruit a larger intake of students.

Development
Aalto SCI takes future societal needs into account when developing programmes. There is good student representation in the decision-making bodies of the school, and official student representatives meet regularly with school leadership. There are a variety of different channels for the students to provide feedback, but there is a question as to whether and how the feedback given is acknowledged to the giver and how it is used.

Teaching
Teachers are competent and take their role as teachers very seriously. All have pedagogical training available and most take advantage of this. The learning environment is friendly and inclusive. Students are exposed to a variety of different teaching approaches.

Teaching tools
The teachers embrace technology. The pandemic has given a positive push to digitalisation. In some of the large courses, technology plays a major role in providing feedback to students (reducing costs and enhancing quality) and in engaging with the large student numbers.

Learning paths
There is considerable student choice and good support for students' different learning paths.

Internationalisation
Students have opportunities to get international experiences, especially 'internationalisation at home'. The number of students from outside Finland is growing, thus promoting diversity.

Multidisciplinarity
Aalto SCI offers a lot of teaching for degree programmes outside of the School of Science in other schools. SCI is generally open to collaborations with other schools and engages in several cross-school programmes.

Support structure
The school's learning services staff helps programme directors, teachers and students in a variety of ways.

Quality assurance
Many QA processes are in place. The relevant stakeholders are involved in these processes, but evidence to suggest they are working effectively still needs to be gathered.

Management
Most of the programme directors are passionate about their job and this is conveyed to those they work with.

Throughput
The programmes have a good throughput overall compared to the other schools.

Good practices

Pedagogical training
School support for teacher development is strong, beyond the specific requirements for tenure-track progression.

Quality assurance system
The school has continual and systematic development and follow-up of education in all cycles.

Student involvement
Involvement on several levels with respect to the development of Aalto SCI is good, especially with respect to decision-making and the promotion of student interests.

Feedback channels
Clear and numerous channels provide opportunities for evaluation and programme development. An example is the work of degree programme committees. Good discussion channels with alumni and other external stakeholders are present in places and are the basis for ongoing development of the school provision of education.

Collaboration with industry
Collaboration in course assignments and project work serves to strengthen both the connection to work life and the relevance of the education. Utilisation of advisory boards widens the future development possibilities. Invited talks and lectures from industry highlighting the practical relevance of education are common.

Joint efforts towards new initiatives
Flexible and supportive attitudes towards joint efforts relating to new initiatives, course designs and the formulation of learning objectives for programmes and modules. This is most visible in joint programmes and service teaching.

Outreach to promote engagement in sci
The bachelor programme engages in many outreach events to promote engagement in Aalto SCI. A good example aimed at improving the gender balance in Aalto SCI is the annual "Shaking up Tech" event, for second and third-year high-school girls. A very nice initiative by the ICT Innovation Masters programme is the joint annual EIT Digital Summer Schools with thematic contents of societal relevance aligned with the Innovation Action Lines of EIT Digital.

Challenge-based education and learning models
The programme highlights an education model where the focus is on student centricity, active learning and impact, and the added value for society and companies. A variety of different types of learning methodology and personalised learning arrangements or options are present in the courses.

Peer-to-peer support in education
Joint cross-school teacher coffee breaks to network and share the experiences of teachers are scheduled. These support teacher development and collaboration.

Recommendations for improvement

Vision and strategy
As Aalto has a new strategy as of 2021, it would now be of value to create a clear vision for Aalto SCI and a supporting strategy that is consistent with that of the university. The school aspires to achieve many goals, but how they are to be achieved needs to be documented.

Programme portfolio coherency
The School has an excellent reputation, yet the coherency of its course offerings is confused. Using the school strategy, it is recommended that the school review its portfolio and create one that builds on the school's strengths and that addresses societal needs in an efficient design. An example could be a rationalised master's portfolio with a common core and specialties to promote greater interdisciplinarity and to create a better balance.

Programme design
Although the school has been developing its expertise in pedagogical approaches and does encourage a variety of possibilities, more work needs to be done to form an engaging and relevant portfolio. Examples might include:

- Developing the possibilities of digitalisation to ensure the value-focused design not only online, but also in-person teaching
- Promoting connectedness between modules within a course of degree studies and the BSc and master's elements of the portfolio
- Ensuring the hours per ECTS are consistently applied in course design

- Emphasising the importance of constructive alignment
- Reviewing the teaching block structure

Management structure and operation
The management structure and its operation need attention. The panel impression was that the overriding approach was more of a 'command and control' variety, rather than inclusive and transparent. The school needs to work more as a team, with clarity in terms of communication, responsibility and authority. This will promote greater awareness and better decision-making.

An area of attention needs to be on the role of programme directors. These individuals are central to the successful operation and development of education. Their role needs to be clearly defined. They need to be consulted on strategic issues as well as operational ones, and need to be given the authority to make decisions relating to their programmes on issues that extend beyond the simply pedagogic. It should be kept in mind that they are the front line for the school, and they need to be valued. It should also be noted that they should also be valued not only within the school, but by the rest of the university as well.

Quality assurance of education
SCI has a lot of relevant and well-thought-through processes for quality assessment. The processes include assessment of and by teachers, support personnel and students and, to some extent, external stakeholders. It is recommended that more attention be paid to 'closing the loops' to provide evidence that actions from the processes are operationalised and followed up on, thus demonstrating a working QA system. An example would be evidence suggesting that the numerous feedback channels from staff to students and students to staff are working effectively. Consistency should be the overall goal.

Interdisciplinary opportunities
The school aspires to achieve goals in this area and is well placed to make interdisciplinarity work, due to it provision of service teaching to other schools. It is recommended that the school be an exemplar for how to make this work more effectively and pilot changes in the university as well as in school processes. Areas to address would include:

- Making service teaching more co-creational and less transactional
- Developing the liaison tutor idea across schools to promote greater understanding
- Challenging bureaucratic and operational barriers, as well as funding models that impede creative ideas and student mobility

Raise student awareness of the opportunities to study at the SCI or for SCI students to study at other Aalto schools. This should focus on removing barriers and creating opportunity.

Resourcing

The resourcing of education needs consideration both within and without the school. Expertise and workloads need review and there are several areas where positive steps can be made, such as:

- Seeking efficiencies in programme design and delivery (common cores, digital opportunities)
- Implementing group supervision strategies for projects and thesis work
- Making pedagogical training and ongoing development a protected part of the teacher workload and possibly more discipline-specific
- More inclusive dialogue within the school to enable the exploration of a wider range of options

Student experience

In general, students find their learning experience in Aalto SCI good. They have a lot of choice, a vibrant learning community and many opportunities for student involvement. However, there is also room for improvement. It is recommended that several areas be addressed rather than any single element.

The uneven workload has been highlighted by Aalto SCI students. This is exemplified in the nonuniform way in which the ECTS are applied. This needs to be addressed to ensure better balance. The five-period system further exacerbates the problem by creating an uneven balance between the periods. Furthermore, the assessment criteria and the learning outcomes often seem unclear to the students. An overhaul of the courses (focusing on constructive alignment and workload) can be combined with curriculum mapping to ensure better student progression through studies and a better balance for their study workloads.

As mentioned elsewhere, the students have many places to impact teaching. Course feedback from the last time a course was held should be addressed in the next implementation of the course to inform students about how student feedback was used in course development. This occurs at times, but not consistently.

Typical' students that are not active in official roles may have less awareness of where to turn when they have questions or experience problems. This suggests communication challenges and the need for action to improve communication, possibly in more creative ways.

Doctoral programme

Compared with first and second-cycle education, third-cycle education is inherently individual and research-oriented. Nonetheless, the quality of the third-cycle education needs to be systematically followed up and developed, while at the same time acknowledging and valuing its unique aspects and conditions. It is recommended that the school implement a more robust quality assurance framework.

The programme director has a central role in the processes of quality assurance and programme development, and this role needs to be properly defined, mandated and resourced. It is recommended that the programme management initiate

efforts to define and develop the framework, involving both supervisors and doctoral students. The system should cover all aspects of the education, and not be limited to the quantitative outcomes of the doctoral thesis (e.g. number of papers, impact factors etc.). Aspects to monitor and follow up could include throughput, support for supervisors, student progression through studies, workload, programme content, equal opportunity, etc. It is important that the outcomes of the process are translated into concrete actions for programme development. This is particularly important with the increasing emphasis on completion within the four-year time-frame and the pressure this places on students. Doctoral students will have different goals following graduation. It is important that different work-life perspectives be embedded in the doctoral programme to prepare the students for different types of career paths.

External voices
The school is well placed to enrich its thinking and offerings through the effective involvement of alumni and industry in both its strategic and operational activity. This needs to be strengthened with clear commitment and support and be applied more consistently across the school.

Lifewide learning
Clearly stated as an aspiration, lifewide learning makes a lot of sense in a fast moving and highly topical field like science. It is recommended that Aalto SCI incorporate a lifewide learning element in their strategy to enable this significant opportunity to be capitalised upon. At present, there is no evidence that this is happening.

3. Summary of the key observations

This chapter presents a compilation of the key observations in TEE 2020. The compilation is derived mainly from the evaluation results of the peer, stakeholder and international review. The university-level compilation presents observations on the results of all the reviews, whether given directly as feedback to the university or included in the feedback to all (or to most of) the schools. The school compilations are composed from the results in the stakeholder and international reviews. The key observations are organised into strengths and development areas. In the development areas, the thematic headings used in the Aalto and the school chapters are the same or similar for the sake of coherency.

Aalto University

Strengths

Reputation for excellence
Aalto University has a reputation for excellence, as manifested in the following areas and reflected from different perspectives:

- Aalto has a radically creative, multidisciplinary vision
- There is a strong sense of pride in belonging to the Aalto community
- Mastering the fundamentals and a good core knowledge of the fields is the competitive edge of Aalto
- The programme portfolio includes programmes which are highly attractive, successful and internationally unique
- Candid self-awareness – Aalto has identified many needs for improvement and initiated actions to address them
- A uniquely open and accessible campus

The education is closely connected to practice and research
Education at Aalto is research-based, strongly connected to practice, and attuned to the developing needs of industry and society at large, as encapsulated in the following areas:

- Aalto University's emphasis on multidisciplinary approaches is relevant and much needed in working life
- Commitment to innovation and entrepreneurship, with good practices such as Aalto Ventures Programme

- Sustainability, digitalisation and urbanisation are understood as key challenges and are tackled in many programmes
- Active stakeholder engagement, e.g. programme advisory boards
- Good success in handling the challenges of remote teaching during the pandemic, including good practices such as pedagogical training and Aalto Online Learning

Aalto's faculty

Aalto's faculty is an important source of strength. The faculty is knowledgeable, competent and willing to invest in developing teaching and support for students. The following areas exemplify the faculty engagement from different viewpoints:

- Highly motivated teachers, teaching excellence is rising in value as an academic career feature
- Strong international recruitment of faculty
- Efforts are made to provide individual support and high-quality teaching, often despite scarce resources
- Systematic activities for faculty management, e.g. regular teachers' meetings, annual education-development workshops

Strong student-centric approach

There is a strong student centric approach in teaching and in education, and students are strongly engaged in the development of education, as exemplified by the following observations:

- Aalto has strong and productive traditions of student engagement, such as student guilds, and student representation in decision-making bodies
- Students' study well-being is highly important, exemplified in practice by the AllWell? initiative
- The development of teaching and education has demonstrated its utilisation of student feedback

Development areas

Aalto University relaunched

Aalto University was created in a 'big bang', realising a radically creative, multidisciplinary vision. The vision needs reinforcement, however, as suggested in the following improvement recommendations:

- What is the 'Aalto' in an Aalto degree if the programmes are mainly offering school-specific studies?
- Move forward with interdisciplinarity and entrepreneurship, include aspects of interdisciplinarity and innovation/entrepreneurship in all programmes.
- Develop conducive structures, support systems and incentives to enhance collaborations across the university. Increase awareness of the possible combinations and opportunities among personnel and students.

Increased diversity

Diversity was identified as a central area needing improvement, starting with a deeper understanding of the concept:

- High need for increased diversity and a broader perspective on diversity (gender, nationality and other) among personnel and students. Very gendered patterns across many disciplines, also in leadership, professorship and support staff.
- Understanding the central role of the university in producing professionals for top positions in Finnish working life, and hence the responsibility to enhance diversity actively.

Renewal of programme portfolio

The current programme portfolio bears marks of the previous restructuring, which was incomplete, making programmes sometimes incoherent and fragmented. The following improvement recommendations were identified:

- Use modern curriculum-development methods to design new programmes; develop strong coherent visions of graduates' target competence levels; facilitate the progression of learning throughout the stages of the programme.
- Cross-cutting themes in all fields – sustainability, internationality, entrepreneurship and digitalisation – and integrate them in the content learning (rather than creating separate courses or programmes).
- Programme learning-outcomes should include the relevant personal, interpersonal and professional skills, consideration for ethics, societal contexts, sustainable development, interdisciplinarity and entrepreneurial skills.

Programme organisation – appropriate mandate and conditions

The current degree programme organisation was found to suffer from weak mandates, very limited influence over resources, and insufficient support, as put forward in the following improvement recommendations:

- Provide the appropriate conditions for leadership and management of educational programmes, both within and across schools.
- Greatly strengthen the role of the programme director, with a clear mandate, with access to resources and an appropriate level of support.
- Better align decision-making in education and resourcing (annual budgeting vs. two-year curriculum planning)

Student experience

The Aalto student experience is in many respects very positive, but there are some aspects that need addressing:

- Multidisciplinary learning is valued, but the mechanisms that enable it are often unclear and students are often deterred.
- Programme management needs to provide better information on the course and curriculum level to students. There is too much reliance only on word of mouth, i.e. other students, student guilds.
- Very variable workload between courses, calling for greater consistency in terms of actual study hours for the number of credits.

Student throughput

Students' study and graduation times included negative factors to be mitigated, but seeing students working while studying as a positive was strongly encouraged:

- Negative factors prolonging study times – such as poor experiences as a student, deficient well-being, poor scheduling and structuring of courses – should be mitigated.
- Situations where students work in tandem with university learning should be embraced. Actively investigate frameworks and tools to capture evidence of work-based learning, for recognition in the given programmes.

Enhanced student recruitment

Student recruitment was seen to need improvement both quantitatively and qualitatively:

- Substantial increase needed in student recruitment to meet the needs of Finnish working life.
- A more student-centric admission process. Clarify the profiles of the programmes in relation to the future vision on a global level, utilising emotive images of society, the world and the global megatrends.
- Attraction and retention of international students, active support for integration in Finnish society and in Finnish working life. Strong support during the studies, creating a sense of belonging, systematic integration of Finnish with international student groups (systematic as opposed to ad-hoc voluntary integration).

Doctoral education

Doctoral education was recommended to become more uniformly organised at the university level to enhance quality assurance and ensure more consistency in the student experience:

- An Aalto Graduate School (to support the schools in running the doctoral programmes) should be established to ensure: i) a consistent system of quality assurance, ii) good and evenly paced study environment, including wellbeing safeguards and rights, and iii) that students are made aware of opportunities after graduation.

Digital and hybrid learning environments

The digitalisation journey of Aalto needs to be developed further, giving opportunities for digital and hybrid learning innovation and good practices to be shared.
- An Aalto-level strategy is needed for advancing and facilitating digital and hybrid education.
- Systematic utilisation of the experiences of the pandemic, while taking advantage of blended formats to create variety of digital and hybrid learning environments.

Recognition of faculty competence

Teaching excellence is gaining more value in the careers of academics, but more needs to be done.

- The career structures must be developed by valuing the capabilities that are desired or needed: innovative teaching, integration of skills and professional preparation, sustainable development, interdisciplinarity, entrepreneurial skills, educational leadership.

- A culture that values research over teaching persists. Important to avoid creating a two-tier career system that purports to recognise teaching, but in effect cements the status differences.

Mechanism for sharing good practices
Many good practices were identified in the programmes and schools. However, the practices are not currently shared effectively.

- Easily applicable systematic ways for sharing good practices between programmes and schools about teaching, digital learning, and collaboration with stakeholders and alumni.

Support for a systematic alumni network and for stakeholder collaboration
There are many active alumni and stakeholder collaborations, but they are lacking in systematic organisation and implementation.

- Systematic support in managing alumni networks and stakeholder collaboration. Currently very much dependent on individual efforts. Partnerships could be negotiated at the university level, thus aligning compensation and mitigating overlaps.
- Strategic collaboration, e.g. industrial networks for doctoral students.

School of Arts, Design and Architecture

Strengths

- Strong national and international reputation with high demand domestically and internationally
- Passionate and engaged faculty and students
- Good culture for collaboration and student personal development, with forums for exchange of good practices.
- Individual programmes highly relevant, with good links to industry and society's needs, emphasis on learning work-life skills and new ways of thinking.
- Concept of "Artrepreneurs" is an innovative approach to instilling in students a mindset where they create their own work situations. The demand in society for the field of arts' know-how does not necessarily mean ready-made positions are available.
- The research-oriented approach in teaching has been strengthened.
- 'Lifewide learning' will encourage students to stay connected while also improving their progression and on-time completion of studies.
- Multidisciplinary approach to co-operation between schools and fields. Two joint programmes at Aalto – a good role model.
- Has a portfolio of courses aimed at non-ARTS students.
- Versatile co-operation with different stakeholder groups, e.g. has study projects for students to experience practices in the field.

Development areas

Role of Aalto ARTS

- Define the role of Aalto ARTS in the changing operational environment and the goals of Aalto ARTS to acting as an active change-maker in society.
- Reinforce the value of creative competencies.

Student experience

- Align curriculum and learning outcomes with ECTS to manage workload of students.
- Systematic (documented, transparent) student feedback.
- Formalise counselling: learning pathways and opportunities as well as wellbeing.
- Student programme handbook to clarify intended learning outcomes, course expectations and assessment.
- Treat student employment as a learning opportunity with ECTS and assessment.
- Multidisciplinarity is one of Aalto's signature identifiers, but it is currently outsourced to students. Mitigation of organisational and study structural obstacles is needed.

Renewal of programme portfolio

- Review portfolio to improve coherence and streamline offerings. Clarify the profiles of the programmes in relation to the future vision on a global level and recognise the special features of each programme in relation to the programmes of the portfolio.
- Development of the education to respond better to the competences and skills that will be needed in the future for typical work positions in the field. Analyse the competencies the graduates should have to act as game changers in the arts and on a programme level.
- Define and communicate the differences between the degree levels and their goals. Communicate how these different levels prepare students for different workplaces and roles in the future.
- Entrepreneurship/entrepreneurial focus should be embedded in all programmes as a mandatory component.

Programme organisation – appropriate mandate and conditions

- Appropriate conditions for leadership and management of educational programmes; a clear mandate and access to resources and appropriate levels of support.

Teacher support

- Address the imbalance in the appreciation of teaching and research. Teaching should receive more recognition, including in terms of career development and salary equality.
- Offer pedagogical support and training for teachers in a way that is systematic and prioritised in their working time.

Mechanism for sharing good practices

- Develop easily applied systematic ways of sharing good practices between programmes and schools with respect to teaching, digital learning and collaboration with stakeholders and –alumni.

Strategic collaboration with alumni and stakeholders

- Define and develop systematic and strategical collaboration with stakeholders and alumni on a school and programme level and recognise the shared value of this collaboration, not forgetting the international aspects.
- Establish a school advisory board with representatives from the school and stakeholder and alumni networks.

Goals of lifewide learning

- Pay greater attention to the changing learner-profile, open the programme portfolio for new entrants.
- What does lifewide learning mean to graduates?
- New forms of credentials, micro-credentials, and stacked qualifications using ECTS to enable students to acquire credentials over time.

School of Business

Strengths

- The Aalto brand and identity is a strong asset in (international) student and staff recruitment. International collaboration and engagement with business and society
- Well-established quality and assurance development culture ('Triple Crown'); The BIZ TEE 2020 Task Force for synergies, coherence and action across parallel, strategic work and continuous quality assurance and development.
- Promising momentum in revision of the programme portfolio (at the bachelor's and, more recently, at the master's level)
- Helsinki Graduate School of Economics
- Supporting faculty in teaching and learning: e.g. the Learning Cafe
- Several programmes have a clear focus on education and are well managed.
- The experience of the Mikkeli Campus 'business model' is a valuable source of inspiration for flexible and accessible micro-credits, stackable certificates, diplomas and modules and for tapping into international academic networks.
- Aalto Economic Institute: Linking academia (students and researchers) and practice

Development areas

Aalto university relaunched

- Communication and cooperation need to be improved. Is it enough that we are a part of Aalto if it doesn't show in our practice?
- Pursue more systematically education-related initiatives in issue-specific areas that require multi- and interdisciplinarity.

Student experience

- Leverage students' part-time jobs as a resource in their Aalto learning journey.
- Clarifying for students their different study path options: specialists, generalists or academics.
- Systematic feedback processes at the course and programme level, leading to adjustments in the courses and programmes; also: feedback is always to be reported to and shared with students.
- Programmes could be fewer but wider, with more options within. Students should be able to choose for themselves.

Development of education

- Multi- and interdisciplinarity as a key vehicle for 'educational renewal': Make it happen!
- Many programmes need 'future proofing' (too much reliance on past success).
- Programme brands are mixed and unclear. Development needed with the customer in mind.
- Evolve learning goals in such a way that the recurring cycles of accreditation are captured in the work of developing the goals.

- Balance hard and soft skills; the T-model and its components should be clear in all programmes.
- At Aalto, all the School of Business programmes should have the ambition of being among the top programmes in the Nordic countries.

Increased diversity

- Need for increased diversity and a broader perspective on diversity (gender, nationality and other) among personnel and students.
- Address the multiculturality and integration of (the growing number of) international students.

Programme organisation – appropriate mandate and conditions

- Appropriate conditions for leadership and management of educational programmes; a clear mandate and access to resources and appropriate level of support.

Goals of lifewide learning

- More concrete actions to develop, target and scale lifewide learning.

Mechanism for sharing good practices

- Create easily applicable, systematic ways of sharing good practices.

Enhanced administrative support

- Make key administrative appointments to improve the school's ability to deliver on various aspects of its mission and better manage the anticipated growth.

Stakeholder collaboration

- Better communication is required towards employers in terms of programme content and learning goals.
- Benchmarking and following what other universities do in the field is important, but also listening to the needs of industry and the expectations of employees.
- Keeping an active role in societal discussions in Finland and bringing our expertise to the discussions is important.

School of Chemical Engineering

Strengths

- School-wide vision on its education with respect to current and future needs in the industry and job market.
- Regular leadership meetings with the vice dean and dean connected to strategy work.
- The school has a clear view of its challenges and risk-mitigation plans have been initiated.
- Strong team effort and team spirit.
- Education portfolio has been revised according to the changing labour market in collaboration with stakeholders.
- Bachelor's and master's level programs are consistent and interconnected with clear learning paths and learning objectives.
- The advisory group for full-time PhD students.
- Focus on attracting talents, professors and lecturers.
- Use of virtual learning, hands-on practices and student-centred learning methods to achieve the learning objectives, e.g. the virtual laboratory lab.aalto.fi.
- Focusing on student study well-being has led to positive trends.
- Long tradition of interaction with industry and stakeholders
- Students traditionally work 3-4 months in the industry, gaining expertise in the field, and can get credit points for this if they report and record their learning.
- Master's students connected to industry through projects, thesis work, and summer jobs, this also emerging at the bachelor's level.

Development areas

Development of education

- Visions of the future should be more explicitly expressed
- Focus areas need to have proven track records
- Multi- and interdisciplinarity is a key element at Aalto. Is it visible enough?
- More attractive programmes needed to increase attractiveness, with clear links to global challenges and megatrends.
- Need a strategy on how to adjust educational activities and resources for an increasing number of students, extended study times, and discrepancies between student workloads and ECTS points.
- The utilisation of feedback to develop course contents, learning outcomes, curricula and learning environment should be transparent.
- Horizontal themes (such as circular economy) should be integrated into programmes.

Student experience

- More diverse and systematic ways to collect and give feedback from and to students concerning educational programme success, workloads, and learning difficulties and obstacles.

- Explication of the skills taught for each course for students to realise that the skill they are learning – presentation skills, for example –are necessary for their work.

Programme management and conditions

- Need to enhance communication between programme directors and teachers.
- Resources needed directly for the development of courses, pedagogical development, human capital, and laboratory as well as virtual facilities.
- Joining forces rather than competing (school-wise, university-wise, and within the field).

Student throughput

- High dropout rate – more concrete actions needed, and increased student engagement.

Enhanced student recruitment

- Ambition level must be set high to attract good students.
- Attractiveness of chemistry and chemical engineering is a shared challenge.
- Trusting "the brand" for attracting and retaining students needs 'future proofing'.
- Increased diversity, while not forgetting to attract and recruit Finnish students.

Digital and hybrid learning environments

- Developing eLearning formats further, including laboratory work, for a more digital/multimodal format.

Systematic alumni network & stakeholder collaboration

- Collaboration should be more systematic and based on strategic thinking; concrete steps to reach the desired future and funding are needed.
- Need to build research competence for the future and make it available to companies.
- Concrete forums for discussion on future trends and how to respond to them is needed.

Doctoral school

- A viable and well-managed doctoral programme with realistic and achievable learning objectives that will be followed is needed.

School of Electrical Engineering

Strengths

- Education is research-based and strongly connected to dynamic industry and public sectors.
- The current core competence level of graduates is good.
- Graduates' entrance into working life is effective and successful – summer and part-time jobs give valuable experience.
- International faculty with both research and teaching strength.
- Teaching is increasingly seen as a shared responsibility.
- Great awareness and honesty in self-evaluation and interviews.
- Courses with hands-on experience, such as ELEC-A4010 "Elverkstad".
- Student guilds traditionally active in programme development
- Teacher coffee-meetings (Opekahvit) several times per semester
- Cooperation with universities of applied sciences for good student recruitment
- Small master's programme creates opportunities for learning in small groups with a lot of hands-on; two teachers in every course

Development areas

Renewal of programme portfolio

- Start with future-led programme ideas based on societal and industry needs, attracting students.
- Integrate personal and professional skills, sustainability, interdisciplinarity.
- Consider interdisciplinary programmes, e.g. electrical engineering combined with sustainability
- Identifying fields in a blind spot of the utmost significance (for instance, wind power in the energy field) – a more systematic process for establishing cross-school programmes is needed, including to avoid silos.

Programme organisation – adequate mandate and conditions

- Strong programmes require strong organisation, i.e. appropriate conditions for leadership and management of programmes.
- A clear mandate, and access to resources and appropriate levels of support.

Development of education

- The development of personal and work-life relevant skills do not get adequate attention.
- Better skills in planning and reporting on experiments are needed.
- Students need skills to keep the focus on their own core field while at the same time grasping the overall picture.
- Modules for cross-school studies (e.g. basic modules in engineering for business school students) – more flexibility for choosing studies and courses.

Pedagogical competence

- Use pedagogical competence to work on educational issues (instead of seeing them as intractable), such as curriculum development, programme leadership, recruitment of female students, organising various forms of teaching, integrated learning, mutually supporting courses.

Student experience

- Students should be able to declare their major and apply directly to it. Curriculum development should be done autonomously in each major. Make clear to students that lecture notes and disciplinary content are what define the objectives of courses, not the stated learning outcomes.
- Rework the schedule and improve coordination to get a more even student workload throughout the year.
- Monitor that the workload is approximately consistent with the ECTS credits.
- Encouragement for diversity (to support students' study choices) and strengthening students' cross-disciplinary study choices. Enlarge awareness and information about these study possibilities.

Lifewide learning

- Continuous/lifewide learning needs are apparent– to support recent graduates as well as older alumni in working life to meet the rapid changes in society.

Integration of international students

- Active support for the integration of international students in Finnish society and Finnish working life. Strong support during the studies, creating a sense of belonging
- Create a master's level study environment where Finnish and international students work together (implemented systematically, not just voluntary).

Systematic stakeholder collaboration

- Stakeholder collaboration needs to be more systematic, not rely mainly on individual efforts.
- Raise the visibility and provide information about stakeholders for students.
- Stakeholder support could be used in enhancing the attractiveness of the programmes, also in attracting more women into technology fields.

School of Engineering

Strengths

- International reputation, brand and identity
- Overall good level of education and teaching, and graduate employment
- Highly motivated, knowledgeable and competent teachers
- Wide-ranging educational portfolio
- Research- and future-oriented approach to teaching
- Increasing multidisciplinarity in the bachelor's degree programmes
- Large intake and good quality of students
- Growing internationalisation of students
- Gender balance and diversity are improving
- Sustainability, digitalisation and urbanisation themes are understood as key challenges and being tackled in many of the programmes
- Moving towards the contextualisation of 'technical' objectives within the broader socio-spatial context
- Strong support systems for students and staff
- Awareness of the importance of valuing and giving recognition to teaching
- Studios and teaching forums for teachers, to help with collaboration and coordination in teaching activities.
- The use of real-world problems
- Informal co-teaching with ARTS
- Dean's List initiative to improve completion rates

Development areas

Renewal of programme structures

- Capitalise on the momentum set by the merger of the two schools to create a vibrant, collegiate environment.
- Broaden and deepen the progress towards co-creation and collaborative teaching across the school and with other Aalto schools.
- Enhance the sense of community for the teachers at the bachelor's level to overcome the challenges of the large size of the school and long distance between buildings, for example, through more interactive and team-building events.
- Encourage professors' full engagement in the bachelor's programme and enhance the sense of community.

Student experience

- Develop a collaborative system (between staff and students) of gathering student feedback and 'close the loop' by using the feedback to improve the courses and programmes.
- Address the inconsistencies between workload expectations and course credits.

Development of education

- Make the existing transferable skills more visible, teach them systematically, perform their assessment by experts, and include them in the school's objectives and the learning outcomes.
- More support for life-management skills and professional identity building throughout the studies at all levels (BSc, MSc, DSc).
- More collaboration with existing incentives (e.g. Aalto Ventures Programme) to improve and encourage an entrepreneurial mindset and skills.
- More collaboration between programmes within the school (as well as with other schools), to support broader multi-disciplinary understanding and competence development among students (e.g. Digital Twins, Internet of Things, Smart Cities, Geographic Information System).

Doctoral education

- A better and more systematic doctoral research training programme is needed as well as more systematic and consistent quality assurance throughout the doctoral studies at the school level.

Programme organisation – appropriate mandate and conditions

- Create the appropriate conditions for strong educational leadership and management of programmes.
- Provide concrete incentives to motivate and encourage collaboration and co-teaching between teachers and programmes.
- Assign the same value and recognition to teaching as to research activities.
- Establish advisory boards at the department and/or programme level.

Increased diversity

- Continue to improve the gender balance and diversity of student intake.
- Further improve the gender balance among the management and the teaching staff.
- Encourage English-speaking staff to learn Finnish to enable them to communicate with Finnish students.

Enhanced student recruitment

- More flexibility in the master's programmes with regard to prerequisites, to accommodate students from both inside and outside Aalto.
- Publicise and make visible the possible pathways that students can take from bachelor's to master's programmes.
- Attract and retain international students, actively support their integration in Finnish society and Finnish working life.

Systematic alumni network & stakeholder collaboration

- Systematic and strategic stakeholder collaboration for identifying future competence needs in degree education as well as lifewide learning needs.

- Create more opportunities for industry to collaborate in shaping the learning outcomes and in developing a professional identity for the different educational pathways.
- More professors of practice and/or guest lectures from stakeholders to bring working life closer to teaching.

School of Science

Strengths

- Strong brand
- Relevance of the education portfolio
- Engaged teaching staff
- Students are offered many choices and their voices are heard
- Openness to multidisciplinary opportunities
- Good throughput
- Collaboration with industry
- Feedback possibilities
- Variety of learning approaches
- Outreach to promote engagement in Aalto SCI
- Joint programmes, service teaching

Development areas

Vision and strategy for Aalto SCI

- Formulate a clear vision for Aalto SCI and a supporting strategy that is consistent with that of the university.
- Realise interdisciplinary opportunities by:
    - Making service teaching more co-creational and less transactional.
    - Developing the liaison tutor idea across schools to promote greater understanding.
    - Challenging the bureaucratic and operational barriers and funding models that impede creative ideas and student mobility.
    - Form synergies with industrial engineering; utilise the School of Business more, reducing overlaps.

Management and organisation

- Enhance the inclusivity and transparency of management and dialogue. The school needs to work more as a team with clarity in terms of communication, responsibility and authority.
- A stronger and clearly defined role for the programme director, with a clear mandate (on both strategic and operational issues) and access to resources and appropriate levels of support.
- A working quality-assurance system is needed to show that actions from processes are operationalised and followed up on consistently, e.g. through feedback channels between staff and students.

Increased diversity

- Need for increased diversity and a broader perspective on diversity (gender, nationality and other types) among personnel and students.
- Understanding the role of the school in producing professionals for top positions in Finnish working life, and hence the responsibility to enhance diversity actively.

Development of programme portfolio and education

- Build a coherent portfolio that is based on the school's strengths, addresses societal needs, and has an efficient design, e.g. a master's portfolio with a common core and specialisms that promote greater interdisciplinarity.
- Promote the interconnectedness between modules within a course and the bachelor's and master's elements of the portfolio.
- Emphasise the constructive alignment of courses and workload.
- Review the teaching block structure.
- Ensure that students learn working life skills: business competences, communication skills, teamwork, leadership.
- Seek efficiencies in programme design and delivery (common cores, digital opportunities).
- Implement group supervision strategies for projects and thesis work.

Student experience

- Raise the awareness of other students to explore the opportunities to study in the SCI and for SCI students to study in other schools. Focus on removing barriers and creating opportunity.
- Ensure the hours per ECTS are consistently applied in course design to mitigate work overload.
- The five-period system creates an uneven balance between the periods. Better curriculum mapping needed.
- The assessment criteria and the learning outcomes often seem unclear to the students.
- Improve communication to students, including in creative ways and ensuring students know where to find information and support.
- The fact that students are employed at the same time as their university learning should be embraced. Active investigation of frameworks and tools to capture evidence of work-based learning for recognition in the programmes.

Enhanced student recruitment

- Substantial increase needed in student recruitment to meet the needs in Finnish working life.
- Attraction and retention of international students, active support for their integration in Finnish society and in Finnish working life.

Doctoral education

- Implement a more robust and systematic quality framework where the outcomes of the quality process translate into concrete actions for programme development.

- Different work-life perspectives need to be embedded in the doctoral pro-gramme in order to prepare students for different types of career paths.

Lifewide learning

- A significant opportunity to be capitalised on. Incorporate a lifewide learning element in the SCI's strategy.

Systematic alumni network and stakeholder collaboration

- Have an open and welcoming attitude towards stakeholder collaboration and development.
- Effectively and consistently involve alumni and industry in strategic and oper-ational activities, e.g. set up an advisory board of stakeholders for the school and/or programmes.
- Strategic collaboration, e.g. industrial networks for doctoral students.

4. Conclusions and next steps

This chapter presents the main conclusions that can be drawn from the evaluation results and the next steps in the development of teaching and learning at Aalto. The chapter also includes observations on the evaluation process and recommendations for similar projects in future.

Conclusions and next steps

TEE 2020 has brought up many strengths that we have in our educational activities. Talented and motivated faculty and many attractive programmes, for instance, will form a solid foundation for our work in the coming years.

Parallel to this, the evaluation has pointed out important and substantive development needs in education at Aalto. As was pointed out particularly by the international review panel, Aalto has already identified several of these development needs and initiated actions to address them. Praise was given for Aalto's candid self-awareness, resulting in a clear view of the challenges, together with risk-mitigation plans. In this way, there is a promising momentum in the development and revision of education. The momentum is heightened by the TEE 2020 results of a passionate and engaged faculty and student body, and a strong sense of pride in belonging to the Aalto community. The prerequisites for successful development and revision actions seem to be in place, and it is time to put these actions into practice.

Development actions can be divided into short- and long-term. The timeline for short-term actions is based on the curriculum cycle of the university, which is two years. The current curriculum cycle ends at the end of the 2021–2022 academic year, and the next curriculum cycle is for 2022–2024. The timeline for long-term actions extends through the strategy period of the university. Aalto's new strategy has just been launched, and the first planning period is for 2021–2024.

For the curriculum cycle 2022–2024, based on the results of TEE 2020, the Learning Steering Group (LESG) has discussed the following themes as central for curriculum development:

- Assessing and developing measures to alleviate the workload experienced by students in the courses and the programmes, based on the available feedback. In addition, ensuring that the content of the courses, the teaching methods.

and the methods for evaluating teaching and learning support the completion of the learning outcomes within the target time.

- Enhancing cross-school and cross-unit planning and co-development both on the individual-teacher level and on the programme level (structural level).
- Advancing the cross-cutting themes of sustainability, radical creativity and entrepreneurial mindset in the degree programmes.
- Implementing and boosting digital solutions in the pedagogical framework and support services.
- Identifying lifewide learning perspectives and potential (elements within courses, micromodules etc) in the programmes.

The target is to achieve a living, work-in-progress document supporting community discussions and fostering a learning-centric culture with key elments of the future-led-learning strategy.

The guidelines and instructions for the new curricula revision will be decided before the end of spring term 2021. Proposals for development targets is prepared and discussed primarily in the LESG and decided on in the University Academic Affairs Committee (AAC).

In the longer term, an elemental part of the development of Aalto University's educational impact is systematic and evidence-based management of the educational portfolio. How to introduce new programmes and evaluate and develop existing ones are important decisions that can benefit from cross-school discussions to identify potential interfaces, synergies and meaningful correlations. There is substantial untapped potential in the portfolio management practices for ensuring a balanced and attractive portfolio of educational programmes from the BSc level to the MSc and doctoral level. LESG has already identified the portfolio of BSc programmes and programme development as a subject to be discussed Aalto-wide during 2021.

Many of the educational development ventures and projects complementing curriculum work can also contribute to resolving the challenges brought up by TEE 2020. Schools are analysing the key findings in connection with their dialogue process and annual-clock activities during 2021, and LESG will continue the Aalto-wide coordination of the most prominent development activities within education. For the strategic planning period 2021–2024, the following key strategic projects are being considered:

- Education shaping a sustainable future – integrating cross-cutting themes and multidisciplinarity into the programmes
- OASIS – incubator of holistic wellbeing
- Developing our digital and engaged learning environment

Finally, not every important thing needs to be organised as a project or formal development venture. Open dialogue within the Aalto community and everyday ac-

tions, e.g. the development of the effective use of study periods as a means of supporting the reduction of workloads, showing the value of teaching and learning, as well as also small steps taken to carry on and improve our already high-quality education, can make a big impact in the longer term. Both major development activities and small-scale, easily adaptable actions enhance learning-centricity and the student experience.

Observations on the evaluation process

As a comprehensive evaluation of all degree education at Aalto, with substantial evaluation data from several both internal and external perspectives, TEE 2020 can be judged a successful and worthwhile endeavour. The evaluation required dedication and substantial input from the degree programmes and from the schools. The level of motivation was high, and the different stages of the evaluation process attracted much interest and high expectations. The required work would have been less demanding for all involved if the general objectives of TEE 2020 had been more clearly and concretely stated. It seemed at times that the respondents were generally uncertain about the goals and the final outcomes of the evaluation, and therefore were not always able to see the benefits of the process beyond the individual programmes. Questions were raised about the utilisation of the produced evaluation material. Clearly, communication about the targets and the motivation of TEE 2020 could have been more thorough and reached out more actively to the Aalto community.

The first evaluation phase – the programme self-evaluation – was received as a good tool for reflecting over the purposes, goals and practices of the programmes. The evaluation process differed, however, between the programmes as they differ in size and structure. Overall, the participants found the internal workshops and discussions the most valuable part of the self-evaluation process. To improve the detailed and sometimes overlapping self-evaluation survey, the participants put forward suggestions for a more focused survey with specific themes or a more narrative format. According to the participants, the main objective should be a reflection over the programme's overall objectives, and what the focus should be when developing the programmes further. The questionnaire could also have included possibilities to provide feedback concerning the university level. Moreover, more guidelines on how to interpret the terminology and questions would have reduced the confusion brought about by some questions. The hectic spring term was less than ideal timing for the laborious process, due to the annual curriculum process and the sudden switch to remote work due to the pandemic. The flexibility in the evaluation schedule was consequently much appreciated. To anticipate the workload and plan the internal processes, all the participants would have hoped for more informative and clearer communication well in advance.

The second evaluation phase – the peer review – was perceived as beneficial and instructive. The peer review seemed to create a genuine interest in building up a network of peer support in degree programme management and development. The peer review was also praised for having a well-functioning format. The external facilitation of the peer discussions was appreciated, and it allowed the programme representatives to focus on what was the most useful part of the discussions, i.e. the sharing of experiences. The participants found it very useful to share with peer programmes the concrete good practices, challenges and other experiences. As a result of the peer review, wishes were expressed for creating a feasible peer network for degree programmes, as well as other systematic ways to share experiences and practices and to give collegial support.

The third evaluation phase – the stakeholder review – was very well received in the schools and by the stakeholder panels. A high level of enthusiasm could be witnessed among both the Aalto participants and the panellists. The review was generally appreciated as an opportunity for the degree programmes and the schools' leadership to receive first-hand feedback and input about the impact and value of Aalto's education. Conducting the review remotely had the effect of intensifying the review days and created a somewhat exhausting experience for the panels. Wishes for more time to discuss in greater depth were expressed repeatedly during the review days. Yet, most panellists acknowledged that the time they would have available to take part in such discussions was also limited. All the school panels expressed their appreciation for being invited to participate and noted that it had been an interesting and rewarding experience. Some panel members even asked to be invited back after the evaluation process was completed to discuss the overall results and the planned development actions. Moreover, several panel members expressed their interest in continuing active participation in the development of education as, for example, members of an advisory board. However, the panels also noted different levels of interest and engagement from various programmes towards TEE 2020. It was emphasised that this kind of external evaluation can, at its best, give valuable input to the programmes and should be taken as a serious opportunity to develop teaching and learning. Some programmes felt the content of the discussions was not focused on the themes of the evaluation (such as the future of work, and stakeholder collaboration), but instead focused on the present situation in working life and the needs in the immediate future.

The fourth and last evaluation phase – the international review – has received praise and appreciative feedback from the participants, both from the panellists and from Aalto participants. The panel wanted to congratulate everyone for the superb organisation of the remote visit week and the excellent support during the week. Given the need to arrange the site-visit remotely, the practical organisation and arrangements were perceived as exemplary. Specific feedback from the panel related that the technical arrangements worked fine, the document sharing and availability were good and the whole event had a friendly feeling about it. The panel had members from different continents, and the time difference was a challenge. Nevertheless, the panel was able to find ways to write together on one document and hold lively discussions. The panel work was described as very enjoyable. The scheduling of the remote visit week was, however, experienced as intensive and as a difficult balance between, on the one hand, having more time for meetings, including more meetings with participants from the Aalto community, and on the other hand, having more time also for the panel work. Similarly, Aalto participants gave spontaneous feedback about there not always being enough time for discussions. In addition, Aalto participants would have appreciated more detailed instructions for the panel meetings, e.g. specific questions and themes. The panel, on the other hand, specifically wanted to have a certain level of spontaneity and less pre-meditation in the discussions.

The pre-task of the panel prior to the remote visit was appreciated by the panellists and seen as essential and critical for creating a shared point of departure. The amount of material available for the pre-task was, however, perceived as somewhat daunting. The arrangement in which each panellist received a pre-task containing two assessment areas – one in their own area of expertise, the other in the peer's - received good feedback. Assessing two different areas helped the panel to create a more holistic understanding of Aalto, although working on a completely different peer area was also seen as somewhat hard. The primary focus area (i.e. within the panellist's own expertise) inevitably seemed to gain more attention, and the input in the secondary area might suffer. Some of the panel members suggested that more varied background documentation would also have been helpful, e.g. short videos showing different aspects of the campus, and examples of student work. These could be viewed prior to the evaluation and help to give a better feel of Aalto.

To sum up, TEE 2020 succeeded in producing a holistic evaluation of teaching and learning at Aalto from multiple perspectives. It was clearly beneficial for the evaluation to include two different evaluation viewpoints both in the internal evaluation (self-evaluation and peer review) and in the external evaluation (stakeholder review and international review). This meant, of course, that the evaluation project was relatively time-consuming and required a continual – perhaps experienced as prolonged – engagement of the community, and many times the workload fell on the same people. In addition, the pandemic situation in 2020 gave its own twists to the evaluation, and plans had to be changed sometimes quite ad hoc. It was, however, good to see that evaluation discussions could be conducted remotely, and even receive praise for the flexibility the remote mode created. As a conclusion for similar evaluations in the future, multiple evaluation perspectives can be strongly recommended, and hybrid or even fully remotely conducted practical implementations can be made to work successfully.

Below is a concise evaluation summary of the TEE 2020 project.

Evaluation phase	Worked well	Proposals for improvement
Programme self-evaluation	Worked as a good tool for reflecting over the purposes, goals and practices of the programmes Internal workshops and discussions in conducting the evaluation valuable Flexibility in the evaluation schedule	More focused survey with guidelines for terminology and questions, possibility to give feedback to the university level Communication well in advance for reasonable time management; hectic spring term not the best time
Programme peer evaluation	Perceived as beneficial and instructive Sharing and benchmarking between peers External facilitation of the peer discussions	High interest in peer network to be utilised

Stakeholder review	Commitment and enthusiasm among Aalto participants and panellists	More time for the review discussions
	Evaluation data for the panels	Different levels of interest and engagement among programmes
	Organisation and atmosphere of the remote visit day(s)	Some of the review discussions could have been more focused on the evaluation themes
	Aalto facilitation of the review discussions and the panel work	
International review	Pre-task created a shared point of departure	More focused (and less in quantity) evaluation data for the panel
	Commitment and enthusiasm among Aalto participants and panellists	More time for the review discussions and for the panel work
	Organisation and atmosphere of the remote visit week	
	Aalto facilitation of the review discussions and the panel work	
Overall	Holistic evaluation with multiple perspectives	Communication of the targets and the motivation of TEE 2020 for the Aalto community
	Remote mode	Scheduling aligned better with the annual work calendar of the Aalto community
	Committed, often enthusiastic engagement of all participants	

Appendix 1. Project organisation

Project steering

President's Management Team
Professor Ilkka Niemelä, President, Chair
Professor Kristiina Mäkelä, Provost
Professor Ossi Naukkarinen, Vice President (Research)
Professor Petri Suomala, Vice President (Education)
Professor Janne Laine, Vice President (Innovation)

Professor Tuomas Auvinen, Dean, School of Art, Design and Architecture
Professor Jyri Hämäläinen, Dean, School of Electrical Engineering
Professor Timo Korkeamäki, Dean, School of Business
Professor Kristiina Kruus, Dean, School of Chemical Engineering
Professor Jouko Lampinen, Dean, School of Science
Professor Gary Marquis, Dean, School of Engineering

Ms Marianna Bom, Chief Financial Officer
Ms Kati Hagros, Chief Digital Officer
Mr Teppo Heiskanen, Director (Advancement and Corporate Engagement)
Ms Kristiina Kemetter, Head of Legal
Ms Sirkku Linna, Director (Development)
Dr Raili Pönni, Head of Planning and Leadership Support
Mr Jaakko Salavuo, Director (Communications)
Ms Riitta Silvennoinen, Chief Human Resources Officer
Mr Ville Jokela, Managing Director (Aalto University Properties Ltd)

Learning Steering Group 2020
Professor Petri Suomala, Vice President (Education), Chair
Professor Tomas Falk, Vice Dean (Education), School of Business (from 1.8.2020)
Ms Leena Hauhio, Manager, Learning Services
Ms Iiris Kauppila, Manager, Learning Services, School of Art, Design and Architecture
Ms Mari Knuuttila, Manager, Learning Services, School of Science
Professor Ari Koskelainen, Vice Dean (Education), School of Science
Ms Pia Lahti, Manager, Learning Services, School of Business
Ms Saara Maalismaa, Manager, Learning Services
Professor Keijo Nikoskinen, Vice Dean (Education), School of Electrical Engineering
Professor Jouni Paltakari, Vice Dean (Education), School of Chemical Engineering
Ms Sanna Pihlajaniemi, Manager, Learning Services
Dr Perttu Puska, Manager, Learning Services, School of Electrical Engineering
Ms Anni Rintala, Manager, Learning Services, School of Chemical Engineering
Dr Heidi Rontu, Head of Education Development Ventures, Learning Services
Professor Timo Saarinen, Vice Dean (Education), School of Business (until 31.7.2020)
Ms Johanna Söderholm, Manager, Learning Services
Ms Milla Vaisto-Oinonen, Manager, Learning Services, School of Engineering
Professor Kirsi Virrantaus, Vice Dean (Education), School of Engineering

Professor Rasmus Vuori, Vice Dean (Education), School of Art, Design and Architecture
Mr Jussi Välimäki, Head of Business Control, Financial Services
Ms Eija Zitting, Head of Learning Services

Operative lead of the project
Dr Heidi Rontu, Docent, Head of Education Development Ventures, LES

TEE 2020 workgroup
Professor Alexander Frey / Professor Antti Karttunen, School of Chemical Engineering
Ms Noora Jaakkola, Learning Services
Professor Mikko Jääskeläinen, School of Science
Dr Kirsti Keltikangas, School of Electrical Engineering
Ms Milja Leinonen, Student of Technology, Aalto University Student Union
Ms Sanna Pesonen, School of Arts, Design and Architecture
Dr Heidi Rontu, Docent, Head of Education Development Ventures, Learning Services
Ms Johanna Söderholm, Manager, Learning Services
Dr Minna Söderqvist, Manager, Learning Services
Ms Riikka Leikola, School of Business
Professor Kirsi Virrantaus, Vice Dean (Education), School of Engineering
Ms Sara Rönkkönen, Learning Services

Appendix 2. Timeline of the evaluatio

January – May 2020	**Programme self-evaluation**	**Initial deadline for the self-evaluation 31 March, prolonged to 31 May 2020**
May – September 2020	Programme peer review	Deadline for the peer review 30 September 2020
May – September 2020	Programme vision	Deadline for the programme vision 30 September 2020
October 2020	Stakeholder review Remote visit of the school panels	Remote visit dates: 21-23 October 2020
October – November 2020	International review Pre task of the panel	Deadline for the pre task 30 November 2020
December 2020	International review Remote visit of the panel	Remote visit dates: 14-18 December 2020

Appendix 3. Programme self-evaluation instructions

Programme self-evaluation

These are the self-evaluation questions of the Teaching and Learning Evaluation Exercise 2020 at Aalto University (see attachment 1 for the whole evaluation process). The self-evaluation is conducted in all the degree programmes at the university. The deadline for the self-evaluation is by 31st March 2020.

More information about submitting the evaluation report will be available by the end of January 2020.

The self-evaluation questions are organised into eight thematic sections accordingly:

1. Purpose and overview
2. Objectives of the programme
3. Learning outcomes
4. Recruitment and intake
5. Learning
6. Teaching
7. Student, alumni, and stakeholder communities
8. Management and operations

In addition, the Master's degree programmes are asked to align the programme with the research focus areas of Aalto University.

The questions mainly comply with the following structure:

- Brief description
- Estimation of the success rate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent).
- Add, if applicable, good practices and/or perceived challenges.

An introduction for the self-evaluation questions is provided in each thematic section. In the evaluation, you can utilise different feedback and survey data available in the online reporting tool for programme management (see attachment 2 for instructions). In the tool, there are also links to other data relevant evaluation. Support will be offered to use the online tool in clinics in January and February, and on demand. For more information see the TEE webpages at https://www.aalto.fi/en/programme-directors-handbook/teaching-and-learning-evaluation-exercise-tee.

In addition to the data in the reporting tool, we recommend that you use the data from the AllWell? study well-being questionnaire. The AllWell? results have been sent to all programmes. Study wellbeing is an outcome of high-quality teaching, supervising and well designed, functional curriculum (see attachment 3 for more

information). The AllWell? questionnaire measures the alignment of teaching, interest and relevance of teaching and feedback from teachers to students. The results indicate that these factors have a significant impact on the success as well as the wellbeing of students. For any further questions, please contact allwell@aalto.fi.

The programme may conduct the self-evaluation in a way that works best for the programme to achieve comprehensive and analytical evaluation results. We recommend, however, that the assessment discussions concerning the self-evaluation questions involve an extensive number of teaching staff and students who take part in producing the degree programme. Endeavour to keep the answers compact (preferably not more than 500-800 words) and easy to read.

More information about the TEE evaluation will be continuously updated on the TEE webpages https://www.aalto.fi/en/programme-directors-handbook/teaching-and-learning-evaluation-exercise-tee.

If any question seems unclear, please send your query or feedback by email to heidi.rontu@aalto.fi, or call +358 50 307 7875.

Thank you for your commitment to the Teaching and Learning Evaluation Exercise at Aalto University!

Yours sincerely,
Heidi Rontu, PhD, Docent
Head of Education Development Ventures
Learning Services
Aalto University
heidi.rontu@aalto.fi
+358 50 307 7875

School:

Degree programme:

Programme director:

Brief description of how the self-evaluation has been conducted:

Theme 1: Purpose and overview

Goals for providing purpose and overview: What is viewed to be the reasons why the programme exists or has been established, how it serves a larger purpose, what self-assessment practices exist, and what development the programme has undergone

Question 1: Purpose and goals of the programme
Briefly describe the degree programme and its purpose and goals.

Question 2: Development of professional field
Briefly describe future competence requirements within the field.

Question 3: Past changes and revisions
Briefly describe how the programme has been evolving during its lifespan; what have been major revisions, and how the programme has changed?

Question 4: Evaluation and assessment practices
Briefly describe previous evaluations and other assessment practices (e.g. review of annual results), measures and follow-up.

Theme 2: Objectives of the programme

Goals for evaluating the objectives of the programme: Does the programme have well-defined objectives that support its development, provide basis for the planning of curriculum and teaching, and can be monitored to provide feedback about the success of the programme?

Question 5. Learning objectives of the degree programme
5.1 Briefly describe the main learning objectives of the degree programme.

5.2 Briefly describe how the learning objectives are revised and updated.

5.3 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of the process of revising and updating the learning objectives of the programme.

5.4 Add, if applicable, good practices and/or perceived challenges.

Question 6. Alignment and accumulation of the learning objectives of the programme
6.1 Briefly describe how the learning objectives of the programme are linked to the curriculum and teaching.

6.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of linking the learning objectives of courses and modules to the learning objectives of the programme.

6.3 Add, if applicable, good practices and/or perceived challenges.

Question 7. Future societal and professional needs
7.1 Briefly describe how the learning objectives of the programme are aligned with future societal and professional needs.

7.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of the alignment of future societal and professional needs in the programme.

7.3 Add, if applicable, good practices and/or perceived challenges.

Question 8. Degree of internationalisation
8.1 Briefly describe how internationalisation is integrated in the programme, in its functions and delivery.

8.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of integrating internationalisation in the programme.

8.3 Add, if applicable, good practices and/or perceived challenges

Question 9. Multidisciplinary understanding
9.1 Briefly describe how the development of students' multidisciplinary understanding is supported in the programme, in its functions and delivery.

9.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of supporting the development of students' multidisciplinary understanding in the programme.

9.3 Add, if applicable, good practices and/or perceived challenges.

Theme 3: Learning outcomes

Goals for evaluating the outcomes of the programme: Are the outcomes defined and monitored, and is the programme using this information regarding how well it meets the objectives of the programme?

Question 10. Methods for evaluating the learning outcomes
10.1 Briefly describe methods for evaluating the learning outcomes of the programme.

10.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of the used evaluation methods in generating information on the attainment of the learning outcomes.

10.3 Add, if applicable, good practices and/or perceived challenges.

Question 11. Impact of the evaluation on the learning outcomes
11.1 Briefly describe how the evaluation of the learning outcomes is utilised in the development of the programme.

11.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of using the evaluation of the learning outcomes in the development of the programme.

11.3 Add, if applicable, good practices and/or perceived challenges.

Theme 4: Recruitment and intake

Goals for evaluating the recruitment and intake in the programme: Does the programme have efficient and manageable intake sources, does the programme have a clear student profile, is the programme competing for students with other Aalto programmes?

Question 12. Student recruitment
12.1 Briefly describe the ideal student profile of the programme.

12.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of attracting ideal students to the programme.

12.3 Add, if applicable, good practices and/or perceived challenges.

Question 13. Sustainability of student intake
13.1 Briefly describe the sustainability of student intake in the programme.

13.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of the sustainability of student intake.

13.3 Add, if applicable, good practices and/or perceived challenges.

Question 14. Future prospects for student recruitment
14.1 What is the current student intake in the programme, and briefly describe the growth potential of student intake.

14.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the growth potential of the student intake in the programme.

14.3 Add, if applicable, good practices and/or perceived challenges.

Theme 5: Learning

Goals for evaluating learning in the programme: Do the learning objectives of the programme materialise in students' learning outcomes, does the programme and its learning environment support good student experience.

Question 15. Feedback and support for students' learning
15.1 Briefly describe methods for providing feedback and support to students on their learning.

15.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of providing feedback and support to students on their learning.

15.3 Add, if applicable, good practices and/or perceived challenges.

Question 16. Accessibility and flexibility in students' learning
16.1 Briefly describe the methods for supporting accessible and flexible learning paths in the programme.

16.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate for accessible and flexible study paths.

16.3 Comments, if applicable, e.g. good practices and/or perceived challenges.

Question 17. The competence and professional development of students
17.1 Briefly describe the support for students' competence and professional development.

17.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate for supporting the students' competence and professional development.

17.3 Comments, if applicable, e.g. good practices and/or perceived challenges.

Theme 6: Teaching

Goals for evaluating teaching in the programme: How well is the teacher community functioning, can the teachers work towards programme goals, what is the role of the programme director in the development of teaching?

Question 18. Teaching methods
18.1 Briefly describe teaching methods and pedagogical solutions used in the programme.

18.2 Briefly describe the use of digital solutions in teaching and future prospects for digitalisation in the programme.

18.3 Briefly describe the use of real-life cases and/or working life collaboration in teaching.

18.4 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the suitability of the used teaching methods and pedagogical solutions in order to achieve the intended learning outcomes of the programme.

18.5 Add, if applicable, good practices and/or perceived challenges.

Question 19. What is the status of student study well-being in the programme
19.1 Briefly describe the status of student study well-being in the programme.

19.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the status of student study well-being.

19.3 Briefly describe methods for supporting study well-being in the programme.

19.4 Comments, if applicable, e.g. good practices and/or perceived challenges.

Question 20. Teacher community
20.1 Briefly describe the teacher community of the programme.

20.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the functionality of the teacher community in working towards the intended learning outcomes of the programme.

20.3 Add, if applicable, good practices and/or perceived challenges.

Question 21. The role of the programme director
21.1 Briefly describe the role of the programme director in the development of teaching in the programme.

21.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the success rate of the impact of the programme director on the development of teaching.

21.3 Add, if applicable, good practices and/or perceived challenges.

Theme 7: Student, alumni, and stakeholder communities

Goals for evaluating the student, alumni and stakeholder communities: Does the programme have a functioning student community, is the programme cooperating with student community in the development of the programme, is there a functioning alumni and stakeholder community, is the programme cooperating with alumni and stakeholders in the development of the programme?

Question 22. Student collaboration and feedback
22.1 Briefly describe the programme's procedures for student collaboration and collecting and processing student feedback.

22.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the extent of implemented development measures on the basis of student collaboration and feedback.

22.3 Add, if applicable, good practices and/or perceived challenges.

Question 23. Alumni collaboration and feedback
23.1 Briefly describe the programme's procedures for alumni collaboration and collecting and processing alumni feedback.

23.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the extent of implemented development measures on the basis of alumni collaboration and feedback.

23.3 Add, if applicable, good practices and/or perceived challenges.

Question 24. Stakeholder collaboration and feedback
24.1 Briefly describe the programme's procedures for stakeholder collaboration and collecting and processing stakeholder feedback.

24.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the extent of implemented development measures on the basis of stakeholder collaboration and feedback.

24.3 Add, if applicable, good practices and/or perceived challenges.

Theme 8: Management and operations

Goals for evaluating the management and operations the programme: Do the management procedures support the programme and its development, is the resourcing supporting the programme and its development, is the connection between the programme and the organising department(s)/school(s) supporting the programme and its development

Question 25. Management of the programme
25.1 Briefly describe decision-making and other relevant management processes of the programme.

25.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) how well the management procedures of the programme support the achievement of the objectives of the programme.

25.3 Add, if applicable, good practices and/or perceived challenges.

25.4 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) how well the management procedures support solving potential problematic situations in the programme.

25.5 Add, if applicable, good practices and/or perceived challenges.

Question 26. Support for educational leadership of the programme
26.1 Briefly describe the support for educational leadership of the programme.

26.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the support for educational leadership of the programme.

26.3 Add, if applicable, good practices and/or perceived challenges.

Question 27. Resources for the programme
27.1 Briefly describe the resources that are available for the programme

27.2 Estimate on a scale of 1-4 (1=absent/poor, 2=emerging, 3=good, 4=excellent) the adequacy of resources.

27.3 Add, if applicable, good practices and/or perceived challenges.

For Master's degree programmes

Alignment with the research focus areas of Aalto University
Assess the status of the degree programme in relation to the seven focus areas of research at Aalto University. The focus areas are identified in the Aalto University Research, Art and Impact (RAI) Assessment 2018, https://www.aalto.fi/en/re-search-art/research-assessments

Please choose 1-2 research focus areas that the programme is most closely linked to.
The research focus areas are:

1.   Advanced energy solutions
2.   Art and design knowledge building
3.   Global business dynamics
4.   Health and wellbeing
5.   Human-centred living environments
6.   ICT and digitalisation
7.   Materials and sustainable use of natural resources

Appendix 4. Evaluated degree programmes

Bachelor's programmes

Aalto ARTS: Bachelor's Programme in Arts, Design and Architecture

Aalto BIZ: Bachelor's Programme in International Business
Bachelor's Programme in Business
Bachelor's Programme in Economics

Aalto CHEM: Bachelor's Programme in Chemical Engineering

Aalto ELEC: Bachelor's Programme in Electrical Engineering

Aalto ENG: Bachelor's Programme in Engineering

Aalto SCI: Bachelor's Programme in Science and Technology
Aalto Bachelor's Programme in Science and Technology

Master's programmes

Aalto ARTS: Master's Programme in Architecture
Master's Programme in Art Education
Master's Programme in Collaborative and Industrial Design
Master's Programme in Contemporary Design
Master's Programme in Costume Design
Master's Programme in Creative Sustainability
Master's Programme in Fashion, Clothing and Textile Design
Master's Programme in Film
Master's Programme in Interior Architecture
Master's Programme in Landscape Architecture
Master's Programme in New Media
Master's Programme in Nordic Visual Studies and Art Education
Master's Programme in Photography
Master's Programme in Urban Studies and Planning
Master's Programme in Visual Cultures, Curating and Contemporary Art
Master's Programme in Visual Communication Design

Aalto BIZ: Master's Programme in Accounting
Master's Programme in Business Administration
Master's Programme in Business Law
Master's Programme in Economics
Master's Programme in Entrepreneurship and Innovation Management
Master's Programme in Finance
Master's Programme in Global Management
Master's Programme in Information and Service Management
Master's Programme in International Design Business Management
Master's Programme in Management and International Business
Master's Programme in Marketing

Aalto CHEM: Master's Programme in Chemical, Biochemical and Materials Engineering

Aalto ELEC: Master's Programme in Automation and Electrical Engineering
Master's Programme in Electronics and Nanotechnology

Aalto ENG: Master's Programme in Advanced Energy Solutions
Master's Programme in Building Technology
Master's Programme in Geoengineering
Master's Programme in Geoinformatics
Master's Programme in Mechanical Engineering

Master's Programme in Real Estate Economics
Master's Programme in Spatial Planning and Transportation Engineering
Master's Programme in Water and Environmental Engineering

Aalto SCI: Master's Programme in Computer, Communication and Information Sciences
Master's Programme in Engineering Physics
Master's Programme in ICT Innovation
Master's Programme in Industrial Engineering and Management
Master's Programme in Information Networks
Master's Programme in Life Science Technologies
Master's Programme in Mathematics and Operations Research

Doctoral programmes

Aalto ARTS: Doctoral Programme of Aalto Arts

Aalto BIZ: Doctoral Programme in Business, Economics and Finance
Aalto Executive Doctor of Business Administration

Aalto CHEM: Doctoral Programme in Chemical Engineering

Aalto ELEC: Doctoral Programme in Electrical Engineering

Aalto ENG: Doctoral Programme in Engineering

Aalto SCI: Doctoral Programme in Science

Appendix 5. Instructions for the programme peer review

Peer review, description

The purpose
The purpose of the peer review to share the current state and the quality of the planning, management, implementation, and development of the degree programme with another programme. The peer review focuses rather on managerial procedures and practices than the quality of results or individual teaching approaches or contents of the programme.

The targets
Provides ideas and perspective about how to develop the programme, and offers an opportunity to learn from good practices and development ideas in another programme
Creates an opportunity to network among programme directors and other key persons involved in the programme development
Strengthens programme management skills through peer support
Offers benefits for the audition of Aalto University due in 2022. The audit will include a mandatory bench-learning phase (see FINEEC guidelines). Peer review works as a rehearsal for the audit.

The method
The peer review is a guided/facilitated discussion between programme directors and 1-4 members of academic staff, LES personnel or other key persons involved in the programme development.
The pairing of the programmes is conducted by the Vice Deans for Education in the Aalto schools. The programmes will be informed about their pairs in April.
The peer discussion is based on the questionnaire in the programme self-evaluation with the aim of identifying strengths and weaknesses, and good practices to share. The peer programmes can concentrate on two or three themes in the peer review discussion. The peer programmes agree on the themes for the peer discussion before the discussion.
The peer discussion is estimated to take 3-4h, and the discussion is facilitated by personnel from the learning services/outsourced facilitation support. In the peer review the emphasis is on the discussion. Written feedback is not required but can be given as part of the peer discussion.

The outcome
Summary of the peer discussion (= 'great practices to share'), support for the summary offered by the facilitator(s).
Each individual programme comprises a short vision for the programme as result of both the self-evaluation and the peer review. The vision should describe the target state of the programme for the upcoming years, and it is written according to a given template.

Appendix 6. Instructions for the programme vision

Programme Vision

Please write a vision for your programme. The recommended length of the vision is one A4 page. You have two questions to support you in writing the vision.

1. What are the main lessons learned of the programme's self-evaluation?

2. What is the programme's foresight of the content development and the development of teaching and learning methods?

Appendix 7. Stakeholder review panels

School of Art, Design and Architecture
Erkki Astala, YLE
Kari Korkman, Helsinki Design Week
Jarmo Lampela, YLE
Katarina Nyman, Nordisk Film
Jukka Savolainen, Desigmuseum
Kirsikka Vaajakallio, Hellon

School of Business
Jaakko Eteläaho, Nordea
Miikka Huhta, Miltton
Markus Helaniemi, Vapa Media
Kari Janhunen, Finpro
Joni Mäkinen, Alma Media
Pekka Rantala, Epassi
Marita Salo, Henry ry
Mia Sirkiä, Saari Partners

School of Chemical Engineering
Naveen Chenna, Andritz
Carmela Kantor-Aaltonen, Chemical industry Federation
Mervi Karikorpi, Teknologiateollisuus ry
Juhani Nokela, Tekniikan akateemiset ry
Jarkko Partinen, Outotec
Reetta Strengell, Kemira

School of Electrical Engineering
Mikael Björkbom, Konecranes
Heikki Holmberg, Okmetic
Matti Kauhanen, ABB
Matti Keskinen, Nokia
Tomi Salo, VTT

School of Engineering
Petteri Katajisto, Ministry of Environment
Miimu Airaksinen, Rakennusinsinöörien liitto ry
Jarkko Koskinen, National Land Survey of Finland
Ari Bertula, Konecranes
Kati Kiyancicek, City of Helsinki
Tarja Laine, City of Vantaa
Mikko Leppänen, Ramboll

School of Science
Tuula Antola, City of Espoo
Eija Hakakari, YLE
Ismo Laukkanen, ABB
Rasmus Roiha, Ohjelmisto- ja e-business ry
Jarmo Ruohonen, ZenRobotics Oy
Anssi Salmela, Bluefors Oy
Mikko Viikari, Futurice

Appendix 8. Timetable and facilitation of the stakeholder review

School	Date for the remote visit	Facilitation
School of Arts, Design and Architecture	21 – 23 October 2020	Ms Noora Jaakkola, Planning Officer Ms Sanna Pesonen, Planning Officer
School of Business	21 – 23 October 2020	Dr Perttu Kähäri, Head of Development Ms Anni Nousiainen, Coordinator
School of Chemical Engineering	22 October 2020	Dr Jaana Suviniitty, Pedagogical Specialist Ms Eija Zitting, Head of Learning Services
School of Electrical Engineering	21 – 22 October 2020	Dr Kirsti Keltikangas, Pedagogical Specialist Ms Eeva Halonen, Planning Officer
School of Engineering	21 – 23 October 2020	Mr Jyrki Romu, Laboratory Engineer Ms Johanna Söderholm, Manager Ms Maiju Tikkanen, Coordinator
School of Science	21 – 23 October 2020	Ms Marja Niemi, Development Manager Dr Heidi Rontu, Docent, Head of Education Development Ventures

Appendix 9. Instructions to the stakeholder review panels

Stakeholder review

Introduction

The purpose of the stakeholder review is to evaluate the current state of the degree programmes of Aalto University, reflect on the relation and relevance to the needs in the labour market and in society at large. The review aims at providing feedback and recommendations for future development of the degree programmes.

The focus of the review is in what kind of knowledge and competence Aalto University produces to society. In the review it is interesting to see whether Aalto University and its stakeholders share a common understanding of the future needs in the labour market and in society; do Aalto University and its stakeholders have same ideas of the world and future challenges and prospects, and how can we face these together.

There is a stakeholder review panel for each Aalto school. The panel consists of representatives for the labour market and the third sector for which graduates from Aalto University are important. The panel will have a one - three-day site visit in the school. The site visit consists of review interviews with the leadership and the degree programmes of the school.

Before the site visit, the panel will receive review data of the degree programmes and the school. The panel will have the programme self- and peer evaluations and the programme visions. In addition, the panel will have a summary of the core statistics of the programmes and the school.

The site visit - review interviews

The panel will meet the leadership of the school and the representatives of the degree programmes of the school for a review interview. The school has decided the representatives of the school's leadership, and similarly together with the degree programmes, has decided the representation of the degree programmes in the interview.

In the interview the panel has the role of asking questions with the aim of creating an active discussion. Each interview starts directly and does not include any programme or other general presentations. During the degree programme interviews, it is possible that some of the leadership of the school, e.g. the vice dean of education and the head of academic affairs are present. Their role in the programme interviews is, however, not active but rather that of a listener.

There is facilitation of the interviews with the purpose of ensuring a successful management of the interview schedule and the evaluation report of the panel. The facilitator starts the interview, introduces the participants, manages the opportunities to speak and ends the interview. The facilitator, together with assistant(s), is responsible for writing the report, based on the interviews. At the end of each review day, the facilitator summarises the results of the day's discussions, and at the end of the last review day summarises a **concluding evaluation of strengths and development needs** for the approval of the panel.

School
Interview with the leadership of the school

The themes of the interview are **the future of work** and **stakeholder collaboration**.
The panel is requested to identify strengths and the development needs under these themes in the education of the school.

How does the future of work look like in the professional field(s) of the school?
- Current competence of the graduates
- Future competence needs in working life and society
- Development needs in the education to meet the future of work

What are the school's targets for stakeholder collaboration?
- Current forms of stakeholder collaboration
- Good practices of stakeholder collaboration
- Development needs of stakeholder collaboration

Degree programme
Interview with the degree programme

The themes of the interview are **the future of the field (5-10 years)** and **stakeholder collaboration**. The panel is requested to identify strengths and the development needs under these themes of the degree programmes. Below are some support questions for the interview.

How does the future of the field look like (5-10 years)?
- The grand challenges of the field
- The impact of the future prospect of the field on the programme
- Competences needed for future challenges

What are the good practices and future needs for collaboration between the programme and stakeholders?
- The current forms of stakeholder collaboration

- New openings for the collaboration between the programme and stakeholder
- Concrete ways to develop the collaboration

Appendix 10. International review panel

Field of arts
Prof. em. Ellen Hazelkorn
Director of Higher Education Policy Research Unit (HEPRU)
Dublin Institute of Technology
Ireland

Prof. Rachel K.B. Troye
Pro Rector
Head of Institute, Institute of Design
The Oslo School of Architecture and Design (AHO)
Norway

Field of business
Prof. Dorte Salskov-Iversen
Head of Department
Copenhagen Business School
Denmark

Prof. Mark Freel
Vice-Dean
Telfer School of Management
Ottawa University
Canada

Virpi Malin, PhD, Lic.Sc., MBA
University Teacher
University of Jyväskylä
Finland

Field of science and engineering
Prof. Jens Bennedsen
Science and Technology Learning Lab
Aarhus University
Denmark

Prof. Robin Clark
Dean and Director of Education
International Manufacturing Centre
University of Warwick
UK

Prof. Carey Curtis
Land use and transport integration research
Curtin University
Australia

Prof. Simin Davoudi
Environmental Policy & Planning
Director of GURU (Global Urban Research Unit)
Newcastle University
UK

Prof. Christina Divne
Structural Biology
Director of Third Cycle Education
KTH Royal Institute of Technology
Sweden

Prof. Kristina Edström
CHAIR
Engineering Education Development
KTH Royal Institute of Technology
Sweden

Prof. Harri Haapasalo
Industrial Engineering and Management
Head of research unit
University of Oulu
Finland

Prof. Hanna Knuutila
Chemical Engineering
Deputy of Education
NTNU
Norway

Prof. Greet Langie
Mechanical Engineering Technology
Vice Dean for Education, Faculty of Engineering Technology
KU Leuven
Belgium

Prof. Jan Lundell
Chemistry (Chemistry Education)
Chair of LUMA
University of Jyväskylä
Finland

Prof. Lars Lundheim
Electrical Engineering (engineering education)
NTNU
Norway

Appendix 11. Instructions for the pre task of the international panel

The deadline for the pre task is 30th November 2020.

As the member of the review panel you are invited to create an **understanding of the current state of education at Aalto University**, based on the eight themes of the programme self-evaluation conducted by bachelor's, master's and doctoral degree programmes of Aalto University.

You will be working on two areas: **your own education expertise area** (number 1 in the table) and **the education expertise area** (number 2 in the table) that is given to you.

You are asked to identify the most central issues, good practices and development needs. In order to help you in this task, we propose that you use the SWOT tool to support the analysis. The target is to use the tool to support the analysis. You need not fill all the four parameters of SWOT rigorously in all the eight themes and the two education expertise areas, but rather as you identify issues and topics.

Below is a short description of the four parameters of SWOT (e.g. Helms & Nixon 2010):

- *Strengths*: characteristics of the business or project that give it an advantage over others (internal factors)
- *Weaknesses*: characteristics of the business that place the business or project at a disadvantage relative to others (internal factors)
- *Opportunities*: elements in the environment that the business or project could exploit to its advantage (external factors)
- *Threats*: elements in the environment that could cause trouble for the business or project (external factors)

In addition to the SWOT parameters, you are encouraged to write down questions and topics under each theme and education expertise area that you would like to include in the site visit. **You can also point out** important remarks relating, e.g. issues specific for a certain degree level (bachelor, master, doctoral).
For the pre task, the panel is requested to use the following evaluation material, of which programme vision, peer review and self-evaluation statistics are the primary materials.

- Programme visions (1 page)
- Programme peer reviews (3-4 pages)
- Statistics of the programme self-evaluations
- Access to all the programme self-evaluations

The pre task template
(to be filled in the webropol survey tool https://link.webropolsurveys.com/S/7504648ECC2FD363)

	Education expertise area 1		Education expertise area 2	
1. Purpose and overview	Strengths	Weaknes-ses	Strengths	Weaknes-ses
	Opportuni-ties	Threats	Opportuni-ties	Threats
Questions, topics for the site visit				
2. Objectives of the prog-ramme	Strengths	Weaknes-ses	Strengths	Weaknes-ses
	Opportuni-ties	Threats	Opportuni-ties	Threats
Questions, topics for the site visit				
3. Learning outcomes	Strengths	Weaknes-ses	Strengths	Weaknes-ses
	Opportuni-ties	Threats	Opportuni-ties	Threats
Questions, topics for the site visit				
4. Recruitment and intake	Strengths	Weaknes-ses	Strength	Weaknes-ses
	Opportuni-ties	Threats	Opportuni-ties	Threats
Questions, topics for the site visit				
5. Learning	Strengths	Weaknes-ses	Strengths	Weaknes-ses
	Opportuni-ties	Threats	Opportuni-ties	Threats
Questions, topics for the site visit				
6. Teaching	Strengths	Weaknes-ses	Strengths	Weaknes-ses
	Opportuni-ties	Threats	Opportuni-ties	Threats

Questions, topics for the site visit				
7. **Student, alumni and stake-holder communities**	Strengths	Weaknes-ses	Strengths	Weaknes-ses
	Opportuni-ties	Threats	Opportuni-ties	Threats
Questions, topics for the site visit				
8. **Management and operations**	Strengths	Weaknes-ses	Strengths	Weaknes-ses
	Opportuni-ties	Threats	Opportuni-ties	Threats
Questions, topics for the site visit				

Bibliography

Helms, M. M.; & Nixon, J. C. (2010). Exploring SWOT analysis – where are we now? *Journal of Strategy and Management, 3*(3), 215-251. Retrieved 10.8.2020 at https://emerald.com/insight/content/doi/10.1108/17554251011064837/full/html

Appendix 12. Instructions for the remote review visit and template for the evaluation report

Introduction

Target

The target of the international review is an assessment of Aalto's degree programmes (programme portfolio). The programmes under evaluation are assessed from an international perspective. This means that the programmes should be compared to international education within the same field of higher education, keeping in mind that Aalto University has multidisciplinary actions between arts, science, business and technology.

The panel is requested to assess i) **the current state of education at Aalto** and ii) **the potential for future foresight and renewal**.

In the assessment, the panel is asked to give special attention to the stated focus areas of the evaluation

- Programme (portfolio) management, including Aalto's capability to anticipate the future requirements for work and knowledge
- Competence accumulation in the degree programmes
- Ways of implementing multidisciplinarity in education
- Fluency of student progress through studies

Frame of reference

The frame of reference of the review is the strategy of Aalto. According to the current strategy the purpose of education is to *spark the game changers of tomorrow,* with a focus of development on *future-led learning*. The defined development items within education are

- Renewing educational offering
- Developing our digital and engaged learning environment
- Integrating sustainability and multidisciplinary studies into programmes
- Advancing learning-centricity and focusing on holistic well-being

Previous evaluation and development actions

The previous teaching and learning evaluation exercise was conducted in 2010-2011. As a result of the evaluation several development points were then identified. Many of these have been included in the earlier education strategies of Aalto University.

Below is a comprised list of the most significant development recommendations of the previous evaluation exercise.

- To develop educational leadership and strategic development of degree programmes, the organizational structure and resource allocation of teaching

- To develop systematic evaluation methods, procedures and KPIs for education. The evaluation system should support students' and teachers' role as key actors of teaching and learning.
- To support models and methods for teachers for mentoring and sharing good practices and creating better practices.
- To develop the measurement of the impact of development actions.
- To emphasise the importance of pedagogical competence in personnel policy and ensure that the level of internationality is considered in pedagogical training.

Based on the recommendations from the evaluation in 2010-2011 and other identified improvement needs in education, the university has implemented several development actions and projects. Below is a list of major improvements and development projects conducted since 2010-2011.

- Systematic assessment of the teaching competence of academic personnel as part of the recruitment process
- Pedagogical training for academic personnel
- Aalto Design Factory: interdisciplinary product design and learning hub uniting students, teachers, researchers, and industry
- Strategic initiative Aalto Online Learning: support and innovation centre and network for teachers to develop and master online and blended learning
- Strategic initiative Aalto Ventures Programme: centre providing Aalto students help in building new scalable businesses, and Aalto teachers in including entrepreneurship in education
- Strategic initiative Programme Attractiveness: project with the target to enhance the attractiveness of Aalto University's degree programmes
- Strategic initiative Challenge-based learning: pedagogical method development incorporating real-life challenges provided by partners into teaching in a multidisciplinary way.
- Strategic initiative Success of Students: study well-being project enhancing the success of students by advancing study support, teaching and learning services.

Evaluation interviews

The panel will meet different university stakeholders during the review week both as one panel and as the panel members arranged into smaller groups. The panel members are mostly grouped according to the school allocation in the pre task of the panel. In the pre task each panellist has assessed two schools. Below are the interview groups.

The whole panel
- The initiative meeting with Vice President for Education
- The leadership of the university
- The final meeting with Vice President for Education, Deans and Vice Deans for Education of the schools

The panel grouped
- The leadership of the schools
- The students
  - Student union, university level (AYY & TF)
  - Student representatives, each school separately
  - International students (schools mixed)
  - Doctoral students (schools mixed)
- The personnel (schools mixed)
  - Teaching personnel
  - Programme directors
  - Supporting personnel (schools & university level)

Template for the evaluation report

A. Feedback and recommendations to the university
   a. Strengths
   b. Good practices
   c. Recommendations for improvement

B. Feedback and recommendations to the schools
   School of Art, Design and Architecture
   a. Strengths
   b. Good practices
   c. Recommendations for improvement
   School of Business
   a. Strengths
   b. Good practices
   c. Recommendations for improvement
   School of Chemical Engineering
   a. Strengths
   b. Good practices
   c. Recommendations for improvement
   School of Electrical Engineering
   a. Strengths
   b. Good practices
   c. Recommendations for improvement
   School of Engineering
   a. Strengths
   b. Good practices
   c. Recommendations for improvement
   School of Science
   a. Strengths
   b. Good practices
   c. Recommendations for improvement

Appendix 13. Schedule of the remote review visit

	Mon 14th Dec	Tue 15th Dec	Wed 16th Dec	Thu 17th Dec	Fri 18th Dec
9.30-9.45	Orientation to the day	Orientation to the day	Orientation to the day	Orientation to the day	Orientation to the day
9.45-10.35	Panel working	SCI leadership	Parallel sessions 1. Cross school degree programmes 2. BIZ TEE 2020 task force 3. Student union (AYY & TF)	Panel working	Panel working
10.35-10.50	BREAK	BREAK	BREAK	BREAK	BREAK
10.50-11.40	Vice president for education	Panel working	Parallel sessions 1. Group 1. Master's programmes 2. Group 2. Master's programmes 3. Group 3. Master's programmes	Panel working	Panel working
11.40-11.55	BREAK	BREAK	BREAK	BREAK	BREAK
11.55-12.45	ELEC leadership	CHEM leadership	Parallel sessions 1. Doctoral programmes 2. Bachelor's programmes (Finnish/Swedish) 3. Bachelor's programmes (English)	Panel working	Panel working
12.45-13.30	LUNCHBREAK	LUNCHBREAK	LUNCHBREAK	LUNCHBREAK	LUNCHBREAK
13.30-14.20	ARTS leadership	Aalto leadership	Parallel sessions 1. Group 1. Bachelor's teaching 2. Group 2. Bachelor's teaching 3. Group 1. Master's teaching	Parallel sessions 1. Students of ARTS 2. Students of SCI 3. Students of ENG	Panel working
14.20-14.35	BREAK	BREAK	BREAK	BREAK	BREAK

14.35-15.25	ENG leadership	Aalto leadership	Parallel sessions 1. Group 3. Bachelor's teaching 2. Group 2. Master's teaching 3. Group 3. Master's teaching	Parallel sessions 1. Learning environments 2. Guidance and support for students 3. AllWell? study well-being	Panel working
15.25-15.40	BREAK	BREAK	BREAK	BREAK	BREAK
15.40-16.30	BIZ leadership	Panel working – 16.00	Parallel sessions 1. Doctoral students 2. Students of ELEC 3. Students of CHEM	Parallel sessions 1. Students of BIZ 2. Programme management and development	Vice President for Education, Deans, Vice Deans for Education
16.30-17.00	Panel working		Panel working	Panel working	Wrapping up the evaluation

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