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Assessment, competence and educational development of the generic digital competences of professional teachers

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English abstract

The purpose of this article is to investigate what potentials and challenges the results from a systematic surveying of teachers' generic digital competences provide. The background of the article is UCL's 4-year project "Uncovering teachers' generic digital competences" (2018-2022), where generic digital competences of professional teachers are mapped systematically in preparation for data-informed, targeted and dialogue-based competence development.

First of all, it is theoretically concluded that teachers' generic digital competences is a processual development which recognizes the influence of digital technologies and digital teaching on and influence from the student's learning context. Next, it is argued that the question framework for teachers' generic digital competences contains 5 domains: competence area, themes, learning domains, questions and guiding explanation, which together provide an understanding of digital competences such as knowledge, skills and critical understanding. Finally, it is concluded that the project creates a common language and a systematic approach to planning and implementing targeted competence courses, so educations, managers and teachers can mature strategically and digitally.



Background

Earlier research on the comprehension of technology shows that teachers' digital competence levels are uneven, and the needs of competence development vary greatly from teacher to teacher. These needs range from a lack of actionable knowledge to the ability to operate digital technologies and to the need to redesign education, which changes the professionalism and teaching methods of the teacher (Hasse & Brok, 2015). Similarly, recent research during the Covid-19 period shows that students are frustrated with the quality of digital education, highlighting the inadequate digital competences of teachers (Georgsen & Qvortrup, 2021). Based on several years of experience in digital competence development of teachers, we understand that the digital competences of teachers, or the lack thereof, have an impact on educational quality. However, there is currently no consensus on the relevant digital skills and competencies which a teacher must possess (Dalsgaard & Caviglia, 2020).

Competence development in educational institutions happens in various ways alternating between formal and informal frameworks at both the employee and organizational levels. This development is based on internal strategies, organizational development needs as well as changes, trends, and tendencies in society. With this background, the development of teachers' competencies often appears random, unsystematic, and sporadic, and may seem more like an offer than a necessity, without assessing the teachers' actual level of competency. An alternative to an unsystematic approach is a systematic and procedural development of digital competencies based on the individual teacher's level and need for competency development (Bjørnholt & Jensen, 2017).

Digital competencies encompass various understandings (Dalsgaard & Caviglia, 2020) and can be proportional to the growth of digital technologies and didactical methods of organizing education. Conversely, digital technologies are constantly evolving and enabling new didactic educational designs, making digital competencies a dynamic process which changes constantly according to goals and purposes (Hasse & Brok, 2015). However, digital competences are not solely about acquiring new expertise and competencies. It is also about gaining the ability to put them into perspective and create value for students' learning possibilities.

The ongoing digitalization and mediatization (Hjarvad, 2016) of educational institutions, with a focus on educational technologies and various digital platforms, prompted The Danish Ministry of Higher Education and Science to initiate an action plan in 2018. The action plan had a call for action: Technological upgrade in Higher educations. The primary objective of this plan was to address the experiences and barriers faced by higher educations and institutions in developing the digital competencies of both teachers and students. As a result of this political attention towards teachers' digital competencies, institutions were required to develop digitalization strategies, implement digital education initiatives, and establish a baseline for teachers' digital competencies, as well as introduce various measures to enhance teachers' digital skills.



Purpose

This article is based on the four-year development project named “Uncovering Teachers’ Generic Digital Competencies” (2018-2022) in UCL University College, as a part of UCL’s strategical framework contract with the The Danish Ministry of Higher Education and Science. The purpose of the article is to examine the uncovering of teachers’ general (common) digital competencies for the year of 2022 (not the entire duration of the project), and how data collection from the research is applied to ensure targeted investments in data-informed and dialogue-based competence development of teachers.

In this article, it is argued that teachers’ generic (common) digital competencies include four fundamental areas of competencies: technology and didactics, information retrieval, production, and presentation as well as communication and collaboration. These areas of competency are based on and developed from the European Framework for the Digital Competence of Educators (DigCompEdu, 2017) and are the central digital foundation for teachers’ digital competences, which we will be addressing at a later stage in this article. This leads us to the scientific question of the article:

Which potentials and challenges are provided by the results of systematic research of teachers’ generic digital competencies using the wheel of competencies?

To examine the scientific question of this article, we will first describe the theoretical and empirical foundation of uncovering teachers’ generical digital competencies in the year of 2022. Subsequently, we will examine the implementation of the projects’ coverage of teachers’ generical digital competencies, which is the basis of understanding the scientific foundation of the article. To nuance the concept and understanding of a question frame for generic digital competences, we will first attend to digital competencies. Next, we will analyze and explain which digital competences the research is mapping, with the purpose of processing data that we will analyze and discuss for each competency effort and through three different cases. In the analysis, we will address the research question on potentials, challenges and results in a systematic coverage of teachers’ generic digital competencies using the wheel of competencies and the new insights within competence and educational development that are put into practice.

To examine the purpose of the article, we have chosen relevant theory and empirical evidence as described in the following section.

Theoretical and empirical foundation of the article

The article is based empirically on the data collection of 434 survey responses regarding teachers’ generic digital competences covering the year 2022. The responses were obtained from teachers’ individual assessments in separate educations. This means that the data was generated from three divisions. Firstly, each teacher is receiving their own data research. Secondly, a collective data set is generated from all teachers in a specific education and lastly a united data set gathered from all 434 assessments across the entire organization. The understanding of generic digital competences in higher education is based on “A Framework for Developing and Understanding Digital Competence in Europe” (DigCompEdu, 2013) and “European Framework for the Digital Competence of Educators” (DigCompEdu, 2017), as well as the understanding of “Technucation” (Hasse & Brok, 2016) and “Learning domains” (referred to as “Læringsdomæner” in Danish) related to digital competencies (Ala-Mutka, 2010, 2011; DigCompEdu, 2013).

To examine the research question of this article, we will explain and discuss the digital competencies of teachers and the question framework for uncovering the generic digital competences of teachers displayed in a wheel of digital competencies. Next, we will collect data from the research and analyze it in relation to the science question of how potentials and challenges are experienced in practice. Lastly, we will use three dialogue meetings with educational institutes and educational leaders as a starting



point.

The dialogue meetings will be treated as three different cases where we will analyze potentials and challenges. These cases will be described as detailed studies, delving into a phenomenon that can contribute to context-dependent knowledge (Flyvbjerg, 201g).

In the following section, we will examine the nature of generic digital competencies, as this will lay the groundwork for the subsequent data collection and analysis, forming the foundation for the analysis of the science question.

First, we will take a closer look at the project implementation.

Uncovering teachers' generic digital competences (2018-2022)

Uncovering teachers' generic digital competences is a four-year-old project, where all teachers at UCL have participated in an annual assessment. The assessment takes the form of a self-evaluation using a competence wheel, where each teacher assesses their own experiences and understanding of their digital competences. The evaluation of their digital competences is established using a seven-step-Likert-scale (McLeod, 2019; Nielsen & Skriver, 2019). The quantitative data from the assessment, as well as the collective score and the taxonomical model of Dreyfus and Dreyfus (1980) for skills and knowledge acquisition, are being incorporated into the dialogue-based work of developing digital competence development formats and recommendations in education.

The individual assessment serves two purposes. Firstly, it provides each teacher with personal feedback regarding their own generic digital competences. Secondly, it provides data to target competence development offers aimed at teachers based on their to area of expertise and educational level in UCL. The individual self-evaluation can be included in the employee development meeting and used to agree on targeted competence development initiatives. In the dialogue between teacher and educational management, a process for competence development initiatives can be agreed upon, based on the collected data related to the teacher's assessment, combined with the wishes, and needs of the individual.

By answering 51 questions, the teacher will receive an outline in the form of a wheel of competencies, showing the collective self-evaluation in numbers and graphics. The self-evaluation consists of four areas of competencies, which are followed by seven response options (ranging from "to a very small extent" to "to a very great extent"). Within these respond options, individuals can indicate their level of agreement with the statement. The Likert scale is one of the most common ways of examining respondents' experiences and understandings in survey questionnaires (McLeod, 2019). However, the self-evaluation does not provide an option for respondents to provide detailed explanations for their own responses. Thus, there is no room for nuances that can be useful and beneficial in relation to targeted competence initiatives.

Self-evaluation as a method has constraints, challenges, and limitations since it is the teacher's own experience and understanding of their generic digital competences. For example, a teacher (1) can perceive their capability within collaborative digital technologies to be sufficient since they are using these technologies from time to time. The teacher is accesses to be highly competent, whereas another teacher (2), using the same digital technologies daily in many educational settings, is experiencing challenges and a lack of knowledge about the tools and is therefore feeling less capable.

Both teachers' self-evaluation are true and sincere since each teachers' use of digital technologies and experience of digital competences are unique. However, if the two self-evaluations are to be compared, teacher (2) could appear more digitally competent since this teacher utilizes digital technologies to a greater extent than teacher (1). On that note, the results can only be used individually and not for comparing one teacher to another. As a united evaluation on a single education, it will, however, provide



an indication of the teachers' collective score and level of competence.

To create a clear overview, the teacher is also provided with a unified score, shaped from Dreyfus and Dreyfus' "five stages of proficiency" (Dreyfus & Dreyfus, 1980). From this model, five intervals are described, where each teacher is assigned a level based on their assessment. With the division of levels, it becomes easier to retrieve a common understanding of how teachers perceive their own digital competencies, as well as what is required to reach the next level. However, levels do not contribute to creating a nuanced picture of the teachers' digital competences, making it hard to allocate targeted course of actions to the individual teachers.

Using their evaluation of their own generic digital competences as a starting point, each teacher is allocated various recommendations on possible targeted competence initiatives based on the self-evaluation data. Targeted competence initiatives or recommendations will appear as e-learning courses aimed at the individual teacher. Furthermore, a common catalogue of competencies will be composed for all teachers across all educations using data from the collective response from the teachers, as well as data analysis from the uncovering of each education, which will be presented to the educational leaders. Data collection and analysis of all three types of competence initiatives are elaborated later in this article.

In the following section, we will theoretically discuss the conception of the term digital competencies as a starting point for configuring teachers' generic digital competences.

Digital competences

Over the past years, understanding and defining digital competences has become proportionate with the constant and accelerating development of technologies. These technologies have been creating new actionable opportunities and framework that teachers and educational institutions can take advantage of in new digital didactical ways. Nationally as well as internationally, two main discourses within digital competences are defined (Rienecker, 2017). Partly, they are being described in an abstract level, e.g., being used as a digital literacy and to some extent at a more specific level as skills, knowledge, and settings for digital technologies, referring to generic digital technologies.

In the 21st century, digital technologies are obtaining an invasive role to an extent that we should no longer be talking about competences in relation to digital technologies, but to a higher extent about competences necessary to be able to act as a citizen of society in a democratic society. A. Martin (2006) describes this as "digital literacy", which can be translated to digital literacy in the following way:

"To further encompass the lifelong ability to act in the fluid digital infrastructure of the 21st century and contends that digital literacy is fundamental for all Citizens." (Martin, 2006, pg. 155).

Digital skills are thereby the foundation for acting with technologies in digital infrastructures in the 21st century. Conversely, digital technologies will also affect our literacy (or digital literacy) and thereby our identity: How we think and act as humans (Hasse and Brok, 2015, pg. 11). Scientist Lotte Nyboe (2009) describes digital skills as the capability of the individual to associate with digital technologies, and she refers to digital competences as "the capacity to, in a reflective way, leverage own knowledge and various skills in specific situations." (Nyboe, 2009, pg. 95). Digital skills are therefore a prerequisite for understanding digital competencies, and digital competencies become the prerequisite for utilizing digital skills. In other words, Lotte Nyboe argues for the cohesiveness between digital competences, digital skills and digital literacy (Nyboe, 2009, pg. 15).

In the scientific project "Technucation" from 2015, created to generate new knowledge about professional teachers' understanding of technology, including digital skills and competencies,"



technological literacy”, Hasse and Brook first and foremost describes technology as a materiality in the following way:

“A materiality that is designed with the purpose of finding application in and affecting current practice. When technology is utilized in practice, it conveys new situated meanings.” (Hasse & Brok, 2015, pg. 15).

Regarding the quote above, technology is understood as a materiality that can appear both digital and non-digital and still be of extensive meaning for the practice in which it is a part. This also means that the use or non-use of technology on a practical level requires knowledge and understanding of initiatives (skills and competencies) to be meaningful in a teaching practice. The use of technology is therefore a question of the way in which technology is integrated in the teaching, and understanding of technology is described as:

“ The learned ability acquires and combine technical know-how with other forms of social and cultural understanding, which makes it possible to make qualified choices, see opportunities for implementation, use and application of new and disruptive technologies in a professional context.” (Hasse & Brok, 2015, s. 26)

The technical competences are therefore developed partly by using technology from a learning perspective and partly by building up an understanding of the technology as well as the context of the technology.

As a framework for understanding the development of teachers’ understanding of technology (comprising technical skills and competencies), the project called “Technucation” has developed an analysis model and a planning tool (the TEKU-model) aiming to understand technology in a professional context. The TEKU-model, using four dimensions, is applied to understanding the interaction between digital technologies and other dimensions to be able to scaffold a teaching situation supported by a multidimensional understanding of technology. The four dimensions of the TEKU-model are summarized as follows:

T: To apply various strategies for how to gain knowledge of a new and unknown technology when it is going to be applied in the workplace.

E: To think in a problem-solving manner in a context where technology and a situation in the workplace are combined. What happens when technologies are implemented in an educational setting?

K: To cover where technologies originate and which organizational, societal, historical, and political relations have presented a technology in a workspace.

U: To reflect upon the influence of which technologies are having in professional work and professionalism.

Teachers’ understanding of technology encompasses more than just digital skills, competencies, and digital literacy. It also includes an understanding of the origin of the technology, how it is applied, and the impact it has on professionalism.

Based on this, we can deduce that digital technologies are a materiality that affects our teaching practice with the aim of creating learning for the student. The teachers’ digital competences are a processual development, acknowledging the influence of digital technologies on the learning context of the student. In addition, digital skills and competences are prerequisite for the teacher’s professionalism and development of technology understanding, just as they are a fundamental qualification for all citizens. In this context, we consider technology with a learning purpose as opposed to a specific professional technology, which is only relevant to a single education. The technology must therefore be understood as a learning technology, meaning a technology supporting the process of learning.



In the following section, the understanding of teachers' digital competences in the development of question frame and digital competence wheel for uncovering teachers' generic digital competences in UCL is included, as addressed above.

Development of question frame for generic digital competences

To cover teachers' generic digital competences, it is crucial to delve deeper into the question frame to describe the structure and framework. In this context, the European Framework for the Digital Competence of Educators (DigCompEdu, 2017) is used as the basis for developing the question frame for the teachers' generic digital competences.

This section examines the development of the question frame, which is built upon the European Framework for the Digital Competence of Educators (DigCompEdu, 2017), as well as the utilization of participatory design (Bannon & Ehn, 2013) as a design method to support the qualification of the same framework made by the project working group.

European framework for teachers' generic digital competences

European Framework for the Digital Competence of Educators (DigCompEdu, 2017) is a scientifically well-founded framework, that describes what it means for teachers to be digitally competent (DigCompEdu, 2017). This framework serves as a general reference and template to support the further development of a question frame for teachers' specific digital competencies in Europe (DigCompEdu, 2017, pg. 13). DigCompEdu is designed for teachers at all educational levels, including those in higher educations. The framework encompasses the following main competencies related to digital technologies:

- ★ The teachers' individual professional digital competences
- ★ The teachers' competences within digital technologies, didactics, and learning
- ★ The teachers' digital competences in the development of students' digital competences



These three main competences result in six areas, as displayed in Table 1 (DigCompEdu, 2017, pg. 24).

Table 1. Six areas of competencies in DigCompEdu (2017).

Area 1	Teachers' use of digital technology in professional collaboration with students and colleagues.
Area 2	Necessary digital competences for creating and sharing digital resources for education and learning.
Area 3	Teachers' conducting and use of digital technologies for education and learning.
Area 4	Teachers' use of digital technologies for student-centered education and learning strategies.
Area 5	Teachers' didactical strategies for teaching and learning.
Area 6	Teachers' educational and digital competences as a foundation for developing the digital competences of the students.

The framework of DigCompEdu synthesizes national and regional initiatives to capture teacher-specific digital competences. The purpose is to provide a general reference structure for developers of digital competence models (DigCompEdu, 2017, pg. 24). The reference structure from DigCompEdu is based on scientifically valid research conducted by the European Commission Joint Research Centre (JRC) and is intended to serve as a foundation for other reference structures. It is used as the basis for developing a question frame for teachers' digital competences and, consequently, generic digital competences.

The six areas defined by DigCompEdu were further developed and grouped to simplify the definitions and make them more applicable and understandable for teachers in their assessments. Additionally, the simplified definitions were instrumental in mapping out which competence initiatives should be initiated. Below is an overview of the areas from DigCompEdu that were grouped, as well as the resulting generic digital competence area.

Table 2. 4 areas of generic digital competences from UCL

DigCompEdu's areas	4 areas of generic digital competences from UCL
Area 2+3+4+5	Technology and didactic
Area 1+2+6	Information search
Area 3+4+5+6	Production and presentation
Area 1+2+6	Communication and collaboration



The working groups' qualification in developing the question frame

In the further development of the question frame for teachers' generic digital competences, a working group were formed with the purpose of contributing to the clarification of the expected competences that a teacher from UCL should possess. Additionally, the group aimed to examine and further develop the underlying themes and questions of the question frame. To ensure that the question frame was not solely based on a theoretical framework, it was crucial to include discussions, experiences and preconceptions from various groups of teachers.

Participatory Design was used as a methodology to involve teacher groups in the development of generic digital competences, with the following purpose:

"The main approach in PD research has been to organize projects with identifiable stakeholders within an organization, paying attention to power relations and the empowerment of resources." (Bannon & Ehn, 2013, pg. 43)

Participatory design as a design method provided an opportunity for active participation from stakeholders in the development of the product. It also facilitated collaboration, ensuring co-determination, participation, and understanding of the definition of generic digital competences in UCL. However, it was challenging to incorporate all suggestions provided for the question frame, requiring the working group to make final choices after careful deliberations (Mattelmäki et al., 2013).

The following themes of competences were developed as a result of the completed workshops and deliberations:

Table 3. 4 generic digital areas of competence and competence themes from UCL

4 generic digital areas of competence from UCL	Competence themes
Technology and didactic	Development of digital education Digital technologies Explore digital technologies for teaching
Information search	Data protection Source criticism Search strategy
Production and presentation	Forms of education Education materials Learning processes
Communication and collaboration	Use of digital strategies Knowledge sharing Sharing of materials

Question frame design

Competence themes can easily appear as overall understandings that are not clear and do not describe which skills a single teacher is expected to possess. However, digital competencies are more than four areas of competencies and more than merely the ability to use digital technologies at a practical level. Instead, digital competencies must be understood as the ability to combine knowledge, skills, and opinions in any given situation (Hasse & Brok, 2015). Digital competencies consist of three learning



domains (Ala-Mutka, 2013; DigCompEdu, 2013):

1. Specific skills to use digital technologies
2. Theories and knowledge about technologies
3. Opinions, attitudes, and critical understanding

With the conception and cohesiveness of the three learning domains, focus is placed more widely on digital competences as not only skills but also theoretical knowledge and a critical understanding. A large usage of digital technologies is thereby not the same as strong digital competences. Digital competences are also dependent on which learning domain first comes into play for the teacher. This means that, for example, knowledge is acquired in an educational setting or by processing information from an article, whereas skills are enhanced by handling a specific situation or issue. Opinion, attitude and critical understanding are the hardest domains since they are exactly controlled by the identity and opinions of the individual and can involve several types of initiatives such as motivational talks or involvement. The learning domains are fundamentally codependent and form the collective basis for digital competences.

Table 4 below displays the development and final design of a question in the question frame and the competence wheel for teachers' generic digital competences.

Table 4. An example of the design of a question for the question frame for teachers' generic digital competences

Area of competences	Competence themes	Learning domains	Question	Indicative explanation
Production and presentation	Educational materials	You are producing, assessing and using digital learning materials and tools that support students' learning processes. You are creating the framework for student collaboration to be supported digitally	Can you produce digital learning materials that mainly consists of text for students?	"Digital learning materials" include PowerPoint presentations, linking or similar in Google Workspace for Education or Office 365

The question frame is formed using the four areas of competences, competence themes, and learning domains as a starting point. To specify the question and direct it towards the actual meaning of the question, a supportive guide is added, explaining which technologies are being utilized in the organization. By making this division, a totality is created for questions that can be accessed from the learning domain that is most relevant. Therefore, the guiding explanation creates a clearer understanding of what technologies are involved in relation to the specific question.

With the description of the project as well as the argumentation for developing the question frame



related to the competence wheel, the following sections will address the data collection and analysis of the targeted competency courses to answer the scientific question of the article about potentials and challenges related to uncovering teachers' generic digital competences.

Data collection and analysis according to targeted competence courses

In the following section we will describe the data collection and analysis of the targeted e-learning courses that the catalogue of competences as well as the dialogue meetings with the educational leaders, designed as three cases.

E-learning courses: Targeted digital competence courses

As part of the process of uncovering of generic digital competences, teachers are offered individualized e-learning courses (the competency shelf) as well as a catalogue of competences built upon data from the teachers' collective assessments. The catalogue of competences is described at a later stage in the article.

Based on Dreyfus og Dreyfus' levels, a competence shelf was developed, providing each teacher with recommendations on which digital areas or tools and, what level of competence it would be relevant to perform the competence lift on. The division of levels is thereby based on each teachers' result from the assessment of generic digital competences. The wheel generates a level from a percentage rate within competences in the use of either UCL's learning platform itslearning, Google Suite, or Office 365. Levels 3-5 are chosen since it was expected that lower levels would be too low to develop competences. Levels vary from 3 to 5, and it is an individual choice whether to continue to higher levels once any level is completed. It is also possible to step down one level or more, depending on the users' starting point. Some teachers prefer to skill up at a lower level before continuing to higher levels.

The e-learning courses are self-studies that deal with specific digital tools that have been clarified during the uncovering process, as well as various areas in digitalization, such as understanding technology. The courses are short and flexible and do not require planned time. After completing a level, the user is provided with the opportunity to take a short quiz before moving on to the next level. The purpose of this is to offer the teacher feedback related to their understanding of the professional content. After completing an e-learning course at level 5, the user is given the opportunity to take a collective test. By achieving a minimum of 80% correct test responses, the user is given the opportunity to receive a digital badge as proof of completing the e-learning course. A badge is a digital verification that represent achieved knowledge and exact skills in a specific area. Being assigned a digital badge can be a valuable way for a teacher to display their level in a given area related to generic digital competences.



Figure 1 shows an example of the progression from an e-learning course concerning itslearning.

Since the ambition is to improve the teachers' competences, it was decided that the levels on e-learning courses would be defined between 3 and 5. Table 5 states that the data collection from every 434 of the teachers' answers was from the uncovering of 2022.

Table 5. Data collection of 434 teachers' assessments

E-learning courses	Recommendations level 3 (1-78%)	Recommendations level 4 (79-91%)	Recommendations level 5 (91-100%)	Badges assigned
Itslearning 2.0	174	166	94	15
Google Suite	212	149	73	9
Office 365	158	155	121	11

Analysis of data collection

The distribution of self-evaluations from the three areas/e-learning courses shows that most teachers perceive their competences in Google Suite to be the lowest within the three levels. Additionally, only nine badges are assigned for Google Suite, which is the lowest number of the three badge certifications of all e-learning courses. With this transparency of data, there is a great potential in creating a targeted effort to develop digital competences in Google Suite, since a large part of the teachers perceive a deficiency of these competences. On the other hand, Google Suite consists of many programs that can appear unmanageable and perhaps less relevant in order to develop competences, since it is meaningless to use all programs for educational purposes. Also, there are no requirements that teachers must receive a badge in each of the courses, since these are recommendations, and each teacher is free to choose or opt out of according to their own interest.



The self-evaluation of teachers regarding Office 365 are equally distributed in all three levels, with 158 at level 3, 155 at level 4 and 121 at level 5. For this, 11 badges have been assigned. With the data from the assessments, it will be possible to use a competency course that matches the organizational level of ambition using Office 365. If you want all teachers to be at level 5, this will be possible by having everyone complete level 5 and thereby receiving a badge in Office 365. The data shows that there is an even distribution across all three levels, which indicates that the overall impression of teachers' perception of digital competences in Office 365 is not dominant at a specific level. Therefore, it is not clearly stated which level requires the most attention regarding competence development.

In itslearning 2.0, most teachers are placed in level 3 and 4, yet in a more even distribution between these levels than in the case of Google Suite, as well as a certain number of teachers placed at level 5, with 15 assigned badges. Itslearning is used as the primary learning platform for teaching, which makes it expected that the teachers have all the relevant digital competences and skills, since this is the exact learning platform which they are using daily. Yet, the data from table 5 indicates that there is a need to provide competence initiatives in the use of itslearning if teachers are to experience a mastering of itslearning in level 5. It is also relevant for all teachers to complete e-learning courses 3-5 and to receive a badge in itslearning 2.0 to confirm the perceived level from the uncovering and the real level of competence. Because the individual teacher can easily experience that he or she is located at level 3, but during the completion of the competence courses, the teacher will evaluate and experience that he or she is located at level 5.

Using these data on the teachers' generic digital competences, it will be possible to initiate targeted competence courses based on the three levels. The teachers will thus be provided with a tailored course to elevate their level if the individual teacher's ambition is to improve and reach a higher level. Consequently, it is possible for the organization, from any given level of ambition, to move teachers from level 3 to 5 and thereby have them experience a competency lift. On the other hand, these data do not specifically state which competency level matches the need or ambition of the individual teacher. Is it relevant for all teachers to reach level 5 if it is only used to a certain extent? Therefore, it is necessary to determine a fundamental level of ambition for teachers in each individual education. This is clarified in the analysis of the three cases.

The competence catalogue

Contrary to the described e-learning courses, blended competence courses have been developed and compiled in a competency catalogue. Since the competency courses are organized as blended courses, they build upon the advantages of combining online courses with courses requiring physical attendance. Due to the blended approach, the courses have a more didactical and educational perspective than the e-learning courses.

The planning of the competency catalogue is rooted in both the data analysis of the generic digital competences for all the teachers in the organization, as well as thoughts on the nature of competency development. We will briefly explain both parts.

The development of competences takes place in various ways and spans between formal and informal competence development. Informal development of competences is defined as activities where the teacher's competencies are developed, but these are not formalized activities defined by the educational institution. During the teachers' daily practice and problem-solving, competency development occurs through collaboration with colleagues and knowledge research from literature online or via networking. These examples do not constitute a complete list but should be seen as an illustration of the informal competence development that is constantly taking place. The ongoing task performance thus include a systematic gathering of experience and knowledge, which is informal and complements the formal activities of competency development. The purpose of the competence catalogue is to set a systematic and targeted direction for competence development, which has an organizational and strategic framework, speaking into the practice and expanding it.



The other starting point for developing the competence catalogue was the data analysis of the teachers' generic digital competences. The data analysis mapped various areas where the teachers felt the least competent. The percentage is indicated in each category with an organizational baseline. In the assessments of 2022, the collective organizational baseline (average) of all teachers' responses was 76%, stating 0% as the lowest and 100% as the highest level. A baseline of 76% was generated from a data study, grouping the underlying percentages into themes and competence initiatives as stated in table 6.

Table 6. Competence initiatives

	Organizational competency initiatives for the year of 2022
1.1	Explore and challenge current technologies such as Office 365, G Suite for Education (Google) and Studietube.
1.2	Experiment with new digital technologies.
1.3	Use digital technologies for educational differentiation, feedback, and digital synchronous educational purposes.
1.4	Develop new digital types of education and learning spaces such as online education, blended learning, hybrid learning, etc.
1.5	Use and explore itslearning for education and knowledge sharing.
1.6	Can use mobile technologies for educational purposes. Digital technologies are defined as cellphone, video camera, cameras, and microphones for live streaming and such.

Analysis of competence courses

The competence areas as identified above serve as the foundation for the formal competence development offered in the competence catalogue. Taking into account the data analysis, the competence catalogue was composed of numerous diverse competence development courses. As previously mentioned, these were offered in a blended format.

Blended learning can be viewed from various perspectives, but it is commonly understood as a combination of in-person teaching and online education (Pedersen & Larsen, 2021.) For instance, Garrison and Vaughan (2008) describe blended learning as carefully designed learning environments that combine in-person teaching (face to face, or F2F) and online learning formats. The balance between F2F and online teaching is crucial for the asynchronous and synchronous processes, which are intended to support the participants' ability to achieve the educational goals (Kurt & Yildirim, 2018). Therefore, blended learning is not just an alternation between F2F and online teaching, but also involves the didactic selection and deselection of digital technologies, learning processes, and educational methods (Pedersen & Larsen, 2021).

First and foremost, there is a need to explore and experiment with new and familiar technologies. Using the organization's current digital technologies, it is necessary to investigate the different options and functionalities each technology can bring to the learning situation. The question, therefore, is not so much about valid skills and competences, but rather about different didactic approaches to planning, executing, and evaluating teaching when using digital technologies. These approaches include blended and hybrid learning, where technology is incorporated as a part of the educational format and creates opportunities for educational differentiation, feedback etc. For instance, there is a need to explore itslearning in relation to teaching and knowledge sharing. It is



crucial to actively test the learned skills and competences in one's own teaching sessions, which is an important element in the competence courses stated in the competence catalogue. There is a need to connect the theoretical aspect with the practical execution of teaching, according to the individual teacher's wishes.

In addition, teachers are expressing a need to develop digital competences within mobile technologies. Mobile technologies are defined as technologies such as the use of mobile phones, video production, and technologies used for live streaming. Besides wanting to develop digital skills for using mobile technologies, there are also didactical considerations for the application in the form of, for example, blended and hybrid learning, since the technology can create possibilities for teaching situations to be carried out regardless of location and time.

Furthermore, there is a need to experiment with new technologies for teaching purposes, implement them in the curriculums, test them didactically in the learning environment and assess their applicability and value. This can make it challenging to create targeted competence courses, as some teachers perceive the technologies as new, while others see them as technologies already existing within the organization. Additionally, it will be difficult to define which digital technologies are new and relevant to the individual teacher, student, and education. New technologies not only foster new understandings of the technologies themselves but also new ways of thinking about education. Therefore, new technologies are connected to the individual teachers' new didactic perspectives.

A common feature of the competence initiatives is the teachers' need to use, explore, and experiment with known and new digital technologies in teaching situations. This means that there is a natural focus on didactics and learning processes. In the competence catalog's blended learning formats, the focus is on the link between didactic, technology and learning processes.

In the following sections, we will focus on three cases that explore targeted and data-informed competence development within each individual education program.

Dialogue meetings

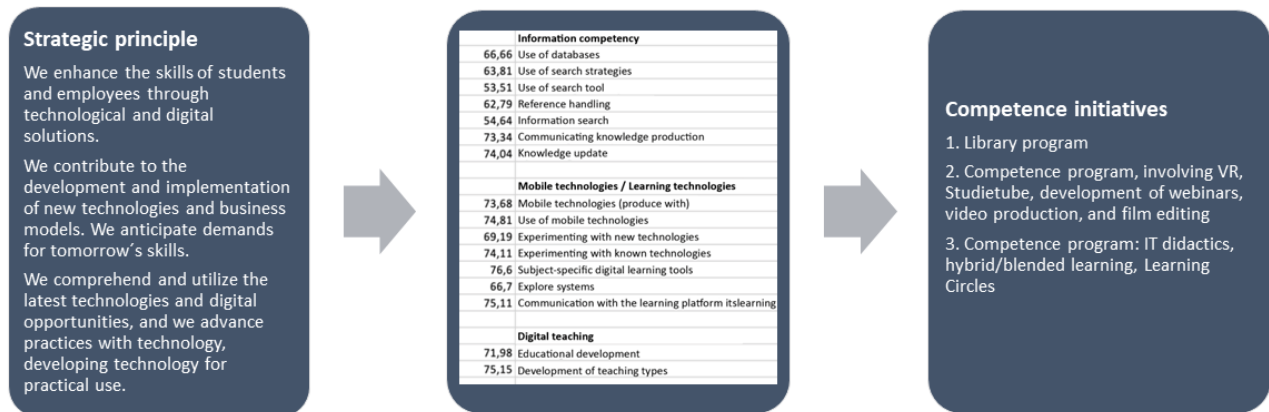
As part of "Mapping teachers' generic digital competencies" it was reported to the individual educational leader what the overall result of the education was. This took place as dialogue meetings, where the education's result and the education's ambition for developing the teachers' digital competences was addressed.

The purpose of the meetings was to create consensus between the education's teachers' coverage (data) and the education's ambition and initiatives for competence development. However, there was a shared understanding that relevant competence development should not only be viewed as data. Each education program's culture, reservations, other competence initiatives, and ambitions should be included in data-informed, dialogue-based, and targeted competence development formats for the program's teaching groups.

The dialogue meetings were organized with an agenda, where the education programs were presented with a data analysis of the teachers' assessments. This was subsequently grouped into competence areas and recommendations for competence initiatives based on these areas. The competence areas and recommendations are aligned with UCL's strategic ambitions.

Figure 2 provides an example of the coherence between UCL's strategy, the identified competence areas, and the recommended competence courses.

Figure 2. Cohesiveness between strategy, data from the assessments and recommendations on competence courses



Dialogue meetings - analysis

In the subsequent section, we analyze dialogue meetings conducted in 2022 with three different educational managers. Referred to as U1, U2 and U3. These dialogue meetings are examined in separate case studies, with the aim of identifying potential opportunities and challenges in uncovering teachers' generic digital competences, which is the central research question of this article. As a theoretical perspective on the significance of the diverse understandings that emerge from the different interpretations and perceptions of the competence assessment in the case studies, we utilize the three learning domains for digital competencies (Ala-Mutka, 2013; DigCompEdu,2013):

- * Specific skills to use technologies (A)
- * Theories and knowledge of technologies (B)
- * Opinions/attitudes and critical understanding (C)

Case 1: Dialogue meeting 1 with educational manager

In the initial dialogue meeting with U1, the assessments of generic digital competencies of the education program's teachers were presented. The overall impression was that 6 out of 16 teachers assessed their digital competencies to be at Dreyfus and Dreyfus' level 2: digitally advanced beginners. This surprised U1, as the perception was that the integration of digital technologies was not seen as a problem and that many of the teachers expressed that digital teaching was seen as the future focus for the education program. However, the uncovering revealed that the deficiency in digital competencies was primarily related to the use of the learning platform "itslearning", while Google Suite was the teachers' preferred digital technology. Therefore, they perceived themselves as highly digitally competent.

Case 1 analysis

Since itslearning is the primary digital technology for teaching sessions, U1 chose to state an ambition that a teaching session should always start by using itslearning but not always end there. The management wanted to focus on a holistic solution and a fixed IT architecture using itslearning as the entry point.

To do this, a targeted competence course for teachers were initiated, testing itslearning and the program's possibilities of using the collaborative digital technologies. They wanted to make a transition



and create a common understanding of the use of primary and secondary learning technologies in education. Thereby they were able to make a more targeted development of teachers' generic digital competences. The potential is thereby to show a lack of focus in the use of primary and secondary technologies in education programs. Moreover, it shows that the educational managers' preconception is not necessarily coherent with the teachers' perceptions. Related to the three learning domains for digital competences, the teachers are searching for specific digital skills when it comes to implementing of digital technologies (A), whereas the educational manager's understanding was focusing on IT-architectural knowledge (B) and when to use the different digital platforms.

Case 2: Dialogue meeting 2 with educational manager

During the dialogue meeting with educational manager U2, data and recommended competence courses were presented. The education's ambition for the teachers' generic digital competences matched the level that the uncovering revealed, which is why the conversation very quickly revolved around which digital technologies were missing from the education to support digital teaching. There was a request to involve new learning technologies and specific professional technologies and there create an opportunity for teachers to further develop their digital competencies.

Analysis of case 2

In the education's survey, it became clear that the teachers' experiences and assessment of how they could involve and use digital technologies were very high, whereas digital competencies for exploring, producing, and experimenting with digital technologies were somewhat lower. It thereby became clear during the dialogue that the targeted competence initiative should not mainly evolve around which new technologies to include and how, but that there was more of a need to explore and experiment with present digital technologies in teaching situations. The focal point of the targeted competence development thereby became the didactics and how to implement and experiment critically with the digital technologies in teaching situations, rather than merely experimenting with new digital technologies for the sake of digital technologies.

In the following dialogue meeting with a selection of teachers from the education, which were going to qualify the course, it was chosen to initiate learning circles, where teachers were going to experiment with a specific current digital technology in a didactical way during a teaching session. The potential is here that one can tailor exactly the course that the education wants. The challenge lies in the fact that during the conversation with the educational leader, new needs may arise that can divert attention from the needs that the uncovering reveals. In the specific case, competence development is initiated that is not only focusing on experimenting with digital technologies but also on didactical competence development.

When it comes to the three learning domains for digital competences, the teachers and the educational leader agree that it is not about developing new digital skills (A). The educational leaders want a deeper level of knowledge about and inclusion of new digital technologies (B), whereas the teachers to a higher extend need knowledge about and understanding on how to critically implement the technologies didactical in a teaching situation (C).



Case 3: Dialogue meeting 3 with educational manager

During the dialogue meeting with educational leader U3, the data foundation and recommendations for the education program's teachers' generic digital competences were presented. During the dialogue meeting, the uncovering related to the teachers' digital reference handling was discussed as the general digital competence that the teachers, to a lesser degree, perceived themselves to be capable of. The educational leader U3 was somewhat surprised since the education's teachers recently had completed a course in reference handling and he or she were perceiving this course to be both rewarding and impactful. The teachers were competent when it came to references.

Analysis of dialogue meeting 3

In the dialogue between U3, the project manager and their leader, it became clear that there were different perceptions of the nature of digital reference handling. While the teachers were highly skilled in reference management, they faced challenges when it came to using technologies for this purpose. It was the technology and professionalism which the teachers were unable of mastering, whereas the analogue reference management was not a problem.

In relation to the three learning domains for digital competencies, the teachers' needs are about developing specific digital skills for handling a reference system (A) rather than professional knowledge of how to make a correct reference. On the other hand, the educational leader's understanding is focused on the teachers' professional knowledge (B), as well as the digital skills required to handle a digital reference system (A).

In the dialogue meeting, this difference was addressed, and a consensus was reached on the definition of digital reference management competencies. This discussion clarified that the varying interpretations fostered a new shared understanding and, importantly, a common language for digital technologies and competencies. This reduces complexity and minimizes misunderstandings, as exemplified in the case of digital reference management. A common frame of reference was established for approaching generic digital competencies and for developing various formats competence initiatives. This shared understanding promotes collaboration and a unified goal: to create targeted competence courses. The aim is to strategically and digitally mature the educational programs, making them more inclusive and adaptable in terms of medialization and digitalizing.

Conclusion

In this article, we have explored the assessment of teachers' generic digital competences in 2022 and how dialogue meetings with educational leaders can lead to targeted competence initiatives within each educational program.

We have argued for the development of a question frame for professional teachers' generic digital competencies, as well as a systematic concept for self-evaluation for digital competencies in the form of a competence wheel, a taxonomy, a competence shelf, and a competence catalogue. This will enable individual teachers to uncover their competencies and work with targeted competency initiatives. From a theoretical exploration of digital competences, we conclude that the question frame for the competence wheel should encompass five domains: competence area, themes, learning domains, questions, and an explanatory guide. This structure will facilitate a collective understanding of digital competences as a combination of knowledge, skills and opinions/attitudes.

In the article, we have explored the potentials and challenges that arise from a systematic examination of teachers' generic digital competences using the competence wheel.



In relation to our research question, we have analyzed the following findings in this article:

- ✦ By setting a level of ambition for the targeted competency initiative, it is possible to tailor the different initiatives from data and thereby create a competency lift for the teachers' generic digital competencies. However, there is uncertainty whether the teachers need this exact competency lift within those digital technologies related to their teaching methods.
- ✦ Constructing an understanding of digital technologies and a shared language for developing digital competencies for the educational leaders, which connects digital technologies, digital competences, and didactics.
- ✦ A shared language for generic digital competences and competence development to reduce complexity and minimize misunderstandings between teachers' and leaders' perceptions of the focus in the targeted competence initiatives. In all three cases, different understandings, and interpretations of digital competences from the three learning domains occur.
- ✦ A systematic approach to working with generic digital competences which promotes collaboration with the shared purpose to create targeted competence courses, making the education programs mature strategically and digitally.

The basic challenge with the assessment of teachers' generic digital competences is partly that there is no common understanding of what teachers are responding to, which prevents the formation of a specific picture of their competence needs. Secondly, it is a self-evaluation that requires answering truthfully to receive targeted competence development. Also, a lack of ambitions for developing teachers' competences can create an unfocused and random competence development.

Using a systematic approach to the assessment of digital competences and targeted competence development, each educational program can take the next step towards a more strategic and digital maturity. This also enhances their capacity to focus on developing new digital educational formats that meet the educational demands of the future. The future demands innovative and digitally driven education, which necessitates changes in leadership style, employee assignments, and students' studies.

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