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# Developing “Digital Barometer”

A Tool for Recognizing the Level of Digital Skills

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## **Abstract**

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The thesis addressed a gap that is critical at Metropolia Business School (MBS): the absence of a systematic approach to determining the level of digital skills of its growing population of business undergraduate students, in this study, coming specifically from Nepal. Such students have been noticed to have difficulty getting settled, which has affected their academic results and professional readiness. The objective of this thesis is to come up with the Digital Skills Barometer, a diagnostic instrument to recognize the levels of digital skill at the onset of studies and guide institutional assistance.

The study employed applied action research with three data collection rounds, mainly coming from internal interviews, and then co-creation of the intervention with key stakeholders, followed by a small-scale testing of the tools with the students. The theoretical framework is based on the DigComp 2.2 framework and best practices in digital competence assessment. The current state analysis identified the gaps in students’ digital skills, and the wish to have a more systematic assessment. The gaps in skills (specifically in navigating equipment and school platforms, usage of formal digital communication, and creating content), as discovered, may lead to academic failures, if stay unaddressed.

The main outcome of this thesis is the Digital Barometer, a solution focusing on recognizing the levels of digital skills. It is based on the five competence domains of DigComp 2.2, a proven EU-approach with assisting, non-judgmental assessment. The tool includes obligatory, task-specific items (e.g., question related to the use of platform and proficiency with specific IT tools) and recognizing the level of digital skills based on either 10-point scale or multiple-choice-based questions. The tool was tested with a small group of Nepalese students and reviewed with the senior MBS lecturers. Feedback was used to further refine the tool. The introduction of the Digital Skills Barometer will ensure that MBS has a data-driven, systematic approach that allows early detection of digital skill deficiencies, and planning a timely and focused help.

Keywords: Digital skills, digital competence, business school, Nepalese, students, DigCompEdu Frameworks

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## 1. Introduction

Higher education is rapidly becoming digitalized, which not only creates opportunities but also challenges to international students in a global context. The proportion of European institutions of higher learning currently making use of blended or fully online platforms has risen to more than 80 percent, but students in the developing nations are struggling to cope with the digitally intensive aspects of learning (Potocan et al., 2025). Nepalese students, in particular, experience challenges in using online learning platforms, studying effectively in digital environments, and completing virtual projects. Their digital proficiency becomes an important factor for academic achievements and enabling opportunities to integrate into international education communities (Giri, 2021).

International Business Bachelor programs have attracted more and more Nepalese students annually in Europe, and also at Metropolia. Although the institution welcomes them, students have been facing difficulties because of the varying levels of digital skills. The digital infrastructure and prior exposure to digital infrastructures in Nepal are minimal when compared to Finland, often resulting in a visible difference in the capabilities of the student vs. expectations of receiving educational institutions.

This thesis aims to help this situation by creating a tool which will help evaluate and monitor digital skills of the students.

### 1.1 Business Context

Metropolia University of Applied Sciences (UAS) is the biggest university of applied sciences in Finland that provides diverse degree programs in most fields and areas such as technology, health care, culture, and business. Metropolia UAS also has one of the most popular business schools to study international business that attracts students representing more than 40 nationalities. Metropolia Business School (MBS) is focused on innovation, digitalization, and applied learning, which are in line with the overall Finnish national policy of promoting digital competence in higher education. The university competes within the competitive landscape of international education, which includes the adoption of digital tools and platforms, including online learning platforms, digital collaborative technologies, and analytics-based pedagogy. They all lie at the heart of the process of ensuring academic achievements and high academic standards.

## 1.2 Business Challenge, Objective and Outcome

The Metropolia Business School (MBS) aims at offering high quality education to its diverse international student community. Nevertheless, a full picture of digital skills of its students is yet to be developed. This gap has practical implications: some students do not have enough skills to feel confident using online learning platforms, digital tools, and even emails, which results in problems with effective work in courses, online teams, and they often need extra assistance. MBS wishes to make effective interventions that are based on specific needs in digital competencies, which would require a measuring tool for a start. The challenge for this Thesis is therefore to develop a tool that would provide the education institution with the necessary diagnostic information for such an intervention.

The Objective of this thesis is to develop *the Digital Skills Barometer to assess the digital skills of one group of Nepalese business students at MBS*, so that to diagnose and later address the gaps in the digital skills development.

The Outcome of this study is a Digital Skills Barometer that *assess the digital skills of one group of Nepalese business students at MBS*. This Outcome will help identify the levels and needs in digital skills development, which then leads to actionable recommendations for institutional support and skill development initiatives.

## 1.3 Thesis Outline

This thesis explores the digital skills assessment tools in order to develop one that will suit the needs of the case organization. The thesis scope is focused on the digital skills of one selected group of Nepalese students at the Business School and aims to assess the digital skills of these students in higher educational settings. This study is done by utilizing the Applied action research approach, combining quantitative research such as interviews and surveys, to create and test a tool called the Digital Skills Barometer.

This thesis is arranged into seven sections to lead a reader through the process of the research and findings. Section 1 presents the business context, the thesis objectives, and thesis structure. Section 2 provides the description of the research methodology, such as research approach, research design, methods of data collection and data analysis. Section 3 is a report on the available literature and best practices on digital skills assessment that ends with a conceptual framework that will guide the development

of the tool. Section 4 is the current state analysis that collects the needs and views of the staff and students on existing digital competencies and gaps in them, and relates them to the future tool tailored to the Nepalese students. Section 5 elaborates on the preparation of the initial proposal on the Digital Skills Barometer, which was informed by the previous phases. Section 6 analyzes the findings of pilot testing of the tool, gathers feedback from key stakeholders and makes final adjustments to the tool, and makes recommendations for the implementation in practical use. Section 7 wraps up the thesis and summarizes the findings.

#### 1.4 Key Concepts

*Digital Competence:* Being able to use digital technologies confidently, critically and responsibly for learning, work, and participation in society, including information and data literacy, communication, content creation, safety, and problem-solving (Rizza, 2014).

*Digital Skills Barometer:* An assessment tool developed in this thesis based on a survey that collects data about digital competencies while identifying the context for potential support where needed.

*Needs Analysis:* The systematic process for identifying the difference between current and desired conditions, to help inform the design of tailored interventions to stimulate performance or outcomes (Mustapha Kura & Kaur, 2021).

*DigComp and DigCompEdu Frameworks:* The European Union frameworks that provided a structure for understanding the evaluation of digital competence among citizens and educators, this study is based in part upon this framework (Süzer & Koc, 2024).

## 2. Method and Material

This section outlines the research design, research methodology, and data collection and analysis techniques used in this thesis.

### 2.1 Research Approach

Research approach can be categorized by types, families, methods and strategies. Starting with the family, *basic* research is all about building general knowledge and understanding theories whereas applied research gets into solving specific real problems in real world. Another important difference is between qualitative, quantitative and mixed methods approaches. Qualitative research aims to investigate phenomena in depth, using non-numerical data such as interviews or textual analysis. Quantitative research focuses on measuring variables and analyzing numerical data, usually to see if hypotheses are true. Mixed methods research integrates qualitative and quantitative approaches to enhance understanding. Research can also be conducted as a field study, involving direct engagement with the natural setting of the problem, or own study, relying on existing data and literature review. (Saunders et al., 2019).

In the context of applied research, various techniques are used to collect data depending on the type of the problem. These consist of interviews like structured semi- structured, and unstructured, surveys, direct observations and document analysis. While surveys allow for more comprehensive data collection from larger cohorts, interviews are appropriate for obtaining deep insights from individuals. Document analysis is helpful for gathering data from existing materials from organizations such as reports or records which allows researcher to study behaviors or processes through observations in their own natural environment. These methods are selected for applied research as they facilitate the investigation of particular organization's processes and outcomes. (Saunders et al., 2019).

In applied research, various research methods can be used such as case studies, action research and applied action research. Case studies involve a comprehensive examination of one or few cases within their real context. The goal of action research is to bring about change while studying the process through cycles of planning, acting, observing and reflecting. Applied action research, on the other hand has a different goal

and way of doing things. The main goal is to improve organizations through research-based development activities, which usually only happen once and focus on results instead of the process itself (Kananen, 2013). According to Kananen, (2013, pp. 13-22) applied action research is appropriate when a particular organizational issue requires improvement and when collaboration between the researcher and the organization can result to best solutions. Thus, Applied action research facilitates the integration of the research and development phases to achieve organizational improvement.

In this study, the applied action research strategy was selected because the purpose is to develop a practical tool, the Digital Skills Barometer, to assess the digital skills among a group of Nepalese students at Metropolia Business School (MBS). This study aligns with that context, as it seeks to develop a tool through collaboration among students, faculty, and administrators, facilitating direct input from the stakeholders throughout the process. In this case, it empowers MBS to assess digital skills and formulate the tailored support measures. This study focuses on one development cycle which is designing, testing and refining the tool differing from traditional action research that involves multiple iterative cycles. Therefore, applied action research was the most suitable approach to achieve the aim of the research effectively ensuring practical results.

## 2.2 Research Design

Figure 1 shows the research design of this study and its key elements.

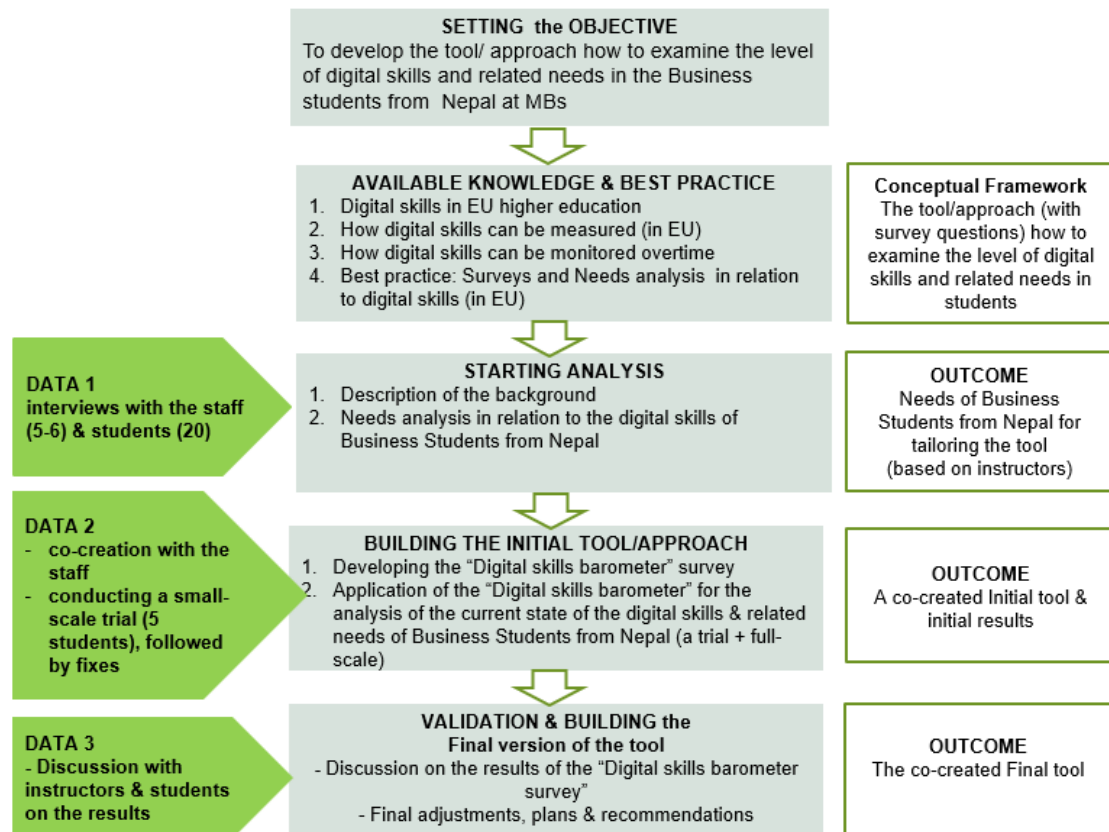


Figure 1. Research design of this thesis.

As shown in Figure 1, the study follows a logical approach that is initiated with defining the objective, followed by a review of available knowledge and best practice, which results in the development of the conceptual framework. The first round of the data collection (Data 1) comprises the interview with the staff and students to understand the current state of digital skills, and the relevant needs and digital gaps. In the second round of the data collection (Data 2), the initial proposal for the tool is co- created together with instructors and tested in a small-scale pilot with students, after which the adjustments are made based on the feedback. The third round (Data 3) focuses on the validation through a discussion of the pilot results with both instructors and the students, leading to the refinement of the tool. The outcome lastly is the final version of the tool.

### 2.3 Data Collection and Analysis

This thesis is based on a number of data sources, and the data has been gathered in multiple rounds. The main data is gathered from the interviews, workshops, and internal documents. The table below is a review of the three major phases of data collection.

Table 1. Details of Data collections 1-3 used in this study.

	Participants / role	Data type	Topic, description	Date, length	Documented as
<b>Data 1, for the Current state analysis (Section 4)</b>					
1	Respondent 1: Manager and researcher	Face to face Interview	Current digital skills and related needs among international business students	Feb 2025, 75min	Field notes
2	Respondent 2: Administrator	Face-to-face Interview	Experiences in coordinating this particular group	October 2025, 75min	Field notes
3	Respondents 3-4: Instructors/ staff members	Face-to-face Interviews	Experiences in instructing this particular group	October 2025, 60min each	Field notes and recording
<b>Data 2, for Proposal building (Section 5)</b>					
4	Respondent 1: Manager and researcher	Face to face Interviews (a series of discussions)	Inputs to developing the tool	November 2025, 75min	Field notes
5	Respondents 5-6: Instructors/ staff members	Face-to-face Interviews	Experiences in instructing this particular group & inputs to developing the tool	November 2025, 60min each	Field notes and recording
<b>Data 3, from Validation (Section 6)</b>					
6	A survey with 17 students		A small-scale test of the tool	December 2025	Survey responses
7	Respondent 1: Manager and researcher	Face to face Interview	Inputs to refining the tool	December 2025, 75min	Field notes

Table 1 provides a summary of the three data collection rounds applied in this study, including participants, types of data, the topic to be discussed, and data documentation format.

First, the current state analysis was based on Data 1 which consists of five single interviews with five internal specialists. These sessions inquired about the experiences related to digital skills of the selected group of students (the Nepalese group). These interviews were conducted mostly in autumn 2025 and lasted from 60 minutes to 1,5 hours.

In Data 2, the data was collected from participants who were part of development of the initial proposal. The goal was to gather input and generate ideas and suggestions that could be applied in building the initial proposal. The field notes captured in these session, on how the digital skills can be measured and needs recognized when developing the tool.

Data 3 was collected in the validation phase, from a group of students who participated in a small-scale testing of the tool, developed in the previous stge. The results were gathered, analyzed and discussed with the key stakeholder. The aim of this round was to analyze the proposal, discuss its relevance to the needs of the case organization, and get the final feedback that will allow fine-tuning the suggested tool. Field notes were used to capture the validation inputs.

In the three rounds, the activities involving interviews and discussions were the main ways of collecting data. The interviews were performed in a semi-structured style and were either face-to-face interviews or conducted in TEAMS. Field notes were created and some were also accompanied by audio recording so as to be accurate in interpretation. Thematic content analysis was used to analyze all the textual data in order

The most part of the analysis leads to defining the level and relevant needs of the digital skills of the surveyed students. Section 3 below starts by paving the ground for the tool creating and explores available literature and best practice on assessing digital skills in higher education (HE).

### **3. Available Knowledge and Best Practice on Assessing the Digital Skills in Higher Education**

This section discusses available knowledge and best practice on the assessment of digital skills in higher education students, especially in EU countries.

#### **3.1 Digital Skills in EU Higher Education**

*Digital skills* refer to the abilities required to confidently, critically, and responsibly use digital technologies for learning, working, and participating in society. These skills go beyond basic technical proficiency and include competencies such as information and data literacy, digital communication, content creation, safety, and problem-solving. They enable individuals to access, evaluate, and apply digital resources effectively, interact and collaborate in online environments, create meaningful digital outputs, protect their digital identity and well-being, and tackle challenges through the strategic use of technology (Chanda et al., 2024).

Digital skills have been placed at the core of academic achievement and job marketability in the framework of higher learning within Europe, and they have influenced the curriculum design as well as pedagogic practice. Technology-enhanced learning environments have been incorporated into universities at a faster rate, and students have the chance to gain digital competencies as well as display disparities in skill levels among various groups of students. The differences occur because of the previous learning experiences, socio-economic status, and national digital infrastructure, and internationally oriented students with the background of developing countries usually have more difficulties in adapting. Educational assessment and improvement of digital skills needs to be provided by educators capable of integrating technology in the education process, tracking student adequacy, and developing responsible digital citizenship, so that all students can have equal and significant learning processes (Mohd Nong et al., 2024).

The landscape of higher education in the European Union has undergone a significant transformation through digitalization, basically reshaping the teaching, learning, as well as institutional operations. Digital competence has become an essential element of

academic performance and future labor marketability, and the systematic methods of comprehending these abilities and equipping students and educators with them are necessary. (Ilomäki et al., 2016).

The European Commission has placed digital competence as one of the eight main competences in lifelong learning and defined it as the competent, critical, and responsible utilization of digital technology to learn, to work, and to participate in society. Therefore, this conceptualization is not limited to technical proficiency and thus includes critical thinking, problem-solving, and ethical aspects in the digital space. The DigComp framework was initially released in 2013 and updated to version 2.2 in 2022 provides a full structure that is structured around five main competence areas, including information and data literacy, communication and collaboration, creation of digital content, safety, and problem solving. Each area includes the specific competences with eight proficiency levels ranging from foundation to highly specialized, allowing the nuanced assessment of digital capabilities across various contexts (Khan & Vuopala, 2019).

Within EU higher education institutions, digital skills have become progressively integrated into the curriculum design and pedagogical approaches. The shift toward technology-enhanced learning environments, accelerated meaningfully during the COVID-19 pandemic, has disclosed both opportunities and disparities in digital competence among the student populations. (Matsieli & Mutula, 2024). Research conducted across numerous EU member states designates the considerable variation in digital skill levels among the incoming students, influenced by factors including prior educational experiences, socioeconomic background, as well as national digital infrastructure development. The European University Association's 2021 report on the digitally improved learning showed that while 87% of European universities had integrated digital technologies into their teaching strategies, only 42% had systematic approaches to assessing the digital competencies of students upon entry (Symeonaki et al., 2025).

International students, chiefly those from developing countries, experience the distinctive challenges of adapting to the digitally intensive European higher education environments. Studies investigating the experiences of students from South Asia, Africa, as well as Southeast Asia in the DigCompEdu framework tailored to suit the educators and further built upon the DigComp are based on the digital competencies of successful teaching in modern higher education. In addition, this framework differentiates that to

build in the digital competence of the student, educators are needed who can effectively bring the technology into the pedagogical practice, measure the digital abilities, and provide the learners with digital citizenship. Nonetheless, there is still unequal implementation of the same across the EU institutions, and significant differences in the institutional support and opportunities for professional development, and the mechanisms of assessment are present (EUA, 2025).

Studies at the Joint Information Systems Committee demonstrate that self-reported digital skills of the students often do not reflect the true performance with most of them overvaluing their digital skills in such domains as information assessment, data handling, and collaborating digitally. This observation highlights the importance of objective assessment instruments as opposed to using the self-reported information only. Furthermore, the digital divide persists within the EU higher education, not merely as a matter of access to technology but progressively as disparities in the quality of the digital skills and the capacity for leveraging the technology for learning as well as professional development (Miah, 2024).

The European Commission's Digital Education Action Plan 2021-2027 emphasizes the importance of digital competence development at all educational levels. It helps in allocating substantial resources to support member states in improving the digital infrastructure, building the educator capacity, and encouraging inclusive digital education. (Education.ec.europa.eu, 2025). However, the specific attention to the requirements of the international students from developing countries remains limited in both policy frameworks as well as institutional practices, while demonstrating a noteworthy gap in the current approaches to digital competence in EU higher education.

Table 2. Five core competence areas (DigComp 2.2, 2022).

Five Core Competence Areas (DigComp 2.2, 2022)	
1. Information and Data Literacy	The capacity to identify, access, analyzes, and deals with digital information and data critically. Includes evaluation of source credibility, analyzing datasets, and providing the evidence in scholarly or professional format. Students will be able to prove the ability to search, organize, and use digital information responsibly (Furtáková, 2024).
2. Communication and Collaboration	Skills to communicate, cooperate, and interact in the digital world. Discusses electronic communication, sharing of information, electronic collaboration, and respecting online etiquette and codes of ethics. Students are able to be digitally responsible, collaborate as a team, and be responsible online.

3. Digital Content Creation	The skill to format, develops, and handles electronic content of different types (text, images, audio, video, code). Incorporates creation of correct, innovative, and context-specific resources without violation of copyright and licensing regulations. Students can combine knowledge and create relevant digital products.
4. Safety	Scanning and implementing measures to safeguard personal information, online identity, gadgets, and health. Reports on cyber security, privacy on the internet, and fair usage of electronic materials. Upon ethical standards, students will be able to protect themselves and others in online settings.
5. Problem-Solving	The skill of recognizing the digital needs and challenges and using digital tools to address the problems or be innovative. Incorporates problem-solving, doing problem-solving in an inventive manner, and providing an evaluation of solutions. Young learners can use digital skills to accomplish learning, research, and work assignments (VUORIKARI, 2022).

These five core competence areas are what it means to be digitally competent in today's connected world, according to DigComp 2.2 (2022). They show that being digitally competent means more than just knowing how to use technology. It also means being able to think critically about information, communicate ethically and effectively, be creative on every content, know and follow rules and use digital tools to solve difficult problems. This approach shows that digital literacy is a complex skill that requires a balance mix of knowledge, skills and attitudes in all five areas. This framework allows educators, policy makers and institutions to systematically assess and promote the enhancement of digital competence across diverse educational and professional contexts.

### 3.2 How Digital Skills are measured in EU Higher Education

The measurement of digital skills in higher education requires multifaceted approaches that capture both the breadth and depth of competencies. EU institutions and researchers have developed diverse assessment methods, each with different strengths & limitations, contributing to an evolving understanding of the effective digital skills measurement. (Vuorikari et al., 2025).

*Self-assessment instruments* show the most widely utilized approach because of their scalability and cost-effectiveness. The DigComp framework has spawned several self-assessment tools, including the Digital Competence Wheel and various institutional adaptations. Hence, these instruments typically employ the Likert-scale questions asking

respondents to rate their proficiency across specific competencies. (Vuorikari et al., 2025).. The JISC Digital Experience Insights Survey, administered annually across UK higher education institutions, with participation exceeding 35,000 students in the year 2019, exemplifies the large-scale self-assessment approaches. However, research consistently demonstrates that the self-assessment alone offers insufficient accuracy, with studies reporting discrepancies of 20-30% between self-assessed and objectively measured competencies, chiefly among the students with lower actual skill levels who tend toward overestimation (Jain, 2001).

*Performance-based assessments* offer more objective measurement by necessitating the demonstration of specific digital skills through practical tasks. Hence, the International Computer and Information Literacy Study, which is done in multiple countries that constitute many EU member states, uses computer-based testing in which students are made to perform genuine tasks such as reviewing online information sources, making digital presentations, and managing digital communication (Fraillon et al., 2019). The 2018 cycle demonstrated that in the countries participating in it, only 2 percent of students demonstrated the highest level of proficiency, with 18 percent falling below the mark of basic competency in the results. Thus, these data demonstrate the interesting identities of the skills gap even in the highly digitalized countries.

*The analytics of behavioral data* indicate the emergence of a new measurement practice based on the data about the learning management system, digital footprint, and interaction patterns to deduce the level of digital skills. Research carried out in various universities in European states, another prediction of the digital competency of the level of student engagement with digital learning sources can be made with an accuracy of 75-80 percent. Nevertheless, the given approach is accompanied by some critical ethical concerns regarding privacy and data protection, which are primarily applied to the requirements of the EU General Data Protection Regulation (Chounta et al., 2024).

*Domain-specific digital skill assessments* have emerged, recognizing that the digital competencies manifest inversely across the academic disciplines. Business education, for instance, requires specific digital skills in areas like data analysis, digital marketing, virtual collaboration, and business intelligence tools. Generic digital competence frameworks, while providing the foundational structure, may incompetently capture discipline-specific requirements, signifying the necessity for tailored assessment instruments. (Ma et al., 2024)

Thus, *quantitative and qualitative data collection* is increasingly described based on a mixed methods approach that integrates both the quantitative and qualitative data collection methods in the rigorous digital skills assessment of higher education research. These approaches might combine the surveys with practical assessments, interviews, or analysis of the digital artifacts produced by students. Hence, such comprehensive methods offer a richer understanding of not only what students can do digitally but also their attitudes, confidence levels, as well as contextual factors influencing the digital competence development. (Sillat, L.- H. et al. 2021).

The European Framework of the Digitally Competent Educational Organizations provides the institutional-level evaluation tools, which enable the universities within the order to measure their digital competence within the seven dimensions that comprise leadership, teaching and learning practices, professional development, and infrastructure (Chounta et al., 2024). Although it is more concerned with the institutional assessment and not the individual one, the framework provides a valuable context to comprehend the settings through which the students develop digital competencies.

Summing up, the key identified methods to measure include, as shown in Table 4.

Table 3. Some methods to measure digital skills in HE.

Methods to measure digital skills in HE	
1. <i>Self-assessment instruments</i>	These assessments allow students to rate their own digital skills through Likert-scale surveys, making them scalable and cost reasonable for everyone (Vuorikari et al. 2025). However, these methods provide insufficient accuracy, with studies reporting discrepancies of 20-30% between self-assessed and objectively measured competencies, among the students with lower actual skills level who tend toward overestimation (Jain, 2001)
2. <i>Performance-based assessments</i>	These assessments require students to demonstrate their digital skills through practical tasks such as reviewing online information sources, making digital presentations and managing digital communication (Fraillon et al., 2019)
3. <i>Domain-specific digital skill assessments</i>	These assessments require students to demonstrate their digital skills in areas like data analysis, digital marketing, virtual collaboration, and business intelligence tools. (Ma et al., 2024)
4. <i>Behavioral data analysis</i>	This method is carried out through the prediction of the digital competency of the level of student engagement with digital learning sources (Chounta et al., 2024)

5. Other <i>quantitative and qualitative data collections</i>	This method is carried out through surveys with practical assessments, interviews, or analysis of the digital artifacts produced by students. (Sillat, L.-H. et al. (2024))
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These measurement techniques describes that assessing digital skills in higher education requires multidimensional approach. Self-assessment tools may look simple and easy to use by everyone but they may not provide accurate result without proper validation from the experts. If selected wisely, these methods above can be integrated to produce reliable and relevant assessment of digital skills.

### 3.3 How Digital Skills Can Be Monitored over Time

*Longitudinal monitoring* of digital skills offers the essential insights into competency development trajectories, intervention effectiveness, as well as emerging gaps necessitating the institutional response (Chounta et al., 2024). EU higher education institutions have applied numerous approaches to tracking the digital competence evolution, though systematic longitudinal studies remain relatively limited compared to the cross-sectional assessments.

*Repeated cross-sectional surveys* administered to diverse student cohorts at regular intervals enable institutions to monitor the trends in the digital skill levels and requirements. This approach has been shown by the Digital Experience Insights Survey, which has been conducted on annual UK institutions since 2016, recording the change in student expectations, access patterns, and also reported competencies. Analysis of the multi-year data discloses increasing sophistication in the use of social media by students for learning purposes, growing the expectations for mobile-accessible resources, and persistent challenges with digital information literacy despite overall rising comfort with new and updated technology (Das et al., 2024).

*Learning analytics platforms* progressively incorporate digital competence tracking functionalities, enabling continuous monitoring through the analysis of student interactions with digital learning resources. Systems implemented at institutions comprising the Open University in the UK and several Dutch universities analyze the patterns like frequency and sophistication of the searches, diversity of information sources consulted, as well as quality of the digital collaboration behaviors. These systems can further generate the competence profiles that update throughout the

programs of students, providing the early warning indicators when students reveal limited digital engagement or problematic digital practices. (Kleimola & Leppisaari, 2022).

*Cohort tracking methodologies* encompass assessing the same group of students at numerous time points throughout their educational journey. Research conducted at Finnish universities, including multi-year studies tracking students from entry through graduation, discloses that the digital competence development does not occur consistently across all of the competence areas. (Chounta et al., 2024). While students typically display rapid advancement in basic technical skills and communication competencies during their first year, progress in critical digital literacy and digital content creation often plateaus without the targeted pedagogical interventions. Hence, these findings propose that passive exposure to the digital learning environments proves inadequate for comprehensive digital competence (Furbani et al., 2025).

*Portfolio-based assessment approaches*, where the students compile evidence of the digital competence development throughout their studies, deliver both summative and formative monitoring possibilities. Implementation at several European universities shows that structured digital portfolios, when integrated with the guided reflection activities, support the metacognitive development alongside skill acquisition. However, the portfolio approaches necessitate substantial resources for implementation as well as assessment, while limiting the scalability (Garcia, 2025).

Finally, *the European Commission's Digital Economy and Society Index* offers the macro-level monitoring of digital skills across member states, though its emphasis on the general population rather than higher education specifically limits the direct applicability. (Chounta et al., 2024). Nevertheless, trend data showing that as of 2020, only 58% of Europeans aged 16-74 possessed at least basic digital skills, shows the broader context within which higher education institutions operate & further suggests the significant proportions of students enter higher education with the foundational skill deficits.

Challenges in longitudinal monitoring include upholding participant engagement across the multiple assessment points, accounting for the technology evolution that may render the earlier assessments non-comparable with later ones, as well as distinguishing between the development attributable to the educational interventions versus general exposure & maturation. Methodological approaches addressing these challenges embrace using the criterion-referenced assessment tied to stable competence definitions

rather than the technology-specific skills, applying the incentive structures to inspire the ongoing participation, and using the cohort-sequential designs that combine the longitudinal and cross-sectional elements. (Sillat et al., 2021) .

Summing up, the key identified methods to measure include, as shown in Table 4.

Table 4. Some methods to monitor digital skills in HE.

Methods to monitor digital skills in HE	
1. <i>Longitudinal monitoring</i>	This method offers the insights into competency development trajectories, intervention effectiveness, as well as emerging gaps necessitating the institutional response.(Chounta et al., 2024)
2. <i>Repeated cross-sectional surveys</i>	This method collects data from diverse students at regular intervals to monitor the trends in the digital skill levels and requirements, as approached by UK institutions since 2016.(Das et al., 2024)
3. <i>Learning analytics platforms</i>	This method incorporate digital competence tracking functionalities, enabling continuous monitoring through the analysis of student interactions with digital learning resources.(Kleimola & Leppisaari, 2022)
4. <i>Cohort tracking methodologies</i>	This method encompass assessing the same group of students at numerous time points throughout their educational journey to track students from entry through graduation disclosing that the digital competence development doesn't occur consistently across all of the competence areas. (Chounta et al., 2024)
5. <i>Portfolio-based assessment approaches</i>	In this approach, students compile evidence of the digital competence development throughout their studies, deliver both summative and formative monitoring possibilities while supporting reflective learning. (Garcia, 2025).

These approaches to monitor digital skills overtime describes that institutions and universities has various tools such as longitudinal monitoring, surveys, platforms, cohort tracking and digital portfolios but each has its own strengths and limitations.

### 3.4 Surveys and Needs Analyses for Digital Skills: Examples

Higher education in the European Union has gone under remarkable transformation with digitalization. Digital competence seems to be a vital part of academic success and future employability, and the systematic methods of comprehending as well as acquiring these abilities are constantly developed (Ilomäki et al., 2016).

By these days, higher education institutions have accumulated various practices of assessing digital skills of their students. One example is shown in Table 5 below.

Table 5. Digital Experience Insights Survey (adapted from “Assessment of Digital Competencies in Higher Education Students: Development and Validation of a Measurement Scale” by Mejias- Acosta 2024, p. 4).

Dimension	Variables	
Access to digital content management	ADCM1	I have applications that keep me up to date with the news
	ADCM2	I can search for and access information in digital environments
	ADCM3	I can use different media to store and manage information
	ADCM4	I can search for the information I need on the internet
	ADCM5	I can understand the information I obtain from the Internet
Digital Empathy	DE1	I respect other people in digital environments
	DE2	I take into account the opinions of others in digital environments
	DE3	I can put myself in others' shoes in digital environments
	DE4	I am willing to help other people in digital environments
	DE5	I informed myself before commenting on a topic
Use of Digital Media	UDM1	I can complete digital content related to my tasks
	UDM2	I can use digital media to detect content plagiarism
	UDM3	I use digital media to solve tasks and exercises
	UDM4	I can create and edit digital content required in my studies
	UDM5	I skillfully use digital software to complete learning tasks
Digital Security	DS1	I avoid inappropriate behavior on social networks
	DS2	I am careful with my personal information and that of others
	DS3	I can identify harmful behaviors that can affect me
	DS4	I Before carrying out a digital activity, I evaluate the consequences
	DS5	When sharing digital information, I consider my privacy and security
Communication of Digital Content	CoDC1	I know how to communicate through different digital media
	CoDC2	I can communicate with other people in digital environments
	CoDC3	I know how to communicate with others in different ways (images, texts, videos, etc.)
	CoDC4	I share information and content through digital tools
Creation of Digital Content	CrDC1	I know different ways to create and edit digital content
	CrDC2	I can transform information and organize it in different formats
	CrDC3	I can present what I want to convey in digital environments

As shown in Table 5, it presents the scale for measuring digital competencies developed by Fan and Wang (2022) and later validated by Mejias- Acosta et al.(2024). The measurement scale is structured in six key dimensions of digital competencies,

The European commission has placed digital competence among eight primary key competences in the lifelong learning and has defined it as a assured, critical, and accountable use of digital technologies to learn, work and engagement in the society. Therefore, this conceptualization does not just limit to technical expertise but includes

the critical thinking, problem solving and ethical aspects of digital settings. DigComp framework, initially launched in 2013 and released as version 2.2 in the year 2022, represents a comprehensive framework that is structured on the five major areas of core competence that include information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. Each area includes the specific competences with eight proficiency levels ranging from foundation to highly specialized, allowing the nuanced assessment of digital capabilities across various contexts (Khan & Vuopala, 2019).

Within EU higher education institutions, digital skills have become progressively integrated into the curriculum design and pedagogical approaches. The shift toward the technology-enhanced learning environments, accelerated meaningfully during the COVID-19 pandemic, has disclosed both opportunities and disparities in the digital competence among the student populations (Matsieli & Mutula, 2024). Research conducted across numerous EU member states designates the considerable variation in digital skill levels among the incoming students, influenced by the factors including the prior educational experiences, socioeconomic background, as well as national digital infrastructure development. In a report by the European University Association (2021) on the digitally enhanced learning, it was revealed that whilst 87 per cent of European universities had integrated the digital technologies into their teaching modalities, only 42 percent of the universities were systematic with the assessment of the digital capabilities of students at their entrance (Obelovska et al., 2025).

The most affected groups of international students are mainly those of the developing countries whose challenges are unique to the digitally rich European higher education settings. The research that explores experiences of South-Asian and African students and even Southeast Asian students in European universities reveal the vast disconnect between anticipated and actual digital capabilities (Zhao et al., 2021)<sup>0</sup>. These gaps do not only occur in the technical skills but also include the digital information literacy, academic digital practices and the knowledge of the digital academic integrity standards. Therefore, the outcomes go beyond the individual student achievement directly to the effectiveness of the institutions since universities will not be able to provide the comparative learning opportunities in the absence of the overall awareness of the various student needs (Rafi et al., 2019).

The DigCompEdu framework, specifically designed for the educators, complements DigComp by addressing the digital competencies required for the effective teaching in contemporary higher education. Also, this framework distinguishes that developing the digital competence of student requires the educators who can efficiently integrate the technology into pedagogical practice, assess digital skills, as well as empower the learners for digital citizenship. However, implementation across EU institutions remains uneven, with noteworthy variations in the institutional support, professional development opportunities, as well as assessment mechanisms (EUA, 2025).

Studies conducted by the Joint Information Systems Committee show that the students themselves tend to incorrectly assess their level of digital skills, and in many cases overrate their level of mastering such aspects as the ability to evaluate information, handle databases, and even digital teamwork. This observation confirms the importance of objective assessment instruments and not the self-reported data. Furthermore, the digital divide persists within the EU higher education, not merely as a matter of access to technology but progressively as disparities in the quality of the digital skills and the capacity for leveraging the technology for learning as well as professional development (Miah, 2024).

The European Commission's Digital Education Action Plan 2021-2027 emphasizes the importance of the digital competence development at all educational levels. It helps in allocating the substantial resources to support member states in improving the digital infrastructure, building the educator capacity, and encouraging inclusive digital education (Education.ec.europa.eu, 2025). However, the specific attention to the requirements of the international students from developing countries remains limited in both policy frameworks as well as institutional practices, while demonstrating a noteworthy gap in the current approaches to digital competence in EU higher education (Ndibalema, 2025).

And the third element is about how digital skills can be monitored over time and best practices and need analysis. Longitudinal monitoring of digital skills offers the essential insights into competency development trajectories, intervention effectiveness, as well as emerging gaps necessitating the institutional response (Chounta et al., 2024). EU higher education institutions have applied the numerous approaches to tracking the digital competence evolution, though systematic longitudinal studies remain relatively limited compared to the cross-sectional assessments.

Cohort tracking methodologies encompass assessing the same group of the students at numerous timepoints throughout their educational journey. Research conducted at Finnish universities, including multi-year studies tracking students from the entry through graduation, discloses that the digital competence development does not occur consistently across all of the competence areas (Chounta et al., 2024). While students typically display the rapid advancement in basic technical skills and communication competencies during their first year, progress in the critical digital literacy and digital content creation often plateaus without the targeted pedagogical interventions. Hence, these findings propose that passive exposure to the digital learning environments proves inadequate for the comprehensive digital competence development (Murtadho et al., 2023).

Repeated cross-sectional surveys administered to diverse student cohorts at the regular intervals enable institutions for monitoring the trends in the digital skill levels and requirements. This approach has been shown by the Digital Experience Insights Survey which has been conducted on annual UK institutions since 2016 recording the change in student expectations, access patterns, and also reported competencies. Analysis of the multi-year data discloses increasing sophistication in the use of social media by students for the learning purposes, growing the expectations for the mobile-accessible resources, and persistent challenges with the digital information literacy despite overall rising comfort with new and updated technology.

Learning analytics platforms progressively incorporate the digital competence tracking functionalities, enabling continuous monitoring through the analysis of student interactions with the digital learning resources. Systems implemented at institutions comprising the Open University in the UK and several Dutch universities analyze the patterns like frequency and sophistication of the searches, diversity of information sources consulted, as well as quality of the digital collaboration behaviors. These systems can further generate the competence profiles that update throughout the programs of students, providing the early warning indicators when students reveal the limited digital engagement or problematic digital practices (Kleimola & Leppisaari, 2022).

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aged 16-74 possessed at least basic digital skills, shows the broader context within which higher education institutions operate & further, suggests the significant proportions of students enter higher education with the foundational skill deficits

Challenges in longitudinal monitoring include upholding participant engagement across the multiple assessment points, accounting for the technology evolution that may render the earlier assessments non-comparable with later ones, as well as distinguishing between the development attributable to the educational interventions versus general exposure & maturation. Methodological approaches addressing these challenges embrace using the criterion-referenced assessment tied to stable competence definitions rather than the technology-specific skills, applying the incentive structures to inspire the ongoing participation, and using the cohort-sequential designs that combine the longitudinal and cross-sectional elements (Sillat et al., 2021).

Portfolio-based assessment approaches, where the students compile evidence of the digital competence development throughout their studies, deliver both of the summative and formative monitoring possibilities. Implementation at the several European universities shows that structured digital portfolios, when integrated with the guided reflection activities, support the metacognitive development alongside skill acquisition. However, the portfolio approaches necessitate the substantial resources for implementation as well as assessment, while limiting the scalability. The systematic approaches of needs analysis in the context of digital competence must allow determining the existing level of skills and the underlying need, situational aspects, and suitable intervention measures. Institutions of higher education in Europe have therefore established and perfected various best practice methods in undertaking the digital skills surveys and needs require certain analysis and provide the worthwhile advice to the analogous efforts (Gaebel and Morrisroe, 2023).

The co-design principle reflects a significant best practice where the stakeholders, which include the students, educators, and support staff are involved in the process of analyzing the requirements. The studies of the digital competence assessment initiatives in many European universities show that co-designed instruments achieve the higher response rates and the greater validity and the institutional buy-in in opposition to the top-down strategies. A co-design team of 15 faculty and 40 students at Utrecht University in designing a survey of digital skills resulted in an instrument that was both comprehensive enough and had a reasonable respondent burden, achieving a 68 per

cent response rate against 43 per cent of one previously designed by an administrator (Zeivots et al., 2025). Table 7 demonstrates the self-perceived digital competence level of the university students in the important areas with strengths in information literacy and communication, and lower strengths in digital content creation and programming.

Table 6. University Students' Self-Perception of Digital Competence in European Higher Education Institutions (adapted from Mejias- Acosta et al., 2024).

<b>Information and Data Literacy</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Good</b>	<b>Very Good</b>	<b>Mean</b>	<b>SD</b>
I use ICT tools to search, locate, select, organize, evaluate, process, store, transform, disseminate, cite and communicate information.	6.9	20.5	62.6	10.1	2.76	0.722
I use specialized search engines and meta-search engines with various mechanisms (Identify keywords, synonyms and related terms, search in more than one language...).	3.8	14.5	63.9	17.8	2.96	0.687
I understand different sources of information and can build search strategies correctly based on them.	6.2	27.3	55.7	10.7	2.71	0.738
I analyse and comment critically on information, data sources and digital content, verify the validity and timeliness of the information located.	7.0	29.3	54.3	9.4	2.66	0.743
I apply different methods and tools to manage and store information, data and digital content for easy retrieval.	6.5	28.0	55.5	10.1	2.69	0.738
I have my own strategy to organize and retrieve information and data.	7.4	27.2	54.8	10.5	2.68	0.758
<b>Communication and Collaboration</b>						
I communicate and interact through a variety of digital devices and applications (SMS, email, cloud, QQ, WeChat, video conferencing).	3.2	12.2	66.0	18.6	3.00	0.661
I participate in social networks, collaborative platforms and online communities where I share knowledge, multimedia content and information.	5.0	22.5	59.7	12.8	2.80	0.718
I collaborate through the Internet with other people in my educational or professional field that form my personal learning network (PLN).	6.6	26.7	56.3	10.4	2.71	0.740
I engage with society through online participation (social, political, cultural, administrative action) and am aware of the potential of technology for citizen participation.	4.8	22.8	61.2	11.2	2.79	0.698
I use digital technologies and media for teamwork.	4.6	22.4	61.7	11.3	2.80	0.692
I use technology and collaboration tools to plan, execute and share monitoring of activities and projects.	6.0	27.4	56.4	10.2	2.71	0.728
I participate in learning activities such as MOOCs through collaborative environments.	6.2	26.4	56.9	10.5	2.72	0.734
I am familiar with the rules of conduct online or in the virtual world, such as being friendly, respecting people's privacy and being careful with my language.	3.0	12.1	61.6	23.3	3.05	0.687
I stay up to date with ethics regarding internet use.	2.7	10.7	64.4	22.1	3.06	0.660
I take care to remind my family and friends of the basic rules of behaviour on the Internet.	2.6	12.3	64.5	20.6	3.03	0.656
I know how to create and manage a public, personal and professional profile on social media.	4.5	19.6	60.5	15.4	2.87	0.716
I am able to manage several digital identities depending on the objective or context.	5.2	22.2	58.8	13.8	2.81	0.730
I pay attention to what I post online and I know how to protect my digital reputation and/or that of others.	2.6	10.2	63.1	24.0	3.09	0.661

Digital Content Creation	Very Poor	Poor	Good	Very Good	Mean	SD
I use a variety of tools and software to create multimedia content in a variety of formats.	7.7	36.6	49.1	6.7	2.55	0.732
I am able to use different media and methods to present ideas in a creative way.	6.8	35.6	50.6	7.0	2.58	0.721
I am able to edit, modify, improve and combine existing resources to create new and relevant content and knowledge.	7.0	34.6	51.5	6.9	2.58	0.722
I understand the basic knowledge and laws of intellectual property and the licensing of information and digital content when working with ICTs.	6.5	32.6	52.8	8.2	2.63	0.726
I know the basics of digital processes, understand the principles of programming and what is behind a programme.	9.4	38.5	45.2	6.9	2.50	0.759
I make modifications to computer programs, applications, configurations and equipment as needed	11.7	37.9	43.7	6.7	2.45	0.784

Table 6 shows the results from the quantitative survey provides insight into the digital competency levels among students in areas such as information and data literacy, communication and collaboration, digital content creation, and safety. The results mainly indicate that most students perceive their digital competency to be “good” in relation to digital search, evaluation, organization, and management activities, as well as digital communication and collaboration. But there are lower levels in digital content creation, programming, and application modifications (Zhao et al., 2021).

Theoretical grounding in the established frameworks safeguards the comprehensive coverage of relevant competence areas while allowing the comparison across the contexts. Best practice involves adapting international frameworks like DigComp to local institutional and disciplinary contexts rather than either wholesale adoption or completely novel instrument development. Also, the University of Helsinki's approach to assessing the digital competencies demonstrates this practice, using the DigComp framework as foundation while integrating the discipline-specific items developed through faculty consultation as well as additional items addressing the institutional technology ecosystems (Mattar et al., 2022). The factor loadings reported in Table 8 reveal the strengths of the relationship between each of the items regarding the six dimensions of digital competence of students.

Table 7. Factor Loadings of Students' Digital Competence Survey Items (adapted from Meijas- Acosta et al., 2024).

Items	F1	F2	F3	F4	F5	F6	U
DG2-I am able to search for and access information in digital environments.	0.933						0.108
DG4-I am able to search for information that I need on the Internet.	0.859						0.103
DG3-I can use different tools to store and manage information.	0.755						0.139
DG5-I can understand the information I get from the Internet.	0.678						0.114
DG1-I have apps that keep me up to date with news.	0.678						0.318
DG7-I skillfully use digital software to complete learning tasks.	0.522						0.132
DG30-I am willing to help other people in digital environments.		0.820					0.141
DG33-I consider the opinion of others in digital environments.		0.792					0.125
DG32-I respect other people in digital environments.		0.763					0.086
DG 29-I am able to put myself in other people's shoes in digital environments.		0.651					0.226
DG34-I get informed before commenting on a topic.		0.599					0.193
DG12-I can use digital means to solve problems encountered in my study.			0.902				0.100
DG9-I can create and edit digital content with higher standards according to the requirements of work or study.			0.680				0.224
DG13-I am able to use digital means to detect plagiarism in content that I created.			0.673				0.209
DG8-I can complete digital content that meets the minimum requirements of learning tasks.			0.622				0.126
DG28-Before doing a digital activity (e.g., uploading a photo or comment), I think about the possible consequences.				0.796			0.190
DG27-I avoid behaviors that are harmful on social networks.				0.667			0.136
DG26-I am able to identify harmful behaviors that can affect me on social networks.				0.630			0.179
DG25- I avoid having arguments with others in digital environments.				0.609			0.328
DG23-I am careful with my personal information.				0.437			0.230
DG15-I know how to communicate with others through different digital means.					0.725		0.077
DG16-I know how to communicate with others in different ways (e.g., images, texts, videos, etc.).					0.625		0.123
DG14-I can communicate with others in digital environments.					0.583		0.098
DG20-I am able to accurately present what I want to deliver in digital environments.						0.536	0.196
DG21-I can transform information and organize it in different formats.						0.489	0.161
DG19-I know different ways to create and edit digital content (e.g., videos, photographs, texts, animations, etc.).							0.158
DG37-When sharing digital information, I am able to protect my privacy & security.							0.299

Table 7. shows the survey factors that evaluate digital competencies with respect to six key dimensions. These include digital content management and access, digital empathy, use of digital technology means, digital safety, communication, and digital content creation. The items are designed to assess to what extent each one taps into each corresponding factor, with most items above 0.6, signifying that there is no issue with validity in terms of measurement. The survey can be used to evaluate digital competencies among higher education students with sensitivity to technical competencies as well as socio-emotions such as empathy and digital safety (Kryukova et al., 2022).

Researchers believe that *mixed methods need analysis* combining the quantitative surveys with qualitative methods yields richer, more actionable understandings than either approach alone. Hence, the Technical University of Munich's comprehensive digital competence needs analysis combined a survey of 850 students with the focus groups, individual interviews, and analysis of the support service utilization data. Hence, this multi-faceted approach disclosed that while survey data designated the general comfort with basic technologies, qualitative data uncovered the specific anxiety points

around data management for research projects as well as confusion about the academic digital integrity standards that were not apparent from the survey responses alone.

Importantly, pilot testing represents a critical quality assurance step regularly underutilized in practice. Best practice involves the conducting small-scale trials with the representative participants, collecting both of the quantitative data & qualitative feedback about the instrument clarity, length, and relevance. The University of Edinburgh's development of a digital experience survey encompassed the two pilot phases: initial cognitive interviews with 10 students reviewing each of the questions for comprehension, followed by a pilot survey with 50 students delivering the feedback on overall experience. Hence, this iterative process recognized the ambiguous terminology, eliminated redundant items, and enhanced the logical flow of questions, meaningfully improving the final instrument's quality (Vuong & Bui, 2023).

Culturally as well as linguistically appropriate instrument design becomes chiefly significant in international higher education settings. Research on the survey methodology with international students highlights the significance of the clear, jargon-free language, provision of the contextual explanations, and awareness of cultural differences in response patterns. Studies document that the international students from collectivist cultural backgrounds may exhibit diverse response tendencies on self-assessment items compared to the students from the individualist cultures, requiring the careful interpretation of results.

Appropriate incentivization strategies balance inspiring the participation with avoiding coercion or undue influence. Effective approaches recognised in European higher education embrace entry into prize draws, provision of the personalized feedback reports, as well as integration of the participation with existing course structures where morally suitable. The University of Amsterdam's digital skills survey offered participants automated the personalized reports comparing their competence profiles with program averages as well as offering the targeted resource recommendations, achieving 71% participation among target populations (Vuorikari et al., 2025).

Data protection and ethical issues are also to be considered with appropriate care primarily, due to the demands of EU General Data Protection Regulation. The transparent communication of the data utilization, the anonymization methods, safe data storage, and the express informed consent processes are the best practices. The

difficulties that many European universities have had in their experience when learning analytics practices or comprehensive digital skills tracking have raised certain privacy-related questions among the students and staff, which explains the significance of the initial ethical assessment and stakeholder deliberation (Aseri, 2020).

The result of the needs analysis should be disseminated and conducted as actionable reports, which will protect the fact that assessment activities are converted into the real developments. Best practice involves the various types of reports that are provided to the different stakeholder groups: comprehensive technical reports to the researchers and administrators, and simplified reports to students, and specific recommendations to the educators and the support services. The method of the Technical University of Denmark in the process of sharing the information about the outcomes of the digital competence assessment included a data visualization dashboard of the interactive format that allows the users to access the information regarding the results according to the demographic variables, program areas, and the particular domains of competence, which makes it possible to make the data-driven decisions on the university-wide level (Schnepf et al., 2024).

The needs analysis embedded institutionally in the quality assurance and continuous improvement processes guarantees the long-term focus on the development of the digital competence as opposed to the evaluation of the digital competence conducted once. The educational institutions that are part of Aalto University and the University of Ghent have incorporated the digital skills assessment into regular reviews of the program and student support services and established the systematic mechanisms of monitoring and responding to the developing needs (Ličen & Prosen, 2024).

### 3.5 Conceptual Framework of This Thesis

The conceptual framework of this study maps the core elements that can help in assessing digital skills in higher education. First, Digital competences are defined using the DigComp and DigCompEdu frameworks of the European Commission (European Commission, 2022), which are organized around five areas, namely (1) information and data literacy, (2) communication and collaboration, (3) digital content creation, (4) safety, and (5) problem-solving.

This conceptual framework is a synthesis of three key points, namely, (1) *the assessment areas*, (2) *the methods to measure*, and (3) *the methods to monitor*. The framework can help to utilize these core elements for assessing digital skills among various student groups in higher education. By assessing individual competencies, institutions can formulate strategies for measuring and monitoring digital skills, to recognize gaps and inform interventions.

Next, Section 4 applied this conceptual framework, first, for analyzing the case organization, and second, for building own assessment tool.

Table 8. Conceptual framework for assessing Digital Skills.

Core areas to <u>asses</u>		Methods to assess		Methods to monitor	
5 Core competence areas (DigComp 2.2, 2022)		Methods to measure digital skills in HE		Methods to monitor digital skills in HE	
1. Information and Data Literacy	The capacity to identify, access, analyze, and deal with digital information and data critically. Includes evaluation of source credibility, analyzing datasets, and providing <a href="#">the evidence</a> in scholarly or professional format. Students will be able to prove the ability to search, organize, and use digital information responsibly (Furáková, 2024).	1. <i>Self-assessment instruments</i>	These assessments allow students to rate their own digital skills through Likert-scale surveys, making <a href="#">them</a> scalable and cost reasonable for everyone (Vuorikari et al. 2025). However, these methods <a href="#">provides</a> insufficient <a href="#">accuracy</a> , with studies reporting discrepancies of 20-30% between self-assessed and objectively measured competencies, among the students with lower actual skills <a href="#">level</a> who tend toward overestimation (Jain, 2001)	1. <i>Longitudinal monitoring</i>	This method offers <a href="#">the insights</a> into competency development trajectories, intervention effectiveness, as well as emerging gaps necessitating the institutional <a href="#">response</a> .(Chounta et al., 2024)
2. Communication and Collaboration	Skills to communicate, cooperate, and interact in the digital world. Discusses electronic communication, sharing of information, electronic collaboration, and respecting online etiquette and codes of ethics. Students are <a href="#">able</a> to be digitally responsible, collaborate as a team, and be responsible online.	2. <i>Performance-based assessments</i>	<a href="#">These assessment</a> require student to demonstrate their digital skills through practical tasks such as reviewing online information sources, making digital presentations and managing digital communication (Fraillon et al., 2019)	2. <i>Repeated cross-sectional surveys</i>	This method collects data from diverse students at regular intervals to monitor the trends in the digital skill levels and requirements, as approached by UK institutions since <a href="#">2016</a> .(Das et al., 2024)
3. Digital Content Creation	The skill to format, develop, and handle electronic content of different types (text, images, audio, video, code). Incorporates creation of correct, innovative, and context-specific resources without violation of copyright and licensing regulations. Students can combine knowledge and create relevant digital products.	3. <i>Domain-specific digital skill assessments</i>	These assessments require students to demonstrate their digital skills in areas like data analysis, digital marketing, virtual collaboration, and business intelligence tools. (Ma et al., 2024)	3. <i>Learning analytics platforms</i>	This method <a href="#">incorporate</a> digital competence tracking functionalities, enabling continuous monitoring through the analysis of student interactions with digital learning <a href="#">resources</a> .(Kleimola & Leppisaari, 2022)
4. Safety	Scanning and implementing measures to safeguard personal information, online identity, gadgets, and health. Reports on cybersecurity, privacy on the internet, and fair usage of electronic materials. Upon ethical standards, students will be able to protect themselves and others in online settings.	4. <i>Behavioral data analysis</i>	This method is carried out through the prediction of the digital competency of the level of student engagement with digital learning <a href="#">sources</a> .(Chounta et al., 2024)	4. <i>Cohort tracking methodologies</i>	This method <a href="#">encompass</a> assessing the same group of students at numerous time points throughout their educational journey to track students from entry through <a href="#">graduation</a> disclosing that <a href="#">the digital</a> competence development doesn't occur consistently across all of the competence areas. (Chounta et al., 2024)
5. Problem-Solving	The skill of recognizing the digital needs and challenges and using digital tools to address the problems or be innovative. Incorporates problem-solving, doing problem-solving in an inventive manner, and providing an evaluation of solutions. Young learners can use digital skills to accomplish learning, research, and work assignments (VUORIKARI, 2022).	5. <i>Other quantitative and qualitative data collections</i>	This method is carried out through surveys with practical assessments, interviews, or analysis of the digital artifacts produced by students. (Sillat, L.-H. et al. (2024)	5. <i>Portfolio-based assessment approaches</i>	In this approach, students compile evidence of the digital competence development throughout their studies, deliver both summative and formative monitoring possibilities while supporting reflective learning. (Garcia, 2025).

## **4. Starting Analysis in Assessing the Digital Skills and Related Needs**

This section discusses the results from the current state and needs analysis of digital skills assessment in students at the case organization.

### **4.1 Overview of the Current State Analysis**

The Current State Analysis (CSA) analyzed the current state of assessing digital competencies, on the example of a group of Nepalese students at MBS. This group of 30 Nepalese students was selected since the students share the same background, and it was easy to eliminate the influence of a specific educational area and thus analyze a homogenous group.

The analysis was conducted in four steps. The initial step asked the informants about the first area of the CF, the conceptual framework. The second step asked for the second area, and the third for the third area. The final step pulled the findings together and pointed to the strengths and weaknesses of current practices of assessing digital skills.

The analysis involved the case organization's perspective through conducting semi-structured interviews with the academic and administrative personnel (4 informants). During the staff interviews, the goal was explained as follows: students at the start of their studies demonstrate different levels of their digital skills. To deal with this challenge, a structured approach to the assessment of current digital skills in students is needed. During their studies, the results of this assessment (if monitored further) will help in the creation of specific support systems, which is why such an instrument as a diagnostic tool is required.

### **4.2 Background of the Assessment of Digital Skills**

In terms of the business issue, MBS has experienced increased enrollments of Nepalese students in its International Business programs. Although such students are highly motivated and able to handle academic tasks, most of them experience challenges when adjusting to the digitally developed educational ecosystem in Finland (Informants 1,2,3,4). As the Nepalese students explain it themselves, in contrast to Finland, where digital infrastructure and e-learning have been firmly integrated into the academic culture,

Nepalese students often have prior experience with the use of these technologies and online pedagogies. This deficit of digital readiness poses obstacles in engagement, using learning platform, and eventually in academic performance and confidence in their studies.

The problem is intensified by the differences in the technology background that students have. Digital literacy of Nepalese students is different, and related to their educational, social and professional backgrounds, which may be different to a “traditional” Finnish student. This discrepancy was explained by the informants (both staff and students themselves) by the difference in the environments of learning, i.e. not being exposed to advance digital learning before the start of their studies. Therefore, MBS is interested to have a tool that would be able to evaluate the digital skills of students and find ways to close digital skills gaps, if identified.

#### 4.2.1 Most Used Digital Skills Currently

Staff interviews reveal that there are some knowledge gaps in the digital competencies of Nepalese students in MBS. They are very mobile-based in their digital skills and use informal tools to communicate and work together. The results from the interviews are structured according to the assessment areas in the DigComp 2.2 framework, important findings are organized in the following way.

### **1. Information and Data Literacy**

The skills of students in this regard are too fundamental and irregular to facilitate academic performance. They are simple online searching but not competent to search and find information, and make their information manipulation in formal university systems.

Familiarity with core academic platforms is a basic disjunction. Informant A mentioned that often students explain that they have no idea how these tools operate, talking about Moodle and Z-drive, two indispensable elements to access the material and submit it (Informant A). Informant B explained that although students can access information online, they are not able to organize, synthesize, or apply the information they find efficiently to the digital tools the university anticipates they should (Informant B).

This goes as far as to critical evaluation. Informant C observed the inclination to refer to the first web searches without evaluating the credibility, authority of the source, or its suitability to an academic situation (Informant C). There are serious practical implications. Informant D attributed these deficits to missing deadlines, work of a lower quality, and excessive technical support needs (Informant D).

The reactive and informal attitude of students towards digital information is inappropriate to the formalities of higher education, which creates inefficiency and impedes academic results.

## **2. Communication and Collaboration**

Data from those interviewed shows that there is a sharp difference in the way students communicate digitally. The almost complete use of the informal applications of mobile utilization, such as WhatsApp, to facilitate peer-to-peer collaboration is, nonetheless, juxtaposed with strong failures in formal digital communication.

Peer-to-peer learning, as Informant B followed, is the most prevalent in learning collaborative tools, but on a small-scale ecosystem: students seem to learn about digital tools by sharing knowledge with peers on services such as WhatsApp. The thing is, however, that this forms a closed circle; I barely see how they actually interact and cooperate using a formal digital platform, whether they do attain the right etiquette" (Informant, B).

This unofficial network encourages effective peer-to-peer support, with more competent students helping others. Nonetheless, it does not equip them with academic and professional norms. According to informant A, poor formal email communication is one of the consequences of this gap: In most cases, students do not respond to emails promptly and, in other cases, do not reply at all. This directly contributes towards missed deadlines, vague instructions, and failure of the formal communication channels".

The staff has had to adjust to using WhatsApp in order to get the necessary information. Informant C supported this change: "This has been virtually necessitated, since we cannot use email to deliver urgent class announcements but have been compelled to use the WhatsApp groups. It works well in the short run, but it deteriorates professional communication patterns that we want to impart to them (Informant, C). In addition,

Informant D observed that the ability to write correctly formatted, clear, and professional emails is a unique and prevalent skill gap among the student group (Informant D).

### **3. Digital Content Creation**

The ability to develop digital content has also been singled out as a major academic bottleneck. Although students have a mere familiarity with standard applications such as PowerPoint, these skills tend to be superficial and limit their production of quality academic output.

Informant B traced this limitation directly to assessment outcomes: They are all familiar with simple presentation packages such as PowerPoint, but that is seldom more than basic templates. This has a direct impact on the depth and professionalism of interactive assessments i.e. presentations in courses such as "Organizational Behavior" (Informant, B).

Such skills are normally accomplished via peer-to-peer learning as opposed to formal education. According to Informant C, something is taught informally, like how to add a slide or place an image into the presentation, yet not the rules of concise visual design or how to create a persuasive online story (Informant, C). Informant D brought in a key point of view on the question of scope: Presentation is not the only bottleneck. Producing properly formatted reports, simple data visualizations, or even elementary academic videos are a constant challenge, restricting students in their capacity to demonstrate the learning (Informant, D). Overall, students are able to work with simple software programs, but are not yet able to write effective, polished and purposeful digital academic work.

### **4. Safety**

The results of the interviews show that the knowledge that students have on the topic of digital safety is procedural and exists on a level of basic account security. It is common in this field that knowledge is seen as something to get oriented with as opposed to a continual and holistic aspect of digital literacy.

The emphasis here lies on the basic access as explained by Informant A: "The concept of digital safety teaching is rather procedural here. It consists primarily of the teaching of

Condor and passwords in the initial Helpdesk classes (Informant A). Informant B said that this strategy does not provide a wider picture of concepts: "Beyond being able to remember their login information, there is little trace of systematic knowledge related to data privacy, secure sharing measures, or even recognizing online risks such as phishing (Informant B).

Informant C linked such gap to the apparent student behavior: "We observe such practices as sharing login credentials to make it easier or transferring sensitive academic material to personal cloud storage, which explains why the values of data ownership and data security are not embedded on the practice's level (Informant C). According to informant D, the risk is summarized as follows: Their digital safety competence is reactive as aimed at recovering their locked account instead of proactive management of their digital footprint and personal data (Informant D).

## **5. Problem-Solving**

The results of the interview reveal a significant and positive change in the level of digital problem-solving skills of students, but the level of proficiency in this area is still different.

Informant A has highlighted the significant improvement: "Digital problem-solving has gotten significantly better over the years; now they can equally address most technical issues, as well as other students (Informant A). This was confirmed in practice by the informant B, who confirmed telling me: The digital tools that students successfully use have been search engines, online tutorials, peer forums, and so on to conduct research, analyze, and design solutions to the assignments they are given. They are more qualified and independent in this sense" (Informant B).

But Informant C gave an important caveat, as the skill is domain specific: "Their ability lies in familiar informal digital spaces such as social media and consumer applications. The strategic problem-solving process may fail, especially when it is facing a new academic system or specific software (Informant C). This was echoed by informant D, who explained it as a trend of practical workarounds instead of fundamental knowledge: They are good at accepting on the spot, practical workarounds to get something done, which demonstrates flexibility. Nonetheless, this does not necessarily reflect in to a more profound, transferable knowledge of digital systems or methodologies" (Informant D).

Overall, even though students have shown high and increasing problem-solving competencies in a known digital setting, systematic and critical thinking, in the setting of unfamiliar or formal problem-solving in digital applications, has been identified as weak and can be developed further.

#### 4.2.2 Current Practices to Measure & Monitor Digital Skills (at the Case Organization)

The interviews indicate that MBS does not have a common approach to assess digital skills of its students. Table below summarizes the responses by interviewees as for the methods that are currently used (against the methods recommended by literature).

Table 9. Current and Potential Methods for Measuring and Monitoring Digital Skills at MBS (vs. the conceptual framework).

Methods to Measure (Assessment) as in CF	Current Use at MBS	Methods to Monitor (Tracking Over Time) as in CF	Current Use at MBS
<p><b>1. Self-assessment instruments</b></p> <p>Students rate their own digital skills via surveys or reflections<sup>1</sup></p>	Occasional. For example, Informant B uses "group self-reflection at the end of the course." No ready-made survey are available so far.	<p><b>1. Longitudinal monitoring</b></p> <p>Tracking individuals over time to understand growth (Wise, 2019).</p>	Not yet practiced. Informant B noted it would be "a useful method, particularly for this...", but no systematic tracking yet exists.
<p><b>2. Performance-based assessments</b></p> <p>Practical tasks like presentations (Fraillon et al., 2020).</p>	Course-specific. Informant B uses it in his/her course for performance assessment. Informant A also uses this method.	<p><b>2. Repeated cross-sectional surveys</b></p> <p>Measuring different cohorts to identify trends (McManus, 2020).</p>	Not yet practiced. No regular surveys yet exist.
<p><b>3. Domain-specific digital skill assessments</b></p> <p>Evaluating skills within specific disciplines (Vuorikari et al., 2025).</p>	Occasional. Courses like "Marketing" and "IT Tools" apply it as part of their course assessment.	<p><b>3. Learning analytics platforms</b></p> <p>Using LMS data (Moodle) to track engagement (Mosia et al., 2025).</p>	Underutilized. Many instructors can track analytics in MOODLE, but no coordinated reporting yet exists.
<p><b>4. Behavioral data analysis</b></p>	Not practiced. The method is familiar through research publications and	<p><b>4. Cohort tracking methodologies</b></p>	Not systematically practiced. Informant A sees value, and all staff

Inferring skills from digital footprints and online research (Nugumanova et al., 2019).	professional discussions, but not used.	Following a group (e.g., entry year) through studies (Morrow, 2010).	members stressed they do it regularly (by tracking the groups), but not yet systematic reported.
<b>5. Other quantitative and qualitative collections</b>  Interviews or digital artifact analysis (Malik et al., 2023).	Occasional. Not yet systematically practices as an assessment method.	<b>5. Portfolio-based assessment approaches</b>  Collecting artifacts and reflections over time (Pegrum & Oakley, 2017).	Recognized & practices, especially in some areas (like thesis writing). Informant A called it "the best type" for thesis, but not yet used for systematic reporting.

The current methods include examples from almost all areas discussed above, but not always systematically used. Digital skills gaps is realized when it brings a noticeable academic or administrative problem. As an illustration, the skills gaps are only noticed when the students fail to hand in an assignment through Moodle (Informant A), or connect via Zoom (Informant D), or when they have difficulties with creating a presentation (Informant B). Monitoring, which takes place, relies on the observation of instructors on the progress of students in one course. Yet, all instructors stress that the digital skills grow fast among the studied group.

*"I have seen that the progress of students is much better than expected at this point." (Informant B)*

Without a systematic approach, the responsibility of digital skills assessment currently falls to the individual staff members. Instructors, such as Informant B, will have the responsibility of preparing assessments/ reports that implicitly assess digital skills. Study Coordinators, have to go into a supporting role, troubleshooting problems such as email communications and access to the platform. No specific position or task is associated with the induction of the new students to digital skills or their assessment.

As for *the Tools*, the case organization has various tools that are relevant for assessing digital skills. For example, Moodle exists, but not all its analytics are utilized for systematic reporting of digital skills. Content delivery is done through platforms such as OMA and tools such as Word and PowerPoint; document creation and storage is done via Google Docs; teleconferencing is done via Zoom and Teams, but not skill diagnostics. The most efficient media has turned out to be informal WhatsApp, which is widely regretted by the staff, as it illuminates a gap in skills to use email and OMA (the learning

platform i.e. organizational intranet). This is especially regrettable since own platforms and emails are the main means to communicate in the job market, and the students such miss the importable job-related skills. The informant however noted that - after more extensive exposure to the organizations (educational) setting - the students (here, the Nepalese students) gradually start using emails with the time.

### 4.3 Analysis of the Needs in Digital Skills Development & Their Assessment

This text showing the results of the analysis is divided into relevant categories that present the analysis results by groups of findings.

#### 4.3.1 What Digital Skills are Most Needed for Studies

Staff interviews show three essential digital skills areas among of Nepalese students at MBS.

##### **1. Hardware and Platform Competence**

The first need is for some basic computer skills (i.e. managing own PC) and navigation through the institutional information (e.g. web-sites at MBS, which support academic operations. Informant A indicated that the students find it difficult to use very simple computers, and they are using their mobile phones to do virtually everything.

This involves challenges in using digital tools and platforms such as Moodle and the Z-drive, as students do not have an idea of how these applications work (“hardware”, “basic architecture”, as Informants A and C expressed it). This gap is urgent enough, as students fail to be able to select and use a PC for their studies. With such a lack of basic competency here, academic start becomes difficult.

##### **2. “Digital Culture” in Communication**

Students exhibit challenges in understanding and following official information (most evident in the failure of reading and following their emails). Although the staff members report sufficient informal online competence (e.g. in WhatsApp and peer support), they have significant difficulties in more “serious” and official communication types. For

example, students do not respond to their emails, and sometimes they do not open emails at all, resulting in missed deadlines as well as missing information. This especially evident in writing messages because not every student can write a good, effective email, and often has little knowledge about professional etiquette in the digital realm. This digital culture also relates to proper timing and scope of communication (e.g. late evening calls). The enhancement of these skills is crucial to being able to cooperate and communicate in academic institutions and further in professional life.

### **3. Digital Content Creation (e.g. for academic purposes)**

Some students demonstrate significant weakness in digital content creation, which may show in poor course performance. Informant B pointed out,

*"I do not necessarily feel that every one of them has access to basic presentation tools like PowerPoint, and this is where the course like Organizational Behavior is involved because the most important evaluation in this course is how to make a presentation, and that presentation must be interactive. As we are talking, not all of them are well-versed with PowerPoint, but they are cross-teaching, that is, they learn amongst themselves in high-stakes tasks that are graded, and this puts an unnecessary strain on their academic achievements" (Informant B)*

The notes from the interviews can help to understand where digital content creation could be improved, and how digital skills of the students start to become better with exposure, peer support, and systematic use of such applications as OMA, Moodle and Zoom.

#### **4.3.2 How These Digital Skills Can Be Assessed**

The review reveals that the stakeholders are interested in a multi-method assessment framework (relying not only on self-assessment but observable performance and measurements of the digital skills of students).

According to all informants, *performance-based assessment* is one of the most precise indicators of digital skills. This was emphasized by Informant A, who said that this assessment can be done via assignments, project work and, most of all, the thesis that includes all the needed digital skills. This opinion is similar to the teaching experience of Informant B, who has supported the relevance of practical demonstration:

*"Performance-based assessment is exemplified by the presentation itself. This approach directly tackles such gap areas as the digital content creation, since*

*evaluating the capability of students to create and present the presentations in the properly chosen software should be used, rather than their own self-esteem or informal skills". (Informant B)*

There was also a strong support for *portfolio-based assessment*, especially via *longitudinal tracking*. Informant A characterized the thesis as a complete portfolio representation, also over the time. In the thesis work, students had to search for information, process the information, use library databases, write the text, analyze various data, format the text, use servers and manage the images, i.e. everything that the students are taught in school. Informant A claims that a successful completion is an excellent indicator that they are ready to be employed.

The staff informants also expressed their wish to use more *learning analytics* as a valuable resource that was not used much currently. As Informant A mentioned,

*"Instructors who use Moodle are able to follow learning analytics through this platform, implying that adopted systematization of both analytics and self-assessments and performance-based measurements could become a quality, data-driven model of tracking digital skills acquisition during student studies". (Informant A)*

#### 4.3.3 Other Suggestions

In addition to particular assessment strategies, the analysis provided important additional suggestions on assisting the development of digital skills, namely, paying attention to timing and pedagogical approach.

The most pressing recommendation relates to when *the initial assessment* is to occur. It was emphasized by all interviewees that the existing reactive approach is, in a way, fundamentally flawed. Specifically, Informant A suggested introducing an active diagnostics paradigm shift by suggesting the introduction of a pre-study survey, to be sent out before their studies begin... or even before they arrive in Finland (along with the Acceptance letter). Such a pre-arrival screening would allow the institution to offer pre-emptive and specific support to help it avoid the academic setbacks experienced by the students in the first semester, which are quite critical these days.

The second recommendation relates to better utilization of *peer-to-peer support*. The observation of the learning process exhibited by the students showed that they transfer knowledge most effectively through horizontal dynamics. Informant B noted that students

learn much better to talk to themselves and work it out themselves than to learn as instructed from the top down. This would mean that any digital resource or tool presented to them must be explainable by them to each other, given their culture of good collaboration in learning is a strategic asset to be used as an asset, but not as a liability. This method is a factor that will identify and make use of the already existing social support systems among the student body.

#### 4.4 Key Findings: Summary of the Current State Analysis Results

This section summarizes the results of the current state analysis pointing to the main strengths and weaknesses in the current practices.

##### 4.4.1 Strengths and Weaknesses of Current Practices of Assessing the Digital Skills

One of the main *strengths* is the dedication and consciousness of the personnel to help students in (a) *addressing the initial digital skills gaps* and (b) *further developing* the digital skills. The academic and administrative staff became aware of the digital skill gaps among the Nepalese student group and feel motivated to assist. Their observations are detailed, and they are a significant source of evidence for this thesis.

The second strength is that the students have *a strong peer-to-peer culture of learning*. The students can often be more helpful than the teacher, according to Informant B, who also mentioned that students in getting a message through to each other, and can often teach others how to use e.g. the computer. Such a collaborative interaction is also a good asset that can be used to supplement formal assessment and training programs.

Third, MBS already has the technological base to conduct a more systemic evaluation. Online platforms like Moodle have built-in analytics of learning and can be used to track engagement and performance by the use of existing tools that are not being fully harnessed currently.

The first *weakness* is that the current practice *lacks a systematic approach to assessment*. Also, the existing assessment practices are not formalized. They are based on ad-hoc observations, informal reflections, and crisis workaround communication, and there is no e.g. a standardized survey or longitudinal monitoring.

Second, the gaps in digital skills are not identified early enough (i.e. until they have manifested in the academic processes, i.e., the inability to finish the enrolment, or the inability to arrive at an online meeting on time, or create a presentation).

Lastly, there is an apparent disconnect between the daily student digital practices and the institutional demands. On the one hand, students are used to the informational mobile-based applications like WhatsApp. On the other hand, the education institution prepares them for professional life, via the use of crucial professional tools, as well as formal forms of communication. This misconception that exists between the goals of the institutions and down-to-earth daily practices of the students' needs better communication, so that it can be addressed. In other words, students need to be explained that the work life expects them to perform on a much higher level with the digital skills, that they currently have, in order to be ready for employment.

Table 10 below provides a summary of these strengths and weaknesses.

Table 10. Summary of Strengths and Weaknesses in Current Digital Skills Assessment Practices at MBS.

STRENGTHS	WEAKNESSES
1. dedication and consciousness of the personnel to help students in (a) <i>addressing the initial digital skills gaps</i> and (b) further developing the digital skills	1. the current practice <i>lacks a systematic approach to assessment</i>
2. students have a <i>strong peer-to-peer culture of learning</i>	2. gaps in digital skills are not identified early enough
3. MBS already has the technological base to conduct a more systemic evaluation	3. disconnect between the daily student digital practices (existing skills) vs. the institutional expectations/professional world (e.g. WhatsApp vs. Emails)

#### 4.4.2 Key Identified Most Needed Skills & Needs (Development areas) in Assessment of Digital Skills

The findings synthesis leads to the identification of three interrelated needs, defining the basic development priorities of this thesis. These dimensions directly point to the need for developing a Digital Skills Barometer (a tool /survey).

First, the identified gap is *the lack of an assessment tool*. The current assessment practices are scattered and they affect both students and staff. The importance of an assessment tool is seen through informant A, focusing on the fact that a survey had to be conducted before the beginning of his/her studies. The Digital Skills Barometer can be a response to this need.

Second, the study establishes a gap in present digital skills and expectations. E.g. lack of hardware skills (i.e. basic PC knowledge) and tools and platform competence in the Z-drive and Moodle, influence e.g. digital content creation. These skills need to be prioritized for assessment and development in the Barometer to ensure that they are in line with the academic requirements.

Third, the results show that there is a need to have more formalized methods of assessment. Accuracy and consistency are restricted when based on informal observation, hence the proposal need to employ more than just the use of self-assessment methods.

In this regard, the Proposal building will be narrowed down to these practical needs, to evaluate basic digital skills and offer the solution.

## 5. Building Initial Proposal for the Digital Barometer Tool

This section merges the results of the current state analysis and the conceptual framework and develops the Initial proposal with the help of internal co-creation (Data 2).

### 5.1 Overview of the Proposal Building Stage

This section presents the steps in the Proposal building for this study. For gathering Data 2, the data was collected from 3 participants who were part of development of the Initial proposal. The goal was to gather input and generate ideas and suggestions that could be applied in building the initial proposal. The field notes captured these session, on how expectations can be met when developing the tool.

The proposal building was conducted in 3 steps. First, a draft of the proposal was co-developed in a series of decisions with Participant 1. Second, two other stakeholders were involved in revising the proposal tool. Third, the tool was finalized (before testing it in the next stage, Section 6). The Initial proposal of the tools is presented at the end of this Section 5.

### 5.2 Findings from Data 2 (pulling together CSA, CF and Data 2)

This section describes the contributions of key stakeholders (Data 2) and merges them with the results of the CSA and the CF. The CSA detected the essential weak points in platform navigation, basic mastery of software and the needed support. The CF, together with the DigComp 2.2 framework, offered a conceptual framework upon which the evaluation of digital competence could be conducted.

Stakeholders were then requested to make suggestions (Data 2) on how these weaknesses could be resolved by the use of a practical assessment tool. Their recommendations were based on the early identification of the problems, on translating the abstract areas of competencies into measurable points in the survey, and on the possibility of making the outcomes of the assessment outcome to be the source of support by the institution. Table 13 below shows the inputs for the proposal.

Table 11. Key stakeholder suggestions (findings of Data 2) for Proposal building in relation to findings from the CSA (Data 1) and the Conceptual framework.

<i>Inputs from literature (CF)</i>	<i>Suggestions from stakeholders from CSA (Data 1) summary (from Data 1)</i>	<i>Suggestions from stakeholders from the Proposal building (Data 2)</i>												
<p><b>Area 1 (5 elements)</b></p> <table border="1" data-bbox="336 566 683 1128"> <thead> <tr> <th colspan="2" data-bbox="336 566 683 591">5 Core competence areas (DigComp 2.2, 2022)</th> </tr> </thead> <tbody> <tr> <td data-bbox="336 595 443 703">1. Information and Data Literacy</td> <td data-bbox="443 595 683 703">The capacity to identify, access, analyze, and deal with digital information and data critically. Includes evaluation of source credibility, analyzing datasets, and providing the evidence in scholarly or professional format. Students will be able to prove the ability to search, organize, and use digital information responsibly (Curlakova, 2024).</td> </tr> <tr> <td data-bbox="336 707 443 801">2. Communication and Collaboration</td> <td data-bbox="443 707 683 801">Skills to communicate, cooperate, and interact in the digital world. Discusses electronic communication, sharing of information, electronic collaboration, and respecting online etiquette and codes of ethics. Students are able to be digitally responsible, collaborate as a team, and be responsible online.</td> </tr> <tr> <td data-bbox="336 806 443 913">3. Digital Content Creation</td> <td data-bbox="443 806 683 913">The skill to format, develop, and handle electronic content of different types (text, images, audio, video, code). Incorporates creation of correct, innovative, and context-specific resources without violation of copyright and licensing regulations. Students can combine knowledge and create relevant digital products.</td> </tr> <tr> <td data-bbox="336 918 443 1012">4. Safety</td> <td data-bbox="443 918 683 1012">Scanning and implementing measures to safeguard personal information, online identity, gadgets, and health. Reports on cybersecurity, privacy on the internet, and fair usage of electronic materials. Upon ethical standards, students will be able to protect themselves and others in online settings.</td> </tr> <tr> <td data-bbox="336 1016 443 1124">5. Problem-Solving</td> <td data-bbox="443 1016 683 1124">The skill of recognizing the digital needs and challenges and using digital tools to address the problems or be innovative. Incorporates problem-solving, doing problem-solving in an inventive manner, and providing an evaluation of solutions. Young learners can use digital skills to accomplish learning, research, and work assignments (VUORIKARI, 2022).</td> </tr> </tbody> </table>	5 Core competence areas (DigComp 2.2, 2022)		1. Information and Data Literacy	The capacity to identify, access, analyze, and deal with digital information and data critically. Includes evaluation of source credibility, analyzing datasets, and providing the evidence in scholarly or professional format. Students will be able to prove the ability to search, organize, and use digital information responsibly (Curlakova, 2024).	2. Communication and Collaboration	Skills to communicate, cooperate, and interact in the digital world. Discusses electronic communication, sharing of information, electronic collaboration, and respecting online etiquette and codes of ethics. Students are able to be digitally responsible, collaborate as a team, and be responsible online.	3. Digital Content Creation	The skill to format, develop, and handle electronic content of different types (text, images, audio, video, code). Incorporates creation of correct, innovative, and context-specific resources without violation of copyright and licensing regulations. Students can combine knowledge and create relevant digital products.	4. Safety	Scanning and implementing measures to safeguard personal information, online identity, gadgets, and health. Reports on cybersecurity, privacy on the internet, and fair usage of electronic materials. Upon ethical standards, students will be able to protect themselves and others in online settings.	5. Problem-Solving	The skill of recognizing the digital needs and challenges and using digital tools to address the problems or be innovative. Incorporates problem-solving, doing problem-solving in an inventive manner, and providing an evaluation of solutions. Young learners can use digital skills to accomplish learning, research, and work assignments (VUORIKARI, 2022).	<p><b>Area 1:</b></p> <p><b>Information and Data Literacy</b></p> <p>Struggle with “understanding what they need to do” and “reading the information”</p>	<p>Informant A suggested adding question like, “How do you understand written digital instructions and use academic information in formal systems?” as students misinterpret instructions and struggle to apply information in formal systems.</p>
5 Core competence areas (DigComp 2.2, 2022)														
1. Information and Data Literacy	The capacity to identify, access, analyze, and deal with digital information and data critically. Includes evaluation of source credibility, analyzing datasets, and providing the evidence in scholarly or professional format. Students will be able to prove the ability to search, organize, and use digital information responsibly (Curlakova, 2024).													
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	<p><b>Area 2:</b></p> <p><b>Communication and Collaboration</b></p> <p>Heavy reliance on WhatsApp instead of formal platforms.</p>	<p>Informant A and informant B suggested assessing academic email writing and collaboration using formal digital tools.</p>												
	<p><b>Area 3:</b></p> <p><b>Digital Content Creation</b></p> <p>Reliance on “basic templates” in presentations. Student struggle with properly formatted academic content.</p>	<p>Informant A and B suggested assessing students about basic-content creation, because some students use these tools for the first time and struggle with required coursework tasks.</p>												
	<p><b>Area 4:</b></p> <p><b>Safety</b></p> <p>Digital safety knowledge is limited to “condor and passwords,” with</p>	<p>Informant A and B suggested to assess understanding of AI use, because students show unclear awareness of academic integrity and acceptable digital practices.</p>												
	<p><b>Area 5:</b></p> <p><b>Problem-Solving</b></p>	<p>Informant A and B suggested to assess how students deal with basic technical problems and unfamiliar digital tools.</p>												

	<p>Additional area 6:</p> <p><i>Gaps in learning platforms navigation and the need to assess basic hardware understanding and readiness to use e.g. a PC</i></p>	<p>Informant A highlighted that many Nepalese students struggle to understand OMA during the first weeks of study. Informant A recommended adding question “<i>Where did you first hear about OMA?</i>” to identify whether students rely on formal institutional onboarding or informal peer networks. This operationalizes DigComp Area 1 by assessing how students access and locate essential institutional information.</p> <p>Informant A further suggested including the item “Is your laptop fully charged or functions well?” based on repeated classroom observations where students brought unusable devices. This moves assessment beyond device ownership to functional access, a prerequisite for effective participation in digital learning environments.</p>										
	<p>Additional area 7:</p> <p><i>Digital culture</i></p>	<p>Informant A proposed drawing attention to the digital culture, after noting marked differences in students’ email language. This item extends the DigComp Area 2: Communication &amp; Collaboration and enables differentiation between communication skills and knowledge of basic digital communication etiquette.</p>										
<p>Area 2</p> <table border="1" data-bbox="336 1160 667 1518"> <caption>Methods to measure digital skills in HE</caption> <tr> <td>1. Self-assessment instruments</td> <td>These assessments allow students to rate their own digital skills through Likert-scale surveys, making them scalable and cost reasonable for everyone (Ugrasari et al., 2022). However, these methods provided insufficient accuracy, with studies reporting discrepancies of 20-30% between self-assessed and objectively measured competencies, among the students with lower actual skills level who tend toward overestimation (Jain, 2001).</td> </tr> <tr> <td>2. Performance-based assessments</td> <td>These assessment require student to demonstrate their digital skills through practical tasks such as reviewing online information sources, making digital presentations and managing digital communication (Fallon et al., 2019).</td> </tr> <tr> <td>3. Domain-specific digital skill assessments</td> <td>These assessments require students to demonstrate their digital skills in areas like data analysis, digital marketing, virtual collaboration, and business intelligence tools. (Ma et al., 2024)</td> </tr> <tr> <td>4. Behavioral data analysis</td> <td>This method is carried out through the prediction of the digital competency of the level of student engagement with digital learning sources (Chousta et al., 2024).</td> </tr> <tr> <td>5. Other quantitative and qualitative data collections</td> <td>This method is carried out through surveys with practical assessments, interviews, or analysis of the digital artifacts produced by students (Sifat, L.-H. et al. (2024)</td> </tr> </table>	1. Self-assessment instruments	These assessments allow students to rate their own digital skills through Likert-scale surveys, making them scalable and cost reasonable for everyone (Ugrasari et al., 2022). However, these methods provided insufficient accuracy, with studies reporting discrepancies of 20-30% between self-assessed and objectively measured competencies, among the students with lower actual skills level who tend toward overestimation (Jain, 2001).	2. Performance-based assessments	These assessment require student to demonstrate their digital skills through practical tasks such as reviewing online information sources, making digital presentations and managing digital communication (Fallon et al., 2019).	3. Domain-specific digital skill assessments	These assessments require students to demonstrate their digital skills in areas like data analysis, digital marketing, virtual collaboration, and business intelligence tools. (Ma et al., 2024)	4. Behavioral data analysis	This method is carried out through the prediction of the digital competency of the level of student engagement with digital learning sources (Chousta et al., 2024).	5. Other quantitative and qualitative data collections	This method is carried out through surveys with practical assessments, interviews, or analysis of the digital artifacts produced by students (Sifat, L.-H. et al. (2024)	<p>Methods to measure, and</p> <p>Lack of systematic assessment of basic digital skills</p>	<p>Two methods were especially stressed as good means of measuring: self-assessment and portfolio-based; the domain specific measuring methods were considered as rather belonging to specific courses.</p> <p>Informant A also recommended assessing Excel competencies to capture a critical, high-impact skill gap relevant to business studies and aligned with DigComp’s applied problem-solving dimension.</p>
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As seen from Table 11, stakeholder contributions helped to transform theoretical constructs into context-specific survey items, to make sure that the Digital Skills Barometer will elicit the expected information. Based on these inputs, the Proposal was pulled together in the next step.

### 5.3 Initial Proposal (“Digital Barometer”)

The proposal embraces the five areas of competencies of the DigComp 2.2 model as its five survey sections, namely: Section 1, Information and Data Literacy, Section 2, Communication and Collaboration, Section 3, Digital Content Creation, Section 4, Safety, and Section 5, Problem-Solving. In addition, internal stakeholders strongly suggested to separately inquire about: Section 6, Hardware skills, and Section 7, Digital Culture. This extension directly responds to the CSA findings that the case organization experiences specific challenges in these two areas that were not anyhow touched in the DigComp framework.

The survey will use a response scale of ten points, choose-based answers to facilitate responses, and will only quantitative analysis (since the number of response is fewer than 30, which makes statistical analysis pointless). Each element of the seven survey sections is presented separately below.

#### 5.3.1 Section A of the Initial Proposal: Information and Data Literacy

This first section represents simple questions related to the basic use of equipment. These questions relate to several areas, namely those stressed by the key stakeholders in Data 1 (hardware basic skills & navigation of platform).

Table 12. Questions for Section A for the Initial Proposal building.

#### **Section A: Digital Foundation & Access**

1. What device do you mainly use for your studies at MBS?
2. How confident are you using a laptop or desktop for tasks like writing reports, managing files, or installing software?
3. How easy is it for you to find important information on MBS platforms such as OMA, the intranet, or the student portal?

4. When you first started, how did you learn to use platforms like Moodle or the Z-drive?

### 5.3.2 Section B of the Initial Proposal: Information and Data Literacy

This section was inspired by DigCom, Area 1. An example of what is discussed in this section is presented below:

*“In the area of Information and data literacy, three descriptors are included: • Browsing, searching and filtering data, information and digital content; • Evaluating data, information and digital content; • Managing data, information and digital content.” (DigCom 2024, p.78)*

In addition to the DigComp framework questions, this section also adjusted the suggestions by stakeholders based on Data 2. The questions now ask about the onboarding experiences, basic awareness of the use of Excel, and continue asking about navigating the platform (here, Moodle).

Table 13. Questions for Section 1 for the Initial Proposal building.

**Information & Data Literacy**

5. How confident are you in finding, downloading, and organizing course materials like lecture notes or assignments from Moodle?
6. How often do you check whether online sources are credible and relevant before using them in your assignments?
7. How confident are you in using basic Excel functions, such as sorting data, filtering lists, or creating charts, for your coursework?

### 5.3.3 Section 2 of the Initial Proposal: Communication and Collaboration

This section was inspired by DigCom, Area 2. An example of what is discussed in this section is presented below:

*“In the area of Communication and collaboration, six descriptors are included: • Interacting through digital technologies; • Sharing through digital technologies; • Engaging citizenship through digital technologies; • Collaborating through digital technologies; • Netiquette; • Managing digital identity.” (DigCom 2024, p.80)*

Table 14. Questions for Section 1 for the Initial Proposal building.

**Communication & Collaboration**

8. How confident are you in using Zoom or Teams for online classes and group meetings, including features like screen sharing, breakout rooms, or chat?
9. How comfortable are you collaborating on documents with tools like Google Docs or Microsoft 365, including giving feedback, co-editing, and managing versions?

In addition, this section was extended to ask the questions that were of particular interest to the key stakeholders, namely about digital culture. So, that student knows the correct medium in using online platforms like Zoom or Teams.

Table 15. Questions for Section 3 for the Initial Proposal building.

**Digital Culture in Communication**

10. How confident are you in writing a formal, clear email to a professor, staff member, or business contact?
11. How regularly do you check your official MBS email for announcements, deadlines, and important communication?
12. What do you see as the main differences between communicating with friends and communicating for academic or professional purposes?

In addition, this section was extended to ask the questions about the digital culture for students to know the correct etiquette to communicate with teachers, and students also learn to communicate in a mannered way for professional purpose.

#### 5.3.4 Section 3 of the Initial Proposal: Digital Content Creation

These questions were inspired by DigCom, Area 3:

*“In the area of Digital content creation, four descriptors are included: Developing digital content; Integrating and re-elaborating digital content; Copyright and licences; Programming.” (DigCom 2024, p.81)*

In addition, this section was extended to ask the questions about digital content creation for students to be able to meet the expectations and instructions of the assignments, reports, etc. in the coursework.

Table 16. Questions for Section 4 for the Initial Proposal building.

<b>Digital Content Creation</b>
8. How confident are you in creating clear and well-designed presentations using PowerPoint, Google Slides, or similar tools?
9. How comfortable are you formatting longer documents like reports or theses, including creating a table of contents, headings, page numbers, and consistent styles?
10. How often do you create or modify visuals such as charts, graphs, or simple edited images to include in your assignments?

### 5.3.5 Section 4 of the Initial Proposal: Safety

These questions were inspired by DigCom, Area 4:

*In the area of Safety, four descriptors are included: Protecting devices; Protecting personal data and privacy; Protecting health and well-being; Protecting the environment.” (DigCom 2024, p.81)*

In this section, the question was extended to ask about the safety for students such as phishing or suspicious emails. Students learn to be safe and maintain their privacy for academic purpose.

Table 17. Questions for Section 4 for the Initial Proposal building.

<b>Safety</b>
16. How often do you use unique, strong passwords for your MBS accounts compared to personal accounts?
17. How confident are you in recognizing suspicious emails or phishing attempts?
18. What steps do you take to protect your privacy and security when sharing files or working on group projects online?

### 5.3.6 Section 5 of the Initial Proposal: Problem-Solving

In this section, the question was created to ask about how much ability they have to solve the problems regarding the deadline, learn new digital tools for coursework and be creative to complete the assignments or reports.

*“In the area of Problem solving, four descriptors are included: Solving technical problems; Identifying needs and technological responses; Creatively using digital technology; Identifying digital competence gaps.” (DigCom 2024, p.82)*

Table 18. Questions for Section 5 for the Initial Proposal building.

**Problem-Solving**

19. If a key tool like Moodle or Zoom stops working just before a deadline, what steps do you take to solve the problem?
20. When you need to learn a new digital tool or software for a course, how do you usually go about it?
21. Can you describe a time when you used a digital tool in a creative or unexpected way to complete an assignment or solve a problem?

5.3.7 Section 6 of the Initial Proposal: Basic Hardware Skills

This section was suggested by stakeholders especially to recognize the students’ basic hardware understanding, so that they are able to use e.g. a PC right from the beginning of their studies.

Table 19. Questions for Section 6 for the Initial Proposal building.

**Hardware and platform competence**

22. How confident are you in troubleshooting common hardware and device issues (eg. connectivity problems, unresponsive devices, device set up)?

5.3.8 Section 7 of the Initial Proposal: Additional

This section asks for identifying the gaps in digital skills and detecting any areas for future support, as well as asks for a meaningful approach, from the student perspective, for digital skills development.

Table 20. Questions for Section 7 for the Initial Proposal building.

**Section C: Reflection and Support**

23. Looking at all the areas we discussed, which digital skill or task do you feel least confident about in your studies?

24. What has been the most helpful way for you to improve your digital skills since starting your studies?

25. If the school offered additional support, what kind of workshop, guide, or resource would be most useful for you?

The Initial proposal for “Digital Barometer” consists of seven sections and 25 questions and is presented below.

### 5.3.9 Summary of the Initial Proposal

Table 21. Initial proposal: “Digital Barometer”.

**DIGITAL SKILLS BAROMETER 2025**

Dear Bachelor's students, please fill in this questionnaire about your digital skills and related needs. It is fully anonymous and is intended to better understand the needs and provide support related to developing your Digital skills.

Thank you for your participation! Looking forward, Research team.

**Introductory question: Are you a Bachelor's student (Nepalese group)?**

Please, here and further on, indicate your response by choosing one of the answers:

Yes  
 No  
 Other response  
 Option 4  
 Other: .....

---

**Section 1.**  
Description (optional)

**1. What device do you mainly use for your studies at MBS?**

Please, here and further on, indicate your response by choosing one of the answers:

a PC, personal computer  
 a Mobile phone  
 a Laptop  
 Other: .....

**2. How confident are you using a PC (personal computer) for tasks such as writing reports, managing files, or installing software?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

**3. How easy is it for you to find important information on MBS platforms such as OMA (intranet) or TUUDO (the student portal)?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

**4. When you first started your studies, how did you learn to use platforms like Moodle or the Z-drive?**

Long answer text  
 .....

---

**Section 2.**  
Description (optional)

**5. How confident are you in finding, downloading, and organizing course materials like lecture notes or assignments from Moodle?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

**6. How confident are you in using basic Excel functions, such as sorting data, filtering lists, or creating charts, for your coursework?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

---

**7. How often do you check whether online sources are credible and relevant before using them in your assignments?**

Please, here and further on, indicate your response by choosing one of the answers:

Never  
 Seldom  
 Sometimes  
 Often  
 Always  
 Other: .....

---

**8. How confident are you in using Zoom or Teams for online classes and group meetings, including features like screen sharing, breakout rooms, or chat?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

**9. How confident are you working with documents/groupware tools like Google Docs or Microsoft 365, including storing/finding, sharing, co-editing and managing versions?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

---

**Section 4.**  
Description (optional)

**10. How confident are you in writing a formal, clear email to a teacher, staff member, or business contact?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

**11. How regularly do you check your official Metropolia's email for announcements, deadlines, and important communication?**

Please, here and further on, indicate your response by choosing one of the answers:

From time to time  
 Regularly  
 Weekly  
 Every couple of days  
 Daily  
 Instantly  
 I have my Metropolia's emails re-directed to my personal email  
 Other: .....

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**Section 5.**  
Description (optional)

**12. What do you see as the main differences between communicating with friends and communicating for academic or professional purposes?**

Long answer text  
 .....

---

**Section 6.**  
Description (optional)

**13. How confident are you in creating structured and well-designed presentations using PowerPoint, Google Slides, or similar tools?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

**14. How confident are you with MS Word and formatting documents like reports, assignments or a theses, including creating a table of contents, headings, page numbers, and managing style?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

---

**Section 6.**  
Description (optional)

**15. How confident are you in creating or modifying visuals in Excel such as charts, graphs, or tables to include in your assignments?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

---

**Section 7.**  
Description (optional)

**16. How often do you use unique, strong passwords for your MBS accounts compared to personal accounts?**

Please, here and further on, indicate your response by choosing one of the answers:

Never  
 Seldom  
 Sometimes  
 Often  
 Always  
 Other: .....

**17. How confident are you in recognizing suspicious attempts to contact you online or phishing attempts?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

**18. How confident are you in troubleshooting common hardware and device issues (eg. connectivity problems, unresponsive devices, device set up)?**

0 1 2 3 4 5 6 7 8 9 10  
 fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

**19. When you need to learn a new digital tool or software for a course, how do you usually go about it?**

Long answer text  
 .....

---

**Section 7.**  
Description (optional)

**20. Looking at all the areas above, which digital skills or tasks do you feel least and most confident about in your studies. WHERE LEAST?**

Long answer text  
 .....

**21. Looking at all the areas above, which digital skills or tasks do you feel least and most confident about in your studies. WHERE MOST?**

Long answer text  
 .....

**22. What were the most painful areas for you in terms of digital skills or tools, since you have started your studies at Metropolia Business School? MOST PAINFUL.**

Long answer text  
 .....

**23. What were the most helpful ways for you to boost your digital skills or use digital tools, since you have started your studies in Metropolia Business School? MOST USEFUL.**

Long answer text  
 .....

**24. If Metropolia Business School offered additional support, what kind of help would be most meaningful for you?**

Please, here and further on, indicate your response by choosing one of the answers:

Workshops in groups  
 Self-guidance (in Metropolia's wiki-pages / tietohallinto.fi)  
 Pre-study guidance (before the start of the studies)  
 Online (virtual, non-stop, automated) courses in specific skills  
 1-to-1 guidance by student tutors  
 Other: .....

Please add any COMMENTS how to help you improve digital skills

Long answer text  
 .....

**25. Finally, please give your feedback to this survey (the survey organizes will appreciate your feedback).**

Long answer text  
 .....

**THANK YOU** for your responses!  
 We will follow up on your advice.

The Digital Skills Barometer is proposed as a tool to recognize the level of digital skills and assist the underground business students at MBS. In the next step, the proposal is refined further based on a small-scale test and feedback from the stakeholders, as discussed in Section 6.

## **6. Validation of the Proposal**

This section reports on the results of the validation stage and points to further refinements suggested to the Tool. At the end of this section, the Final proposal and recommendations for its implementation are presented.

### **6.1 Overview of the Validation Stage**

This section reports on the validation results of the proposal developed in Section 5. Here, validation refers to a small-scale testing supported by expert judgement from 2 key stakeholders (Data 3).

Data 3 was collected in the validation phase, from a group of students who participated in a small-scale testing of the tool, developed in the previous stage. The results were gathered, analyzed and discussed with two key respondents. The aim of this round was to analyze the proposal, discuss its relevance to the needs of the case organization, and get the final feedback that will allow fine-tuning the suggested tool. Field notes were used to capture the validation inputs.

### **6.2 Results from the Small-Scale Test**

The results from a small-scale test with the business undergraduate students from the Nepalese group are presented below (13 responses out of 30 members in the group, making the response rate 43,3%).

Additionally, it is important to note that, at the moment of holding the survey, these students were already a 2<sup>nd</sup> year students (not “freshers” anymore, and their digital skills were significantly improved over 1,5 years of undergraduate studies. In this sense, the responses represent the current level of digital skills, not the initial levels (2<sup>nd</sup> year students).

#### **6.2.1 Section A**

Section A asked the following four questions:

Table 22. Questions for Section A (Initial Proposal).

**Section A: Digital Foundation & Access**

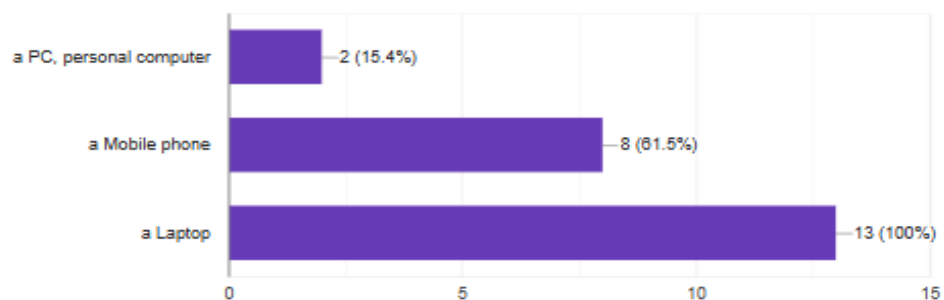
1. What device do you mainly use for your studies at MBS?
2. How confident are you using a laptop or desktop for tasks like writing reports, managing files, or installing software?
3. How easy is it for you to find important information on MBS platforms such as OMA, the intranet, or the student portal?
4. When you first started, how did you learn to use platforms like Moodle or the Z-drive?

Responses confirmed that, in their 2<sup>nd</sup> year of students, all of the students are using computers (100%), while the mobile phones were moved to the 2<sup>nd</sup> place (61,5%), see below. At the same time, Respondent D noted some ambiguity in the question and suggested to delete this part “a PC, personal computer” because it overlap with laptops. It’s obvious that for students PC and laptop may mean the same thing.

## 1. What device do you mainly use for your studies at MBS?

 Copy chart

13 responses



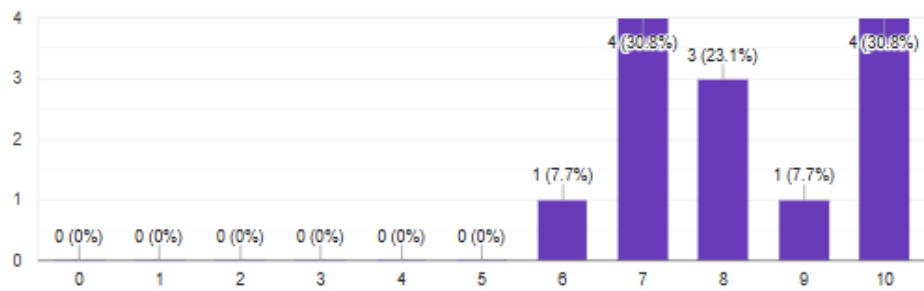
Next, in Question 2 below, only 30,8% of the responded feel quite confident in using the computer (they graded themselves as 10, and another 30,8% graded themselves as 7, on the 1-10 scale). In total, all the respondents showed confidence, albeit in the range from 6 to 10, with the majority in 7-10 part of the scale (i.e. quite strong confidence); see below.

In Question 3 below, the same levels of confidence were shown in the use of main learning and communication platforms, OMA and TUUDO (with the majority grading themselves 7-10, and 38,5% graded themselves as 10, on the scale 1-10).

2. How confident are you using a PC (personal computer) for tasks such as writing reports, managing files, or installing software?

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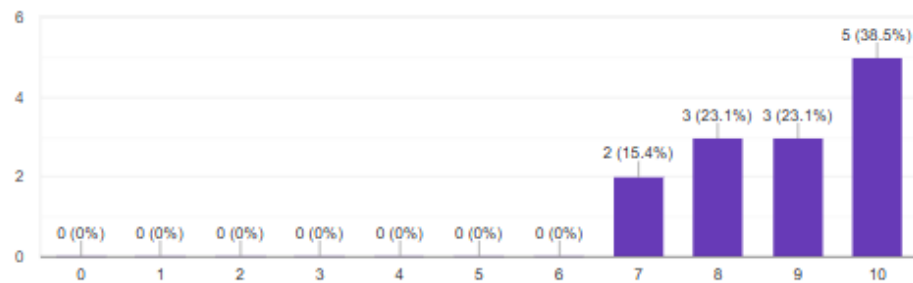
13 responses



3. How easy is it for you to find important information on MBS platforms such as OMA (intranet) or TUUDO (the student portal)?

[Copy chart](#)

13 responses



In Question 4, the responses how the students learnt Moodle and other utilities are shown below. As observed earlier by some of the stakeholders (Data 1), a significant part of the answers points to the students learning from each other:

4. When you first started your studies, how did you learn to use platforms like Moodle or the Z-drive?

13 responses

- It was normal
- Frequently
- From study councillor
- teacher's guide
- As instructed by the lecturer
- Reading instruction
- Through instructions from teachers and trial and error. I don't know what Z - drive is though.
- from friend and teachers
- With the help of friends and lecturers.

## 6.2.2 Section 1: Information and Data Literacy

Section 1 asked the following three questions:

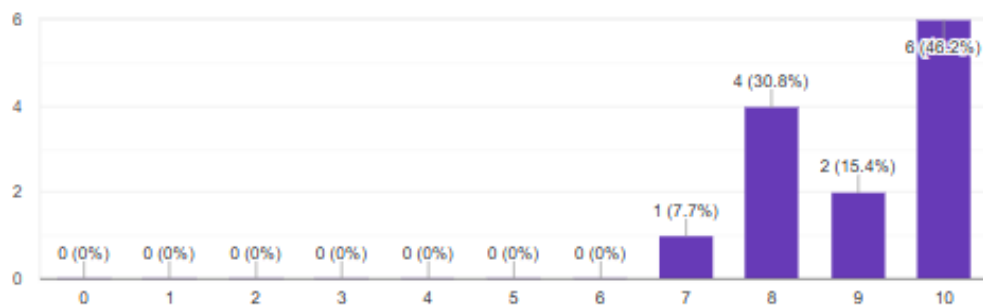
Table 23. Questions for Section 1 for the Initial Proposal building.

<b>Information &amp; Data Literacy</b>	
5.	How confident are you in finding, downloading, and organizing course materials like lecture notes or assignments from Moodle?
6.	How often do you check whether online sources are credible and relevant before using them in your assignments?
7.	How confident are you in using basic spreadsheet functions, such as sorting data, filtering lists, or creating charts, for your coursework?

In Question 5, the responses show that less than half of respondents (46,2%) feel totally confident in using e.g. Moodle for handling the course materials. Although all of them graded themselves between 7-10 (relatively strong confidence).

5. How confident are you in finding, downloading, and organizing course materials like lecture notes or assignments from Moodle? [Copy chart](#)

13 responses

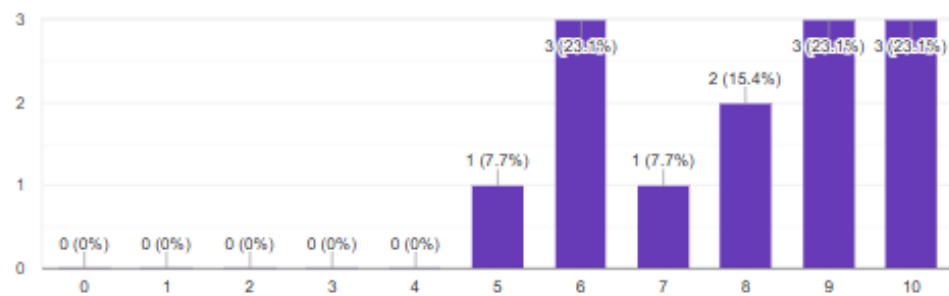


In Question 6, students show less confidence in using Excel (which is quite a complicated tool). Respondent D believes that these questions contain a lot of useful information for the IT tools course instructors, because most of the employer`s companies expect a confident use of Excel. AT the same time Respondent D notes that this Question 6 regarding Excel needs to be located together with the other question related to specific tool. At this moment, some questions should be grouped better, because they are placed in the wrong place and thus get repetitive (for e.g. regarding Excel).

6. How confident are you in using basic Excel functions, such as sorting data, filtering lists, or creating charts, for your coursework?

[Copy chart](#)

13 responses

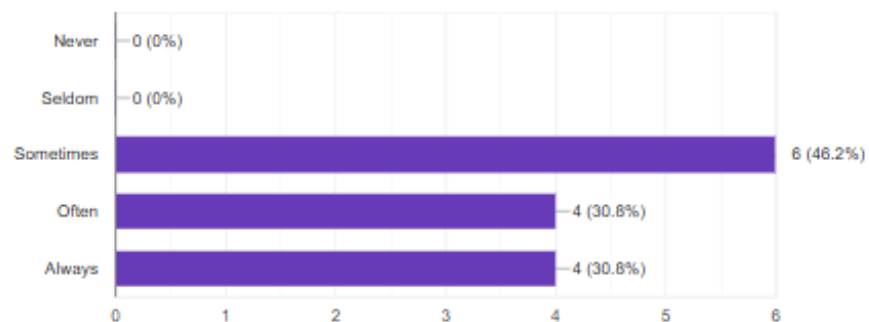


In Question 7, respondents show not very strong levels of security skills. Additionally, in the validation session, Respondent D commented that these questions probably need to be grouped with security questions.

7. How often do you check whether online sources are credible and relevant before using them in your assignments?

[Copy chart](#)

13 responses

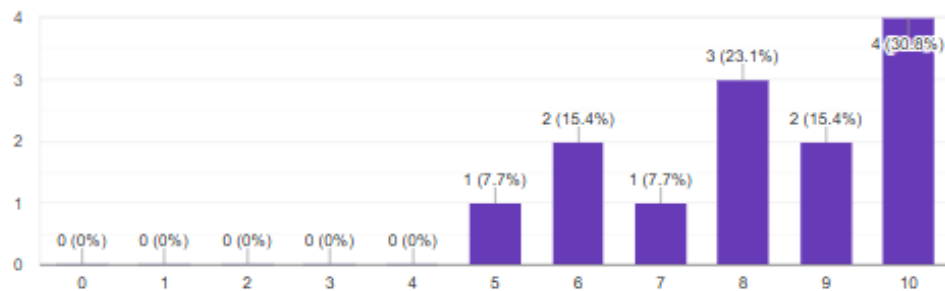


### 6.2.3 Section 2: Communication and Collaboration

In Question 8, respondents show less confidence levels in using groupware (spreading over 5-10 grades). Additionally, in the validation session, Respondent D commented that this question contains important information for the "IT Tools" instructor.

8. How confident are you in using Zoom or Teams for online classes and group meetings, including features like screen sharing, breakout rooms, or chat? [Copy chart](#)

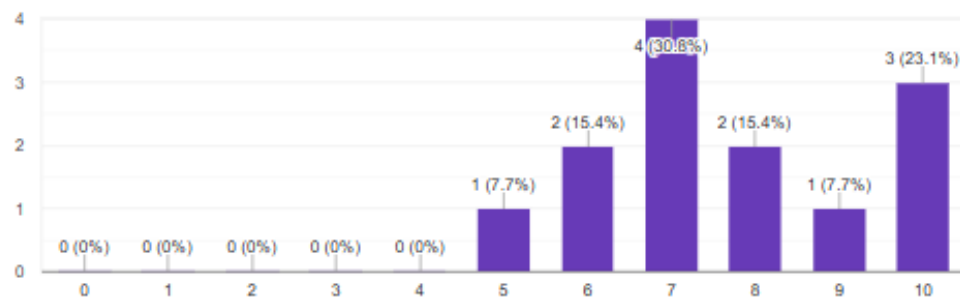
13 responses



In Question 9, responses show the same pattern as in Question 8, these responses shows less confidence levels in Cloud based tools like MS Office 365 and Google Doc groupware (spreading over 5-10 grades).

9. How confident are you working with documents/groupware tools like Google Docs or Microsoft 365, including storing/finding, sharing, co-editing and managing versions? [Copy chart](#)

13 responses

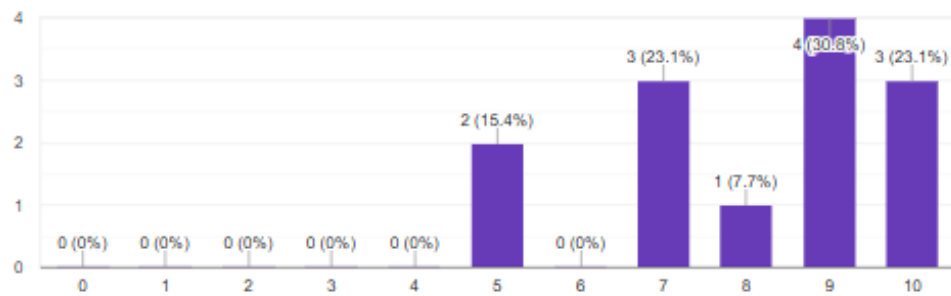


In Question 10, the responses showed lower levels of confidence on how to write an email, which confirms the perception of the faculty members. This area presents a challenge for the students.

10. How confident are you in writing a formal, clear email to a teacher, staff member, or business contact?

 Copy chart

13 responses

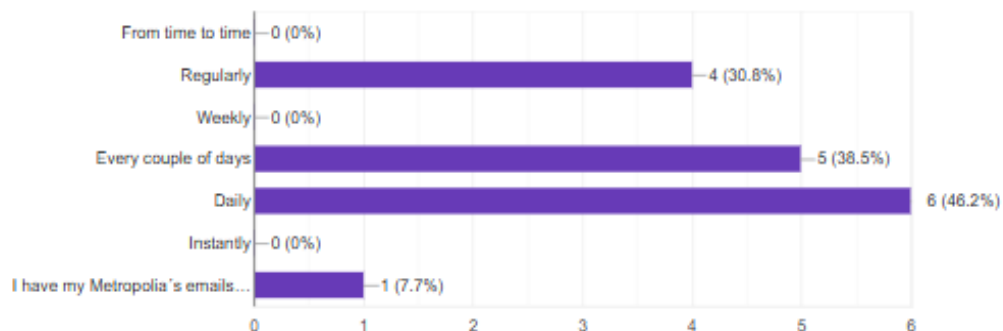


In Question 11, less than half of the of the respondents (46,2%) responded that they check emails daily. Another path (38,5%) checks them bidaily. Both represent taken together, they represent the majority of the students. Respondent D however believes this questions needs to be asked more clearly. E.g. a suggested response “regularly” can be misleading and should replace more clearly formulated options (everyday, every 2<sup>nd</sup> day, every 3<sup>rd</sup> day, every 4<sup>th</sup> day, every 5<sup>th</sup> day, etc.)

11. How regularly do you check your official Metropolia’s email for announcements, deadlines, and important communication?

 Copy chart

13 responses



In Question 12, Respondent D believe that the responses were not very informative. Respondent D believed that this question was aimed at raising awareness about the differences style between professionals and friends.

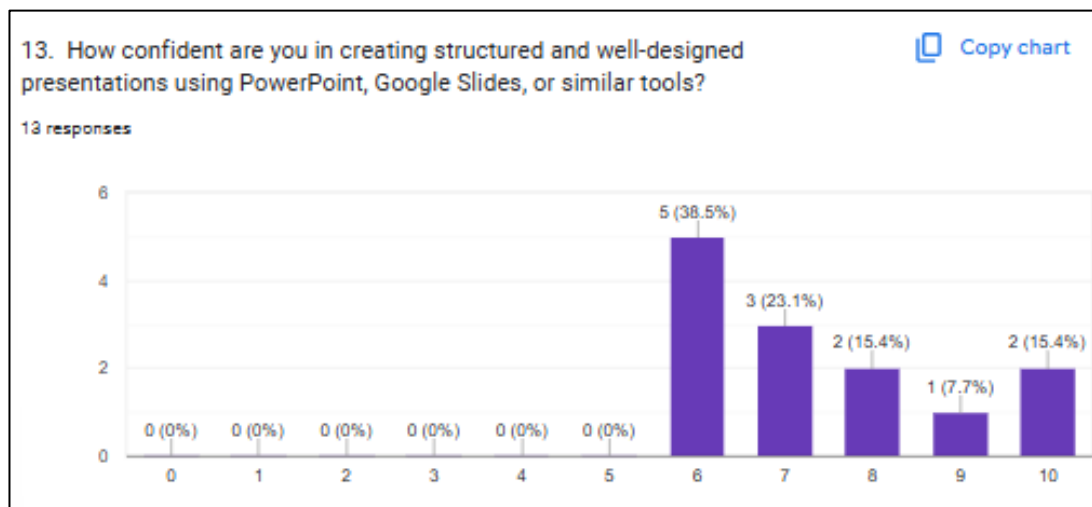
*“Yet, judging by responses it didn’t manage to reach the purpose, so this question could probably be dropped.” (Respondent D)*

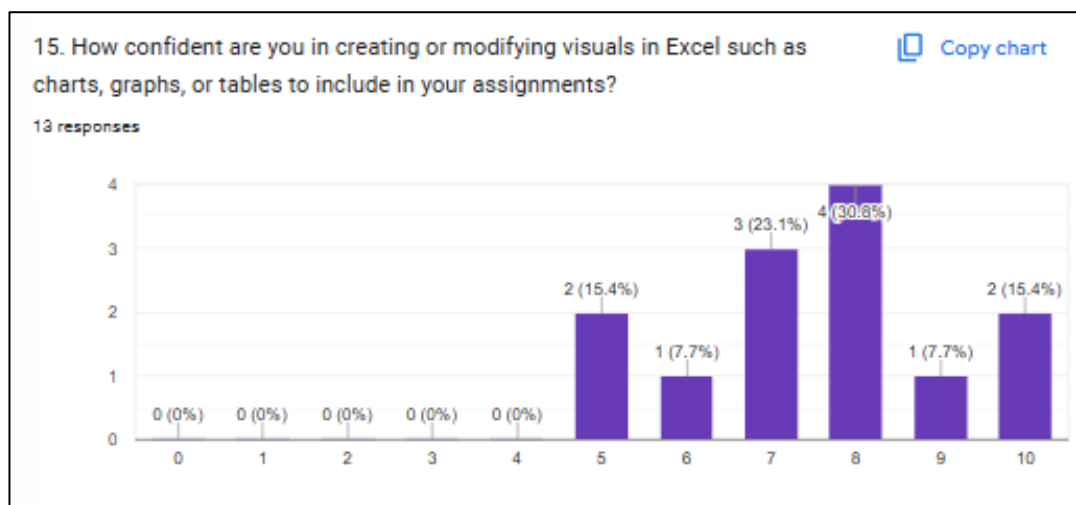
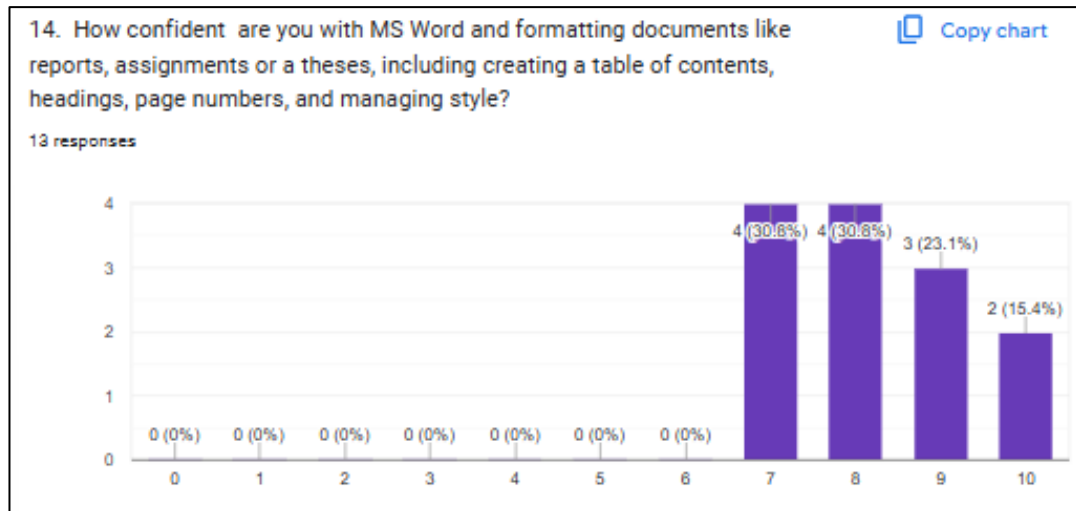
12. What do you see as the main differences between communicating with friends and communicating for academic or professional purposes?

10 responses

General culture
Mostly
It's totally different
Helpful
Usage of formal language. And mainly emails.
With friends we can be casual and since we all are from Nepal, it's easy to understand each other. Communicating for academic or professional purpose is professional which is a good thing because it gives us a hands on experience to integrate in work life.
sometimes it is difficult to coordinate with some professionals they didn't help us in solving our problem in this 3rd semester.
I am confident communicating with friends but for professional purpose, I am nervous.

*“These Questions 13-15 below were well formulated and clear, and the respondents were able to give clear answers, that provide good information about the level of skills in relation to these tools” (Respondent D)*





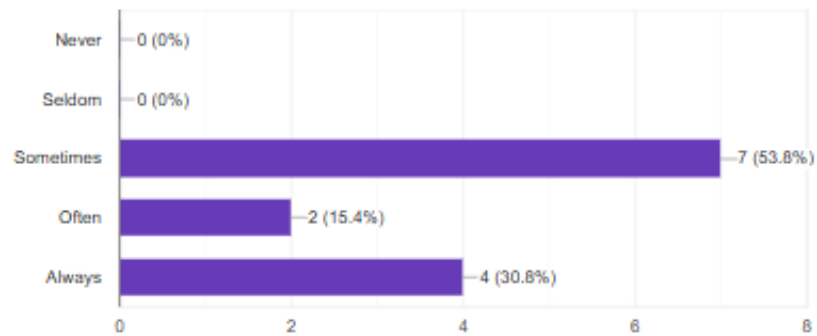
*“These Questions 16-17 below tell that Helpdesk need to be more involved”  
(Respondent D).*

This is because the responses look alarming in terms of digital security skills.

16. How often do you use unique, strong passwords for your MBS accounts compared to personal accounts?

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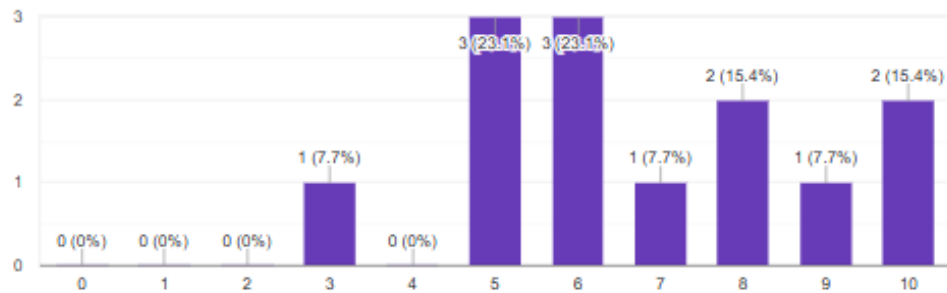
13 responses



17. How confident are you in recognizing suspicious attempts to contact you online or phishing attempts?

[Copy chart](#)

13 responses



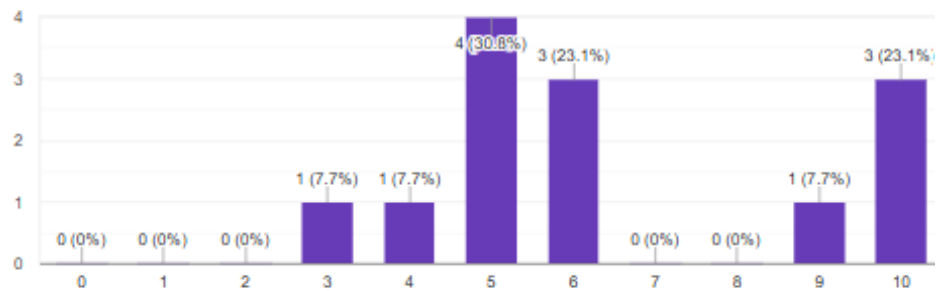
*“These Questions 18-19 below tell that Helpdesk need to be more involved” (Respondent D).*

They demonstrate the difficulties that the students have, and which are typically handled in the “Orientation” by the IT Helpdesks. Respondent D believes that the case organization should seek better cooperation with IT Helpdesks in tackling these needs.

18. How confident are you in troubleshooting common hardware and device issues (eg. connectivity problems, unresponsive devices, device set up)?

 Copy chart

13 responses



19. When you need to learn a new digital tool or software for a course, how do you usually go about it?

13 responses

Searching through the internet, tutorials

Research

I check How To videos on YouTube

im alqays ready to learn the new tools

Online courses, YouTube, friends and lecturers.

through the youtube

I will go through Google or chatgpt.

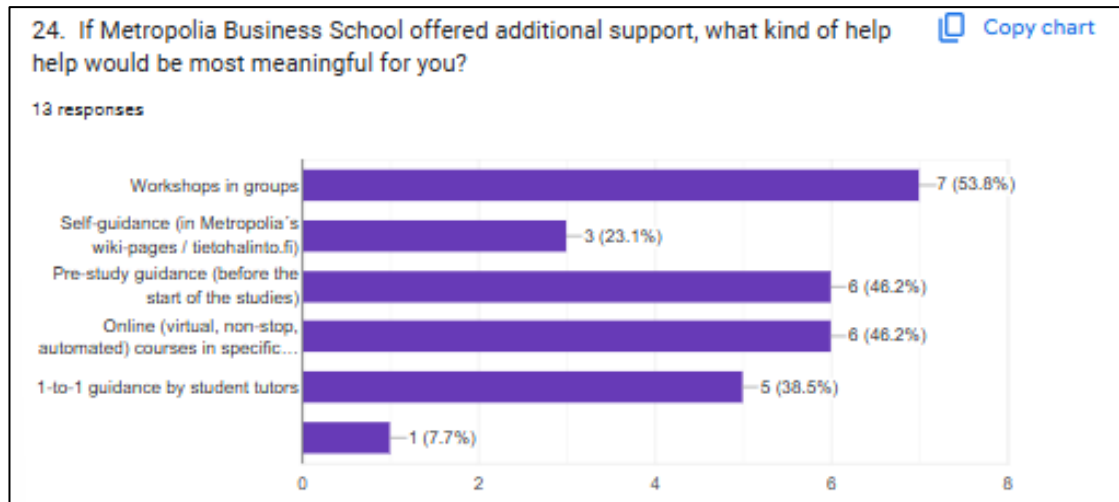
I learn new digital tools by watching tutorials, reading guides, and practicing.

I asked to my teacher first and do research in internet.

Next, Questions 20-23 were suggested to be fully dropped.

*“Questions 20-23 need to be re-formulated, or even dropped (as they basically repeat the well-formulated, clear questions about the same tools already asked earlier). These questions created heterogeneous responses that they do not give any clear information; no need to them” (Respondent D).*

In Question 24, responses pointed to the preferable ways for getting support. The three favorites support channels are (1) workshops in groups (53.8%), (2) pre- study guidance (before the start of the studies) (46.2%), online (virtual, non-stop, automated) courses in specific (46.2%)



In Question 25, the responses unanimously prove that they evaluate this as good for drawing the attention to this topic. They thought that it was really helpful to analyze their digital skills to develop further for better. They thanked the organizers for conducting this survey.

25. Finally, please give your feedback to this survey (the survey organizers will appreciate your feedback).

7 responses

Should add more questions

I really like it

This survey was really helpful to analyze own skills and develop further

Good

Very nice and untouched topic.

yea thank for surveyinh

The survey was clear, well-organized, and easy to complete.

### 6.3 Refinements to the “Digital Barometer” questions

Data 3 also included the validation discussion with the key stakeholder at the case organization. Experts pointed out what should be further developed in the Initial proposal. Data 3 was strictly focused on the Proposal contents and was seeking to finalize it based on the expert feedback. Table 26 below summarizes the inputs from the validation round (example).

Table 24. Expert suggestions (Data 3) for the Initial proposal.

<i>Elements of the Initial proposal</i>	<i>Parts commented in Validation</i>	<i>Description of the comment/ feedback by experts (in detail), Data 3</i>	<i>Development to the Initial proposal</i>
Element A	Questions 1-4	Respondent D noted ambiguity in device-related wording, particularly the overlap between “PC” and “laptop”. Respondent explained that the question should not be about what device students own, but whether they are able to use the computer (be it a laptop or a station PC) for the studies.	Device-related wording was simplified. References to “PC” were removed, and the focus shifted to confidence in using devices effectively.
Element B	Questions 5-7	Respondent D explained that Excel-related questions contain information for specific course instructors, especially for “IT Tools” courses. However, respondent pointed out that these questions were placed in the wrong section and partly repeated other questions.	Excel and tool related questions were regrouped so they appeared together. Overlapping questions were reduced.
Section 3	Questions 8-12	Respondent D confirmed that questions about email writing and communication reflect real challenges. However, the response options such as “Regularly” are unclear and can be understood differently.	Repetitive questions were made clearer and more specific. One unclear question was removed.
Section 4	Questions 13-15	Respondent D stated that these questions were clear and well formulated. Students understood them and were able to give clear answers that provide useful information about their skills.	Those questions were kept without changes.
Element 5	Questions 16-17	Respondent D described the responses to this question as “alarming”. The results show clear gaps in digital security skills and that IT Helpdesk services need	Security-related questions were kept and highlighted as important indicators

		to be more involved in recognizing these problems & supporting students.	of support and needs.
Element 6	Question 18-19	Respondent D explained that the problems shown in these questions are usually handled by the IT Helpdesk, especially during "Orientation". Cooperation between programs and IT support service is needed.	These questions were kept and linked to "Orientation" by IT Helpdesk.
Element 7	Questions 20-25	Respondent D explained that Questions 20-23 mostly repeated the questions already asked earlier and do not evoke clear or useful responses. "No need" for them in their current form. However, Questions 24 and 25 are useful because they show how students prefer to get support and help raise awareness.	Anbiguopus questions were removed. Questions related to support preferences and awareness were retained.
Other comments	To the whole tool	Among other comments Respondent D asked to rethink the numbering of sections currently sections 1-5 contain numbers (it shows origin from DigCom 5 areas). At the same time these numbers are mixed up with letters, such as Sections A, B, C. "It is now time to make numbering go through all sections and retain either numbers or letters but not both."	The numbering of sections was changed to numbers only. The questions are also reshaped or dropped.

As shown from Table 24, the feedback from the validation round (Data 3) was centered on refining the initial Digital Barometer proposal. Respondent D emphasized that while several questions provided "very useful" information for instructors, others were unclear, repetitive, or placed in the wrong sections. Based on the feedback, tool-specific questions, particularly those related to Excel use, were regrouped and overlapping items were revised or removed.

The tool also retained the question related to challenges in digital communication, especially digital culture. Respondent noted that unclear response options, such as "regularly", limited the reliability of the results and therefore more precise wording. In addition, digital security emerges as a critical concern, with Respondent D describing the results as "alarming" and stressing the need for strong involvement of IT helpdesk services.

Finally, the mix of letters and numbers in section labeling was corrected. Following this recommendation, the structure of the Digital Barometer was changed to using only

numbers. Overall, the validation inputs improved clarity, focus, and practicality of the questions.

Table 25. Other validation inputs for the Digital Barometer tool.

Other parts commented in Validation	Description of the comment/ feedback by experts (in detail)	Development of the Initial proposal
a) Comprehensiveness of five competence areas	Confirmed as appropriate for capturing critical competencies; highlighted Information Literacy & Problem-Solving as priority areas	Retained framework; no structural changes
b) Fairness and diagnostic applicability	Emphasized tool should support students, not judge	Embedded diagnostic philosophy in all communications
c) Alignment with observed academic hurdles	Validated connection to platform navigation and software gaps	Strengthened justification linking CSA findings to framework
d) Practical translation into survey questions	Recommended clear, questions mapped to each competence	Added guideline for survey item clarity and relevance

As shown in Table 25, the expert stated that the five areas of competence for discipline of DigCom are comprehensive to the most important digital skills among business undergraduate students. The focus was on diagnostics as opposed to evaluation, which agrees with the wishes identified in CSA. It was meant to ensure that questions were clear to make the survey reliable.

#### 6.4 Final Proposal

Table 26. Final Digital Barometer tool proposal.

<b>Survey Questions</b>
<p><i>This questionnaire explores your digital skills, needs, and practices at Metropolia Business School. Please answer all the questions. Your responses will help the School understand the students' needs and improve digital support.</i></p> <p><b><i>Pleas indicate your confidence on the Scale from 1 to 10 where 1 = Not confident / Never and 10 = Very confident / Always</i></b></p>

**Section 1: Digital Foundation & Access**

1. How confident are you using a laptop or desktop for tasks such as writing reports, managing files, or installing software?
2. How easy is it for you to find important information on learning platforms such as OMA, the intranet, or the student portal?
3. When you first started your studies, how did you learn to use platforms such as Moodle or the Z-drive?

**Section 2: Information & Data Literacy**

4. How confident are you in finding, downloading, and organizing course materials such as lecture notes or assignments from Moodle?
5. How often do you check whether online sources are credible and relevant before using them in your assignments?
6. How confident are you in using basic spreadsheet functions (e.g. sorting data, filtering lists, or creating charts) for your coursework?

**Section 3: Communication & Collaboration**

7. How confident are you in using Zoom or Teams for online classes and group meetings, including features such as screen sharing or chat?
8. How comfortable are you collaborating on documents using tools such as Google Docs or Microsoft 365 (e.g. co-editing, giving feedback, managing versions)?
9. How confident are you in writing a clear and professional email to a lecturer, staff member, or business contact?
10. How often do you check your Metropolia's email for messages, announcements, and other important information?

**Section 4: Digital Content Creation**

11. How confident are you in creating clear and well-designed presentations using tools such as PowerPoint or Google Slides?
12. How confident are you formatting longer documents (e.g. reports or theses), including headings, page numbers, styles, and tables of contents?
13. How confident are you creating or modifying visuals such as charts, graphs, or simple images for your assignments?

**Section 5: Digital Safety**

14. How often do you use strong and unique passwords for your MBS accounts compared to personal accounts?
15. How confident are you in recognizing suspicious emails or phishing attempts?

**Section 6: Hardware & IT Support Needs**

16. How confident are you in troubleshooting common hardware or device issues (e.g. connectivity problems, unresponsive devices, basic setup)?
17. If a key system such as Moodle or Zoom stops working before a deadline, what steps do you usually take to solve the problem?
18. When you need to learn a new digital tool or software for a course, how do you usually approach this?

**Section 7: Digital Culture & Support Preferences**

19. Which digital skill or task do you currently feel *least* confident about in your studies?
20. Which digital skill or task do you currently feel *most* confident about in your studies?
21. What has been the most helpful way for you to improve your digital skills since starting your studies?
22. If the School offered additional support, what type of workshop, guide, or resource would be most useful for you?

The final Digital Barometer tool is improved based on the validation feedback (Data 3). Ambiguous and repetitive questions were removed, tool-specific items such as Excel-related questions were revised, and response options were clarified to improve reliability and usability.

The final proposal for “Digital Barometer” consists of seven sections and 22 questions and is presented in Appendix 3. It is intended for early-stage use to identify student’s digital skill levels and support targeted interventions.

#### 6.5 Recommendations for Implementation

As for the practicalities, there were two main practical points identified that need to be taken into account when implementing the tool.

First, the tool is suggested to be used at either (1) a pre-arrival time (after the students are admitted but before they arrive on campus) or (2) for early-study-times use (e.g. during the first orientation week), with the results directly contributing to such courses in the 1<sup>st</sup> semester as “IT Tools” and “Orientation” contents; so that relevant instructors and study coordinators can immediately intervene.

Second, the results of the surveys can be reported in three report formats: (1) cohort reports to staff (and especially relevant instructors and study coordinators), and (2) executive summary to the management; in addition, (3) a report to the students can also be recommended (e.g. for an orientation session talk with the students about the levels of their digital skills and needed actions).

## 7. Conclusion

The thesis developed the Digital Barometer, which gives MBS an instrument to measure, evaluate and nurture the digital skills of undergraduates. This can be seen as the essence of the study.

### 7.1 Executive Summary

The thesis addressed a gap that is critical at Metropolia Business School (MBS): the absence of a systematic approach to determining the level of digital skills of its growing population of business undergraduate students, in this study, coming specifically from Nepal. Such students have been noticed to have difficulty getting settled in the digitally intensive academic environment of Finland, which has affected their academic results and professional readiness. The objective of this thesis was to come up with the Digital Skills Barometer, a diagnostic instrument to recognize the levels of digital skill at the onset of studies and guide institutional assistance. The main challenge was that the case organization does not currently have standardized and systematic methods of assessing the digital skills of students.

The study employed an applied action research with three data collection rounds. This research design includes involving conversations with faculty members for diagnostic purposes, a proposal building phase together with key stakeholders, and a small-scale testing of the tools on the students, and a final professional evaluation stage.

First, as the theoretical framework of the thesis, the DigComp 2.2 framework and best practices in digital competence assessment guided the process, which ensured the tool would be not only theoretically sound but also applicable to the context.

Second, the current state analysis identified the gaps in students' digital skills, and the wish to have a more systematic assessment as the MBS staff is committed to help students have a well-developed, mature set of digital skills.

The gaps in skills (specifically in navigating equipment and school platforms, usage of formal digital communication, and creating content), as discovered, may lead to

academic failures, if stay unaddressed. This justified the intense demand for using a proactive and standardized diagnostic tool to substitute the current ad-hoc observations.

The main outcome of this thesis is the Digital Barometer, a solution focusing on recognizing the levels of digital skills. To begin with, it is based on the five competence domains of DigComp 2.2, a proven evaluation system, expressed as an assisting, non-judgmental assessment. The tool includes obligatory, task-specific items (e.g., question relates to the use of OMA onboarding and e.g. proficiency with Excel) recognizing the level of digital skills based on either 10-point scale or multiple-choice-based questions.

The proposal was tested with a small group of Nepalese students (for whom it was intended) and reviewed with the senior MBS lecturers. Feedback was used to further refine the tool, reshaping some survey questions, discussing the timeframe for implementation of the earliest possible diagnosis, and encompassing a definite supportive ideology. This validation proved the tool to be practical, relevant, and implementation-ready.

By basing the tool on an internationally recognized framework, this thesis aims at exploiting a strong foundation created by extensive research and practice references in DigComp 2.2, and utilizing its conceptual clarity and interpretation transparency.

The introduction of the Digital Skills Barometer will ensure that MBS has a data-driven, systematic approach that allows early detection of digital skill deficiencies, and planning a timely and focused help, to avoid academic underachievement, and eventually enhance the professional readiness of its graduates, which also impacts the quality of education and the competitive standing of the school.

Importantly, besides the value provided by gathering information about the digital skills of undergraduate students, the survey also helps to move the student to reflect on the items that are inquired about in the survey, and thus help the students notice their own weakness areas and realize their needs for self-improvement and also seeking relevant support. This combination should make the tool a good aid for the School by not only measuring the levels of digital competences, but also activating own reflection and thus helping in better self-recognition of own skill levels and needs.

## 7.2 Closing Words

This thesis is not just a study, but a process of getting to know a burning problem and providing a realistic solution based on evidence and grounded on facts. It relies on the frames of DigComp 2.2 framework and is based on the concept of DigFrame to show the possibility of how theory and applied research may be applied for competence recognition.

The implementation of the Digital Skills Barometer allowed codifying perceived academic obstacles into a framework of assessment, based on the perspectives of the stakeholders of the problems encountered by undergraduates. The outcome is a solution that can help in recognizing the levels of digital skills and competences, as well as provide MBS with support based on the future survey results.

By adopting the Barometer, the organization will cease a habit of responding to the troubles and be on the frontline to advise students and see them through to their desired successes. This thesis aimed to make contribution through applying a clear research methodology and pragmatic team contribution to improve the practice of a specific institution, and thus better prepare students to meet the requirements of the digital era and modern higher education.

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**Appendix 1. Written Statement in the Use of AI in This Thesis**

According to the “*Guidance for addressing the use of AI-based tools in studies at Metropolia Business School (for written submissions)*” from August 2023, I make this statement on the use of AI-based tools in my submitted Master’s thesis.

- 1) Which AI-based large language models or other AI-based tools were used? *I used ChatGPT and Keenious.*
- 2) In which parts of the thesis which tools were used, and for which tasks? *I used it for clarity of my writing, to rephrase sentences and to organize my text more clearly.*
- 3) What portion of the text was helped with these tools, for each use? *AI –based tools were used only as a partial support in different sections of the thesis. No chapter or section was fully written by AI.*
- 4) Which prompts were asked, exactly? *I used different prompts depending on the task, mainly for rephrasing and clarity. There were no fixed prompts for specific page.*
- 5) Here, I describe what continues an ethical and reliable use of AI-based tools. *I used AI tools according to the Metropolia’s guidance.*
- 6) Here, describe how ethically and reliably the AI-based tools were used. *In my thesis submission, AI was used only as writing support. All ideas, analysis, final content are my own.*

This written statement makes part of my thesis and is done to help in evaluation and assessment.

**18<sup>th</sup> December 2025, Helsinki**

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*(Data and place)*

**Sabita Thapa Magar**

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*(Signature)*

## Appendix 2. “Digital Barometer” (Initial proposal)

### DIGITAL SKILLS BAROMETER 2025

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**B** *I* U  

Dear Bachelor's students,  
please fill in this questionnaire about your digital skills and related needs.

It is fully anonymous and is intended to better understand the needs and provide support related to developing your Digital skills.

Thank you for your participation!  
Looking forward,  
Research team



---

Introductory question: Are you a Bachelor's student (Nepalese group)? \*

Please, here and further on, indicate your response by choosing one of the answers:

- Yes
- No
- Other response
- Option 4
- Other: .....

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Section 1.

Description (optional)

---

1. What device do you mainly use for your studies at MBS? \*

Please, here and further on, indicate your response by choosing one of the answers:

- a PC, personal computer
- a Mobile phone
- a Laptop
- Other: .....

---

2. How confident are you using a PC (personal computer) for tasks such as writing reports, managing files, or installing software?

0 1 2 3 4 5 6 7 8 9 10  
fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

3. How easy is it for you to find important information on MBS platforms such as OMA (intranet) or TUUDO (the student portal)?

0 1 2 3 4 5 6 7 8 9 10  
fail            excellent

4. When you first started your studies, how did you learn to use platforms like Moodle or the Z-drive?

Long answer text  
.....

Section 2.

Description (optional)

5. How confident are you in finding, downloading, and organizing course materials like lecture notes or assignments from Moodle?

0 1 2 3 4 5 6 7 8 9 10  
fail            excellent

6. How confident are you in using basic Excel functions, such as sorting data, filtering lists, or creating charts, for your coursework?

0 1 2 3 4 5 6 7 8 9 10  
fail            excellent

7. How often do you check whether online sources are credible and relevant before using them in your assignments? \*

Please, here and further on, indicate your response by choosing one of the answers:

- Never
- Seldom
- Sometimes
- Often
- Always
- Other: .....

Section 3.

Description (optional)

---

8. How confident are you in using Zoom or Teams for online classes and group meetings, including features like screen sharing, breakout rooms, or chat?

0 1 2 3 4 5 6 7 8 9 10  
fail            excellent

---

9. How confident are you working with documents/groupware tools like Google Docs or Microsoft 365, including storing/finding, sharing, co-editing and managing versions?

0 1 2 3 4 5 6 7 8 9 10  
fail            excellent

---

Section 4.

Description (optional)

---

10. How confident are you in writing a formal, clear email to a teacher, staff member, or business contact?

0 1 2 3 4 5 6 7 8 9 10  
fail            excellent

---

11. How regularly do you check your official Metropolia's email for announcements, deadlines, and important communication? \*

Please, here and further on, indicate your response by choosing one of the answers:

- From time to time
- Regularly
- Weekly
- Every couple of days
- Daily
- Instantly
- I have my Metropolia's emails re-directed to my personal email
- Other: .....

12. What do you see as the main differences between communicating with friends and communicating for academic or professional purposes?



Paragraph



Long answer text

.....

.....



Required



### Section 5.

Description (optional)

.....

13. How confident are you in creating structured and well-designed presentations using PowerPoint, Google Slides, or similar tools?

0 1 2 3 4 5 6 7 8 9 10

fail             excellent

.....

14. How confident are you with MS Word and formatting documents like reports, assignments or a theses, including creating a table of contents, headings, page numbers, and managing style?

0 1 2 3 4 5 6 7 8 9 10

fail             excellent

.....

15. How confident are you in creating or modifying visuals in Excel such as charts, graphs, or tables to include in your assignments?

0 1 2 3 4 5 6 7 8 9 10

fail             excellent

.....

### Section 6.

Description (optional)

.....

16. How often do you use unique, strong passwords for your MBS accounts compared to personal accounts? \*

Please, here and further on, indicate your response by choosing one of the answers:

- Never
- Seldom
- Sometimes
- Often
- Always
- Other: .....

---

17. How confident are you in recognizing suspicious attempts to contact you online or phishing attempts?

0 1 2 3 4 5 6 7 8 9 10  
fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

---

18. How confident are you in troubleshooting common hardware and device issues (eg. connectivity problems, unresponsive devices, device set up)?

0 1 2 3 4 5 6 7 8 9 10  
fail ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ excellent

---

19. When you need to learn a new digital tool or software for a course, how do you usually go about it?

Long answer text  
.....

---

Section 7.

Description (optional)

---

20. Looking at all the areas above, which digital skills or tasks do you feel least and most confident about in your studies. WHERE LEAST?

Long answer text  
.....

21. Looking at all the areas above, which digital skills or tasks do you feel least and most confident about in your studies. WHERE MOST?

Long answer text  
.....

22. What were the most painful areas for you in terms of digital skills or tools, since you have started your studies at Metropolia Business School? MOST PAINFUL

Long answer text  
.....

23. What were the most helpful ways for you to boost your digital skills or use digital tools, since you have started your studies in Metropolia Business School? MOST USEFUL

Long answer text  
.....

24. If Metropolia Business School offered additional support, what kind of help would be \* most meaningful for you?

Please, here and further on, indicate your response by choosing one of the answers:

- Workshops in groups
- Self-guidance (in Metropolia's wiki-pages / tietohalinto.fi)
- Pre-study guidance (before the start of the studies)
- Online (virtual, non-stop, automated) courses in specific skills
- 1-to-1 guidance by student tutors
- Other: .....

Please add any COMMENTS how to help you improve digital skills

Long answer text  
.....

25. Finally, please give your feedback to this survey (the survey organizes will appreciate your feedback).

Long answer text  
.....

THANK YOU you for your responses!  
We will follow up on your advice.

**Appendix 3. “Digital Barometer” (Final proposal)**

## Survey Questions

*This interview explores your digital skills, comfort, and practices at MBS. Please answer honestly. Your responses will help MBS understand student needs and improve digital support.*

**Confidence/Frequency Scale for Questions:**

1 = Not confident / Never

2 = Somewhat confident / Rarely

3 = Confident / Often

4 = Very confident / Always

**Section 1: Digital Foundation & Access**

1. How confident are you using a laptop or desktop for tasks such as writing reports, managing files, or installing software?
2. How easy is it for you to find important information on MBS platforms such as OMA, the intranet, or the student portal?
3. When you first started your studies, how did you learn to use platforms such as Moodle or the Z-drive?

**Section 2: Information & Data Literacy**

4. How confident are you in finding, downloading, and organizing course materials such as lecture notes or assignments from Moodle?
5. How often do you check whether online sources are credible and relevant before using them in your assignments?
6. How confident are you in using basic spreadsheet functions (e.g. sorting data, filtering lists, or creating charts) for your coursework?

**Section 3: Communication & Collaboration**

7. How confident are you in using Zoom or Teams for online classes and group meetings, including features such as screen sharing or chat?
8. How comfortable are you collaborating on documents using tools such as Google Docs or Microsoft 365 (e.g. co-editing, giving feedback, managing versions)?
9. How confident are you in writing a clear and professional email to a lecturer, staff member, or business contact?
10. How often do you check your official MBS email for announcements, deadlines, and important information?

**Section 4: Digital Content Creation**

11. How confident are you in creating clear and well-designed presentations using tools such as PowerPoint or Google Slides?

12. How comfortable are you formatting longer documents (e.g. reports or theses), including headings, page numbers, styles, and tables of contents?
13. How often do you create or modify visuals such as charts, graphs, or simple images for your assignments?

**Section 5: Digital Safety**

14. How often do you use strong and unique passwords for your MBS accounts compared to personal accounts?
15. How confident are you in recognizing suspicious emails or phishing attempts?

**Section 6: Hardware & IT Support Needs**

16. How confident are you in troubleshooting common hardware or device issues (e.g. connectivity problems, unresponsive devices, basic setup)?
17. If a key system such as Moodle or Zoom stops working before a deadline, what steps do you usually take to solve the problem?
18. When you need to learn a new digital tool or software for a course, how do you usually approach this?

**Section 7: Digital Culture & Support Preferences**

19. Which digital skill or task do you currently feel least confident about in your studies?
20. What has been the most helpful way for you to improve your digital skills since starting at MBS?
21. If MBS offered additional support, what type of workshop, guide, or resource would be most useful for you?