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Digital Technologies in HE: from the European vision to the university governance

Finnish Case Study. LAUREA

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INTRODUCTION

This report is part of the European research and development work of ECOLHE project and focusing on 'Digital Technologies in HE: from the European vision to the university governance'. ***This report presents the preliminary outcomes of conducted research work of Finnish case study.*** The overachieving main objectives of research work and preliminary outcomes includes cases across European partners. The collections of intellectual outcome represents the European perspectives.

The main objectives of the case studies are to illustrate:

- needs and perspective of improvement of the use of digital technologies in HE
- emerging teaching and staff skills for the digital era;
- the most important problems detected and possible solutions.

A proposal for index

To reach the objective, **each case study report must present the following structure**:

- an introduction,
- a reconstruction of the national political framework related to the digital innovation in HE,
- a focus on universities micro-policies by documentary analysis,
- a qualitative analysis of the focus group and interviews results.

This qualitative research will focus on three areas - **organizational, teaching-learning (educational) and cultural area -** that consider the following seven sub-dimension of analysis, based on the proposal of a Digital Maturity Framework for Higher Education Institution[1] which synthesizes the main existent frameworks/models related to the integration of digital technologies in HE (Đurek, Begičević Ređep, Kadoić, 2019).

1. **Leadership, planning and management**
   a. Financial investment in the use of ICT in learning and teaching; research and development; business of the institution
   b. Strategic planning of ICT integration in HEI
   c. Managing the integration of ICT in learning and teaching at HEI
   d. Managing the integration of ICT in scientific research at HEI
   e. Information System for Supporting Business Processes of HEI
   f. Planning and implementation of training of HEI employees in the field of digital competencies and ICT application
   g. The relationship between the HEI and the state from the aspect of ICT integration

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[1] Area/Dimension of analysis rom the digital maturity framework: 1. Leadership, planning and management; 2. Quality assurance; 3. Scientific-research work; 4. Technology transfer and service to society; 5. Learning and teaching; 6. ICT culture; 7. ICT resources and infrastructure http://archive.ceciis.foi.hr/app/public/conferences/2017/02/CECIIS-2017_paper_58_final.pdf (See Annexes 1).

h. HEI policy in ICT integration and monitoring global trends

2. Quality assurance

a. ICT quality assurance policies;

b. monitoring and periodic review of study programmes, from the aspect of ICT application;

c. evaluation of the work of teaching, research, administrative and technical staff;

d. continuous monitoring of the results of scientific-teaching work and progress;

e. procedures for determining the needs, development or acquisition of ICT resources and their application;

f. approved procedures and follow-up on student enrolment, their progress through study and the completion of studies supported by ICT.

3. Scientific-research work

a. The use of ICT in the preparation and publication of scientific papers;

b. ICT support in the preparation and management of scientific research work and projects;

c. ICT research (collaborative ICT research on HEIs);

d. a system of support for researchers at the beginning of their careers in applying ICT in scientific research;

e. continuous training of researchers in ICT application in scientific research;

f. networking and collaboration of researchers with ICT support.

4. Technology transfer and service to society

a. collaboration with stakeholders (employers, local community, pre-tertiary education) supported by ICT;

b. applied research and professional projects supported by ICT and/or ICT;

c. networking of researchers and users of research (stakeholders) supported by ICT.

5. Learning and teaching

a. preparation, storage and use of digital content in learning and teaching;

b. innovative learning and teaching methods with ICT;

c. the development of teachers' digital competence;

d. the development of students' digital competence;

e. the use of learning analytics to improve learning and teaching;

f. ubiquitous learning and open curricula;

g. personalisation and support for under-represented groups by using ICT in learning and teaching

6. ICT culture

a. the network presence of HEIs;

b. using ICT in HEIs promotion;

c. the development of digital literacy and the promotion of innovativeness in ICT application with HEI employees;

d. self-confidence and motivation of employees on the importance of ICT application;

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e. providing access to and support in the application of ICT infrastructure;

f. the application of ethical standards, copyrights and intellectual property in the ICT field.

7. ICT resources and infrastructure

a. the availability of ICT resources (hardware and software) for learning and teaching;

b. the availability of ICT resources for scientific research;

c. network infrastructures at HEIs;

d. access to ICT resources for students (both in and out of the classroom);

e. digital environment and information systems for employees and students;

f. technical support and maintenance of ICT resources at HEIs;

g. information security system.

The following table summarizes the elements of continuity that can be traced between the changes initiated by the Bologna process in 1999 and the Digital Maturity (Đurek et. a., 2019).

Table 1: Bologna process key issues and Digital Maturity Framework in HEIs

Bologna Process Key issues	Digital Maturity Framework for Higher Education Institution
• **Harmonization of the university cycle system** - two main ones (first and second level) and one corresponding to the doctorate - to facilitate the integration of students into the European market.	1a; 1b; 1h; 2a; 2b.
• Uniformity of the qualification system to facilitate the **recognition of national academic qualifications and careers** with the aim of allowing more free access to the labor market.	1c; 2a; 2b; 3d.
• Insertion of a **credit system based on the ECTS** (European Credit Transfer and Accumulation System) as an estimate of the workload required by students to achieve the objectives.	1c; 2b; 2e; 2f.
• **Promotion of the mobility of students and teachers** in the European area of higher education through the development of programs and initiatives regulated at European and national level (joint degrees and courses of study, joint certificates and final diplomas, implementation of the Diploma supplement).	1a; 1b; 1c; 1d; 3 (a-f); 4 (a-c)

• **Quality assurance** through the establishment of an agency at national level (in Italy the ANVUR) that evaluates the quality of education and, consequently, the assurance at European level of the common standards implemented in cooperation between the countries adhering to the declaration.	2 (a-f); 5 (a-g).
• Employability to be pursued through an education that aims with the first cycle **to provide the skills necessary to carry out a profession.**	3d; 3e; 5d; 5f
• **Learning focused on the active role of the student** by promoting teaching based on understanding, autonomy, the relationship between teacher and student (student oriented).	5 (a-g)
• **Lifelong learning** (Masters, specialized training, continuous training, training agreements with organizations and / or companies, student worker management (part-time, differentiated paths, use of ICT, blended, e-learning).	1h; 3f: 4 (a-c); 5f; 5g;

The exploration of these seven areas will allow us to identify for each case study the main interesting experiences in the field of:

1. Enhancing digital technologies in Higher Education institutions;
2. Academics professional development paths with a focus on digital innovation;
3. Quality assurance in Higher Education with particular attention to digital innovation quality standards in teaching-learning processes;
4. Recognition and validation of teaching competencies with particular attention to digital skills in Higher Education.

- A quantitative analysis of questionnaires' results aimed at students;
- A conclusion oriented to outlines the most important efforts and critical issues in organizational and educational processes aimed to enhance digital resources and the environment in Universities (strengths, weaknesses, threats and opportunities, needs and perspective of improvement).

Based on these assumptions, template expects the national researches articulation in four main sections:
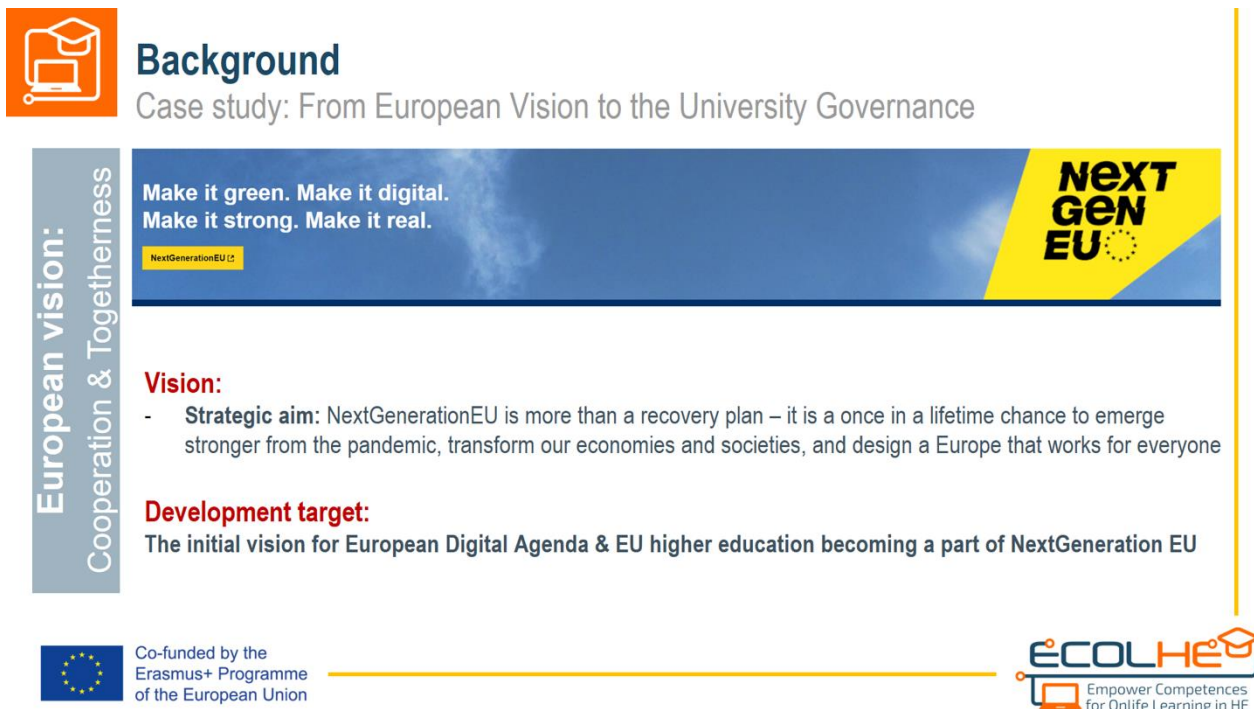
a. Introduction
b. I part: the national framework
c. II part: the results of the field research
    1. in-depth interviews
    2. focus groups
    3. survey online
d. Results / Conclusions (strengths, weaknesses, risks, threats and opportunities)

    The introduction of national research presents the main characteristics of the national report (objectives, methodology, division into chapters and paragraphs).

1.   I PART. Literature analysis: the description of the national framework

1.1   Introduction

The Council of the European Union development policies and strategies helped Finland to propose "Europe 2020 Programme: Finland's National Reform Programme 2019 (2019/32)". In 2020, the Council of the EU proposed a set of recommendation that will help progressive development work in Finland and European Union. In Finland, the digitalisation is at the core of the government's 'Finland: Vision 2030' development work initiated in the year 2018-19. Recently, European Union launched a major initiative Next Generation EU with development targets as depicted in the figure-1:

Figure 1: NextGenerationEU Vision (Author: Paresh Rathod)

The digitalisation of contemporary higher education needs transformational vision, legislative and operational support from the stakeholders, government and relevant bodies. In practice, 'Finland: Vision 2030' manifest expanding the current practices for digitalisation of the education system and relevant services. The Europe 2020 Programme report states the need for support, "to increase cooperation between higher education institutions from the perspective of digitalisation, development of education and student orientation and some of it will also be channelled to the development of continuous learning". Many researchers have observed some key elements of the digitalisation of contemporary higher education including good ICT infrastructure, teachers'

digital competencies and students' abilities to adopt new learning environments and methods play vital roles (Brown, 2002). The Finnish national vision is align with European 'Bologna Digital' vision that Digital Transformation is an effective means to solve 21st century higher education challenges to meet modern societal, cultural and business needs (Rampelt, Orr & Knoth, 2019). It is evident; the need of digitalisation in the European Higher Education Area and ECOLHE research work and outcomes are contributing towards the solutions. The following figure-2 summarises the EU initiatives that gears towards the European higher educations' cooperation and digitalisation.

Figure 2: European higher educations' Cooperation and Digitalisation (Author: Paresh Rathod)

The following sections are presenting analysis of the digital transformational efforts including Finnish legislative framework and other upscaling efforts as described in each individual section:

1.2   The national legislative framework

This section describes the national legislative framework of higher education. Further, it also elaborates on Finnish implementation practices of the agreements made during the Bologna process for the promotion of Digital Technologies in Higher Education.

The higher education acts and framework in Finland: The core UNIVERSITIES ACT, 558/2009(Amendments up to 644/2016) and Universities of Applied Sciences Act 932/2014 (Amendments up to 563/2016) are the main pillar for Higher Education Institutes in Finland. The Finnish qualifications framework is based on the European Parliament's and Council's Recommendation on the European Qualifications Framework for Lifelong Learning

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(EQF). The Finnish qualifications framework is also in line with the European Higher Education Area (EHEA) qualifications framework (including ECTS). Provisions on the Finnish National Framework for Qualifications (FiNQF) and Other Competence Modules laid-down in Act (93/2017). And Government Decree on the National Framework for Qualifications and Other Competence Modules (120/2017).

The national legislative framework

Legislation to implementation

Main findings about the national legislative framework: Field study and practices
- The Finnish national vision is align with **European 'Bologna Digital' vision** that Digital Transformation is an effective means to solve 21st century higher education challenges to meet modern societal, cultural and business needs (Rampelt, Orr & Knoth, 2019).
- According to Finnish Ministry of Education and Culture official reports, *"The digital vision for higher education institutions is a core element of the implementation of the Government Programme under Prime Minister's office."*
- The continuous efforts are resulted into release of Finnish government's **Digital Finland Framework** along with other reforms. These reform contributing towards the Digitalisation of Higher Education.
- **Finnish National Agency for Education(OPH)** is the responsible body for implementations of **education legislative frameworks including digitalisation of education system.**
- In practice, OPH launched a project titled, **'Digivision 2030 for higher education institutes'.** The official project statement says, *"The Digivision 2030, a joint project between Finnish universities and universities of applied sciences, will bring greater opportunities for all learners to learn flexibly utilising new ways, technologies and tools".*
- All Finnish higher education institutions have pledged their contribution to the Digivision 2030 project and signed a participation agreement.
- The Digivisio 2030 focuses on key areas suggested in *"Council conclusions on digital education in Europe's knowledge societies (2020/C 415/10)"*

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Figure 3: Summary of the Field study and Practices (Author: Paresh Rathod)

Intertwined with EU initiatives: The various legislative changes and supports are taking place mainly to meet the challenges of digitalisation of society and modernisation of higher education system in Finland. Finnish government and bodies are forming specific laws, decrees, acts to support the digitalisation development need and efforts since year 2000. The Council of the European Union development policies and strategies helped Finland to propose "Europe 2020 Programme: Finland's National Reform Programme 2019 (2019/32)". The Europe 2020 Programme report states the need for legislative and other support, "to increase cooperation between higher education institutions from the perspective of digitalisation, development of education and student orientation and some of it will also be channelled to the development of continuous learning (lifelong learning): Digitalisation, Student-centered and lifelong learning

National implementation plan and actions: The continuous efforts are resulted into release of Finnish government's Digital Finland Framework in year 2018.

The framework aligned to meet the goals of the higher education stated in the Europe Programme 2020, "to increase cooperation between higher education institutions from the perspective of digitalisation, development of education and student orientation and some of it will be also channelled to the development of continuous learning". The framework for turning digital transformation to solutions meeting grand challenges of digital era. The framework is aiming, "Digital transformation enables speeding up the development of innovative responses

not only to local economic and societal challenges, but for reaching the Sustainable Development Goals". The framework recognises the highest priority for the digitalisation of contemporary higher education along with other education sectors. The framework supported by Finnish government with €400 Million funding to local authorities to support digitalisation efforts and project during year 2018 to 2022. Overall, the following figure-3 depicts the summary of the Finnish national legislative framework from the field study and practices.

National Programme: DigiVision 2030: According to [Finnish Ministry of Education and Culture official reports](), "The digital vision for higher education institutions is a core element of the implementation of the Government Programme under Prime Minister's office." In practice, Finnish government launch a project titled, 'Digivision 2030 for higher education institutes' (In Finnish, DigiVisio 2030). The official project statement says, "The Digivision 2030, a joint project between Finnish universities and universities of applied sciences, will bring greater opportunities for all learners to learn flexibly. The aim is to restructure Finland's higher education over the next decade by means of digitalisation and to make Finland a model country for flexible learning." The following page presents the vision, goal, resources, support and evaluation description of the project.

- **Vision:** The Digivisio 2030 (In Finnish) project is one of the decade's most significant digitalization projects for higher education institutions in Finland. Its aim is to ensure flexible learning opportunities for learners as well as to improve the competitiveness of Finnish higher education institutions globally, while preserving their autonomy and opportunities for strong profiling. All Finnish higher education institutions have pledged their contribution to the Digivisio 2030 project and signed a participation agreement.

- **Goal:** During the preparatory phase, all higher education institutions committed themselves to Digivisio 2030 and project planning by signing a letter of intent. The Digivisio 2030 participation agreement is an extension of the letter of intent, and the administrative model and implementation of the project are agreed upon in it. In addition, the participation agreement lays out common key principles that ensure implementation in a transparent and flexible manner so that it is possible to apply for and obtain funding for the project from different sources. The participation agreement also enables the participation of higher education institution experts in the implementation of the project.

- **Resources:** A6-1: The Ministry of Education and Culture has granted a special grant of EUR 20 million as the first funding for the project. In addition to the special grant, the Ministry of Education and Culture is allocating EUR 17.8 million in strategic funding to the project for 2021-2024.

- **Support:** All the universities have signed the agreement and the project organization leads the cocreative the development work with active communication and involvement of all parties.

- **Evaluation:** All Finnish higher education institutes are actively participates in the national Digivision 2030 various development work.

The initial study conducted under the DigiVision 2030 project confirms the hypothesis of ECOLHE studies conducted by Laurea-Finland, "The implementation of Digivision 2030 by higher education institutions requires changes to legislation". According to the DigiVision 2030 research report:

The learning Ecosystem that Digivision aims to achieve will not be created without changes in laws and regulations, "The first phase of the study Revealed that many of the changes that are important for the Digivision objectives can be agreed upon between higher education institutions. However, there are entities that would certainly be good to agree on at the national level in the future. One example is the question of the controller of Learner's personal data service." says Project Manager Sakari Heikkilä.

The DigiVision report also concludes with the remark aligned with ECOLHE Finnish national case study, "In addition to the Digivision 2030 project, other digitization and development projects for public services are under way. The needs for legislative changes will also be jointly mapped with them." The ECOLHE study also suggests the all relevant aspects needs further development and implementation for successful digitalisation of higher education.

1.3   Professional development

The professional development is essential and critical for the success with the specific focus on the empowerment of digital methodological competencies in higher education. The ECOLHE studies identified the key digital competence framework and categories of human resources. First, the European Digital Competence Framework (DigComp) and Digital Competence Framework for Educators (DigCompEdu) are most useful and key guideline to follow when it comes to identifies the key elements of digitalisations as depicted in following figure:
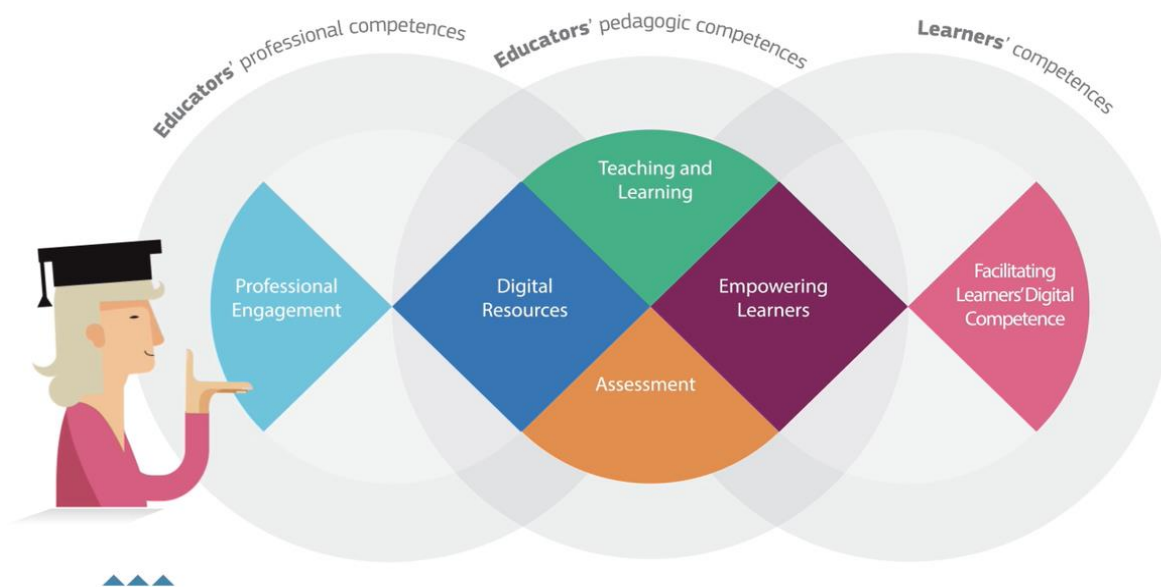
Figure 4: EU DigiCompEdu

Second, the study confirms- it highly essential to identify the target group of professional and human resources to empower with the digital competencies. There are four key categories of professionals, and their upskilling

and development with higher education. It is evident that all these 4 pillars must be strong to demonstrate significant progress. Following figure depicts the four key groups including strategic and leadership professionals, education and teaching professionals, education and admin professionals, and students. These are four key categories of professionals, and their upskilling and development within higher education. It is evident that all these 4 pillars must be strong to demonstrate significant progress.
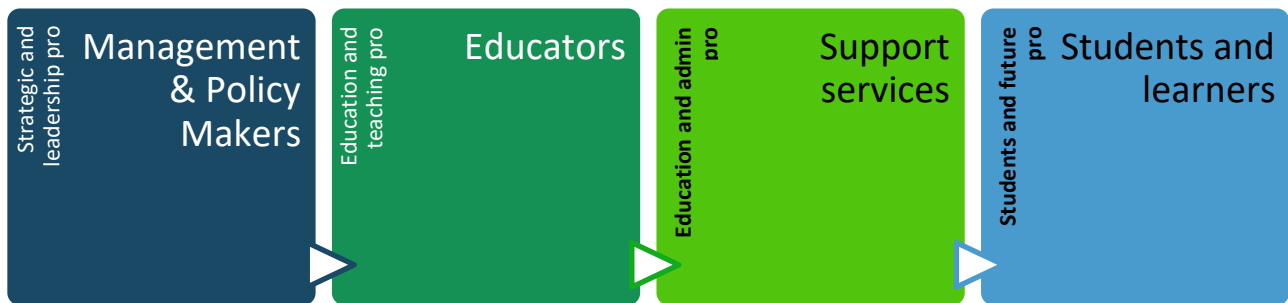
Figure 5: Professional Group for Digital Competencies Empowerment (Author: Paresh Rathod)

Main findings about the professional development: Field study and practices:

- Teachers should have pedagogical competence at first place. When teachers have needed pedagogical competency, they are able to leverage digital tools.

- National Qualification Framework demands every teachers working in higher education in Finland must have valid pedagogical studies. If not, then teachers supported to gain teachers pedagogical education. The same applies to student support services and counsellors. Both professional education offers digital competence module in their training and working life project (integrating work relevant development projects in studies)

- One of the respondent reported, "Teachers are more like equivalent researchers with students. Increased skills and competence of teachers makes challenges in work balance." Another respondent consolidated experience with following comments, "Focus on organizational and educational aspects: bureaucracy, logistics, timing, training models and pedagogical teaching methods. Teachers have to improve own competence (all time) … this is challenging- maturity of students and maturity of teachers."

- Our study finds the current students are more adoptable to technologies and digital education environments. ECOLHE students' survey confirms majority (more than 50%) confirms good online education offerings. However, further data analysis helps to identify key development matters.

    Our key findings confirms- there is unbalanced professional development and digital competences within individual professionals (all four categories). Especially, the management professionals need lots of catch-up with digitalisation and modern needs. These unequal competences pause significant challenges for the successful implementation of the digitalisations within higher education in Finland.

1.4 National systems of assessment and Quality Assurance in HE

During ECOLHE research studies, researchers observed that digital innovation are affecting and influencing the current and future of the higher education institutes in Finland. The ongoing digitalisation development needs national systems of assessment and quality assurance in HEIs. Besides, the Finnish HE acts clearly states HEIs must regularly participate in external reviews and evaluations. Finland has set out the Finnish Education Evaluation Centre (FINEEC) for the same purposes.

FINEEC for HEIs

- Student-centered approach
- Emphasis on the societal impact of HEIs
- Benchmarking from other organisations
- Digital platform
- Quality Label for Excellence
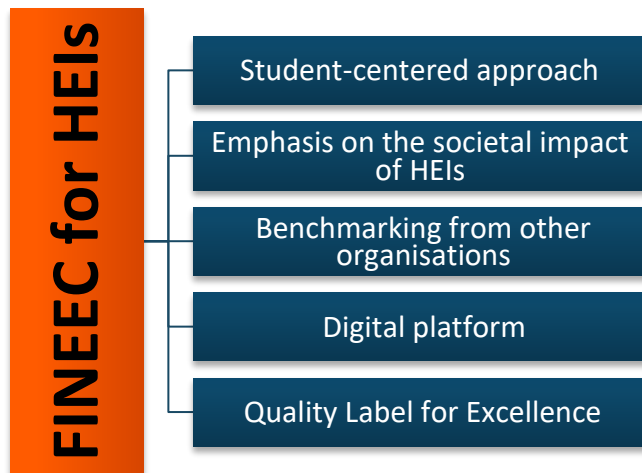
Figure 6: FINEEC Renewed Audit Model (2018-2024)

Generally, the FINEEC closely follows the Standards and Guidelines for Quality Assurance in the European Higher Education Area along with European Commission's guidelines. The recent HE digitalisation efforts also helped FINEEC to renew its audit model for the third round of audits of HEIs (2018-2024). Now, the model includes the digitalisation elements within audit criteria as depicted in Figure-6. Further, the FINEEC also measures various elements in HEIs including generate competences, create impact and renewal (up-to-date study programmes), enhance quality and well-being, and learning organisations on selected focus areas. Figure-7 provides more details insights of FINEEC measuring elements.
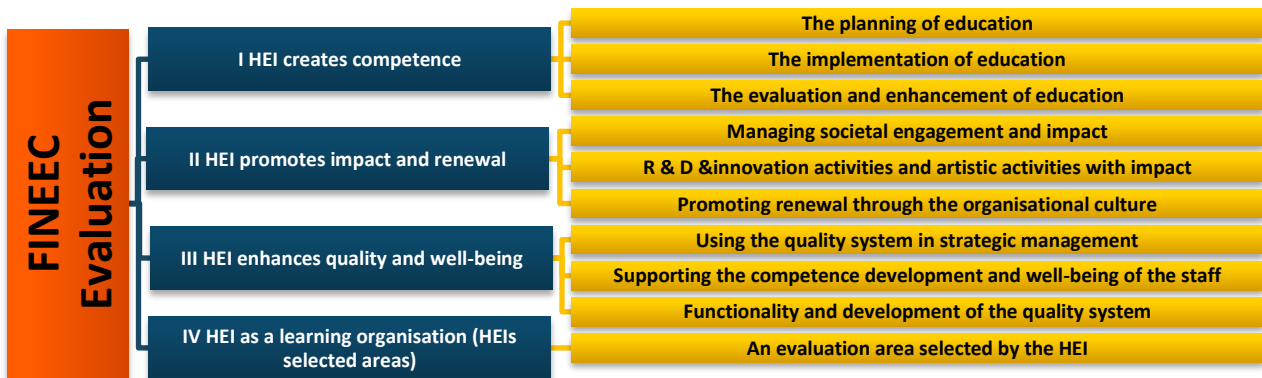
Figure 7: FINEEC Evaluation Criteria

Following are the main findings from ECOLHE field study and practices for the national systems of assessment and quality assurance in HEIs:

● In Finland, Higher education institutions (HEIs) themselves have the primary responsibility for the quality of education they organise.

● Further, these element stipulated in the Universities Act and the Universities of Applied Sciences Act. HEIs are responsible for evaluating their education, research and artistic activities adhering main aspects of national framework. For example, Laurea UAS has developed own quality assurance processes that runs regularly during academic year. Being active HEIs brings frequent Center of Excellence and other benefits.

● The main finding confirms the key gaps of uneven quality of education and process development within various HEIs. This is one the key development challenges mentioned in the Council conclusions on digital education in Europe's knowledge societies 2020/C 415/10 (THE COUNCIL OF THE EUROPEAN UNION).

● ECOLHE field study also confirms the decentralised and autonomous authorities to HEIs brings freedom to individual institutes for the educational innovation. However, the overachieving assessment and quality assurance framework gives development targets to HEIs.

ECOLHE study hypotheses that the national systems of assessment and quality assurance in HEIs across EU nations and adopting the transnational best practices can significantly improve the quality of higher education in Europe.

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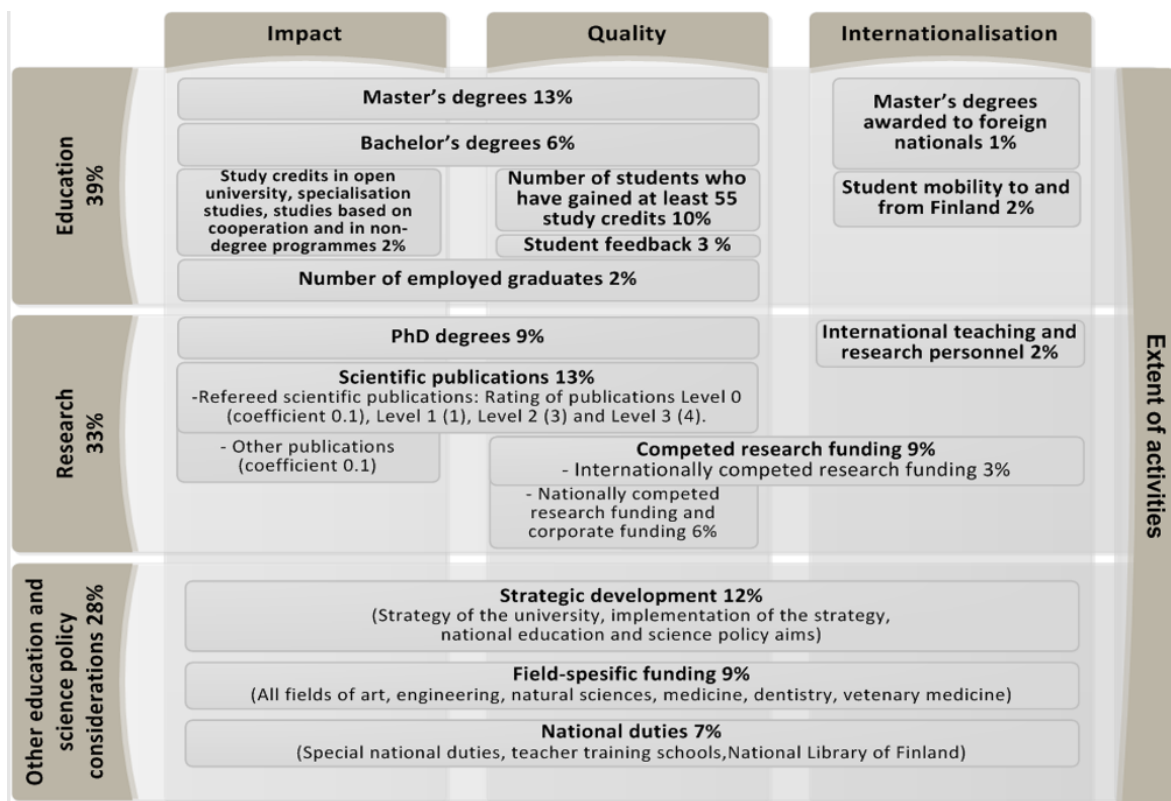
Figure 8: University Core Funding Model (Finland)

1.5 National financing programs

In Finland, although higher education institutions are independent legal entities, the main funding responsibility still lies on the state. Finland's parliament formulates the annual budget for the country. The parliament decides on the amount of core funding allocated by the Ministry of Education and Culture to the higher education institutions. Funding allocated according the core funding models made by universities and universities of applied sciences (UAS) as shown in Figure-8 and 9, The purpose of the core-funding model is to improve the quality, impact and productivity of the higher education institutions.
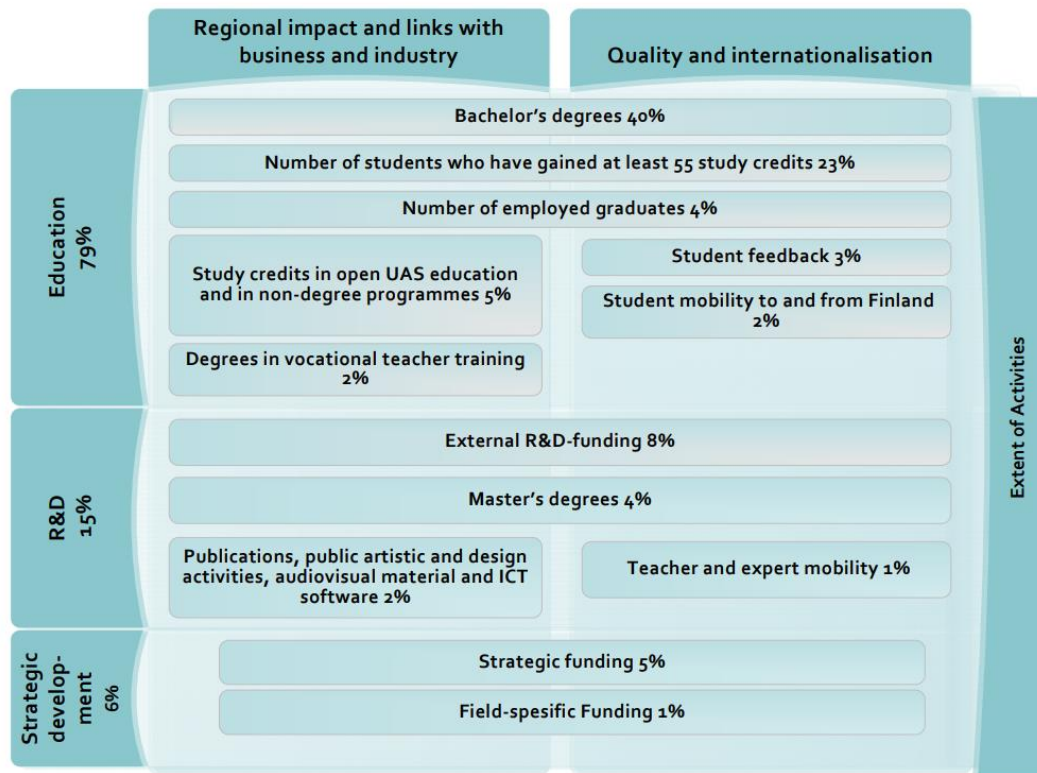
Figure 9: UAS Core Funding Model (Finland)

Core funding distributed mainly based on universities' teaching and research performance, and to UAS' performance in education as well as research and development. Universities and UASs agree on their performance targets with the Ministry of Education and Culture in three-year performance agreements. They are autonomous in terms of allocating funds, as long as the agreed targets achieved during the agreement period.

Following are some main findings of ECOLHE field study and practices about the National financing programme and specific projects to implement innovative didactic methods with the support of digital technology in Higher Education:

● **According to EuroStat data:** European Government expenditure on education: In 2017, public spending on education relative to GDP was highest in Denmark (7.3 %), Sweden (7.1 %), while in Finland (6.3762 %). The expenditure on education totalled EUR 12.3 billion in 2019. Costs of comprehensive school education made up the biggest share of current expenditure on education. EUR 5.1 billion used on comprehensive school education in 2019. The shares were next biggest in university education and research, on which EUR 2.3 billion were spent and in vocational education, on which EUR 1.8 were used.

● **Digital Finland Framework:** The Finnish government supported the framework with EUR 400 Million funding to local authorities to support digitalisation efforts and project during year 2018 to 2022.

- **Digivision 2030 project:** The Ministry of Education and Culture has awarded a special grant of EUR 20 million to the Digivision 2030 project. In addition to the special grant, the Ministry of Education and Culture is allocating EUR 17.8 million from the strategic funding for higher education institutions to the project for the years 2021-2024. The Digivision 2030, a joint project between Finnish universities and universities of applied sciences, will bring greater opportunities for all learners to learn flexibly. The aim is to restructure Finland's higher education over the next decade by means of digitalisation and to make Finland a model country for flexible learning.

- **Special Funding for Vocational Educators:** The resources for vocational education and training boosted by allocating EUR 150 million for recruiting teachers and instructors by 2022.

The government and institutions of higher education are to cooperate in promoting the digitalisation of teaching, particularly the development of digital pedagogy and the provision of sufficient resources for new learning environments.

1.6   Universities micro-policies

The micro-policies in the higher education institutes are playing pivotal role for the success of the mentioned development targets. The independent study conducted in the DigiVision 2030 project and ECOLHE field study and practices confirms the same. The micro-policies have direct impact on the implementations of the broader development and consolidation. This section is proving documentary analysis based on available documents, reports, information and practices of the Finnish case study to understand the way in which Academic Bodies have interpreted, adopted and translated in internal rules and practices the above questions.

Figure 10: Strategic Vision of National Case Study HEI (Snapshot Laurea Strategy 2030)

Strategic vision and policies towards the implementation: The ECOLHE field study and practices found that the Finnish national case study institute (HEI) have systematic initial plan for the digitalisation and future development through its institute's policies, processes and practices.

The analysis clearly found following key points:

- Organisation structural changes within Laurea UAS including management structures, the educational departmental structure and student support systems.

- Laurea focuses on strategic development with concrete vision, strategies and policies.

- Continue development of processes and practices including degree regulations, focus areas, curriculum, study offerings and student support systems.

Figure 11: Digitalisation Focus (Snapshot Laurea Strategy 2030)

- Recognition of best practices and open cooperation within organisation and beyond.

- Developing internal assessment and quality assurance processes.

- Well-beings of students and staff by providing more support systems.

    The national case study HEI has already concrete organisational Strategy 2030 (available publicly on website) with detail development targets.

The following is the quick summary.

Critical need for the change: The HEI clearly identifies the need for the change with development areas as listed:

(1) Promoting a competence-based approach, the quality of learning and the effectiveness of studies in degree education.

(2) Increasing non-degree education in order to address the challenge of continuous learning in society.

(3) Expanding the range of high-quality open digital studies and access to them.

(4) Expanding and deepening the strategic regional, national and international partner network.

(5) Increasing the impact of R&D activities and boosting competitive funding.

Further, the identified key development areas been also supported with strategic policies and processes. The Figure-10 provides a snapshot from Strategy 2030. The president states, *"In line with our revised strategy process, our strategy is based on the Plan-Do-Check-Act (PDCA) cycle and the idea of continuous improvement, according to which understanding is generated, developed and constructed cyclically."* The ECOLHE field study found key areas directly relevant to digitalisations of HEI development target under the titled, "A Digital UAS that reforms professional learning" as depicted in the Figure-11.

1.7   Best practices

The ECOLHE field study and practices confirms the significance of best practices of its own university or HEIs plays pivotal role for the visible improvement in the quality of higher education across Europe. In this section, we are reporting some of the main and most interesting experiences in the field of training teachers, professors and researchers' digital skills along with the main and most interesting pedagogical adopted models in teachers' digital skills.

● **High quality education offerings in some courses:** The student survey and many years research reveals that students are acknowledging very high quality of individual selected online courses. However, the students says, "These are only some courses with high quality, and not every course offers same learning and study experiences." Many participant in the study also suggested to adopt the pedagogical framework and other support services in those lagging courses."   ECOLHE field study and practices also observed the same, sharing best practices within degree programme, departments and transversal programme could significantly improve the quality of HE programmes. For example, ECOLHE project provides immense opportunities to learn best practices from European partners to improve own courses and programmes.

● **Responsible department with skilled personnel and experts:** Laurea has strategic objectives for the digital transformation and the processes; managed by D-unit (Digital Unit) which is responsible for pedagogical and technical training for the teachers.

- **Independent and self-management skills are vital:** The digital virtualized or online studies requires strong self-management skills from the students and teachers, and it sets high bar for the pedagogical implementation. Therefore, the independent and discipline are key elements for succeeding in digitalisation of HEIs.

- **Challenge of upskilling the teaching and non-teaching staff:** The study observed one of the biggest challenge of upskilling the teaching and non-teaching staff. There is a visible gap in the digital skills. Personnel have been comfortable with traditional teaching methods, offerings and support systems due to their prior expertise. It takes tremendous efforts, individual motivations and collective upskilling processes to bridge the gap for digital skills and competences.

- **Digital pedagogical development are essential:** It is evident that we are in the early stage of digital pedagogical practices and implementation. ECOLHE filed study observed the need for the development of digital pedagogical processes and practices. The practices must be aligned and harmonize with available digital tools and techniques. We observed some teachers and support staff are adopting more innovative solutions and optimises their work where students benefits the most while some are struggling with it.

- **Digital tools are helpful:** The positive development, especially the teachers and tutors see that the new digital tools including Canvas LMS, Zoom, Teams, Azure and many others have already eased their work remarkably. As an opposite, they see that their work has become more hectic, and they are not able apply new tools as well as they wish and want.

- **Students adopt the new tools and practices quickly:** It is evident from our field study that students are much quicker to adopt new digital tools, practices and processes. One of the most significant observation that students wishes to use more mobile version of these tools. This is one of the key reason, the digital age students are more comfortable and habitual to use smart phones and computers before entering higher educations.

Overall, the field study and practices along with analysis confirms, there is an unbalance growth towards digitalisations of HEIs. On the positive side, it is a growth rather than decay (decline). Further, HEIs across Europe need more opportunities to share their best practices to improve the quality of education.

2.   II PART. Field research: the national case study

2.1   Introduction

This part presents the empirical part of the national (Finland) case study. In the empirical part there was interviewed personnel from the following focus groups:

- Decision-Makers (none)
- Academic bodies (Laurea - 1 person)
- Teachers and Tutors (Laurea - 7 persons)
- Principal Lecturers and Researchers (Laurea - 2 persons)
- Technical and Pedagogical Support (Laurea - 2 persons)

The data was collected by launching systematic interview process in the Canvas LMS where interviewees were guided through the interview process. The interviewees downloaded the question document (Word-format) from Canvas LMS and then they uploaded their answers by the given deadline. The questions were divided five to six thematic categories including max. 30 questions depending on the focus group. According the feedback interviewees felt that the number of questions were high, some questions were unclear or hard to be answered. Due the heavy process and unclreaness few questions were not answered but still there was received a decent number of quality answers. Secondly, the interview was conduced at the end of the spring semester and many people were not able to contribute due high personal work load.

The data was analyzed thematically with predefined categories and the main findings are presented within each focus groups. There was also made SWOT-analysis for each focus group. The raw data is available in the Appendices. The main overall finding is that digitalization offers great potential for development and innovation, but it could also drain out the personnel if the work is not resourced properly with clear vision and focus.

2.2   Decision-Makers

In this category we had no interviewees. There was contacted few persons from the Finnish National Agency for Education but did not get any committed answers.

2.3   Academic Bodies

The interview request was sent to three persons in Laurea upper management (Vice Rectors) and there was received one reply from the Vice Rector who is responsible for pedagogical development in Laurea. The respondent stated that Laurea has strong commitment for the digitalization of education according the national Digivisio 2030 project and all development work follows the Plan-Do-Check-Act (PDCA) process. Laurea has also strongly invested for the digitalization of education by setting up the department whose responsibility is to

develop pedagogical and technological solutions for the education, and continuously train and support teaching personnel. The biggest threat for the continuous development is lack of time and resources.

Main results

- Organizational level
  - Laurea's digital degrees and degrees components are developed, shared and used openly throughout the whole university
  - Laurea has centralised critical digital innovation in its organizational structure (D-unit)
  - Laurea has good technological resources for digital development/innovation
  - Laurea has strong quality assurance system that follows Plan-Do-Check-Act (PDCA) model
- Teaching-learning level
  - D-unit offers training for the teachers
  - Teachers need more time for adapting new pedagogical methods and digital technologies
  - Laurea works in close collaboration with working life that offers possibility to keep education up-to-date
- Cultural level
  - Laurea has a strategic objective for increasing the amount and quality of the virtual studies
  - Laurea participates to Digivisio 2030 project
- Strength and weakness, opportunity and threat in implementation of the digital innovation in Higher Education

SWOT-analysis

Table 2: SWOT: Academic Bodies

Strengths	Weaknesses
Cocreative processes integrating staff, students and workplaces Good availability of digital tools Good availability of internal training (D-unit) Dedicated technical support for the teachers (D-unit) Strong quality assurance system	Lack of time resources
Opportunities	**Threats**

2.4   Focus Groups: Teachers and Tutors

In this category the interview request was sent to 22 teachers or tutors and there was received 6 answers. The respondents indicated that the digitalization of education has made their work more efficient and flexible. Laurea provides a good set of tools to be used in the distance learning and support is available when needed. One very interesting finding is that the role of the teacher has changed from traditional teacher or information-/knowledge owner to facilitator or tutor and it sets new competence requirements for the teachers in the future. The respondents keep themselves up to date by self studies and sharing best practices with the colleagues. The respondents stated that digitalization has a great innovation potential but the the lack of time and resources prevents for utilizing best possible outcome from the digitalization.

In the students' perspective digitalization provides great benefits including time and place indepency depending on the applied pedagocial model. As an opposite, increased freedom requires strong self management skills and commitment for the studies. Problems can be practical including insufficient communication skills in the virtual environment or incapability for using a microphone or a camera in the online sessions.

Main results

- Teaching practices and digital innovation

  o Use of digital tools has made working processes more efficient, e.g. remote work is possible, assessment can be automated, counselling meeting can be organized remotely, using of third party learning material and lectures can be recorded

  o Many tools are available including e.g. Canvas LMS, Teams, Zoom, Proctorio and Azure

  o The role of the teacher has changed from traditional teacher to facilitator/tutor

  o The use of digital tools enables more flexibility for the students but in opposite increased flexibility requires stronger self-management and goal setting skills

  o Some students have difficulties for adapting proper communications skills needed in digital world e.g. writing emails or use of camera in virtual meetings

  o Best practices are shared actively among the lecturers

  o Main constraints are lack of time resources, lack of competency and resistance for change

- Professional development with a focus on digital skills

  o Wide variety of required skills including mastering the topic to be teach, mastering the teaching language, mastering the digital tools, pedagogical skills and communication skills

- o Lecturers keep themselves up to date by diverse ways including reading, observing, participating to organized trainings, self-training, peer discussions and trying new tools by themselves
  - o Lack of time resources is the biggest constraint for the personal development
- Best practices related to their own university
  - o Online counselling for the thesis process, entrance exam course, entrance exam in Canvas LMS, MOOCs and blended learning
  - o The most effective best practices save time, automate recurring practices and provide better overall service for the students.
- Strength and weakness, opportunity and threat in implementation of the digital innovation in Higher Education

SWOT-analysis

Table 3: SWOT: Teachers and Tutors

Strengths	**Weaknesses**
Good availability of digital tools	Lack of time resources
Good availability of internal training	Lack of teaching competency in digital environment
Dedicated technical support for the teachers	Creative work is not valued
Strong sharing culture for the best practices	Balance between virtual, blended and classroom teaching is unclear
Increased working flexibility	Resistance for change
Increased learning flexibility	Some students lack self-management skills
Opportunities	**Threats**
Possibilities for automation	New tools are not utilized best possible way due lack of competency
Better courses and better student satisfaction	Student dropouts
Expanding study offering to international level	Teachers lose their motivation due lack of time resources
	The ratio on innovation goes down due lack of time resources
	Teacher burnout

2.5   Focus Groups: Principal Lecturers and Researchers

In this category the interview request was sent to 16 principal lecturers or researchers and there was received two (2) answers. All respondents participate actively to European H2020 projects and their answers reflects strongly how digitalization easies their work as a teacher and researcher. As overall, digitalization makes teaching and research activities time and place independent. Especially participation to the scientific seminars during COVID-19 pandemic has been easier and more cost efficient than ever because the scientific seminars have been organized virtually. The virtualized seminars have also increased the participation ratio of the students due removed travelling costs, removed travel insurance issues and increased time efficiency. The respondents keep themselves up to date by self studies and sharing best practices with the colleagues. The biggest threat for the further development is lack of resources.

Main results

- Teaching practices and digital innovation

  - Integrative learning with RDI projects is easier with digital technologies

  - New practices have been adapted, e.g. video presentations instead of synchronized online seminars -> Enables more flexible peer reviews

  - Teaching is now independent of time and place

  - Availability of digital material has been increased

  - Best practices are shared actively among the lecturers

  - Main constrains are lack of time resources, interoperability of different equipment & applications and increased need for leadership, guidance and support

- Professional development with a focus on digital skills

  - Wide variety of required skills including mastering the topic to be teach, pedagogical skills and communication skills

  - Curiosity and fascination are more important than skills.

  - Lecturers keep themselves up-to-date by diverse ways including self-training and working in H2020 projects

  - Lack of time resources is a constraint for the personal development

- Best practices related to their own university

  - Practices for integrating students to the ECHO H2020 project

  - The most effective best practices enable constant small improvements

- Strength and weakness, opportunity and threat in implementation of the digital innovation in Higher Education

SWOT-analysis

Table 4: SWOT: Principal Lecturers and Researchers

Strengths	Weaknesses
Integration of RDI-projects and teaching is easier due virtualized meeting possibilities Strong sharing culture for the best practices Increased working flexibility Increased learning flexibility	Lack of time resources Lack of the time for self-development Increased need for leadership, guidance and support Increased cognitive load Unclear difference between work time and free time
Opportunities Resilient learning Constant small improvements Curiosity	**Threats** Teachers lose their motivation due lack of time resources The ratio on innovation goes down due lack of time resources Teacher burnout

2.6   Focus Groups: Technical and Pedagogical Support

In this category the interview request was sent to 12 experts and there was received 2 answers. All respondents work in the department that is responsible for the digital education pedagogical and technological development in Laurea. The respondents state that the development in the digital innovation perspective should not be limited only on digitalization or technology and digital innovations should have wider perspective including pedagogical aspect. Their view is udenderstable because the department has offered pedagogical and technical training for the teaching personnel during COVID-19 pandemic and they have noticed that development is not possible if technological or pedagocial competences are missing. They have also noticed that their customer group (teachers) is very heterogonous and people have already adapted or they need to adapt new roles in digitalized learning environment.

The department has utilized new digital tools effectively for more effective and flexible internal collaboration and team work. The respondents keep themselves up-to-date by diverse ways including reading, networking with elearning experts of HE, attending conferences, visiting edutech shows. The biggest threat for the further development is lack of time and resources.

Main results

- Teaching practices and digital innovation

    o There should be discussed about innovation as general, not only digital innovation

    o Technology is seen as both resource and limitation

    o Best practices are shared actively among the team

    o The digital skills of teachers are still diverse, heterogenous

    o The digital transformation proceeds step by step, some parts of the organization proceed faster than other

    o Lack of time resource is seen as a restriction for the development

- Professional development with a focus on digital skills

    o Wide variety of required skills including good digital skills, understanding of pedagogical approach, good communicational & interaction skills, innovative mindset, right attitude, system thinking and capability to learn

    o New roles have been to been adopted due digitalized working environment

    o Barriers for competency development: time limits, too much work, no possibility to specialize, sometimes no respect of work and complex work field

    o Support staff keep themselves up-to-date by diverse ways including reading, networking with elearning experts of HE, attending conferences, visiting edutech shows and focusing on the most important things to be finished

    o Lack of time resources is a constraint for the personal development

- Best practices related to their own university

    o More efficient teamwork due rollout of digital tools

    o The practices are verified and they meet the desired target.

- Strength and weakness, opportunity and threat in implementation of the digital innovation in Higher Education

SWOT-analysis

Table 5: SWOT: Pedagogical and Technical Support

Strengths	Weaknesses

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Monetary and time resourcing Good LMS (Canvas) Competency Vision	Lack of time resources No possibility to specialize Lack of the time for self-development
Opportunities Level up the quality of the education which could attract better students High quality courses that enforces Laurea as a brand	**Threats** The personnel are not able to adapt digital transformation

2.7   Students: main results

Introduction

The student survey was targeted to all Business Information Technology Degree Programme students in Laurea University of Applied Sciences. The survey was sent to almost 500 students and there were received 96 responses. The survey covered topically five different domains including 45 multiple choice questions and four open questions. The covered topics are:

- Student profiling – 9 multiple choice questions

- Teaching and Learning Process - 10 multiple choice questions with 5 level Likert scale

- Students' Experience - 17 multiple choice questions with 5 level Likert scale

- Students Learning Outcome - 9 multiple choice questions with 5 level Likert scale

- SWOT-analysis – Four open questions

The profiling questions show respondents gender, age, study year and their personal estimation for their study progress. 61% of the respondents are males and 35% are females while 4% do not want declare their gender. Over 70% of the respondents are at least 26 years old. The age profile reveals well how the student profile has changed when the distance learning possibilities have increased during last years and more mature students are able to study while working. The details are shown in the Figure 12.

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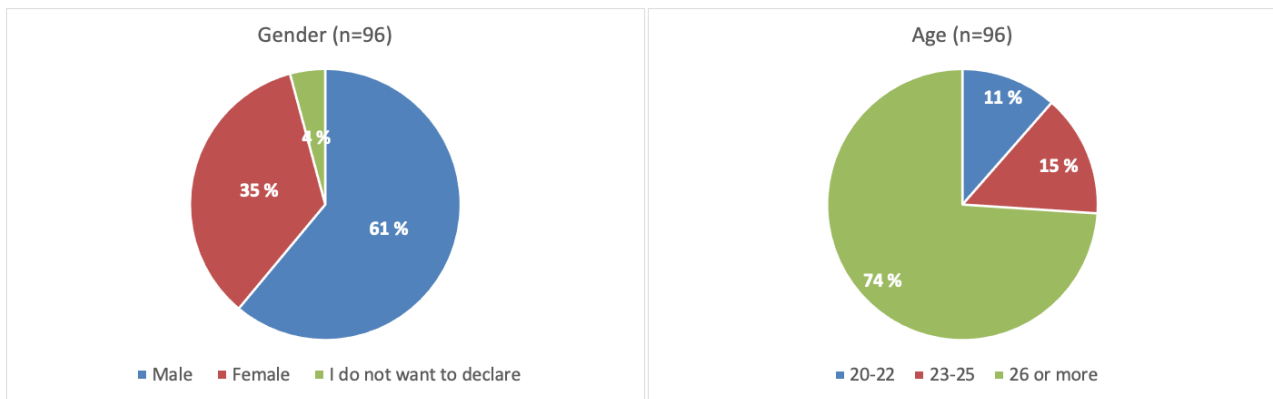
Figure 12: Survey respondents' gender and age

22% of the respondents are first year students, 43% are second year students, 26% are third year students and rest (9%) were not sure about their stage. Over 70% of the respondents estimates that they are progressing with their studies while almost 30% reported for having some difficulties with their studies. The profiling section had no possibility to elaborate why some students are having problems with their studies. The study year and study progress profiles are illustrated in the Figure 13.
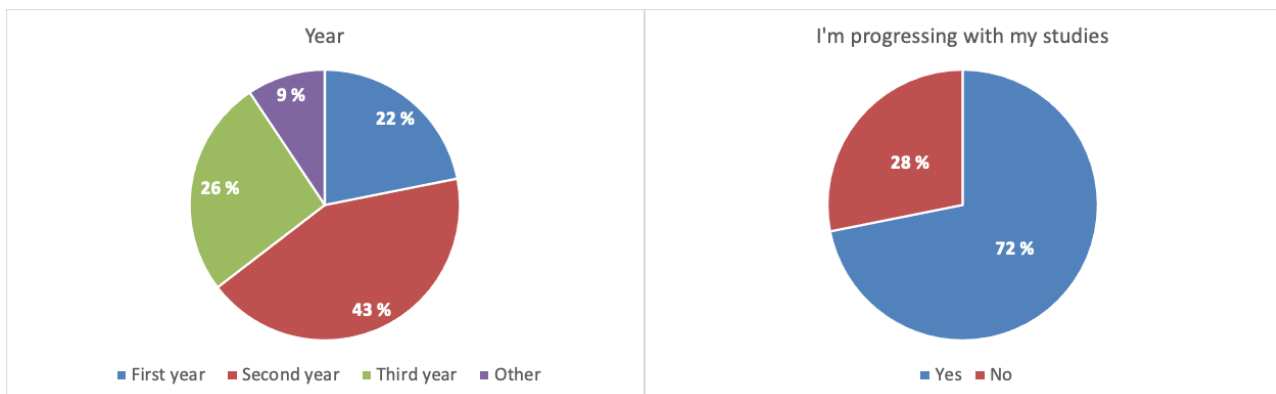
Figure 13: Survey respondents' study year and study progress

Teaching and Learning Process

The Teaching and Learning Process section focus on pedagogical implementation. According to results three most used pedagogical methods in the BIT degree program are 1) Use of visual and digital resources and tools (85% agrees), 2) Use of class group group activities (75% agrees) and 3) Stimulate debating and peer assessment (71% agrees). The least used practices are 1) Use of game elements or educational games (31% agrees) , 2) Assess students' prior knowledge to orient personalised learning (43% agrees) and 3) Use of conceptual maps (52% agrees).

The disagreement level is remarkably high in the four data points including 1) Use of game elements or educational games (42% disagrees) , 2) Assess students' prior knowledge to orient personalised learning (27% disagrees), 3) use lab experiments and simulations (25% disagrees) and 4) Students take innovative tests during the classes (24% disagrees).

The details are presented in the Table 5 and Figure 14.

Table 6: Teaching and Learning Process percentage frequency distribution

	Use game elements or educational games	Use visual or digital resources and tools	Use conceptual maps	Use class group activities	Use case studies	Use lab experiments and simulations	Stimulate debating and peer assessment	Invite guest speakers	Assess students' prior knowledge to orient personalised learning	Students take innovative tests during the classes
Strongly Disagree	13 %	1 %	0 %	0 %	1 %	9 %	3 %	7 %	14 %	6 %
Disagree	29 %	4 %	16 %	5 %	6 %	16 %	4 %	11 %	13 %	18 %
Neutral	27 %	10 %	32 %	20 %	25 %	22 %	22 %	17 %	31 %	20 %
Agree	25 %	47 %	42 %	50 %	46 %	36 %	50 %	42 %	30 %	36 %
Strongly Agree	6 %	38 %	10 %	25 %	22 %	17 %	21 %	23 %	13 %	20 %
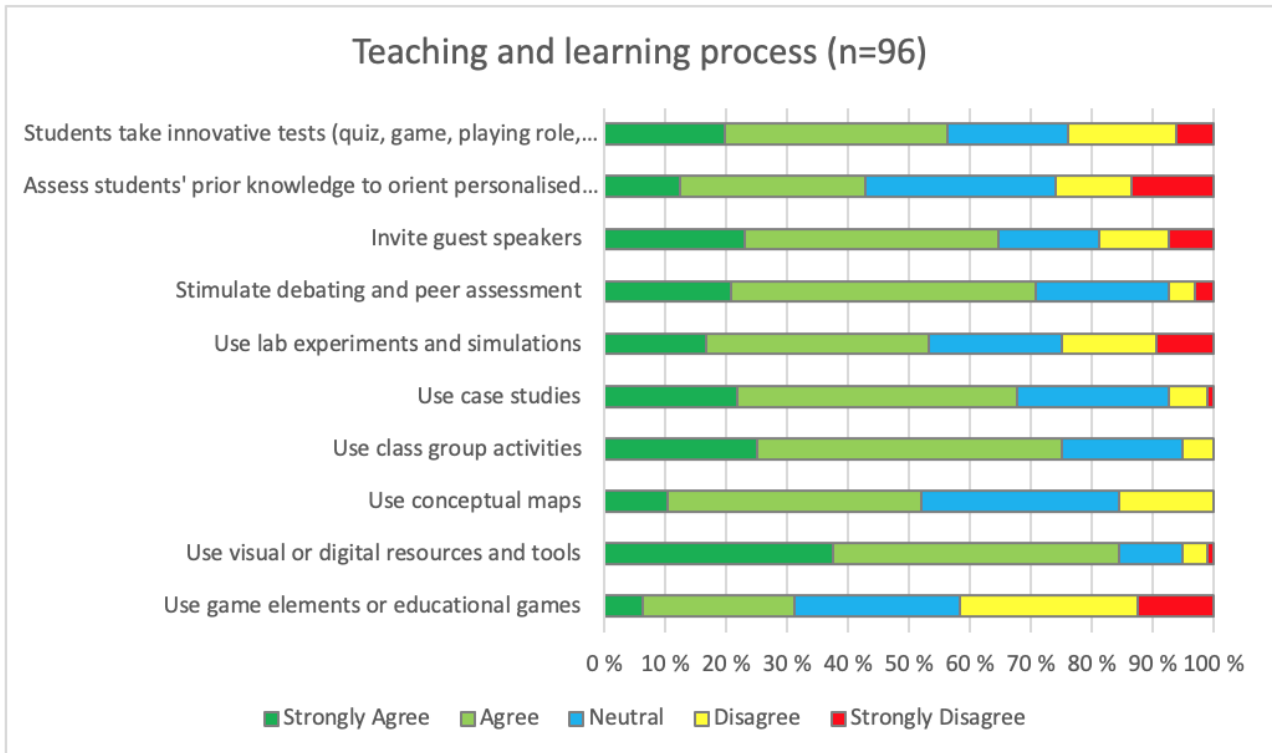
Figure 14: Teaching and Learning Process percentage frequency distribution

Figures 15-19 present results visually for each data point individually.
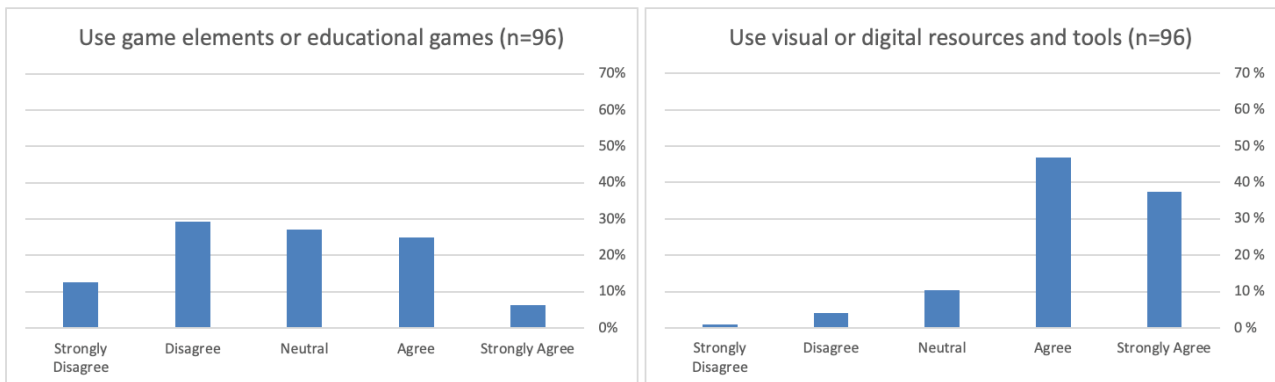
Figure 15: Use of game elements or educational games and Use of visual or digital resources and tools

Use conceptual maps (n=96)

Use class group activities (n=96)
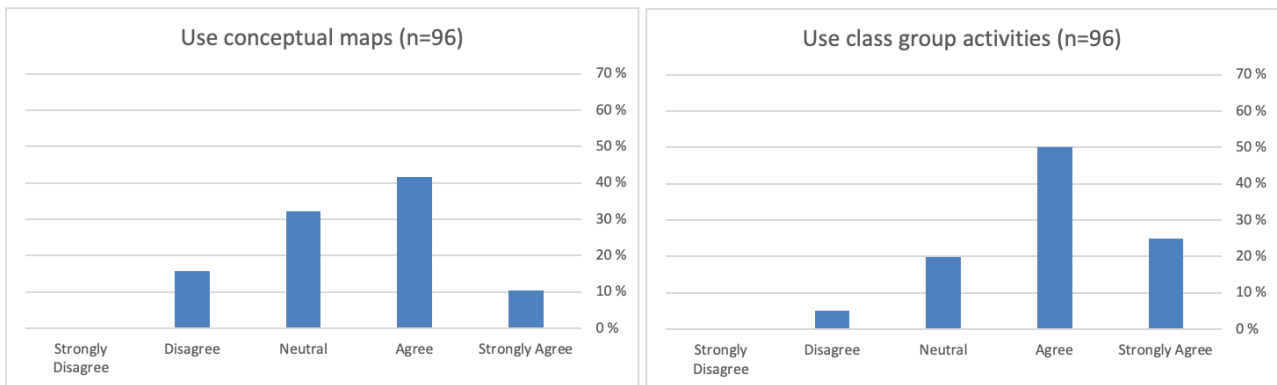
Figure 16: Use of conceptual maps and Use of class group activities

Use case studies (n=96)

Use lab experiments and simulations (n=96)
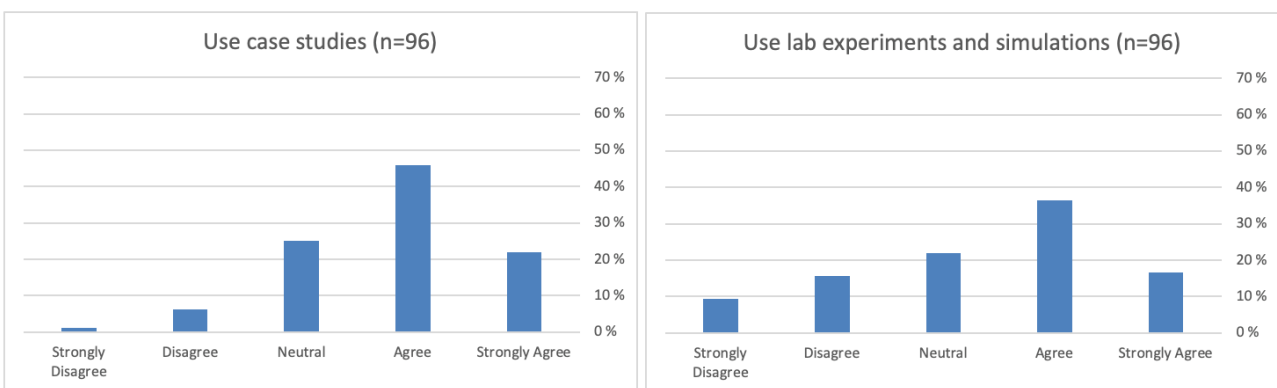
Figure 17: Use of case studies and Use of Lab experiments and simulations

Stimulate debating and peer assessment (n=96)

Invite guest speakers (n=96)
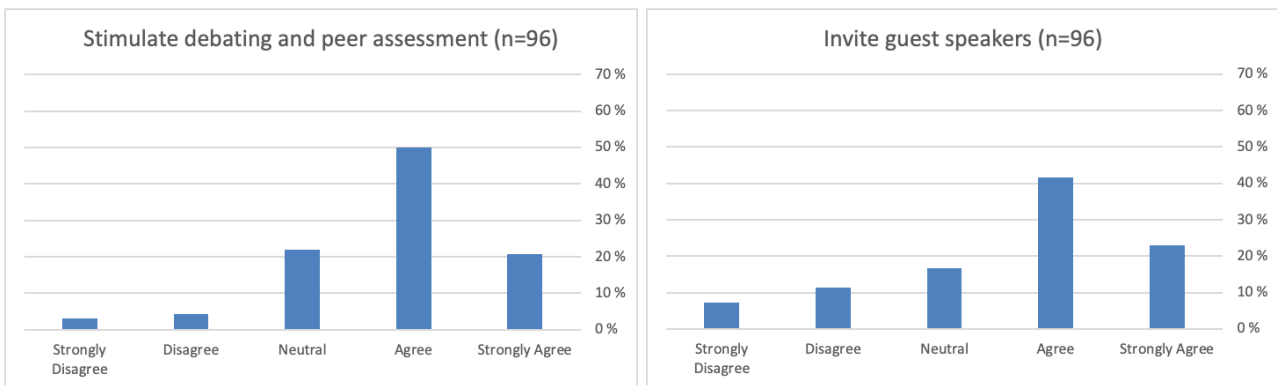
Figure 18: Use of debating and peer assessment, and Use of guest speakers
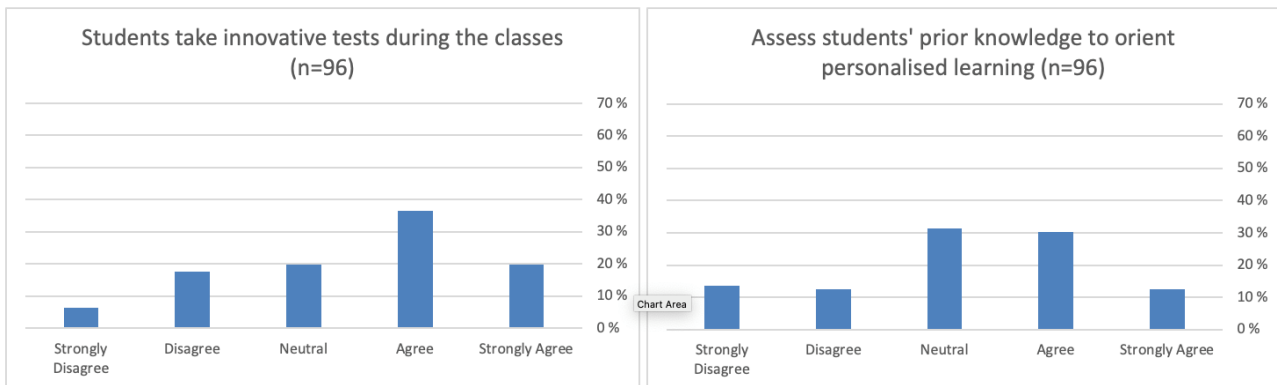
Figure 19: Use of Innovative tests and Use of recognizing prior knowledge

Table 6 presents statistical measures for each data point individually.

Table 7: Teaching and Learning Process statistical summary

	Use game elements or educational games	Use visual or digital resources and tools	Use conceptual maps	Use class group activities	Use case studies	Use lab experiments and simulations	Stimulate debating and peer assessment	Invite guest speakers	Assess students' prior knowledge to orient personalised learning	Students take innovative tests during the classes
N	96	96	96	96	96	96	96	96	96	96
Missing	0	0	0	0	0	0	0	0	0	0
Arith. Mean	2,83	4,16	3,47	3,95	3,81	3,35	3,81	3,61	3,16	3,46
St. Dev	1,13	0,85	0,88	0,81	0,89	1,21	0,92	1,17	1,21	1,18
Min	1	1	2	2	1	1	1	1	1	1
Q1	2	4	3	3,75	3	2,75	3	3	2	3
Median	3	4	4	4	4	4	4	4	3	4
Q3	4	5	4	4,25	4	4	4	4	4	4
Max	5	5	5	5	5	5	5	5	5	5

Students' Experience

The Students' Experience section focus on three sub-domains including 1) students' behaviour, faculty characteristics and administrative staff, 2) teaching staff characteristics and teaching materials and 3) course technological implementation and students' overall satisfaction.

Students' behaviour, faculty characteristics and administrative staff

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Overall satisfaction is high when over 65% students agrees with all six claims in this category. There is no remarkable statistical differentiation regarding the disagreement and the ratio of the disagreement is under 10% for all data points. The details are presented in the Table 7 and Figure 20.

Table 8: Students' behaviour, faculty characteristics and administrative staff

	Students are at their ease to each other	Students are respectful towards each other	Locations is functional to my needs of studying or staff contact	The faculty organization/structure is clear to me	Announcements from the administrative staff are clear	The administrative staff is prompt to support students' needs
Strongly Disagree	3 %	2 %	1 %	0 %	0 %	0 %
Disagree	3 %	5 %	5 %	8 %	6 %	7 %
Neutral	28 %	11 %	21 %	24 %	22 %	17 %
Agree	48 %	47 %	53 %	48 %	54 %	59 %
Strongly Agree	18 %	34 %	20 %	20 %	18 %	17 %
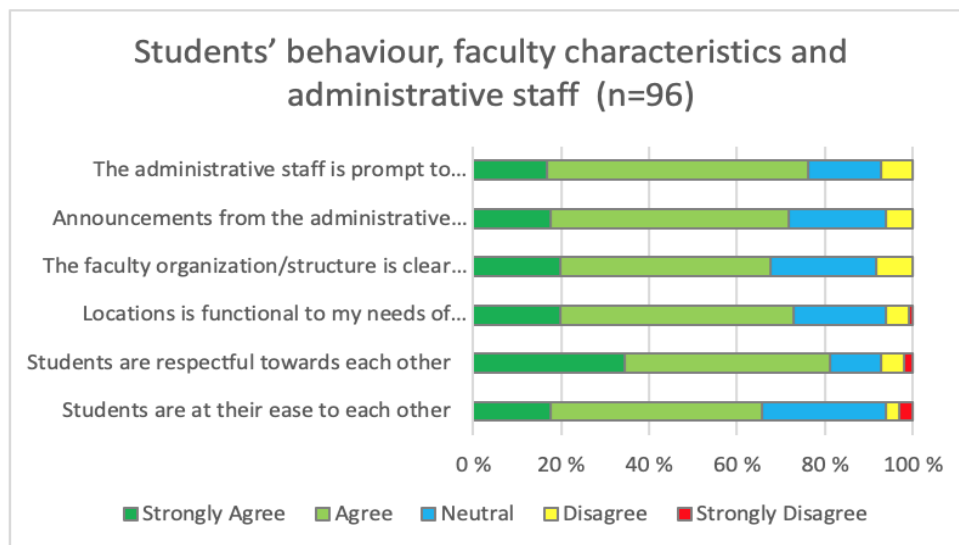
Figure 20: Students' behaviour, faculty characteristics and administrative staff

Figures 21-23 present results visually for each data point individually.

Students are at their ease to each other (n=96)

Students are respectful towards each other (n=96)
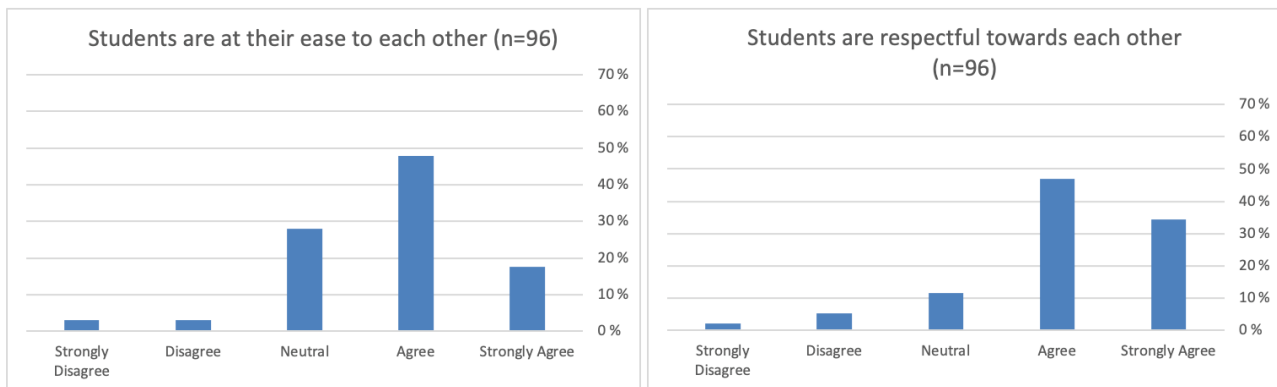
Figure 21: Students' easiness and respectfulness

Locations is functional to my needs of studying or staff contact (n=96)

The faculty organization/structure is clear to me (n=96)
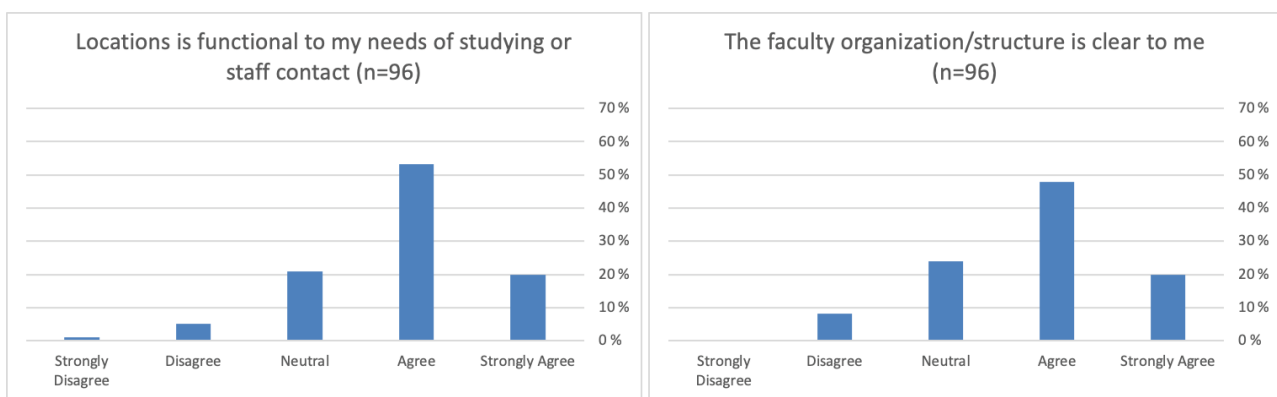
Figure 22: Faculty location and organization structure clearliness

Announcements from the administrative staff are clear (n=96)

The administrative staff is prompt to support students' needs (n=96)
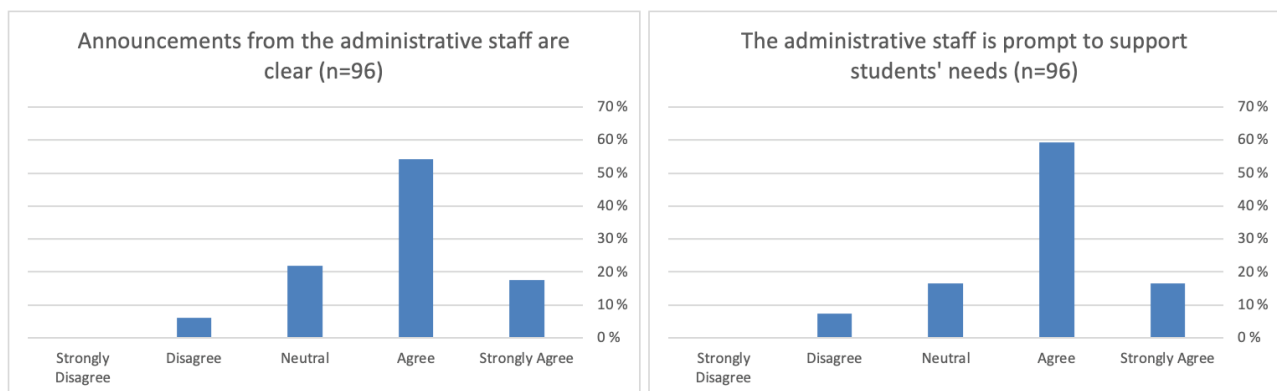
Figure 23: Administrative staff communication and supportiviness

Table 8 presents statistical measures for each data point individually.

Table 9: Teaching staff characteristics and teaching materials statistical summary

	Students are at their ease to each other	Students are respectful towards each other	Locations is functional to my needs of studying or staff contact	The faculty organization/structure is clear to me	Announcements from the administrative staff are clear	The administrative staff is prompt to support students' needs
N	96	96	96	96	96	96
Missing	0	0	0	0	0	0
Arith. Mean	3,74	4,06	3,85	3,79	3,83	3,85
St. Dev	0,90	0,93	0,83	0,86	0,79	0,78
Min	1	1	1	2	2	2
Q1	3	4	3	3	3	4
Median	4	4	4	4	4	4
Q3	4	5	4	4	4	4
Max	5	5	5	5	5	5

Teaching staff characteristics and teaching materials

Results in the second sub-domain are almost equivalent with the first sub-domain. Over 65% students agrees with the five of the six claims in this category but the datapoint "Teaching materials are appealing" differentiates with over 15% disagreement ratio. The overall disagreement level is higher than in the first-subdomain and the ratio of the disagreement varies between 4% and 17%. The details are presented in the Table 9 and Figure 24.

Table 10: Teaching staff characteristics and teaching materials

	Teaching staff is empathic	Teaching staff provide the student support that I need	Teachers are engaged in the teaching process	Teachers are digitally competent	Teaching materials are not too difficult to understand	Teaching materials are appealing
Strongly Disagree	0 %	0 %	1 %	2 %	1 %	3 %
Disagree	4 %	10 %	11 %	8 %	7 %	14 %
Neutral	19 %	15 %	19 %	21 %	18 %	31 %
Agree	52 %	56 %	47 %	53 %	54 %	36 %
Strongly Agree	25 %	19 %	22 %	16 %	20 %	16 %

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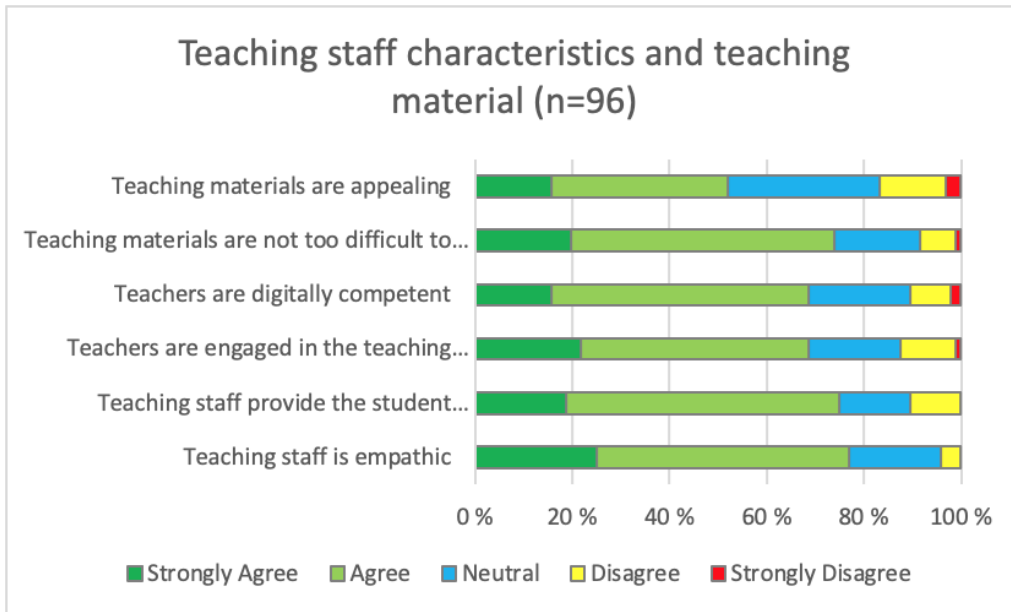
Figure 24: Teaching staff characteristics and teaching materials

Figures 25-27 present results visually for each data point individually.
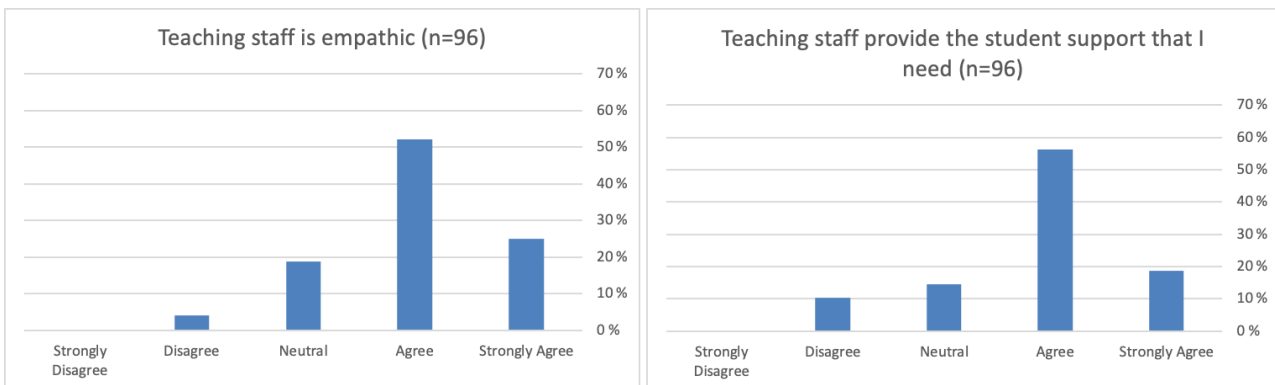
Figure 25: Teaching staff empathy and supportiviness

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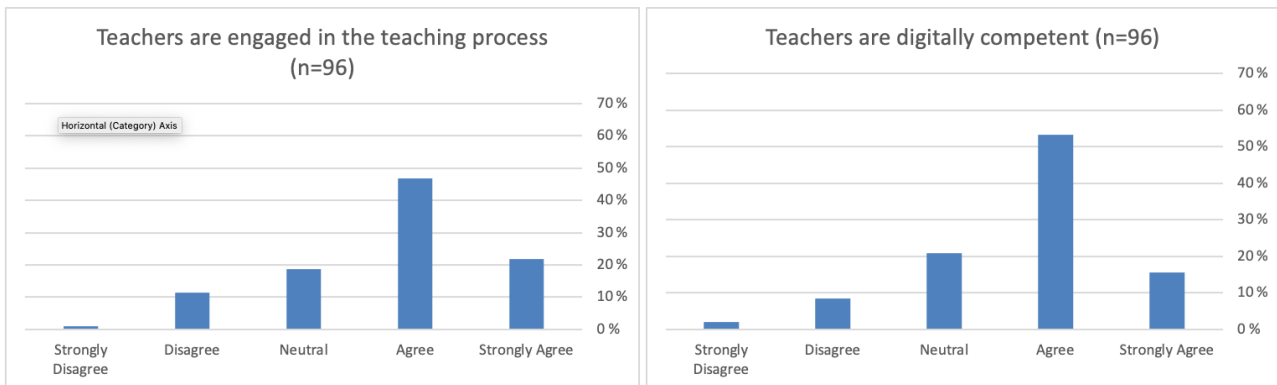
Figure 26: Teachers' engagement to teaching and Teachers' digital competency
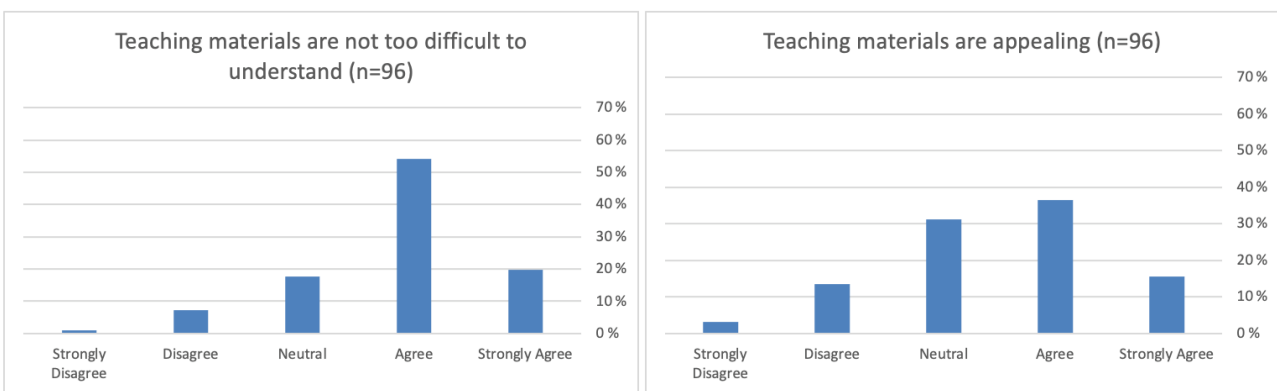
Figure 27: Teaching materials' difficultiness and appealingness

Table 10 presents statistical measures for each data point individually.

Table 11: Teaching staff characteristics and teaching materials statistical summary

	Teaching staff is empathic	Teaching staff provide the student support that I need	Teachers are engaged in the teaching process	Teachers are digitally competent	Teaching materials are not too difficult to understand	Teaching materials are appealing
N	96	96	96	96	96	96
Missing	0	0	0	0	0	0
Arith. Mean	3,98	3,83	3,77	3,72	3,84	3,48
St. Dev	0,78	0,85	0,96	0,90	0,86	1,02
Min	2	2	1	1	1	1
Q1	4	3,75	3	3	3	3
Median	4	4	4	4	4	4
Q3	4,25	4	4	4	4	4
Max	5	5	5	5	5	5

Course technological implementation and students' overall satisfaction

The results of the third sub-domain have bigger variance compared to the first and second sub-domain. Over 65% students agrees with the four of the five claims in this category but the agreement ratio difference between the best and worst data point is almost 50%. The datapoint "Lessons are available to students remotely on the internet" has over 90% agreement level while the data point "Lessons catch my attention and stimulate my curiosity" was agreed only 54% of the respondents. The disagreement level varies between 1% to 10% being in the same level with the two previous subdomains. The details are presented in the Table 9 and Figure 24.

Table 12: Course technological implementation and students' overall satisfaction

	Lessons are available to students remotely on the internet	Lessons catch my attention and stimulate my curiosity	Technology and learning portals (e.g. Moodle, Learning Management System) are effectively used	ICT Tools and platforms are intuitively used	I'm overall satisfied with my choice to study at this University
Strongly Disagree	1 %	2 %	0 %	0 %	1 %
Disagree	0 %	8 %	7 %	6 %	2 %
Neutral	5 %	34 %	23 %	20 %	10 %
Agree	44 %	42 %	46 %	53 %	50 %
Strongly Agree	50 %	14 %	24 %	21 %	36 %
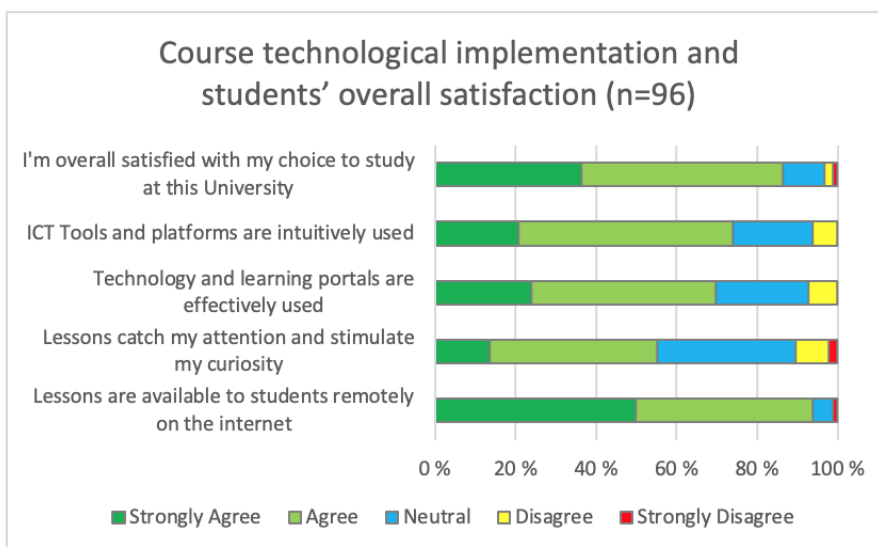
Figure 28: Course technological implementation and students' overall satisfaction statistical summary

Figures 29-31 present results visually for each data point individually.
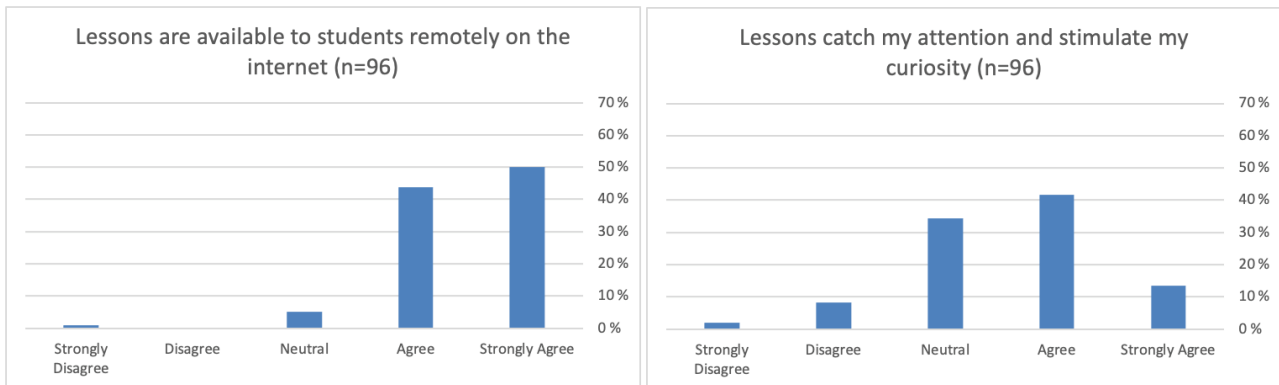
Figure 29: Lessons' remote availability and stimulativiness
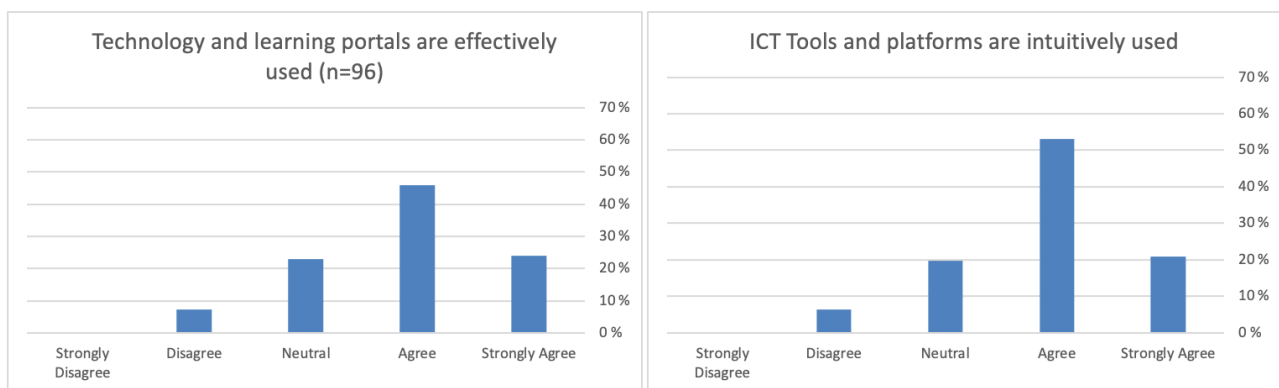
Figure 30: Learning environments' technical implementation
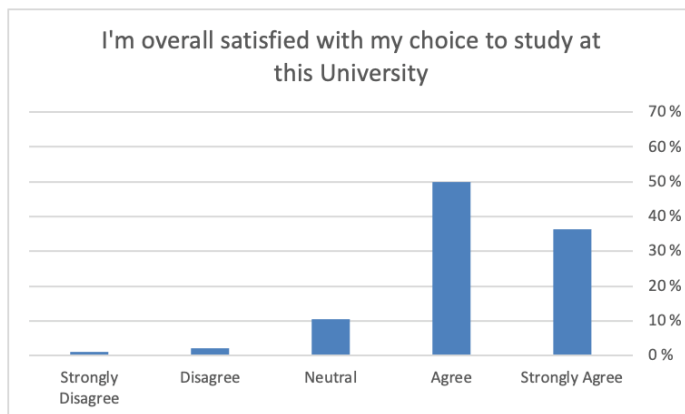
Figure 31: Students' overall satisfaction

Table 13 presents statistical measures for each data point individually.

Table 13: Course technological implementation and students' overall satisfaction statistical summary

	Lessons are available to students remotely on the internet	Lessons catch my attention and stimulate my curiosity	Technology and learning portals (e.g. Moodle, Learning Management System) are effectively used	ICT Tools and platforms are intuitively used	I'm overall satisfied with my choice to study at this University
N	96	96	96	96	96
Missing	0	0	0	0	0
Arith. Mean	4,42	3,56	3,86	3,89	4,19
St. Dev	0,69	0,90	0,87	0,81	0,79
Min	1	1	2	2	1
Q1	4	3	3	3	4
Median	4,5	4	4	4	4
Q3	5	4	4	4	5
Max	5	5	5	5	5

Students' Learning Outcome

Overall satisfaction is very high when over 70% students agrees with the six of nine claims in this category. The biggest concern among the students is if they are able to network with professionals during their studies (14% disagrees) or if the degree is enough to get employed after graduation (9% disagrees). The disagreement level varies between 2% to 14% without being in alarming level in any data point. The details are presented in the Table 14 and Figure 32.

Table 14: Students Learning Outcome

	Studying in this university matches my learning expectations	Studying in this university is really enjoyable	Studying in this university is developing my soft-skills	Studying in this university is giving me the opportunity to meet significant people for my life and my profession	Studying in this university is giving me the opportunity to find a job	Studying in this university will impact my good professional image/reputation	Studying in this university will help me in acquiring a job or career-related knowledge and skills	Studying in this university will help me develop my critical thinking	Studying in this university will help me in team working
Strongly Disagree	1 %	0 %	0 %	4 %	4 %	0 %	0 %	0 %	2 %
Disagree	5 %	3 %	8 %	10 %	5 %	2 %	3 %	5 %	4 %
Neutral	19 %	24 %	24 %	32 %	27 %	23 %	17 %	20 %	23 %
Agree	55 %	51 %	48 %	34 %	42 %	49 %	49 %	49 %	34 %
Strongly Agree	20 %	22 %	20 %	19 %	22 %	26 %	31 %	26 %	36 %

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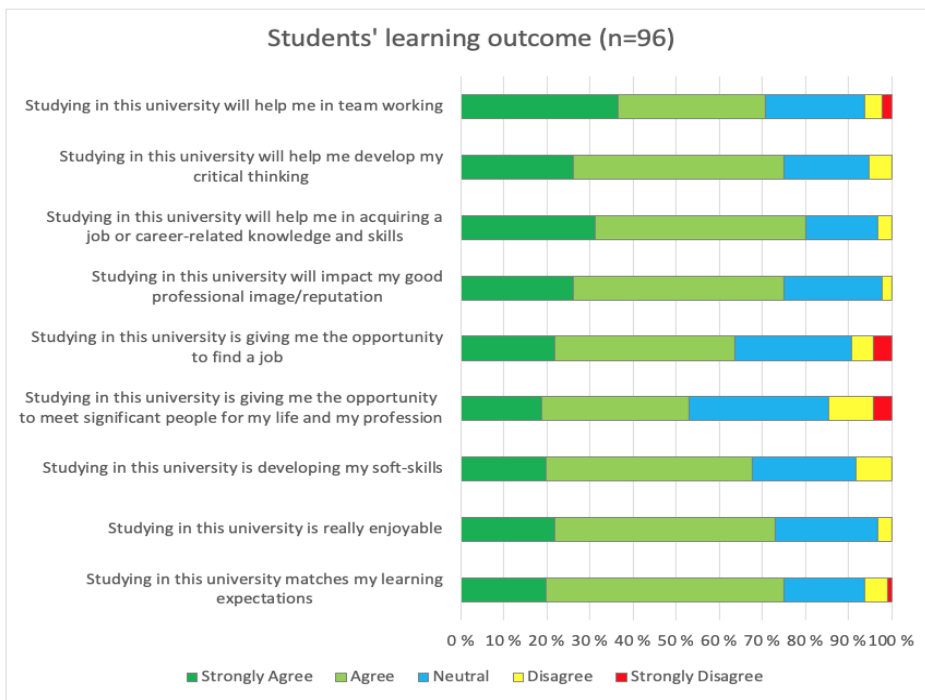
Figure 32: Students Learning Outcome percentage frequency distribution

Figures 33-37 present results visually for each data point individually.
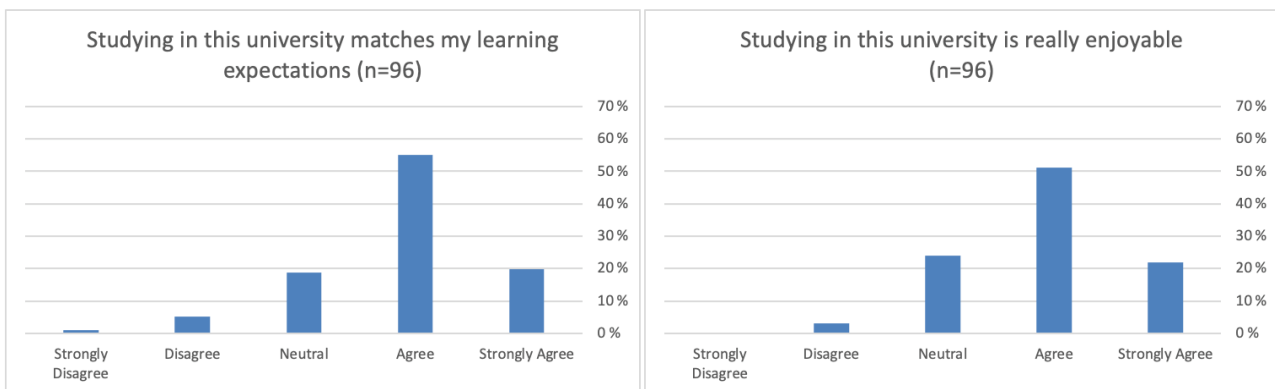
Figure 33: Students' learning expectations and study enjoyment

![ECOLHE - Empower Competences for Onlife Learning in HE]

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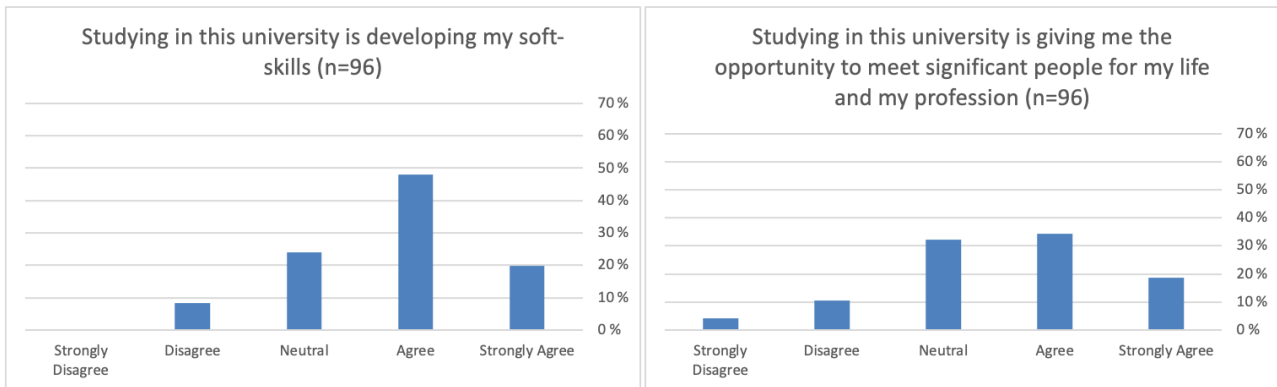
Figure 34: Students' soft skills development and Students' networking possibilites
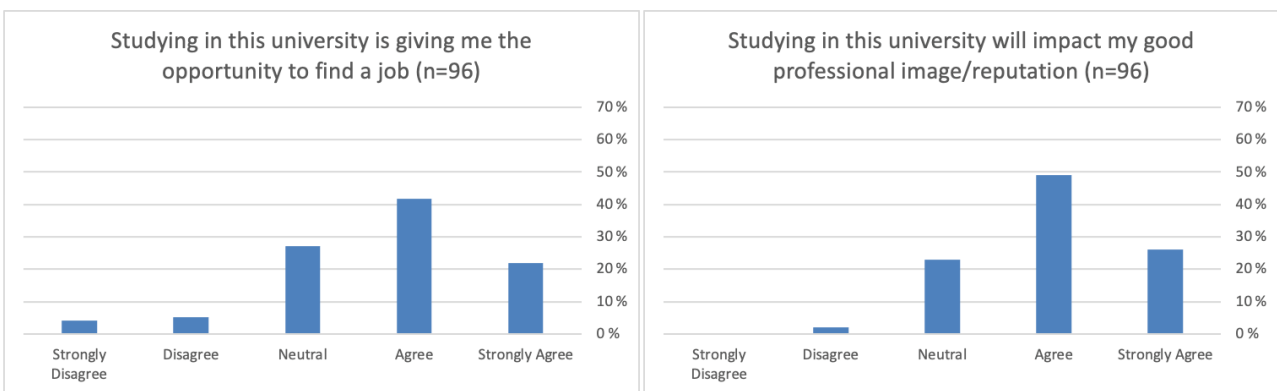
Figure 35: Students expectations regarding to working life
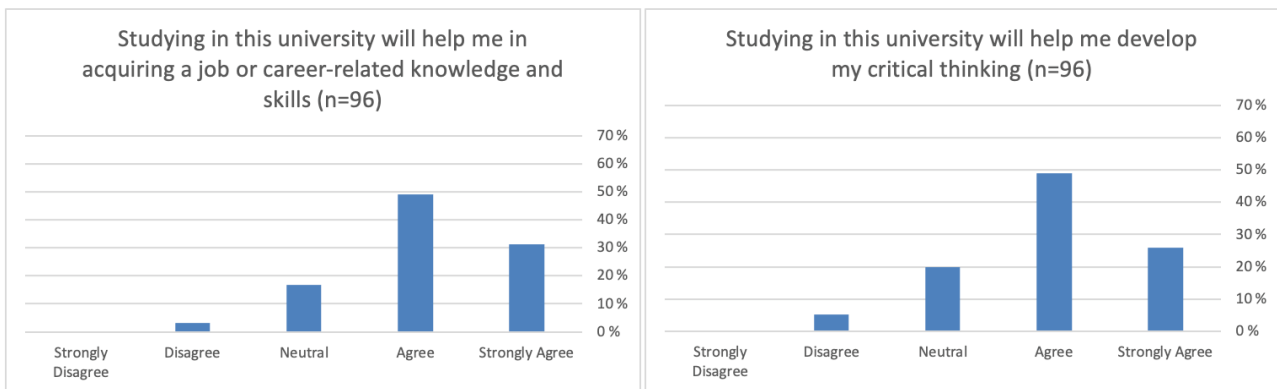
Figure 36: Students' work related competence and Students' critical thinking development
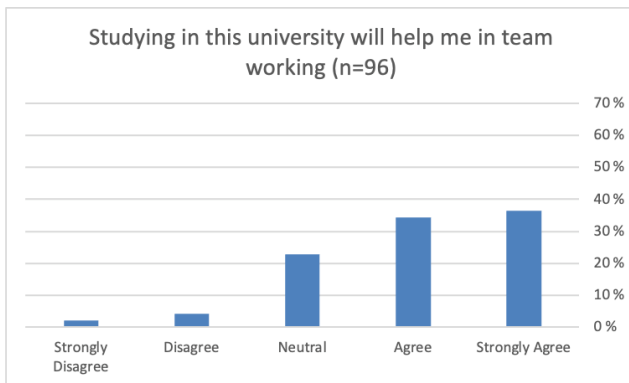
Figure 37: Students' team working capability

Table 15 presents statistical measures for each data point individually.

Table 15: Students' Learning Outcome statistical summary

	Studying in this university matches my learning expectations	Studying in this university is really enjoyable	Studying in this university is developing my soft-skills	Studying in this university is giving me the opportunity to meet significant people for my life and my profession	Studying in this university is giving me the opportunity to find a job	Studying in this university will impact my good professional image/reputation	Studying in this university will help me in acquiring a job or career-related knowledge and skills	Studying in this university will help me develop my critical thinking	Studying in this university will help me in team working
N	96	96	96	96	96	96	96	96	96
Missing	0	0	0	0	0	0	0	0	0
Arith. Mean	3,88	3,92	3,79	3,53	3,72	3,99	4,08	3,96	3,99
St. Dev	0,82	0,76	0,86	1,05	1,00	0,76	0,78	0,82	0,98
Min	1	2	2	1	1	2	2	2	1
Q1	3,75	3	3	3	3	3,75	4	3,75	3
Median	4	4	4	4	4	4	4	4	4
Q3	4	4	4	4	4	5	5	5	5
Max	5	5	5	5	5	5	5	5	5

SWOT-analysis

In the SWOT-section the respondents submitted their view via open questions based on their study experience in Laurea. The individual responses where categorized with suitable themes and the number of occurences were counted in each theme. The table 15 presents the themes that have the biggest number of occurences in the individual SWOT-category. Figures 38-41 present all finded themes.

Table 16: SWOT – Summary

Strengths	Weaknesses
Good and nice teachers (n=21)	Incompetent teachers (n=17)
Online studies (n=14)	Communication issues (n=5)
Flexibility of studies (n=7)	Outdated course material (n=5)
Good reputation (n=5)	Variance in course quality (n=5)
Caring staff (n=5)	Internationalization (n=3)
Opportunities	**Threats**
Collaboration with companies (n=17)	Low teaching quality (n=23)
Digitalization of teaching (n=9)	Competition (n=8)
Online studies (n=9)	Not able to develop (n=5)
Internships (n=7)	Lack of socialization (n=3)
Diversity of studies (n=5)	COVID-19 (n=2)

![ECOLHE - Empower Competences for Onlife Learning in HE]

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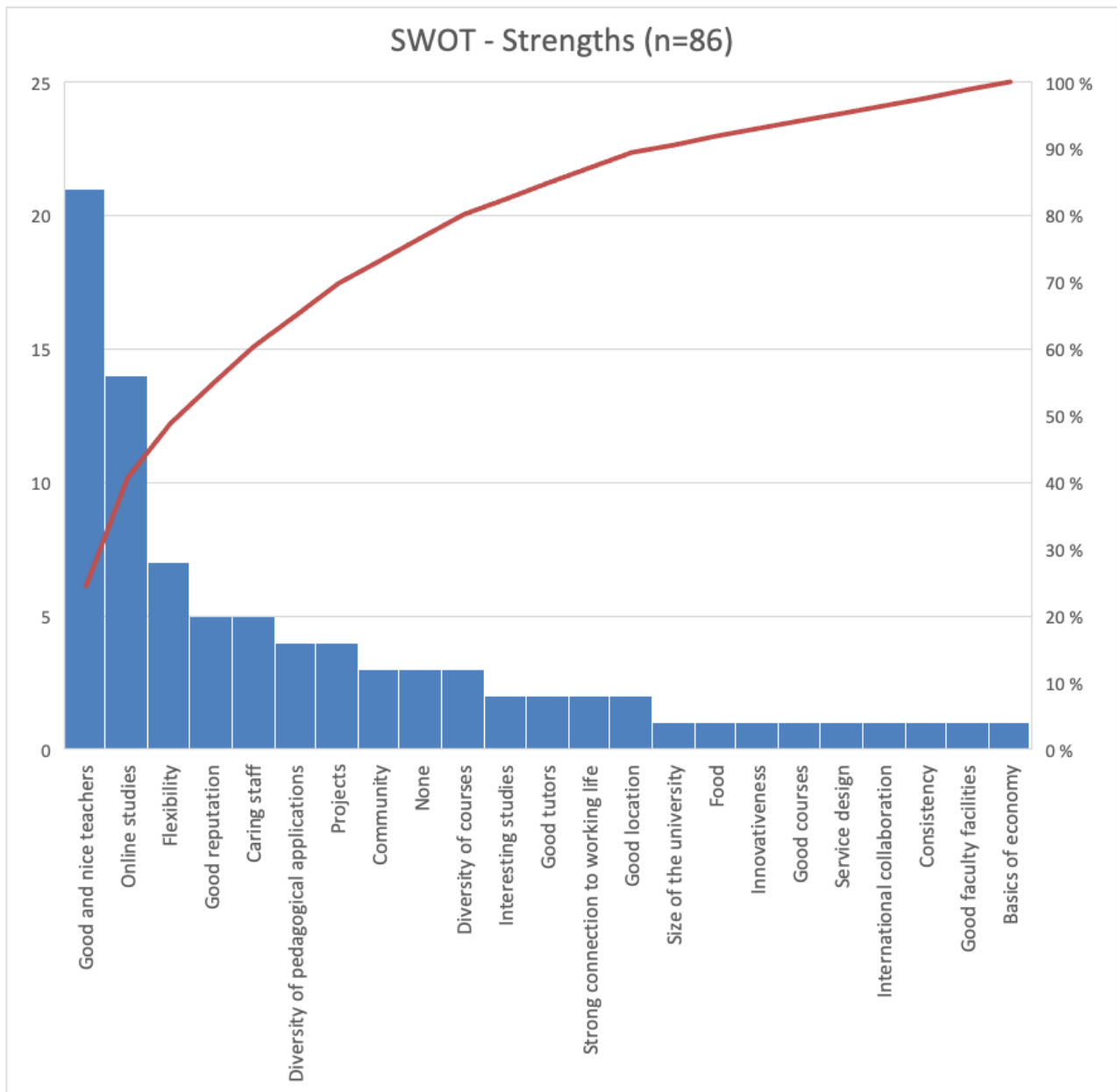
Figure 38: SWOT - Strengths

SWOT - Weaknesses (n=80)
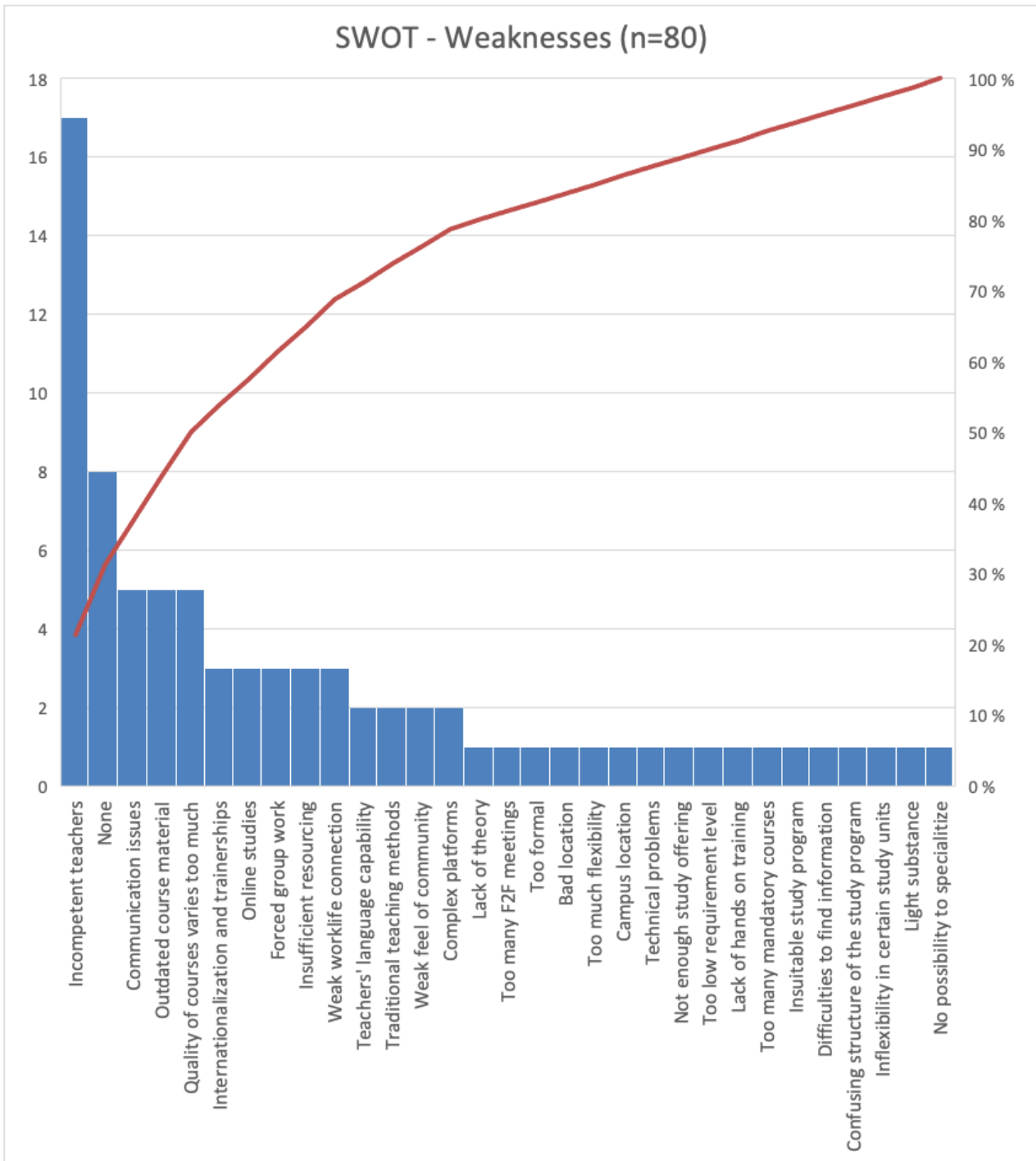
Figure 39: SWOT - Weaknesses

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SWOT - Opportunities (n=76)
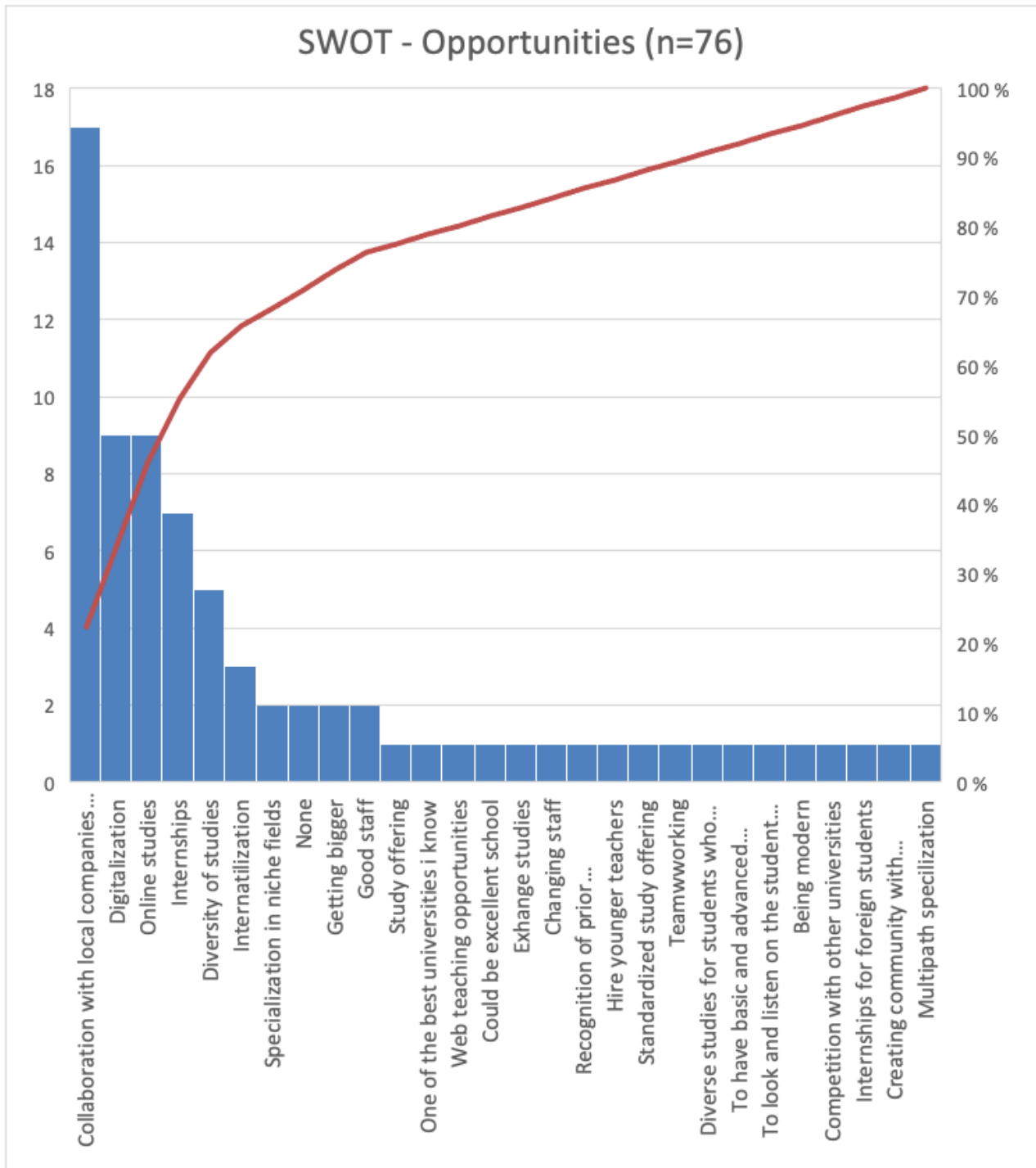
Figure 40: SWOT - Opportunities

Figure 41: SWOT – Threats

![ECOLHE - Empower Competences for Onlife Learning in HE]

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of the European Union
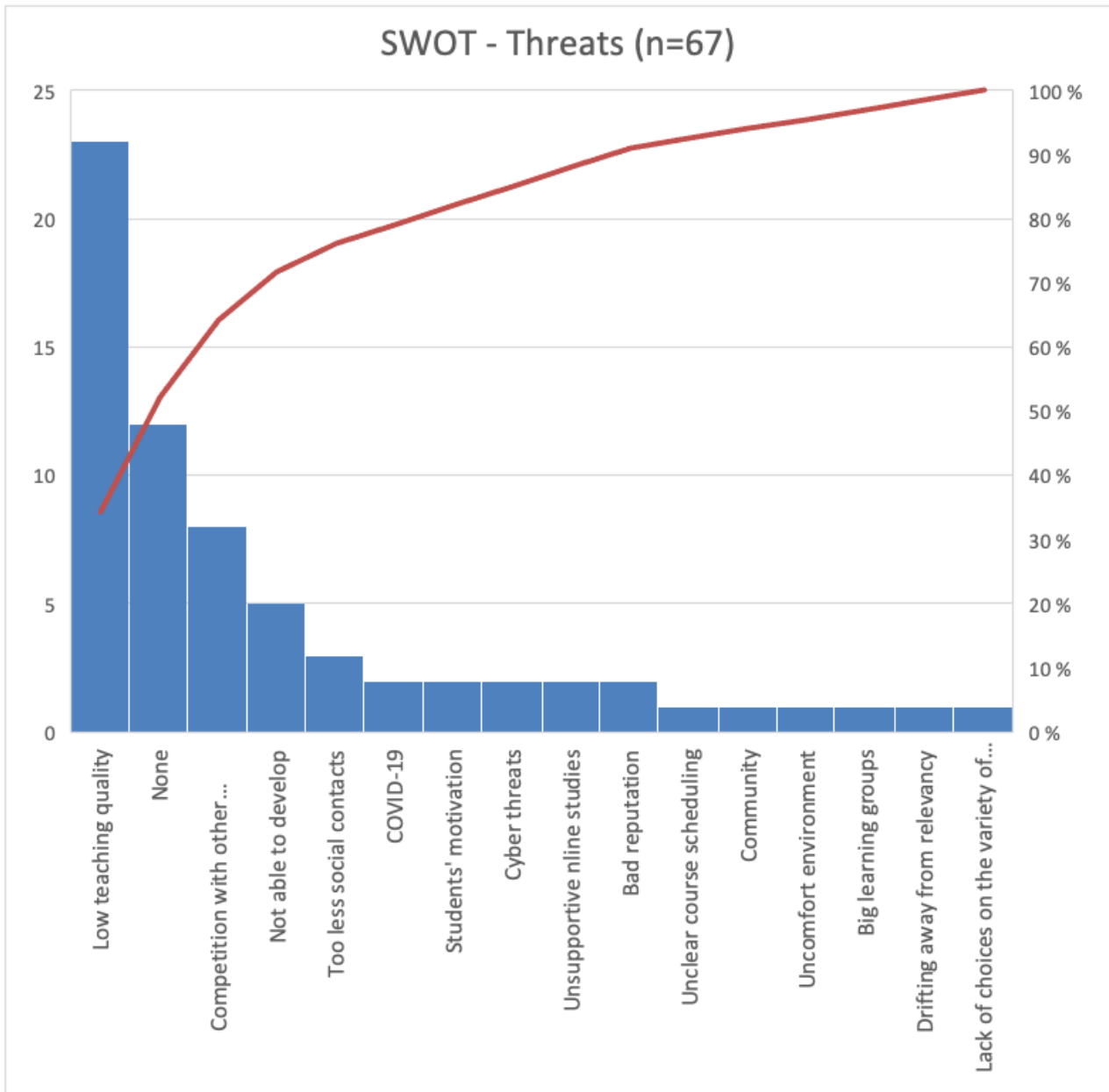
Customized section

In this section there is presented three measures projected with students' maturity. Overall finding is that the students are satisfied with their their studies and they believe that their studies help them for building their career.

I'm overall satisfied with my choice to study at this University	Strongly disagree	Disagree	Neutral or uncertain	Agree	Strongly Agree	Grand Total
First year	0 %	0 %	5 %	62 %	33 %	100 %
Second Year	0 %	0 %	17 %	41 %	41 %	100 %
Third year	4 %	8 %	8 %	44 %	36 %	100 %
Other	0 %	0 %	0 %	0 %	0 %	100 %
Grand Total	1 %	2 %	10 %	50 %	36 %	100 %

Figure 42: Study satisfaction vs. students' maturity

Matches my learning expectations	Strongly disagree	Disagree	Neutral or uncertain	Agree	Strongly Agree	Grand Total
First year	0 %	5 %	19 %	52 %	24 %	100 %
Second Year	0 %	5 %	17 %	49 %	29 %	100 %
Third year	4 %	4 %	20 %	68 %	4 %	100 %
Other	0 %	11 %	22 %	56 %	11 %	100 %
Grand Total	1 %	5 %	19 %	55 %	20 %	100 %

Figure 43: Learning expectations vs. students' maturity

Is giving me the opportunity to find a job	Strongly disagree	Disagree	Neutral or uncertain	Agree	Strongly Agree	Grand Total
First year	0 %	0 %	24 %	48 %	29 %	100 %
Second Year	2 %	2 %	27 %	46 %	22 %	100 %
Third year	12 %	4 %	32 %	36 %	16 %	100 %
Other	0 %	33 %	22 %	22 %	22 %	100 %
Grand Total	4 %	5 %	27 %	42 %	22 %	100 %

Figure 44: Expectations for finding a job vs. students' maturity

Conclusions and results

Staff's perspective

In the managerial and organizational perspective Laurea has strategic objectives according the national Digivisio 2030 project for digital transformation and the process is managed via the department which is responsible for pedagogical and technical training for the teachers. In the quality perspective the transformation process is monitored by the Plan-Do-Check-Act (PDCA) model. The management senses that the personnel works hard and there are some restrictions regarding the resourcing.

Especially the teachers and tutors see that new tools including Canvas LMS, Zoom, Teams, Azure and many others have already eased their work remarkably. As an opposite, they see that their work has become more hectic, and they are not able apply new tools as well as they want. Secondly, virtualized studies require strong self-managerial skills from the students, and it sets high bar for the pedagogical implementation.

The researchers, principal lecturers in Laurea's case, have similar experiences compared to teachers and tutors. Digitalization has offered new place and time independent teaching possibilities, but their cognitive load has increased and the line between the work and free time is more unclear than before. They also see that the digital transformation needs competent leadership and management. However, virtualized scientific seminars have offered great opportunities for both teachers and students.

Fast digital transformation is reflected clearly for the pedagogical and technical support. They have had to adapt new service-oriented role for serving heterogeneous group of teachers; some teachers are pedagogical and technical forerunners but there is also a group of teachers who are not willing to change their working orientation due resistance for change. Lack of time is seen as a major restriction for development and innovation.

The personnel keep themselves up to date by studying themselves, reading, participating to internal training and piloting new technologies. The best practices that make work more efficient are shared openly among the colleagues. In fact, the culture of sharing was highlighted as one of the success factors among the whole personnel.

Student's perspective

According to results three most used pedagogical methods in the BIT degree program are 1) Use of visual and digital resources and tools, 2) Use of class group group activities and 3) Stimulate debating and peer assessment. As a contrary, the least used practices are 1) Use of game elements or educational games, 2) Assess students' prior knowledge to orient personalised learning, 3) Use of conceptual maps and 4) Use of lab experiments and simulations. It seems that there is room for pedagogical improvement if the least used pedagogical methods support learning targets.

Overall satisfaction is high for students' behaviour, faculty characteristics and administrative staff when over 65% students agrees with all six claims in this category. There is no remarkable statistical differentiation regarding the disagreement and the ratio of the disagreement is under 10% for all data points.

Over 65% students agrees with the five of the six claims for the teaching staff characteristics and teaching materials. The datapoint "Teaching materials are appealing" differentiates with over 15% disagreement ratio. The overall disagreement ratio varies between 4% and 17%.

The results of the course technological implementation and students' overall satisfaction have big variance. Over 65% students agrees with the four of the five claims in this category but the agreement ratio difference between the best and worst data point is almost 50%. The datapoint "Lessons are available to students remotely on the internet" has over 90% agreement level while the data point "Lessons catch my attention and stimulate my curiosity" was agreed only 54% of the respondents. The disagreement level varies between 1% to 10%.

Overall satisfaction is very high for the students' learning outcome when over 70% students agrees with the six of nine claims in this category. The biggest concern among the students is if they are able to network with professionals during their studies (14% disagrees) or if the degree is enough to get employed after graduation (9% disagrees). The disagreement level varies between 2% to 14% without being in alarming level in any data point.

According to open questions the main strengths of the BIT programme are good teachers, well organized online studies and the flexibility of the studies. However, there is reported weaknesses too. The main weaknesses are incompetent teachers, communication issues with the teachers, outdated course material and big variance in the course quality. This is an interesting confrontation while there is reported for being good teachers and incompetent teachers. Probably this setup causes phenomena like big variance in course quality. Students see that Laurea has good opportunities for expanding collaboration with companies and extending the offering of online studies. The main threats are low teaching quality, competition with other universities and Laurea's capability to solve existing problems. It is clear that that the students see that there is a lot of opportunities in the educational online market but the low quality is not easing Laurea's position in the competetitive educational sector.

Summary

The main outcome from the empirical part is that digitalization has potential for development and innovation, but it can also drain out the personnel if the work is not resourced properly. The digitalized working environment has already eased work a lot, but simultaneously numerous new possibilities create high cognitive load for the personnel and the students. In the longer run the situation will become intolerable and digital transformation starts to drain more resources that it gains tangible benefits if the transformation process is not managed properly. There should be found clear balance between different pedagogical models including campus based-, blended-, and virtual learning without resistance for change and teachers should have more time for reflection with reasonable daily basis cognitive load.

The situation is visible in the students' perspective too. In spite of the fact that high number of students are satisfied for their studying in BIT programme due well organized and flexible online studies they report that the quality of the education varies too much and they see that Laurea will loose its competitiveness in educational

market if the problems are not solved and the situation is not improved. They are also arguing if the degree is valued in the competitive work market. These signs should be considered seriously and try to find out feasible corrective actions.

Table 17: SWOT: Summary of Academic Bodies, Tutors and Teachers, and Pedagogical and Technical Support

STRENGTHS:	WEAKNESSES:
Staff:	**Staff:**
Cocreative processes integrating staff, students and workplaces	Lack of time resources
Good availability of digital tools	Lack of teaching competency in digital environment
Good availability of internal training (D-unit)	Lack of the time for self-development
Dedicated technical support for the teachers (D-unit)	Creative work is not valued
Strong quality assurance system	Balance between virtual, blended and classroom teaching is unclear
Strong sharing culture for the best practices	Resistance for change
Increased working flexibility	Some students lack self-management skills
Increased learning flexibility	Increased need for leadership, guidance and support
Integration of RDI-projects and teaching is easier due virtualized meeting possibilities	Increased cognitive load
Monetary and time resourcing	Unclear difference between work time and free time
Good LMS (Canvas)	No possibility to specialize
Competency	Incompetent teachers
Vision	Communication issues
Students:	Outdated course material
Good and nice teachers	Variance in course quality
Online studies	Internationalization
Flexibility of studies	**Students:**
Good reputation	Incompetent teachers
Caring staff	Communication issues
	Outdated course material
	Variance in course quality
	Internationalization

OPPORTUNITIES:	THREATS:
Staff:	**Staff:**
Participation to Digivisio 2020 project	New tools are not utilized best possible way due lack of competency
Possibilities for automation	Student dropouts
Better courses and better student satisfaction	Teachers lose their motivation due lack of time resources
Expanding study offering to international level	The ratio on innovation goes down due lack of time resources
Resilient learning	Teacher burnout
Constant small improvements	The personnel are not able to adapt digital transformation
Curiosity	**Students:**
Level up the quality of the education which could attract better students	Low teaching quality
Students:	Competition
Collaboration with companies	Not able to develop
Digitalization of teaching	Lack of socialization
Online studies	COVID-19
Internships	
Diversity of studies	

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Appendices

2.8   Appendix-1: Interview of Academic Bodies

ICT Culture

Q1: What is the vision of innovation and digital innovation in Higher Education in your institution?

A1-1: The changing work environment calls for increasingly open, diverse and flexible learning solutions. Laurea University of Applied Sciences answers this need by developing high-quality digital degrees, degree components and modules. Laurea's digital education is distinguished by the application of Laurea ́s own pedagogical model called Learning by Developing (LbD) in the digital learning environment. To strengthen the integration with workplaces and employers, Laurea puts digital tools to extensive use in its cooperation with working life. Flexible, digitally oriented learning and development environments pave the way for blended learning and collaborative work and development. During their studies, students participating in digital education grow into empathetic and cooperative experts for the future working life. Laurea's staff have solid expertise in digital pedagogy and Learning by Developing (LbD). Laurea is a well-known provider of impactful competence and high-quality digital services. Students have easy access to all of Laurea's student services from their own terminal devices regardless of time and place. High-quality student guidance is also be offered digitally.

Q2: In this institution how digital innovation have modified?

Institutional goals

A2-1: They have been defined in Laurea ́s strategy and its implementation plans.

D2-1: Laurea has a strategic objective for increasing the amount and quality of the virtual studies (Laurea Strategy 2020).

internal and external organizational processes

A2-1: Processes have been redefined to support digital education

Teaching/learning and university practices/activities

A2-1: A new learning management system (Canvas) has been selected and taken in use to support digital innovation.

Competencies and need required to teachers, researchers and students

A2-1: They have been offered various kinds of training and support.

D2-1: Laurea has a unit (D-unit) that is dedicated for supporting virtual teaching and learning (Laurea Intranet).

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The skills required of governance bodies and intermediate and support staff

A2-1: They have been offered various kinds of training and support.

D2-1: Laurea has a unit (D-unit) that is dedicated for supporting virtual teaching and learning (Laurea Intranet).

Leadership, planning and management

Q3: How is the integration of new digital innovation into learning and teaching managed within the university?

A3-1: Laurea's digital degrees and degrees components are developed, shared and used openly throughout the whole university to ensure that they effectively support both degree education and continuous learning. An open approach helps us ensure that the substance and methods of learning are developed continuously and collaboratively and that our education is of a high quality.

Q4: How has the university moved organizationally due to digital innovation?

A4-1: To ensure the scalability and high quality of digital education, Laurea has centralised critical digital innovation in its organizational structure (D-unit).

Q5: What guidance is provided to faculty, staff and students?

A5-1: Plenty of online training, Q&A and other kinds of sessions, lots of open online learning materials and tools etc.

Q6: What are the policies, guidelines and concrete help that central steering bodies offer to universities to redefine their role in the face of the challenge of digital innovation?

Vision

A6-1: The Digivisio 2030 project is one of the decade's most significant digitalization projects for higher education institutions in Finland. Its aim is to ensure flexible learning opportunities for learners as well as to improve the competitiveness of Finnish higher education institutions globally, while preserving their autonomy and opportunities for strong profiling. All Finnish higher education institutions have pledged their contribution to the Digivisio 2030 project and signed a participation agreement.

Goals

A6-1: During the preparatory phase, all higher education institutions committed themselves to Digivisio 2030 and project planning by signing a letter of intent. The Digivisio 2030 participation agreement is an extension of the letter of intent, and the administrative model and implementation of the project are agreed upon in it. In addition, the participation agreement lays out common key principles that ensure implementation in a transparent and flexible manner so that it is possible to apply for and obtain funding for the project from different sources. The participation agreement also enables the participation of higher education institution experts in the implementation of the project.

Resources

A6-1: The Ministry of Education and Culture has granted a special grant of EUR 20 million as the first funding for the project. In addition to the special grant, the Ministry of Education and Culture is allocating EUR 17.8 million in strategic funding to the project for 2021-2024.

Support

A6-1: All the universities have signed the agreement and the project organization leads the cocreative the development work with active communication and involvement of all parties.

Evaluation

A6-1: Laurea University of Applied Sciences actively participates in the national Digivisio 2030 workpackages.

Q7: What are the most important problems you encounter today as a university to cope with digital innovation, even those imposed by the global pandemic?

A7-1: Teachers would need more time to adopt all new technologies and renew their pedagogical approaches to the new digital innovation.

Q8: And what are the solutions adopted in order to: teaching/learning; research; third mission; administrative/management activities etc? With what results?

A8-1: No answer.

Q9: Is it felt/how is it perceived by stakeholders (students, business, society...) your ability to promote digital innovation and renew internal organizational and teaching processes through the enhancement of digital technologies / resources)?

A9-1: No answer.

Quality Assurance

Q10: Has the quality control system provided any indications on the integration of digital innovation in teaching/learning processes?

A10-1: The quality control system offers many kinds of indications that show the integration.

D10-1: Laurea quality control includes four main dimensions: 1) Quality policy, 2) Quality system, 3) Quality culture and 4) Quality services. The main process is Plan-Do-Check-Act (PDCA) model (Laurea Intranet).

Q11: What role does the quality control system play in the promotion of educational innovation processes?

A11-1: The quality control system supports the development work systematically.

D11-1: The quality control system includes metrics for 1) Funding, 2) Strategy, 3) Staff feedback, 4) Student feedback, 5) Partner feedback, 6) National audits and 7) International audits (Laurea Intranet).

Q12: What tools does it suggest?

A12-1: No answer.

Q13: Are periodic monitoring and revision of curricula carried out with regard to the application of digital skills (in order to ensure effective digital maturity of students)?

A13-1: Yes.

D13-1: The main process is Plan-Do-Check-Act (PDCA) model (Laurea Intranet).

Scientific-research work

Q14: What is the university vision of digital innovation in the scientific-research context?

A14-1: No answer.

Q15: Which are the concrete applications to support research and researchers?

A15-1: No answer.

Technology transfer and service to society

Q16: What is the role of the Third Mission in the diffusion of digital innovation inside and outside the University?

A16-1: No answer.

Q17: Who is in your university and what is the role of stakeholders in this process?

A17-1: No answer

ICT resources and infrastructure

Q18: What is the current availability of technology infrastructure and devices in the university?

A18-1: Very good.

Q19: Do you think there are currently methodological skills for using these resources? And updating/maintenance skills?

A19-1: The methodological skills are at the good level but have to be improved constantly

Q20: What are the critical issues/constraints that still weigh on this aspect and possible solutions to overcome them?

A20-1: No answer.

Q21: Has a development plan been designed to do this?

A21-1: No answer.

Learning and teaching

Q22: Which innovative tools, methods and approaches are used to improve the curricula of your university

A22-1: Tight cooperation with the workpalces.

Q23: What kind of support does the university provide for the professional development of faculty, researchers, students and administrative staff with respect to integrating digital innovation into teaching and university management?

A23-1: Own training.

Strengths and weaknesses

Q24: What strengths and weaknesses, if any, are you finding in your university's innovation governance?

A24-1: The cocreative processes integrating staff, students and workplaces are the main strengths.

Q25: Last question: Is there anything further that you think is important?

A25-1: No answer.

2.9   Appendix-2: Interview of Tutors and Teachers

ICT Culture

Q1: What is your idea of digital innovation in Higher Education?

A1-1: I'm not sure I understand what the question is looking for. The role of digitalization in education perhaps? Or my thoughts of what it should be? Also, what is "digital innovation"? I'll try anyway: "digital innovation", which I understand as using new networked applications as a tool to facilitate learning is – first and foremost – a tool. Not very dissimilar to using black boards or public libraries in the years past. Yes, "digital innovation" makes it possible to develop new and interesting – even efficient – ways to facilitate learning, but then again, so did the libraries in their time.

A1-2: What higher education needs is an easy way to produce high quality educational videos, assignments and materials at scale. Also automation that is easy for a teacher to use to set up assignments and self learning evaluations.

A1-3: I'd say there's not much innovation going on here. Each teacher is innovating to improve their own experienceand work capabilities. With increasing number of students and growing online presense I think MOOC's might be the closest thing to digital innovation at the moment.

A1-4: Sharing content is easy. Lectures can be recorded, and they become reusable. Students can participate remotely. Their progress can be monitored automatically. Teacher's role is more controlling and councelling than delivering. Grading changes dramatically as students are not familiar and known to teachers, actually their identity and authenticity cannot be tracked very well. Student volume will increase leaving less time for individual students.

A1-5: Exploring and leveraging new digital opportunities for learning

A1-6: The digital innovation in higher innovation is organization of teaching by applying available tools and pedagogical practices best possible way.

A1-7: Digital innovation in context of Higher Education is the use of digital technology and applications to improve existing education related processes and enhance students and educators experience. When I think of of keyword "digital", I visualize anything and everything available in electronic form planted on top of a hardware and this electronic form at its own core, is a series of statements written down in one or more programming languages and finally melted down into 0s and 1s. At Higher education, be it an administrative staff, a teacher and a student, we all have access to different types of screens equipped with digital applications and information right from enrollment application to graduation application. We use various digital applications for our day-to-day work e.g.   MS Office 365, Peppi, Canvas, Cloud Services-Azure, Adobe Package, Zoom and Teams,

Reportronics,and Sarastia etc but I will be focusing mostly on basic and yet main digital technologies or applications we use in our teaching as teaching itself is the main service provided by a university.

Q2: What is digital innovation in your learning support/ research work context ?

A2-1: Currently digital innovation means preparing for IPv6 networks and the new and exciting new application areas they make possible – IoT to name the most obvious.

A2-2: The innovation would be an automation that helps in creating Finnish texts in the videos. The new directive will bring a lot of extra work for teachers. Now you should get a support trainee to do the texts.

A2-3: Using Cloud based automation tools for automatically checking the programming assignments (this work is still in progress).

A2-4: Very much all mentioned above.

A2-5: Concrete example-1: Leveraging online booking tool for guidance / tutoring meetings. Concrete example-2: Leveraging LMS analytics for monitoring student activity in study units. Enables possibilities in supporting / contacting students based on their progress in study unit

A2-6: The digital innovation can be using a new tool or a new practice for existing tool. The digital innovation concerns teaching, tutoring and learning.

A2-7: In our teaching/learning tasks and in research work, we use various digital applications to streamline our work. Some most important examples are: Learning Management System - Canvas , Remote work/communication - Zoom & Teams, Students and Studies Information System – Peppi and Pakki

Q3: In what way does the digital technologies, also regarding the challenge of the new technology frontiers (e.g. artificial intelligence, digital learning environment, augmented reality etc.) have modified: - teaching-learning processes in your HEI?

A3-1: The teaching and learning are now almost 100% in networks. The path was set already before the pandemic, which then accelerated the move to virtual learning conciderably.

A3-2: In a digital learning environment, all materials are in the same database and it allows to control the quality of workspaces. Applications related to AI and augmented reality are not yet in use.What would be very welcome is ways to set up and teach AI to handle the mechanical tasks related to giving feedback in major projects and thesis. In most of the thesis drafts the initial feedback is almost the same for every student, about grammar, use of imprecise expressions and other things that people commonly write in less academic work, but is not acceptable in thesis. This repetitive feedback could be handled by assistant AI that marks the areas in text that contain common errors that need to be fixed. There is a surprising amount of resistance from some colleagues about the new ways of working, a lot of this probably stems from unfamiliarity with changes in technology. So having self help material to support colleagues in adapting to technological changes would remove unnecessary friction.and scalability of materials

A3-3: LMS's, collaboration tools and digital video is pushing the student-teacher interaction to web. Less and less F2F interaction with the students. It is shifting online as well. However some of the students seem to be more active using online tools such as Teams of Telegram than what they would be in classroom context. I've found myself chatting online with students and answering to their question in increasing numbers.

A3-4: We are still in the process of change, out of control but doing our best to cope with both the digital transformation as the pandemic that accelerates the need to change (not the change itself that cannot be expedited).

A3-5: Digital technologies provides possibilities to automate recurring tasks. This frees time for other HEI activities (i.g student counselling / tutoring). From 1:1 meetings in campus towards teams chat discussions and other digital interactions. Ability to respond faster to different student needs.

A3-6: Advanced technologies (e.g. AI or AR) are not applied for teaching purposes in Laurea. The latest development is new Canvas LMS.

A3-7: I believe out of above 3 examples, digital learning environment is the most important for us teachers. At this one place alone, we teachers are able to create instructions, communication walls, assignments tasks, feedbacks and much more for our students. Along with digital learning environment, another platform - MS Azure has been very useful as well. We have a newly launched digital learning environment – Canvas. I am still exploring its full potential to make maximum use of it. Knowing more about how to use this tool properly will improve the efficiency of knowledge transfer to students and of course interactions with students as well.

Organizational Dimension

Q4: How is the university, understood as a complex system, transformed, under the pressure of digital innovation, in terms of organization, internal processes, work flows and communication, at different levels?

A4-1: The fact the learning is now mostly virtual is bound to have some effect in how we organize the work. For now there have been little signs that the upper management has taken this into consideration. Currently we are organizationally "campus-based", with some autonomy on how we organize the campus-based courses. The real-life campus has rather little meaning in organizing virtual courses however.

A4-2: The internal processes of the university are slowly changing. Opposition to the development of online pedagogy and new systems is common. Issues related to systems are often difficult to communicate because some lecturers don't even want to think about new applications.

A4-3: Slowly. I think processes are the same, just the interaction has moved online.

A4-4: Complex organizations like institutions have little capacity to change, although individual teachers have been quite successful in their efforts to adopt. New processes are defined but not necessarily followed.

A4-5: The leap 2020 has been huge. Still there is so much to do to leverage all the possibilities digital environment provides. A lot of new digital tools in use, but the university culture needs to develop more towards digital opportunities.

A4-6: Transformation is more rapid than organizational processes can be developed. In practice, some of our practices still refers campus teaching practices but we are offering online studies.

A4-7: I believe our university prioritizes the importance of adopting to new digital innovations and has been continuously improving the various digital systems to make processes easier for its teachers and students.

Q5: What are the main criticalities that you have encountered with respect to this?

A5-1: Finding and assigning resources to some virtual courses has been a bit of a hassle, as there are several resource-owners on different campuses that seem not to be able to coordinate their work efficiently.

A5-2: Many lecturers don't want to learn new applications. They have no time. Many say that automated assignments are not suitable for university.

A5-3: We are still enprisoned by the academic calender year and dates, although online presence would make them obsolete in many cases; for example enrollments, graduation dates etc.

A5-4: The amount of labor needed to change the whole pedagogy is always underestimated or ignored. Financial challenges are tried to cover with increasing volumes and it will further decrease the quality that is already in major jeopardy.

A5-5: Digitalization is a culture, not technology transformation project.

A5-6: Some of our processes still refers campus teaching practices.

A5-7: 1) Improved way to organize teaching content, 2) Guidance using digital tools has better user interface and 3) Multiple communication channels.

Q6: How has the figure of collaborating teacher/ tutor changed in the last period and how is digital innovation having an impact with respect to the redefinition of roles, skills, organizational dimensions?

A6-1: Same as previous answer.

A6-2: The number of teachers has not changed. Innovation and the development of something new is still the work of one digi lecturer.

A6-3: No answer.

A6-4: Roles and skills are changing dramatically. Quite new skills are needed and the fairly experienced staff cannot follow.

A6-5: More towards self-study. Need for clear instructions so that there is not that much need for 1:1 collaboration / tutoring. From booked 1:1 discussions towards online discussions.

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A6-6: The main change concerns the identity of a teacher. Many teachers are forced to work in online environment, but their orientation still refers campus/classroom teaching. In such a case online learning environment is not used the best possible way.

A6-7: I think, digital innovation or digital technology has an impact on teacher's role as well as on organization's role in following ways: 1) A teacher can address the larger number of students, especially for teaching theoretical concepts, 2) A teacher can execute same study unit in classrooms mode, blended mode and fully online mode based on the need of targeted students, 3) Delivering and attending guidance sessions from remote locations, 4) Flipped classrooms instructional strategy is possible, 5) Brand specific content is provided by third party sources and 6) -Now and even more in future, anyone at any age from anywhere in the world can learn and even teach!

Teaching Practices and Digital Technologies

Q7: What is your experience in using innovative teaching methodologies with digital technologies?

A7-1: The same as using "innovative" teaching methods in traditional teaching: some are genuinely useful, some are just gimmicks without much use.

A7-2: We will certainly achieve a lot with the new applications. We are just beginning this development. We still do a lot of repetitions, for example, commenting on the same setup issues in student reports. Students would get feedback on the reports quickly with the help of AI.

A7-3: Teachers are doing this individually by themselves. No resources / organizational support is given for this.

A7-4: Digital technology has been major part of my work for years. New innovations are not helpful but digesting the existing technologies.

A7-5: No answer.

A7-6: I have good experiences.

A7-7: Definitely with the help of digital technologies, teaching tasks' efficiency is increased, it has made collaborative work a lot easier. Teachers and students can see assessment parameters, overall progress, material, instructions on one platform.

Q8: Can you give some examples of innovative methodologies with digital technologies applied to your learning support experience?

A8-1: Not really, but I've been using digital tools perhaps longer than most, so maybe I cannot see "innovative" the same way as some.

A8-2: Automatic exam monitoring with Proctorio. In online teaching, we are not yet at the level of innovation. The goal now is to get all teachers to use Canvas first.

A8-3: Telegram groups for students, Teams chat guidance, Support sessions as Zoom-meetings.

A8-4: Using free video material from YouTube. Canvas as a learning environment.

A8-5: No answer.

A8-6: I have implemented fully automated course in Canvas and offered hands-on training in Microsoft Azure cloud services.

A8-7: Recording of contact session, hybrid thesis guidance teaching In class + live on zoom, Creating recordings of theoretical parts and providing students in advance.

Q9: Have digital resources and technologies changed/modified your way of working/teaching/ designing learning paths and relationships with students and colleagues?

A9-1: Yes, but not very much really. The way you need to build and run the courses obviously changes, but then again discussions and meetings with colleagues is now even easier than before.

A9-2: The work has become more efficient. Meeting times have shortened. Students think that teaching online has resulted in a lot of good.

A9-3: Yes. Teaching online has changed my role from teacher to facilitator/tutor. Online presence has also given a possibility to have more short mini-meetings with colleagues instead of 2-3 hour weekly meetings.

A9-4: Face to face contacts moved to online sessions, which is partly good.

A9-5: No answer.

A9-6: Yes it has. I can work remotely and I'm able to automate assessment and some routine tasks.

A9-7: Definitely yes. We as teachers are constantly adopting to the new ways of working/learning/teaching. Digital technologies and trends are changing rapidly, we need to upgrade ourselves with new digital solutions and integrate the digital technology solutions in our teaching in a most suitable manner for our study units and students. I believe relationships with colleagues and students have been more or less same way, nothing much has changed due to the improvements in digital technology.

Q10: Do you share common models/practices in your faculty?

A10-1: Yes.

A10-2: Yes, I share good practices with lecturers, it is an important part of my job description.

A10-3: We share good practices and –experiences. Each teacher implements them as they wish. However we have one weekly staff-meeting online and one monthly faculty meeting online.

A10-4: Naturally some are common (like learning environment) but in general the staff has all freedom to apply their own methods.

A10-5: No answer.

A10-6: I discuss with my colleagues.

A10-7: Yes, we do follow some common practices in our BIT faculty.

Q11: What are the criticalities/constraints that still weigh on digital innovation in your learning support experience and the possible solutions to overcome them?

A11-1: No problems.

A11-2: The biggest limitation is the lack of working hours. There is also a lot to improve in attitudes.

A11-3: Any new innovations / techinal solutions have to be developed without extra resources.

A11-4: The problem is very much lack of leadership, and unrealistic or unpractical visions and strategies. The institutions are poorly managed and that is hard to overcome because any interventions would probably hurt a lot in a short term. The institutions cry for independence so that they can continue their inefficient work.

A11-5: No answer.

A11-6: Many teachers are struggling with new tools and they are not able to unlearn from old practices/habits.

A11-7: In my opinion few constraints can be: 1) constant change in digital applications/solutions, 2) not knowing how to use learning management system properly and 3) change in learning material provided by vendors. Some solution are: 1) Share the best practices with each other, 2) Teachers participate in technology specific training and 3) Testing material provided by vendors, and actively following up on the changes.

Q12: Can you give some examples?

A12-1: No answer.

A12-2: Many workspaces are unfinished. The learning materials are old materials made for contact teaching.

A12-3: If I were to develop Azure-based virtual lab or automated assignments review I'll end up spending days/weeks developing them on my own time without any tech support from the institution.

A12-4: You only need to look at the goals set 5-10 years ago and measure the outcome critically, not opportunistically.

A12-5: No answer.

A12-6: Many teachers are still applying Optima LMS practices in Canvas LMS.

A13-7: Recently we had a training program from Microsoft product and during the learning the material was changed by vendors, it was a confusing situation. In addition, I use MS Azure, the interface keeps on changing, and I need to make changes in my material for guidance almost every semester. Canvas is new for us; we are still exploring its functionalities by testing and sharing good and not so good practices with our team members.

Q13: In your personal experience, what are the main difficulties or advantages that students encounter facing the use of digital technologies in their learning and / or research paths?

A13-1: It would seem that it is too easy to google for the answers to fill into assignments without really trying to understand the issues.

A13-2: The advantage of studying online is that you can study when it suits you. Video recordings can be viewed many times. Studying online is self-employment and is not suitable for the weakest students. The student must be able to read even long instructions.

A13-3: Plethora of digital learning solutions distracts the students; each course / student uses their own systems. Students also seem to have challenges in motivation/self-guiding skills when they have to be in charge of their own learning.

A13-4: The value added by teachers in decreasing, students need to learn independently from materials that are not well planned, sometimes not even understood.

A13-5: The need for self-management. Ability to find the instructions and follow the schedule. So nothing related to technology.

A13-6: The main difficulties concern the use of online communication tools including Zoom and Teams. The students are afraid of using camera and their orientation is to be rather passive receiver than active collaborator.

A13-7: Advantages: 1) Learning from anywhere and 2) Learning with own pace. Disadvantages: 1) Lack of motivation and 2) Not all students are same, it may be easier for some students to follow instructions and ask questions face to face during or after the lecture. Some students feel shy asking questions in online sessions or even sharing their screens with others. However, as teachers we always encourage our students to make efforts and feel comfortable for asking his/her doubts. It is a very common practice in working life, especially when we all are working from home these days due to Covid restrictions.

Professional Development

Q14: Based on your personal experience, which are the main competencies that collaborating teachers/tutors should have in order to carry on effective learning support (referring also to digital, methodological and socio-relational skills)?

A14-1: Ability to communicate professionally a) in virtual environments and b) in english.

A14-2: The teacher's attitude matters a lot. The teacher must have a technical quality of mind, a willingness to solve problems and an open-mindedness to try new systems.

A14-3: Pedagogical vision on the ongoing course, knowledge on the subject, and technical know-how on the tools/platform used.

A14-4: The teachers should be experts in their field, not just supervisors, as is often the case in project-based learning. They should be masters of the basic digital tools and have the basic interpersonal skills, naturally. They should master the language they are teaching in.

A14-5: The ability to leverage digital tools and its features.

A14-6: Teachers should have pedagogical competence at first place. When teachers have needed pedagogical competency they are able to leverage digital tools.

A14-6: 1) Clear communications about studies, 2) In-depth Know how of the learning platform and subject area, 3) Teaching skills and 4) Social skills.

Q15: Can you give some examples?

A15-1: No answer.

A15-2: Many lecturers have gotten better at using Canvas over the past year. On the other hand, teachers who avoid Canvas are only now starting to learn how to use the app.

A15-3: No answer.

A15-4: No answer.

A15-5: Using teams chat & channels for effective tutoring

A15-6: No answer.

A15-7: 1) Communication is an important part especially when we are working with others in a team. Before starting the implementation, sending a welcome email with basic information on LMS is very important practice. Same way thanking all participants at the end of study units. 2) Learning about LMS is a constant process, I sometimes have made mistakes in uploading assignment files or not giving access to students groups etc., students correct us sometimes. 3) We should be able to answer students' questions, and make sure they have understood the answers. 4) Social skills are very important, along with the inclusion of digital communications; we should also have physical interactions when and where possible. I worry sometimes that in the pace of making everything digital we should not forget the importance of physical world. May be finding the right balance between digital and physical is a new skill set we all will be practicing more in future.

Q16: Based on your personal experience, what does help teaching professionals and what does restrain the acquisition and the effective use of those competencies? Focus on organizational and educational aspects: bureaucracy, culture organization, logistics, timing, training models and pedagogical teaching methods.

A16-1: Again, the question is a bit difficult to understand. What is "those competencies" referring to? Also, you are asking me to focus on 7 targets?

A16-2: The biggest factor limiting the acquisition of knowledge is the time resource. In some applications, there are not enough full licenses. Weak equipment and poor working conditions when working from home.

A16-3: Lack of resources in planning and implementing the course.

A16-4: Time and money would help.

A16-5: Organization culture and lack of sharing best practices.

A16-6: Lack of time is the main constrain. Many teachers are so busy that they do not have enough time to study new competencies needed in modern teaching environment. The second issues is the fear of failure. Teachers do not have courage to try new tools or practices.

A16-7: What helps: 1) Trainings, 2) Resources and 3) Motivation to upgrade. What does not help: 1) Inconvenience of making big changes in existing ways and 2) Lack of willingness to learn new ways of teaching.

Q17: Can you give some examples?

A17-1: No answer.

A17-2: Many lecturers work at home on a small laptop screen. And some don't even have an internet connection at home.

A17-3: If the courses were planned with decent time and motivated team of professionals the structure and pedagogy could be thoroughly planned.

A17-4: No answer.

A17-5: No answer.

A17-6: No answer.

A17-7: Our management is willing to incorporate new ways of teaching and learning, new LMS and many more on a regular basis. It is of course to make the processes smoother but it may be challenging sometimes to keep on learning new tools and implementing them properly. Another example is, rules for filling hours in working time announcement application in year 2021 were different from year 2020. This can be sometimes tiring.

Q18: How do you keep yourself up-to-date in order to acquire the mentioned competencies? (self-training, peer tutoring, paid private training, training offered by your HEI, etc.)

A18-1: Mostly reading and observing.

A18-2: I participate in trainings organized by Laurea. I read related literature and magazines and listen to podcasts. I participate in testing future applications and learn how to use new applications. Unfortunately, my time now is not enough for a broader education.

A18-3: Self training, paid learning online.

A18-4: It's a hopeless process but luckily interesting enough to keep motivated.

A18-5: Self-training, peer discussions

A18-6: I try new tools by myself, and I discuss with my colleagues. I know that there are available training offered by dCell but I have participated only once.

A18-7: 1) Teaching itself is a constant learning process, 2) Trainings of various digital tools, 3) peer learning and 4) e-books, articles.

Q19: Can you give some examples?

A19-1: No answer.

A19-2: The last time I tested the Buddycheck peer review program, which will be acquired in the fall. I made a board for a new group of students to team up with Miro. The board has two quadrants. I got good feedback from the board. Tutor teachers were able to do the student team using the tool.I evaluate the Canvas workspaces made by other lecturers using a structured form. This is how we got a huge amount of data in the Digital Team. And now we know exactly what needs to be developed in workspaces. Such a standardized quality assessment by an outsider is better than a subjective self-assessment by a lecturer. This was an educational experience.

A19-3: Udemy, Linkedin professional learning, online articles on the subject matter

A19-4: No answer.

A19-5: No answer.

A19-6: Canvas and Azure.

A19-7: I have been able to upgrade myself within the process of teaching itself. Learning form colleagues, debating with them for better understanding of common teaching interests have been very useful as well. Other than that, reading about our field related articles, news, books have been helpful as well.

Best Practices

Q20: Based on what has just emerged and on your personal experience, which are the best practices in digital innovation in the teaching-learning processes you know in your HEI (specify eventually the name of the project, contact details, etc.)?

A20-1: Thesis seminars on-line have been a moderate success.

A20-2: Entrance exam course "Omavalvonnalla turvallisuutta palveluelämyksiin".

A20-3: With increasing number of students and growing online presense I think MOOC's might be the closest thing to digital innovation at the moment.

A20-4: No answer.

A20-5: No answer.

A20-6: New Canvas LMS and possibility to implement fully automated study units.

A20-7: 1) organizing trainings for all staff related to the specific digital technology inclusion, 2) peer learning support, 3) blended mode of teaching: I believe blended mode of teaching and learning is very appropriate from

my experience, it is a balanced way of teaching with best of both digital and physical interactions and 4) Project Name: BIT degree program for Blended Students itself.

Q21: What makes the best/effective practices?

A21-1: 1) Planning and rehearsing the teaching and 2) reliable and secure software and working data communications (unfortunately not always the case...)

A21-2: We have had good students through the course. Students wrote good feedback on the course.The system can be extended to replace the old entrance examination.

A21-3: They produce great results in terms of the resources used to create them and they enable 24/7 studying.

A21-4: Best practices are heuristics that solve basically zero problems of this complexity.

A21-5: Practices that save time, automate recurring practices and provide better (speed / quality) service for students.

A21-6: They are applicable in many domains.

A21-7: 1) Policies set my Ministry of educations, 2) Strategies of universities and 3) Management of implementing the changes

Q22: What is the level of transfer of these good practices, what facilitates and what does restrain them?

A22-1: No answer.

A22-2: Scalability is facilitated by the fact that a ready-made workspace template already exists. Updating materials and quizzes is slow. And many lecturers do not have sufficient expertise in the field.

A22-3: No answer.

A22-4: No answer.

A25-5: No answer.

A25-6: Some good practices are leveraged via dCell but discussion with the colleagues is more effective and fruitful.

A25-7: I would say 7 on the scale of 0 - 10, considering 0 is not at all, and 10 is the highest level of implementing digital solutions. What facilitates: 1) Trainings, 2) Resources and 3) Motivation to upgrade. What restrains: 1) Inconvenience of making big changes in existing ways and 2) Lack of willingness to learn new ways of teaching.

Strengths and Weaknesses

Q23: Based on your personal experience, which are strengths and weaknesses, opportunities and threats in:

a) the implementation of digital innovation in your university?

A23-1: Not much really. There is some natural reluctance to change old habits, but this is to be expected.

A23-2: The threat is that we will not be able to recruit skilled labor.The development of devices and applications is an opportunity.The weakness is that creative work is not valued. There is no working time for that. The strengths are the motivated and collaborative dCell, Digital Team and Servicedesk.

A23-3: There seems to be a lot of will to do new things but Lack of resources to implement them.

A23-4: No answer.

A23-5: No answer.

A23-6: 1) Strengths – Availability of new tools, 2) Weaknesses – Teachers' competency, 3) Opportunities – Better courses and 4) Threats – New tools are not utilized best possible way due lack of competency.

A23-7: S – Interest in providing better education, W – No answer, O – Expanding education delivery to international level and T – No answer.

b) integration of digital technologies in organization processes and teaching in your university?

A23-1: Already happening. Most work left is to build better support to tools and environments.

A23-2: The attractiveness of education is a threat and an opportunity. The attractiveness of education in the restaurant and tourism industry may decline. The attractiveness of information technology and social education will certainly increase.Weaknesses include lack of resources, lack of common digital vision and old attitudes.The strength is that we have already developed e-learning quality criteria, we have a working ticket system and training for staff. The strength is that we already have several teaching applications in use and information management is constantly making new tenders.

A23-3: Challenges are proposed by The diversity of subjects taught in Laurea. Each discipline has different needs.

A24-4: No answer.

A24-5: No answer.

A24-6: Strengths – Better student satisfaction, Weaknesses – Teachers are overloaded, Opportunities – More efficient working processes, Threats – Worse work satisfaction due personal overload.

A24-7: S - Willingness to learn, W – Keeping up with constant changes, O – Provides flexibility to implement study units for all form of teachings and T – Being dependable on vendors.

Q24: What are the areas for improvement that the experience of the pandemic has brought out with respect to the use of digital technologies/resources in teaching, learning and support processes?

A24-1: Resources for support around the clock (or at least into late evening).

A24-2: Teaching online is effective. In the future, you need to think carefully about the added value of being on campus. With a good ticket system and Teams, communication is adequate and a teacher in trouble gets help quickly. Teachers miss sociality and tacit knowledge. Teachers need to be made aware that today tacit knowledge is called Teams discussions. If the team has a common goal and regular weekly meetings, nothing extra is needed for sociality.Supervisors need leadership training on how to manage work at home and how to communicate online. Traditional supervisors do not trust that work will be done when they are not seeing it themselves.

A24-3: The skills of the personnel vary deeply in terms on general digital competencies. Also the technical equipment in the classrooms are poor for hybrid/online interaction ; now the teacher has to carry web cameras and microphones and set up the classroom in order to stream the campus teaching online. HEI should consider paying the internet-connection at home for remote teaching as well.

A24-4: No answer.

A24-5: No answer.

A24-6: Practices for distance learning have improved a lot. Tools like Canvas, Zoom and Teams are leveraged very well in Laurea.

A24-7: We should be prepared to deliver teaching/guidance in all three modes effectively. Implementation of practical part (hands-on) is still a challenge, here we can improve a lot.

Q25: Which will need to be worked on in the coming months?

A25-1: No answer.

A25-2: More resources for making online teaching materials and teaching online.We need to ensure that all teachers comply with the quality criteria for online teaching. All supervisors must require teachers to adhere to quality criteria. Quality teaching must also be a state of mind for top management.

A25-3: Equip the classrooms with decent equipment and offer training for staff members who need it.

A25-4: No answer.

A25-5: No answer.

A25-6: No answer.

A25-7: Practical (hands-on) exercises part.

Q26: How has the HEI intervened to accompany this process of enhancement and the integration of digital technologies in: a) organizational processes, b) teaching/learning processes, c) third mission activities and d) research?

A26-1: No answer.

A26-2: The Digital Team and dCell do everything possible. In other teams, all issues related to online pedagogy and teaching technology will be left at the bottom of the agenda in meetings. And usually there is not enough time to talk about these important things.

A26-3: No answer.

A26-4: No answer.

A26-5: No answer.

A26-6: Laurea has specific resources (Laurea-IT) who support organizational processes. Laurea has specific resources (dCell) who support teaching staff.

A26-7: By creating strategies and managing the implementation of new digital technologies from start to end.

Q27: And what are the results/effects of these interventions?

A27-1: No answer.

A27-2: Supervisors talk about things with each other by Unit D. I arrange a team visit for teachers and after that the teacher will better understand the importance of technology and quality in teaching.

A27-3: No answer.

A27-4: No answer.

A27-4: No answer.

A27-5: No answer.

A27-6: No answer.

A27-7: Innervations for upgrading the use of digital technology have resulted in positive outcomes.

Q28: What are the limits/risks and opportunities that governance has faced in your HEI's digital innovation process?

A28-1: No answer.

A28-2: The biggest risk is supervisors who have adapted poorly to remote working, there is an assumption that in-person management from a supervisor would add some kind of value.

A28-3: Teachers are very much on their own when planning / implementing the processes. More support is needed.

A28-4: They don't seem to understand the problem at all, they are just waking up.

A28-5: Ability to recognize and pilot new digital tools.

A28-6: Many teachers are overwhelmed due rapid rollout of digital tools and they are in survival mode instead of creative flow state.

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A28-7: No answer.

Q29: How has governance intervened to overcome the negative aspects, limits and risks identified?

A29-1: No answer.

A29-2: The governance would have to acknowledge the negative aspects first, before they can do anything about them.

A29-3: IT-support has been increased, however I think there would be need for a professional / pedagogical support.

A29-4: More rules and regulations that don't have any impact.

A29-5: No answer.

A29-6: No answer.

A29-7: No answer.

2.10　Appendix-3: Interview of principal lecturers and researchers

ICT Culture

Q1: What is your idea of digital innovation in Higher Education?

A1-1: Learning which is independent of time and the place.

A1-2: Using of digital information for decision-making (support of decision-making). Using of digital information for health care and support of well-being.

Q2: What is digital innovation in your learning support/ research work context?

A2-1: Better ICT tools, and COVID 19 forced everyone to learn for applying them.

A2-2: Learning by digital transformations. Compliance of digital innovations.

Q3: In what way does the digital technologies, also regarding the challenge of the new technology frontiers (e.g. artificial intelligence, digital learning environment, augmented reality etc.) have modified: - teaching-learning processes in your HEI?

A3-1: Remote work, teaching and learning. Teams/Zoom meetings, applying text to speech applications when supervising thesis.

A3-2: Distance learning, (24/7) whenever time for learning, certification comparisons. TEAMs tools, reports and samples of evidence.

Organizational Dimension

Q4: How is the university, understood as a complex system, transformed, under the pressure of digital innovation, in terms of organization, internal processes, work flows and communication, at different levels?

A4-1: COVID 19 has forced the university to work outside its school walls.

A4-2: TEAMS and improved NETWORK Tools. Increased freedom and responsibility (in the university as a system).

Q5: What are the main criticalities that you have encountered with respect to this?

A5-1: Reliable broadband connections everywhere. Applications that do not fall down by short interruptions. Interoperability of different systems.

A5-2: Maturity is needed (taking responsibility and amount of skills-competence gaps).

Q6: How has the figure of the teacher/researcher changed in the last period and how is digital innovation having an impact with respect to the redefinition of roles, skills, organizational dimensions of teaching and research?

A6-1: Remote work, same tools (Teams/Zoom) applied in teaching, research and co-operations with companies.

A6-2: Teachers are more like equivalent researchers with students. Increased skills and competence of teachers makes challenges in work balance.

Teaching Practices and Digital Technologies

Q7: What is your experience in using innovative teaching methodologies with digital technologies?

A7-1: Integrative learning with RDI projects is easier with digital technologies.

A7-2: My work experience is more than 20 years in this field.

Q8: Can you give some examples of innovative methodologies with digital technologies applied to your teaching?

A8-1: Students' video presentations as assignments: workshops more effective, easier for peer-reviews than live presentations.

A8-2: Learning by Developing and Resilient Learning (digital samples of evidence in learning as students definer requirements). Integration of regional development, research and learning.

Q9: Have digital resources and technologies changed/modified your way of working/teaching/ designing learning paths and relationships with students and colleagues?

A9-1: Teaching is independent of the place.

A9-2: Yes … currently … almost all is in the digital form.

Q10: Do you share common models/practices in your faculty?

A10-1: Yes, informally with colleagues.

A10-2: Yes … Laurea have a culture of sharing best practices and teamwork.

Q11: What are the criticalities/constraints that still weigh in the adoption of digital innovation/technologies in your teaching practices?... and the possible solutions to overcome them?

A11-1: Time: all new tools need time to learn to utilize. Interoperability!

A11-2: Maturity for independent work and studding. Huge amount of leading, guidance and support is needed.

Q12: Can you give some examples?

A12-1: At the first time, transfer of a study module from Optima to Canvas takes more time than the use of the new system saves time.DNA's firewall breaks up the VPN connections to Laurea's LAN. iPhone's hotspot breaks up connections to PC.

A12-2: Starting of research and development work in real practice (e.g., gaps are challenging in the cognitive views).

Q13: In your personal experience, what are the main difficulties or advantages that students encounter facing the use of digital technologies in their learning and / or research paths?

A13-1: Scaling of applications with different terminal devices

A13-2: Keeping the spirit for learning. Motivation issues. Maturity and self-control (support is needed).

Professional Development

Q14: In your personal experience, which are the main competencies that professors/researchers should have in order to carry on effective lectures (referring also to digital, methodological and socio-relational skills)?

A14-1: Curiosity and fascination are more important than skills.

A14-2: If real learning … ever happens in a form of lectures: pedagogical competence, skills of topics, competence to personal guidance and empowerment.

Q15: Can you give some examples?

A15-1: You learned those matters of which you are interested.

A15-2: Socio-relational information flow and information adoption – adaption issues.

Q16: Based on your personal experience, what does help teaching professionals and what does restrain the acquisition and the effective use of those competencies? Focus on organizational and educational aspects: bureaucracy, culture organization, logistics, timing, training models and pedagogical teaching methods.

A16-1: Constant hurry.

A16-2: Focus on organizational and educational aspects: bureaucracy, logistics, timing, training models and pedagogical teaching methods. Teachers have to improve own competence (all time) … this is challenging. Maturity of students and maturity of teachers.

Q17: Can you give some examples?

A17-1: No answer.

A17-2: E.g., research interventions included to the learning cycles.

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Q18: How do you keep yourself up-to-date in order to acquire the mentioned competencies? (self-training, peer tutoring, paid private training, training offered by your HEI, etc.)

A18-1: Self-training

A18-2: Working in H2020 projects (real world research as competence driver).

Q19: Can you give some examples?

A19-1: I bought Voice Dream applications and learned to use it.

A19-2: Resilient Learning and Learning by Development.

Best Practices

Q20: Based on what has just emerged and on your personal experience, which are the best practices in digital innovation in the teaching-learning processes you know in your HEI (specify eventually the name of the project, contact details, etc.)?

A20-1: Constant small improvements.

A20-2: E.g., student's integration to the ECHO H2020 project.

Q21: What makes the best/effective practices?

A21-1: By force (e.g. Covid 19)

A21-2: E.g., real world research interventions integration to the teaching-learning processes.

Q22: What is the level of transfer of these good practices, what facilitates and what does restrain them?

A22-1: Very high, because of Covid 19.

A22-2: E.g., students have own scopes (not formally or heavy load by the H2020 –project itself, here, the perspective is in learning).

Strengths and Weaknesses

Q23: Based on your personal experience, which are strengths and weaknesses, opportunities and threats in:

a) the implementation of digital innovation in your university?

A23-1: Lack of the time for self-development.

A23-2: E.g., competence evaluation can be more networked.

b) integration of digital technologies in organization processes and teaching in your university?

A23-1: Lack of the time.

A23-2: E.g., more flexibility in learning, e.g., threats as management of cognitive load and maturity guestions

Q24: What are the areas for improvement that the experience of the pandemic has brought out with respect to the use of digital technologies/resources in teaching, learning and support processes?

A24-1: Remote teaching and learning.

A24-2: No effects in this case.

Q25: Which will need to be worked on in the coming months?

A25-1: New balance with remote and school teaching/learning.

A25-2: No answer.

Q26: How has the HEI intervened to accompany this process of enhancement and the integration of digital technologies in: a) organizational processes, b) teaching/learning processes, c) third mission activities and d) research?

A26-1: No answer.

A26-2: Organizational processes: sharing tools and scopes, Teaching/learning processes: learning by development and resilient learning, Third mission activities: scopes for learning (real world connection), Research e.g., students' integration to research

Q27: And what are the results/effects of these interventions?

A27-1: No answer.

A27-2: From teaching to learning together.

Q28: What are the limits/risks and opportunities that governance has faced in your HEI's digital innovation process?

A28-1: No answer.

A28-2: E.g., work balance, comparison of real competence, gaps and maturity, wellbeing

Q29: How has governance intervened to overcome the negative aspects, limits and risks identified?

A29-1: No answer.

A29-2: Yes … e.g., support, tools, sharing of responsibility, "Laurea way and culture"

2.11 Appendix-4: Interview of Technical and Pedagogical Support

ICT Culture

Q1: What is your idea of digital innovation in Higher Education?

A1-1: In Finland the Digital Vision 2030 is going to have innovative goals: students owning their own data, knowledge management, open data, continuing education for lifelong learning via open digital services

A1-2: To find suitable and applicable practices for the learning process. Digitality already exists so we should rather discuss about innovation than digital innovation. Digitality can have different maturity levels.

Q2: What is digital innovation in your staff work (technicians, administrative-organizational-teaching secretariat, etc.)?

A2-1: Chat-bots, integrations of systems e.g. Canvas LMS – EvaluationKIT (study unit feedback)

A2-2: Ref. previous question.

Q3: If and how do digital technologies have modified your way of working and interacting with each other?

A3-1: I have been working partly from the distance for 20 years :D Better internet connections, use of mobile devices, easy to use web conferencing etc.

A3-2: New technologies have given possibility to focus on actual work to be made. As an opposite, new technologies have created more distractions and the balance between the office hours and free time has changed.

Organizational Dimension

Q4: How is the university, understood as a complex system, transformed, under the pressure of digital innovation, in terms of organization, internal processes, work flows and communication, at different levels?

A4-1: We had Laurea DigiVision 2020 (3-year project), which had several strategic goals, themes and steps. I liked that vision project, because it was strategically lead and lead to digitalizing of many of our processes. Openness has increased: open calendars of teachers and other staff, shared repository of courses and course materials in LMS, staff has always a possibility to join the meetings online

A4-2: The transformation proceeds step by step, some parts of the organization proceed faster than other. Internal processes adapt slowly, some process owners are forerunners, but some ones take the step when they are forced to. The nature of the work is becoming more flexible and adaptable. Technology can also make things more complicated, and the transformation process requires adaptability capability from the organization.

Communication is shared among too many channels and that can cause information loss. The communication channels should be prioritized.

Q5: What are the main criticalities that you have encountered with respect to this?

A5-1: The digital skills of teachers are still diverse, heterogenous

A5-2: "Technology first" mentality, we should think actual problems at first place. Resistance for change.

Q6: How has the administrative staff changed in the last period and how is digital innovation having an impact with respect to the redefinition of roles, skills, organizational dimensions?

A6-1: Staff in educational technology / giving technical support have in many cases some other background than technical. Owners of the information systems are now business/educational managers

A6-2: The role is seen as an internal service provider. The adoption of digitalization creates new roles and there are no other options than adaptation and learning.

Teaching Practices and Digital Technologies

Q7: What is your experience in using innovative teaching methodologies with digital technologies?

A7-1: 20 years

A7-2: Positive. The digital environment is more equal for all students. Digitality also enables possibilities for more adaptive learning experience where the most motivated students could have more demanding tasks.

Q8: Up until now, has technological technologies been a resource or a limit to your work?

A8-1: Resource!

A8-2: Both.

Q9: Do you share common models/practices in your team/office/department?

A9-1: Yeas all the time

A9-2: Yes.

Q10: Give some examples

A10-1: We have shared workspace in Teams and wiki. We are training the teachers.

A10-2: Course development, assessment, the adaptation of new technology and tolls, new pedagogical approaches.

Q11: What are the criticalities/constraints that still weigh on digital innovation in your staff experience and the possible solutions to overcome them?

A11-1: Students from other universities easy access to LMS and other learning solutions. Proctoring system of online exams. More easy and attractive system for collecting student feedback.

A11-2: Lac of time resources.

Q12: Can you give some examples?

A12-1: No answer.

A12-2: The balance between support activities and development work.

Q13: What concrete initiatives and changes have been promoted in your HEI for the development of digital innovation in the management, teaching and administrative processes in the last few years?

A13-1: Laurea DigiVision 2020 had several!

A13-2: Common material/course resource.

Q14: In your experience, what are the results/effects of these efforts?

A14-1: Most of the activities were implemented into practice.

A14-2: Training for teachers, sharing common practices, continuity management.

Professional Development

Q15: In your opinion, which are the main competencies that administrative and technicians staff should have in order to carry on effective support to the management, teaching, research and third mission in HEI?

A15-1: Very good digital skills, understanding of pedagogical approach, good communicational & interaction skills, innovative mindset

A15-2: Right attitude, system thinking, capability to learn.

Q16: Can you give some examples?

A16-1: No answer.

A16-2: Right attitude is the key aspect. You need to understand how technologies are integrated to teaching and learning processes both in virtual environment and physical classroom. Capability to adapt and apply new technologies.

Q17: Based on your personal experience, what does help teaching professionals and what does restrain the acquisition and the effective use of those competencies? Focus on organizational and educational aspects: bureaucracy, culture organization, logistics, timing, training models and pedagogical teaching methods.

A17-1: Time limits, too much work, no possibility to specialize, sometimes no respect of work

A17-2: Enablers: More time resources and more clear focus. Restrictions: Complex work field.

Q18: Can you give some examples?

A18-1: No answer.

A18-2: When you are tired is hard to keep right service attitude especially when the written instructions are not studied properly.

Q19: How do you keep yourself up-to-date in order to acquire the mentioned competencies? (self-training, peer tutoring, paid private training, training offered by your HEI, etc.)

A19-1: Reading, networking with elearning experts of HE, attending conferences, visiting edutech shows.

A19-2: Focusing on the most important things to be finished.

Q20: Can you give some examples?

A20-1: No answer.

A20-2: "Plug off yourself" when you focusing on important.

Best Practices

Q21: Based on what has just emerged and on your personal experience, which are the best practices in digital innovation in management processes in your HEI (specify the area / organizational sector of application, contact details, etc.)?

A21-1: No answer.

A21-2: More efficient team work.

Q22: What makes the best/effective practices?

A22-1: No answer.

A22-2: The practices are verified and they meet the desired target.

Q23: What is the level of transfer of these good practices, what facilitates and what does restrain them?

A23-1: No answer.

A23-2: Difficult to answer. The future seems to be promising.

Strengths and Weaknesses

Q24: Based on your personal experience, which are strengths and weaknesses, opportunities and threats in:

a) the implementation of digital innovation in your university?

A24-1: No answer.

A24-2: Strengths-monetary and time resourcing, Weaknesses-too less time resourcing, Possibilities-level up the quality of the education which could attract better students, Threats-no answer,

b) integration of digital technologies in organization processes and teaching in your university?

A24-1: No answer.

A24-2: Strengths-Good LMS, competency and vision, Weaknesses-No answer, Possibilities-High quality courses that enforces Laurea as a brand, Threats-Is the personnel able to adapt the transformation.

Q25: What are the areas for improvement that the experience of the pandemic has brought out with respect to the use of digital technologies/resources in management activities, organizing teaching/learning processes, third mission activities, organizing research?

A25-1: No answer

A25-2: More time resources.

Q26: Which will need to be worked on in the coming months?

A26-1: No answer.

A26-2: More time resources.

Q27: How has the HEI intervened to accompany this process of enhancement and the integration of digital technologies in: a) organizational processes, b) teaching/learning processes, c) third mission activities and d) research?

A27-1: No answer.

A27-2: No answer.

Q28: And what are the results/effects of these interventions?

A28-1: No answer.

A28-2: New roles have enabled the digital transformation.

Q29: What are the limits/risks and opportunities that governance has faced in your HEI's digital innovation process?

A29-1: No answer.

A29-2: Laurea strategy 2030, the third objective.

Q30: How has governance intervened to overcome the negative aspects, limits and risks identified?

A30-1: No answer.

A30-2: I'm not able to understand the question. Resourcing, new roles and new form of cooperation.