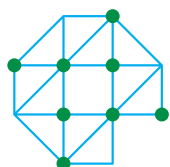


# A framework for digital competences of lecturers



**Acceleration plan**  
Educational innovation  
with ICT

 Facilitating professional  
development of lecturers



## A framework for digital competences of lecturers

Acceleration Plan Educational Innovation with IT  
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**Acceleration plan**  
 Educational innovation  
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## 1. Introduction

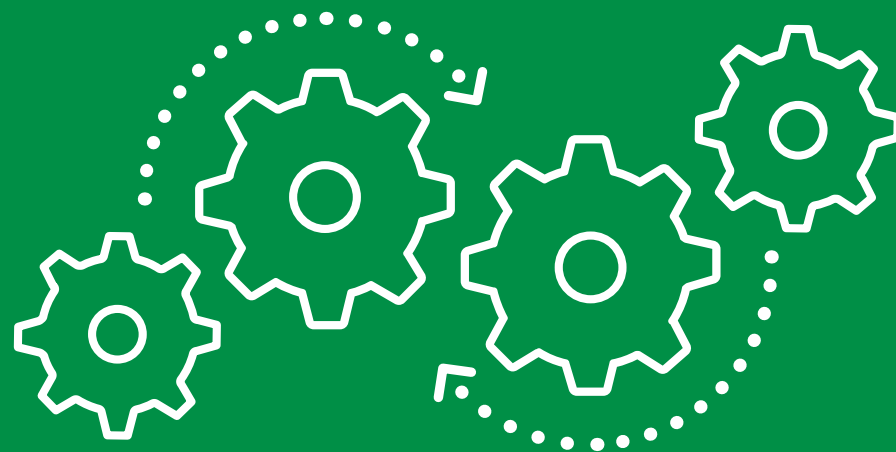
### 1.1 Background

The opportunities provided by IT are growing at an unprecedented rate. The challenge faced by the education sector is to make good use of these opportunities. IT can be a powerful tool for improving both the quality of education and student success. It can enable student-centred and experiential learning, and can help to involve students more in their learning process and improve their learning outcomes. However, as the Dutch Education Council describes in its recommendations<sup>1</sup>, achieving 'thoughtful digitalisation' will be no easy task as it requires combining the right knowledge and support. Whether or not digitalisation will improve the quality of education and students' learning outcomes will depend very much on the transformative power of educational institutions and the abilities of lecturers to thoughtfully redesign their teaching using IT.

The digitalisation of education has increased in momentum since early 2020, due to the lockdown measures taken in the Netherlands to prevent the spread of the coronavirus. Universities have had to make the transition from largely physical teaching to fulltime online teaching, and lecturers and students have had both positive and negative experiences with various forms of online learning and supervision. It is yet to be seen whether, and how, these experiences can be used to help improve the quality of education through a mix of online and physical teaching. What is clear, however, is that educational innovation that makes use of IT will continue to be urgently required in higher education, also once the coronavirus pandemic is over<sup>2</sup>. Which competences, therefore, do lecturers in higher education need if they are to achieve the required innovation using IT? Although much research has been carried out into digital competences for lecturers in various sectors, an overview of the competences required to achieve educational innovation with IT in higher education has not yet been made.

Exploiting the opportunities that digitalisation offers for higher education and identifying what this requires of lecturers and universities are the main objectives of the Acceleration Plan.

The Acceleration Plan is a collaboration between Universities of the Netherlands, The Netherlands Association of Universities of Applied Sciences and SURF. The following three ambitions for digital education are central to the Acceleration Plan:



1. better alignment with the job market;
2. more flexible education;
3. smarter and better learning using technology.

The Facilitating Professional Development for Lecturers zone of the Acceleration Plan (hereinafter: Professional Development zone) researches and develops strategies that can be implemented by universities for the effective professional development of their staff in the area of educational innovation with IT. Based on the professionalisation strategies developed by the zone, universities can put in place an improvement trajectory to accelerate educational innovation with IT within their institutions. One of the questions often asked by participating universities is whether, and if so how, digital education competences can be incorporated into existing professional development plans, such as the basic qualification of teaching competence (BDB) or the basic teaching qualification (BKO). To answer this question, it is first necessary to determine which competences are specifically required for lecturers in higher education in the area of educational innovation with IT.

To do this, the Professional Development zone has commissioned a review of the literature and existing frameworks for digital competences of lecturers, to develop a common competence framework for lecturers for the Dutch higher education sector that focuses on educational innovation with IT. This literature review focused on the following questions:

- Which components of a digital competency framework for lecturers can be identified in the academic literature and educational practice?
- Which competences can be identified in this framework?
- Do differences exist between universities of applied sciences (*HBO*) and other universities (*WO*)?

## 1.2 Research design

Four research tools were applied to answer these questions: a literature review, a comparison of existing competence frameworks, interviews with experts and policy makers, and validation sessions.

The **literature review** was carried out in December 2020 using the Web of Science database, following guidelines provided by Petticrew and Roberts<sup>3</sup>, and Pascoe, Waterhouse-Bradley and McGinn<sup>4</sup>. Only English-language, peer-reviewed articles written after 2010 were included in the literature review.

Various search terms were used relating to three domains: IT, higher education and competences for lecturers. These search terms resulted in 122 articles that met the criteria and contained search terms from all three domains. Following further analysis, 21 articles were found to match the search criteria. The articles that were excluded from the review were either not relevant to higher education or focused on the level of lecturers' digital competences, without describing what exactly the competences were. Using the 21 articles, an overview was produced of the context, the research aim, the main results and the identified digital competences.

An **inventory** was made of **existing frameworks** relating to digital education, education and IT and higher education. The components of these frameworks were analysed (e.g. criteria, target group, dimensions and competences). The following frameworks were included in the comparison (see framework reference list):

- The Digital Competence Framework for Educators (DigCompEdu)<sup>a,b</sup>;
- Competence framework teaching and learning with ICT (Competentieset Leren en Lesgeven met ICT);
- The Digital Teaching Professional Framework (The Education and Training Foundation);
- JISC Teacher profile (higher education);
- ISTE Standards for Lecturers;
- UNESCO ICT Competence Framework for Teachers.

The results of the literature review and the framework comparison were combined to develop a first model of lecturers' competences. This model was based on the following criteria (as defined by the Professional Development zone):

- The main theme is educational innovation with IT and the context is higher education.
- There is a specific focus on flexible and personalised education.
- There is a specific focus on improved alignment with the job market.
- There is a specific focus on different learning environments (e.g. physical, online and workplace).
- There is a specific focus on empowering students for a digital society and the relevant job market.
- This includes a focus on digital competences for learning, living and working.
- There is a specific focus on accessibility to higher education (inclusion).

<sup>a</sup> DigComp2.1 was considered from the perspective of the digital literacy of students, as part of the 'equipping students for a digital society' dimension.

<sup>b</sup> DigComp2.2, which is yet to be published, was checked for additional information but did not result in changes to this framework.

- 
- The competence profile must be relevant to and possible to implement in education practice.
  - The competence profile must be clear and consist of a limited number of main dimensions, subdimensions and competences.

This draft model was presented to **experts** and **policymakers** (see Appendix 1), who provided feedback based on their expertise and on supplementary literature. This feedback was subsequently incorporated into the research. In a series of discussions, the model was further refined based on the literature, the framework comparison and expert input, resulting in a comprehensive framework with main dimensions and subdimensions and the underlying competences.

Finally, this framework was presented to lecturers and IT experts in education in a number of **validation sessions**, to explore the relevance and usability of the framework and to identify any differences between and within the universities. Where necessary, the competences were reworded based on feedback provided in these sessions. While the structure of the framework did not change, the sessions did produce recommendations for the practical implementation of the framework.

In the remainder of this report, we discuss the final digital competences framework for lecturers in higher education.

## 2 The framework and the competences

The framework for digital competences of lecturers in higher education consists of four main dimensions that are further divided into subdimensions and underlying competences. The four main dimensions are: designing, implementing and evaluating education; empowering students for a digital society; professional conduct as a lecturer; and digital literacy for lecturers (see Figure 1). These four dimensions are not separate entities, but are related to one another. For example, digital literacy for lecturers is a prerequisite for lecturers to be able and willing to design and implement innovative digital education. The digital literacy of lecturers is also related to the future skills of students in the digital society. After all, lecturers need to be digitally literate if they are to teach students digital literacy for living, learning and working<sup>5</sup>. A willingness to keep abreast of new technological developments in the profession/discipline is important both for lecturers and students, and is reflected in two dimensions of the framework ('professional conduct as a lecturer' and 'empowering students for a digital society').

One of the unique aspects of this framework is the explicit link made to the student's profession/discipline, as this is not always considered in existing frameworks (see Appendix 2). This link is mainly seen in the 'empowering students for a digital society' dimension, which considers not just digital literacy for living and learning, as do existing frameworks, but also focuses on digital literacy for working.

The framework and competences are formulated in a way that is relevant to and applicable in all universities, as well as a wide range of sectors and disciplines. Furthermore, the framework does not name specific IT applications, to ensure continued relevance.

### This is what experts say about the framework in general:

The experts recommend that the competences are aligned with the tasks of lecturers wherever possible, to increase the relevance and usability of the framework for lecturers. Furthermore, it is important that lecturers develop competences in the context of their teaching activities..

In the remainder of this chapter, we discuss the four main framework dimensions. In each section, we describe a dimension based on the literature, supplemented where necessary with expert input and points that arose during the comparison of the existing

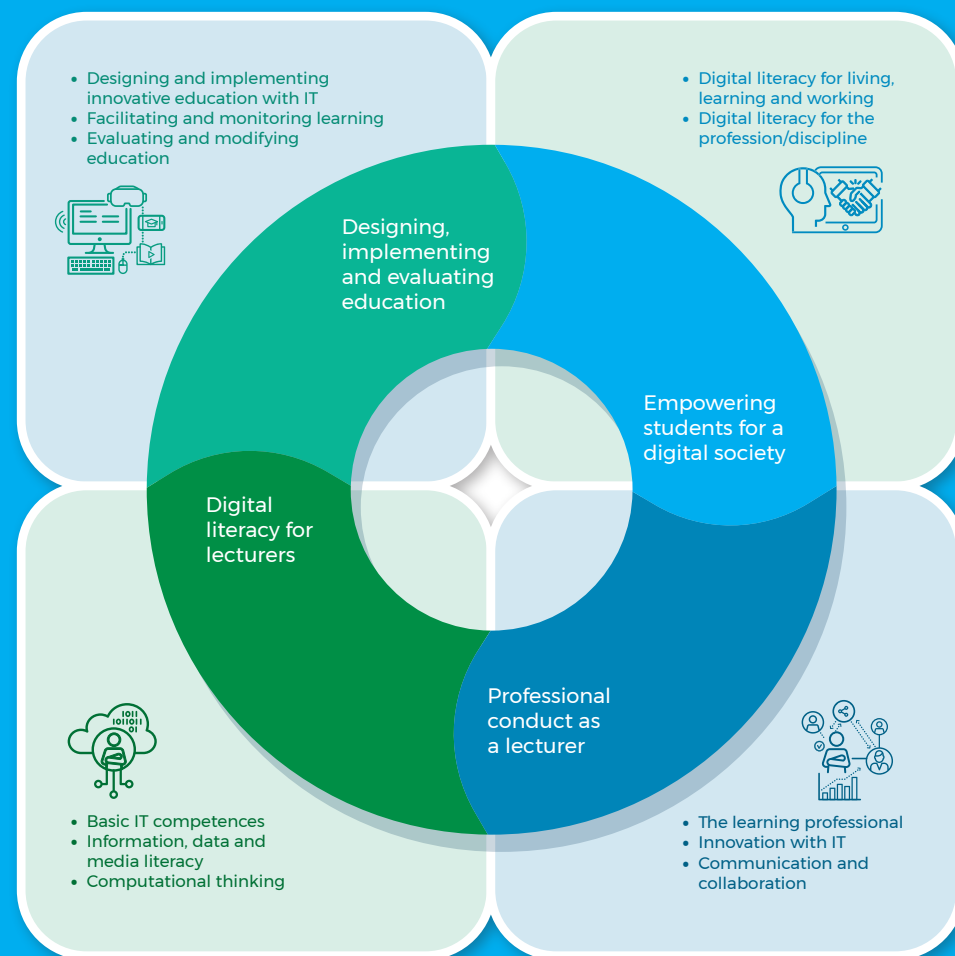


Figure 1 A digital competences framework for lecturers in higher education

frameworks. We also discuss the subdimensions and underlying competences. A table is presented in Appendix 2 of the comparison between this framework and existing frameworks.



## 2.1 Designing, implementing and evaluating education

This first dimension of the framework concerns the competences that are required by lecturers to design, implement and evaluate education. The redesign of education using IT requires specific competences of lecturers, especially when this also involves redesigning the lecturer's own teaching practice to achieve more flexible education that better reflects the needs of students and is more aligned with the job market<sup>5</sup>. The literature emphasises that, in the context of educational innovation, it is very important for lecturers to be able to clearly justify how and why they want to implement IT in a specific context and for a specific target group, while ensuring alignment between learning objectives, learning activities, learning resources and assessment<sup>7</sup>. However, they can only do this if they follow the design process, which is to design, implement and evaluate the education<sup>8</sup>.

### This is what the experts say about designing education:

The design process should be recognisable in the framework, for example based on the ADDIE (analyse, design, develop, implement and evaluate) model.

The experts also emphasise the importance of constructive alignment in instructional design, and urge the use of a broad definition of constructive alignment. A narrow definition is often used in higher education, where constructive alignment is taken to mean alignment between learning objectives, learning activities and assessment, in agreement with Biggs<sup>9</sup>. However, a broader definition is applied in other education sectors, where it is taken to refer, at a minimum, to alignment between educational vision, teaching content, learning objectives, learning activities, learning resources (including IT tools) and assessment.

The literature pays a lot of attention to lecturers' abilities to **design and implement innovative education with IT**, and various studies highlight the importance of designing higher education teaching programmes with a high IT component<sup>10-14</sup>. While education is the perfect setting for ensuring that all students have the necessary digital skills for our information, or knowledge, society, IT can also be important for education itself. It can be used to support existing learning processes, but it also acts as a catalyst for the design and implementation of new forms of learning and education.

The literature also states that it is not only important for lecturers to be able to create new digital educational resources, but also to be able to modify and reorganise existing resources<sup>11,15,16</sup>. Furthermore, lecturers must also take the needs of students into account when designing and implementing education<sup>6,11,17,18</sup>, to ensure more flexible and personalised learning and greater student self-regulation in higher education.

As the literature shows, there are still many challenges when it comes to the competences of lecturers if we are to achieve a 'thoughtful' blend of learning. Wu, Hu, Gu and Lim<sup>19</sup> state that lecturers in higher education need to know how to design and implement an online course in a blended context. To do this, they need to know the correct pedagogical approaches for blended learning. After all, didactics are even more important in the online context than in the classroom<sup>20</sup>. Experiences during the coronavirus pandemic show that many lecturers and universities have faced problems with the mix of online and face-to-face learning<sup>21,22</sup>. As these problems make clear, a continued focus is required on the opportunities provided by blended learning.

### This is what the experts say about competences for designing and implementing digital education:

Lecturers in higher education must be able to teach in a variety of learning environments: not just online and face-to-face, but also combined with learning in the workplace.

'Implementing education' should also take into account the various roles of lecturers in the light of future developments. Student learning takes place in various settings: physical, online and in the workplace, which has implications for the roles of lecturers, who may take on a more coaching role. New forms of education, such as challenge-based learning, also require a new role for lecturers.

When designing and implementing education, lecturers must also take into account student well-being and social inclusion. This is an aspect that receives very little attention in the literature on lecturers' digital education competences, but is mentioned in several frameworks (see Appendix 2). Lecturers need to be able to assess the risks and benefits of using IT in education with regards to student well-being, and react accordingly (The Digital Teaching Professional Framework). Lecturers should also ensure the accessibility of digital education (JISC), taking into account possible differences between students (DigCompEdu). Recent experiences with online teaching during the coronavirus pandemic highlight how important it is to pay attention to student well-being. Lecturers report that they find it difficult to respond to non-verbal signals from students when teaching online, and that the interaction with students is not as good as in a face-to-face context<sup>21,23</sup>.

When using IT to **facilitate and monitor student learning**, lecturers make conscious use of the possibilities offered by IT to improve or support student learning<sup>11,24-26</sup>. Their teaching needs to be aligned with the needs of students<sup>24,27</sup> and with the teaching objectives<sup>18,27</sup>, so that lecturers can improve student self-regulation<sup>11</sup>, collaborative learning<sup>13</sup> and active learning<sup>17</sup>.

### This is what the experts say about designing innovative digital education:

Regarding lecturers' competences for designing innovative digital education and developing more flexible and personalised teaching, the experts point out that lecturers are largely dependent on university policy. For example, lecturers can only implement personalised curriculums if this is supported by the university. Lecturers can however be expected to evaluate the possibilities within a certain context and identify what they need to provide the required teaching.

Lecturers also need to be able to implement IT for student assessment, and several studies refer to assessment strategies that lecturers can develop using IT<sup>11,14</sup>. This can increase the diversity and effectiveness of assessment strategies, which can be better adapted to the individual student<sup>18</sup>. For example, lecturers can use combinations of summative and formative assessment, and can give feedback or encourage peer review<sup>28,29</sup>. The data that is generated by the various systems can be used to analyse and optimise the learning process (learning analytics)<sup>10,30</sup>. A review by Viberg et al.<sup>29</sup> shows that there is much potential for using and analysing this data to improve the learning process, but that this rarely takes place in practice.

### This is what the experts say about competences for facilitating and monitoring learning:

Assessment should be an integral part of education (e.g. formative assessment, assessment as input for differentiation). Assessment can also be used to evaluate education (e.g. using test results to evaluate teaching, possibly supported by IT).



As well as assessing students' learning processes, lecturers need also be able to **evaluate** the instructional design using IT, and **modify** their teaching based on this. To do this, lecturers can use data from IT systems and digital learning resources<sup>31</sup>. Lecturers should also be able to reflect on their own digital pedagogy<sup>7,32,33</sup> and, based on this, design and implement improvements to their teaching<sup>31</sup>. In addition to reflecting on their own teaching practice, lecturers should also be able to reflect on the benefits of IT for the educational process, and in particular the suitability of IT for improving student learning. They should then use this to modify their use of IT<sup>10,34,35</sup>.

### This is what the experts say about competences for evaluating digital education:

When developing digital education, it is important to evaluate the educational design and implementation and modify these if required. It is also important to collect data on the effectiveness of the teaching. Research skills are therefore an important competence.

The experts also emphasise the importance of weighing up the benefits of IT, as well as the presumed benefits of implementing the IT tools. It is important that lecturers are able to evaluate and justify whether and how these benefits are realised in their teaching practice.

Based on the above, we have developed the following lecturers' competences for the 'designing, implementing and evaluating education' dimension. Appendix 2 provides an overview of other frameworks that also include this dimension.

## Designing and implementing digital education

### The lecturer...

1. is able to design innovative education that is consistent with the lecturer's own concept of teaching and learning using IT and with the institution's educational vision;
2. is able to design and implement innovative education that makes use of IT to improve students' ownership of their learning process and respond to the individual needs of students;
3. knows how to support, combine and coordinate the learning process in a variety of learning environments (e.g. face-to-face, online and in the workplace);
4. is able to take the well-being of students and inclusion into account in digital learning processes;
5. is able to select, modify, organise and create digital resources and learning materials.

## Facilitating and monitoring learning

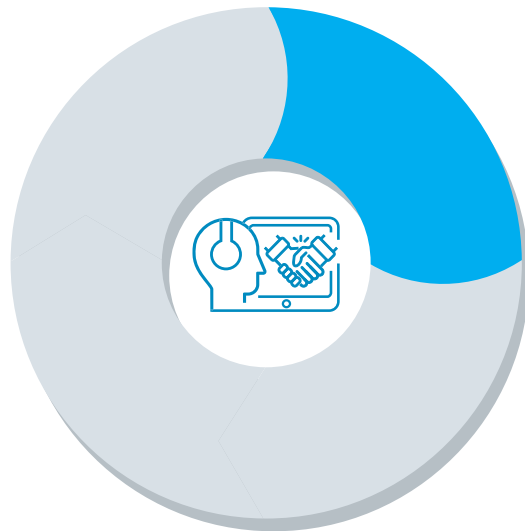
### The lecturer...

1. is able to monitor and support the students' learning process using formative and summative assessment, making effective use of IT;
2. is able to use IT to collect, analyse and report on student data, to understand and improve the students' learning process;
3. is able to use IT to provide timely and personalised supervision and support.

## Evaluating and modifying education

### The lecturer...

1. is able to evaluate and optimise their design for innovative education, making effective use of IT;
2. is able to reflect on the benefits of implementing IT in educational processes and modify its use accordingly;
3. is able to consider their own digital pedagogical-didactic conduct and adapt this to individual, institutional and societal needs.



## 2.2 Empowering students for a digital society

The second dimension in the framework concerns empowering students for living, learning and working in a digital society. The rapid changes taking place in society and the job market, and the accompanying technological developments, require students to acquire new IT competences, both as citizens and as future employees<sup>36,37</sup>. Developing the digital literacy of students is one of the ambitions of the Acceleration Zone, and is being worked on in the Strengthening Digital Human Capital zone.

### This is what the experts say about empowering students for a digital society:

The experts believe that 'empowering students for a digital society' should be included as a separate competence domain in the framework. However, not all lecturers are aware of the need to train students in digital literacy, for example to equip them for lifelong learning, employability and participation in society. Although some people believe that students are sufficiently digitally literate, and that it is the lecturers who can learn from the students, research shows that there are large differences in digital literacy between students.

The experts believe that it is important to identify which aspects can be influenced by lecturers, and which cannot. What, therefore, is the task of individual lecturers, and what is the responsibility of the team or the university as a whole? When applying the framework, the experts recommend distinguishing between the micro, meso and macro levels of the competences in this dimension.

Much attention is paid in the literature to the importance of developing the **digital literacy** of students **for living, learning and working**, and the role that lecturers in higher education can play in this. Lecturers need to create and implement learning activities that enable students to develop information, media and data literacy and computational thinking<sup>11,38-41</sup>. These could be activities that require students to find information and learning resources online and analyse and interpret the information and evaluate its reliability. They could also be activities that encourage students to create their own content or use IT to collaborate and communicate with others or solve problems using IT tools. Students should learn the safe and responsible use of IT, the benefits and risks of the internet and social media, and the rules and regulations governing copyright and the reuse of digital content<sup>5,42</sup>.

### This is what the experts say about competences for digital literacy for living, learning and working:

The experts recommend that attention is paid to the ethical aspects and the normativity of IT, as lecturers are continuously faced with issues such as constant availability, whether or not to switch the camera on, and so on. This also concerns the 'dark side' of the internet: weighing up the benefits of using IT versus the impact that it has on our private lives, the misuse that can be made of learning analytics, the implications of algorithms, and the privacy issues associated with big data.

Students need to be able to learn how to regulate their own learning process<sup>43</sup>, for example using IT tools to plan, follow, evaluate and record their learning process. Students also need to know how to make effective and responsible use of learning analytics, and to have the necessary self-regulation skills to be able to learn in a blended learning environment<sup>44</sup>. They need to be able to set goals, structure their learning environment, develop strategies, manage their time, seek help and evaluate their learning process.

Research shows that there are large differences in the digital literacy of students, particularly when it comes to using IT in their own learning process<sup>21,45</sup>. Lecturers should be aware of these differences and design the learning process so that students are able to develop these skills<sup>11,38-41</sup>.

Lecturers in higher education can be expected to contribute to the digital literacy of students for living, learning and working. This means they should also focus on the specific digital skills that students will need in their **profession or discipline**. Professions and professional activities will of course change with the further digitalisation of society, which means that future professionals will need to be able to develop the necessary competences to continue to train and retrain throughout their careers<sup>37</sup>. More attention should therefore be paid in higher education to the specific digital and soft skills required in a particular discipline<sup>37</sup>.

### This is what the experts say about digital literacy for the profession/ discipline:

The experts recommend making a distinction between generic digital literacy and digital literacy specific to a profession/discipline, which must be included in this framework. This currently receives insufficient attention in higher education although, according to the experts, it is crucial for ensuring alignment between education and the job market. As it also receives less attention in most of the other frameworks, this framework can distinguish itself in this area.

The IT tools that students should be familiar with and capable of using vary widely, depending on the profession/discipline. Furthermore, IT tools undergo continuous development<sup>37</sup>. Taking into account the usability and durability of the competences framework for lecturers, we focus here on the more general meta-cognitive skills that lecturers should be teaching students. For example, lecturers should support students in learning how IT tools are used in the profession/discipline, and teach them to critically assess the suitability of IT tools for the profession/discipline. The lecturer must be able to design learning activities that achieve these learning objectives, and Diaconu et al.<sup>38</sup> state that lecturers should align their use of IT with the future job market of their students. Because of the rapid changes taking place in society, the Digital Teaching Professional Framework also stresses the importance of empowering students with the competences that they need for continued employability<sup>35,37</sup>.

### This is what the experts say about competences for digital literacy for the profession/discipline:

Regarding the use of IT tools, the role of the student is often overly passive. Rather, university students should be expected to lead the way in the use of IT tools, to be able to distinguish useful from less useful tools, and to be able to creatively combine and modify IT tools, contributing to the development of the tools for the profession/discipline. This also concerns an effective component and attitude: encouraging a willingness among students to be an expert in and continue to develop their IT skills, which is crucial for their future employability.

Based on the above, we have developed the following lecturers' competences within the 'empowering students for a digital society' dimension. Appendix 2 provides an overview of other frameworks that include this dimension.

## Digital literacy for living, learning and working

### *The lecturer...*

1. is able to develop and implement learning activities to teach students digital literacy;
2. is able to guide students in making rational use of the internet and social media;
3. is able to teach students to effectively manage and protect personal data and learning analytics;
4. is able to guide students in the regulation and monitoring of their own learning process using IT.

## Digital literacy for the profession/discipline

### *The lecturer...*

1. is able to ensure that students are familiar with new technological developments in the profession/discipline;
2. is able to encourage students to actively contribute to technological innovations within the profession/discipline;
3. is able to help develop the digital communication skills of students to ensure continued employability.



### 2.3 Professional conduct as a lecturer

To be able to design, implement and evaluate innovative education for more personalised and flexible teaching<sup>6</sup>, lecturers need to continue to develop professionally<sup>16</sup>. Learning and innovation competences are important explanatory factors for the ability to develop education<sup>46</sup>, and these competences are therefore part of the professional skill set of lecturers<sup>47,48</sup>. The ability to keep up with technological developments both in society and in the relevant profession/discipline requires an inquisitive attitude and a readiness to share and collaborate with others. An ability to reflect on the own professional engagement and the role of IT in education are also essential components of this<sup>49</sup>.

The competences of the lecturer as a **learning professional** are often included in the 'professional conduct as a lecturer' dimension. The professional development of lecturers is therefore an important requirement for educational innovation<sup>50</sup>. Lecturers need to be able to continue to develop professionally in a manner that reflects the educational context and their own professional identity<sup>48</sup>. This starts with a vision: lecturers should develop their own vision on digital education, and stand behind this vision in order for it to be expressed in their teaching<sup>51</sup>. It is also important that lecturers work together with colleagues to develop a shared, well thought out vision and knowledge base that reflect the vision of the team, the degree programme and the university. For Almerich et al.,<sup>10</sup> this also means that lecturers should take part in research projects that focus on digital education. Lecturers therefore need to have an inquisitive and reflective attitude, apply scientific knowledge to their own teaching context, and reflect on the impact of innovation on the learning process.

#### This is what the experts say about competences for the learning professional:

Learning professionals should actively keep themselves informed of developments in IT in education, both in research and in practice, and familiarise themselves with, evaluate and implement these developments where relevant. It is important that lecturers are able to critically reflect on such developments and identify their advantages and disadvantages.

Because this concerns the competences of lecturers in the context of educational innovation using IT, competences relating to learning and **innovating using IT** are also important. This also means actively following developments in digital education and applying research results and best practices from the field<sup>52</sup>. These are named explicitly, as research carried out among lecturers in higher education shows that such competences cannot be taken for granted<sup>21,53</sup>. Lecturers therefore need to familiarise themselves with innovative practices by experimenting with them and reflecting on their possible benefits in their teaching. The idea that lecturers should be innovative in their use of IT is also supported by the literature<sup>10,17,18,54</sup>.

### This is what the experts say about competences for innovation using IT:

Crucial competences for both IT and education are: an interest in continuing professional development, an inquisitive attitude and a willingness to experiment, in particular because our knowledge of IT is constantly developing. This framework focuses on the competences of lecturers for digital education. Lecturers therefore need to be open to continued professional development and to new ideas and ways of doing things. Such an open attitude and willingness to experiment require courage: daring to experiment and innovate are crucial components of a lecturer's professional conduct. It is important for lecturers to be able to consider new perspectives on learning and critically evaluate change. To do this, lecturers must keep up to date of the latest developments in their profession/discipline.

Educational innovation using IT is a complex process that requires lecturers to critically reflect on and modify their ideas about digital education and their role within it. This can be stimulated by collaborating with other professionals who may have a different perspective on certain issues. Such collaborations create scope for innovation<sup>55,56</sup>.

**Communication and collaboration** with other professionals are identified by various authors in the literature as components of the digital competence of lecturers<sup>12-14</sup>. For example, lecturers should participate in online learning networks and be able to communicate online with the wider education community<sup>10,12,18,54</sup>. This is in keeping with other research that concludes that multidisciplinary collaboration is necessary to achieve educational innovation using IT<sup>8,57</sup>. A specific form of such collaboration is the design of digital education in multidisciplinary design teams, learning communities or communities of practice<sup>58-60</sup>.

### This is what the experts say about competences for communication and collaboration:

Lecturers should not just collaborate, experiment and share with their colleagues, but also with the wider professional field. Educational innovation with IT cannot be achieved alone, so lecturers need to invest in good relationships and collaborations with their team and the wider professional field, and be willing to learn from their students.

The experts emphasise that experimenting with and evaluating innovative digital educational practices should take place in a balanced and scientific manner. They therefore recommend that lecturers are supervised by or work together with researchers in this field.

Based on the above, we have formulated the following lecturers' competences for the 'professional conduct as a lecturer' dimension. Appendix 2 provides an overview of other frameworks that also include this dimension.

## The learning professional

### *The lecturer...*

1. is able to identify areas for personal professional development with relation to educational innovation with IT and to actively work on development in these areas;
2. is able to work with colleagues to develop a vision for innovative digital education and empowering students for a digital society that is aligned with the vision of the university;
3. is able to evaluate their own vision on innovative digital education and modify this based on research results, developments in society and educational practice.

## Innovation with IT

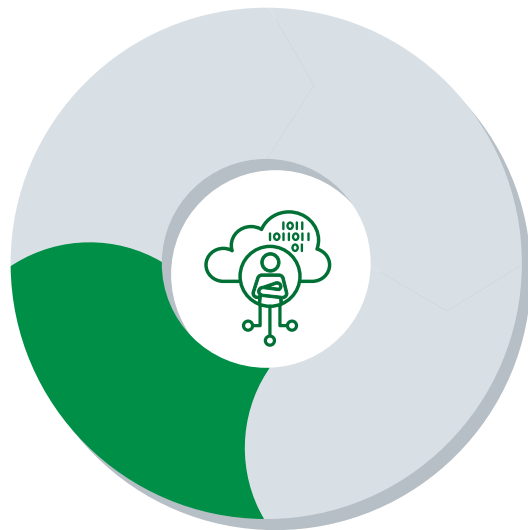
### *The lecturer...*

1. is able to analyse and critically evaluate innovative digital education practice and implement it in their own teaching practice;
2. actively follows innovative digital education practice in their profession/discipline and is able to critically reflect on the benefits of this for their own teaching practice;
3. is able to actively follow and experiment with developments in educational innovation with IT and discuss these with colleagues.

## Communication and collaboration

### The lecturer...

1. is able to collaborate in the design and evaluation of innovative digital education;
2. is able to participate in professional online networks or communities to strengthen professional ties relating to educational innovation with IT;
3. is able to use IT for communication with students, the university and others.



## 2.4 Digital literacy for lecturers

If they are to improve the digital literacy of students and design and implement educational innovation with IT, lecturers themselves also need to be digitally literate<sup>5</sup>. In this framework, therefore, the digital literacy of lecturers is described in parallel to the digital literacy of students. Research shows that the digital literacy of lecturers is directly related to the quality of their teaching using IT<sup>61,62</sup>. Lecturers who are unsure of their own digital competences consider themselves to be less skilled in using IT in the educational setting and less suited to teaching students in digital literacy, and are therefore less likely to use IT in their teaching. Digital literacy can therefore be regarded as a prerequisite for educational innovation with IT. The digital literacy of lecturers is also referred to as a separate competence in various frameworks (see Appendix 2).

### This is what the experts say about digital literacy for lecturers:

The experts recommend that explicit attention is paid to the digital literacy of lecturers. Although it can eventually be integrated into the competences for the other dimensions, lecturers are not necessarily digitally literate and able to use IT in their teaching.

According to the articles analysed in the literature study, **basic IT competences** are an essential component of the digital literacy of lecturers. Some authors are very specific about the types of applications and tools that lecturers should be able to use<sup>12,24,39,63</sup>. For example, Ardiç and Çiftçi<sup>24</sup> state that lecturers should have the following basic skills: word processing skills, spreadsheet skills, database skills, electronic presentation skills, internet navigation skills and graphic tools skills. As far as the framework is concerned, it is less important that lecturers are able to use specific IT tools, and more important that they know how to familiarise themselves with new tools<sup>5,64</sup>. Lecturers should be aware of the IT tools available in their field and their implications for their own teaching practice, so that they can identify which IT applications they need, based on their vision on digital education<sup>16</sup>.

The second subdimension named in the literature is the **information, media and data literacy** of lecturers. This means that lecturers are able to find information and digital content on the internet, process<sup>10,14,54</sup>, analyse and compare this information, and evaluate its reliability and trustworthiness<sup>65</sup>.

Lecturers, like students, must be able to critically evaluate the information that they find on the internet and social media<sup>42,66</sup>. They should therefore be able to critically assess the impact of social media on people's lives and of technology that is used to influence people, and be aware of the opportunities that these provide in education.

Lecturers also need to be more data literate because of the increasing availability of data about students and their environments (see Section 2.1). They therefore need the necessary competences to actively, creatively and critically use and understand large volumes of data<sup>12,67</sup>.

Lecturers in higher education sometimes use digital learning resources, which they adapt to their own purposes. They therefore need to be aware of the various licences and possibilities for reusing resources, to prevent copyright infringements<sup>68,69</sup>.

Finally, the literature on digital literacy increasingly references **computational thinking** as a relevant competence<sup>5,70</sup>. Lecturers need to know what computational thinking is and when it can be applied. This means that they are able to break down a complex problem into steps and processes that can be solved using IT and apply these solutions in the original (pedagogical) context<sup>70</sup>. Computational thinking is relevant in every field and profession<sup>71,72</sup>, making such skills increasingly important both for lecturers and students in higher education.

Based on the above, we have defined the following lecturers' competences within the 'digital literacy for lecturers' dimension. Appendix 2 provides an overview of other frameworks that also include this dimension.

### Basic IT competences

#### *The lecturer...*

1. is able to effectively implement IT in educational processes;
2. knows which IT tools are available or should be available in a certain context, and what their impacts are on the use of IT in the educational setting;
3. is able to select and quickly familiarise themselves with new IT tools, actively keep up with technological developments and experiment with new tools.

### Information, data and media literacy

#### *The lecturer...*

1. is able to find, analyse and interpret digital information and resources and evaluate their reliability;
2. takes a critical approach to the use of internet and social media;
3. understands the rules regarding copyright and plagiarism, the different types of licences and can properly cite digital resources;
4. is able to actively, creatively and critically use and understand data, and manage and protect the personal data of students.

### Computational thinking

#### *The lecturer...*

1. is able to formulate a problem in their profession or discipline in such a way that it can be solved using IT;
2. is able to develop a solution to a problem using IT;
3. is able to apply the solution in their profession or discipline.

## 3 In conclusion

Universities have the important task to prepare students to live, learn and work in a digital society. Lecturers working at universities are therefore expected to support students in the development of the necessary digital competences, and to act as a role model in this where possible. Lecturers are also increasingly expected to be able to implement IT to increase the flexibility of their teaching and to adapt their teaching to the individual needs of students.

This is a complex process and requires the development of specific skills. An important question is therefore which competences lecturers in higher education require in order to achieve this.

The Professional Development zone in the Acceleration Plan for Educational Innovation with IT has therefore commissioned the development of a competences framework for lecturers that focuses on educational innovation with IT. This framework has been developed based on a literature review, a comparison of existing frameworks, interviews with experts and validation sessions with educational professionals in higher education. The framework consists of competences in four main dimensions: designing, implementing and evaluating education; empowering students for a digital society; professional conduct as a lecturer; and digital literacy for lecturers. Each of these dimensions is further divided into subdimensions and the underlying competences. A generic approach was chosen, based on the literature and state-of-the-art knowledge on higher education in the Netherlands. This generic approach ensures that the framework is relevant and applicable to all higher education institutions, as well as all sectors and disciplines.

The interviews and validation sessions showed that the framework provides an effective, balanced and theoretically grounded overview of the competences that lecturers in higher education require in order to innovate their teaching using IT and to equip students to live, learn and work in a digital society.

#### What is the next step?

To translate this research into educational practice, additional steps are required that go beyond the scope of this research. Drawing from the interviews with experts and the validation sessions, the following focus areas can be identified for these follow-up steps.

Discussions with lecturers, IT professionals in education and policymakers highlighted the fact that they find it difficult to use the framework to develop a vision and strategy on

who should be able and willing to develop which competences, when and how. There is therefore a need for more concrete descriptions with practical examples, such as behavioural indicators that describe what exactly lecturers should know and be able and willing to do in order to master a certain competence. Providing concrete examples can also help the lecturer to place the framework in their specific educational context. A first step towards achieving this could therefore be to translate the framework into behavioural indicators for newly qualified lecturers.

What should newly qualified lecturers know and be able and willing to do in terms of digital education? Based on this, the implications can be identified for professional development programmes for newly qualified lecturers, such as the basic qualification of teaching competence (BDB) and the basic teaching qualification (BKO), as well as for other follow-up programmes.

Both the experts and the education professionals would therefore like more examples of what the competences will look like in practice, and tools or guidelines to integrate the framework into the university's professional development policy.

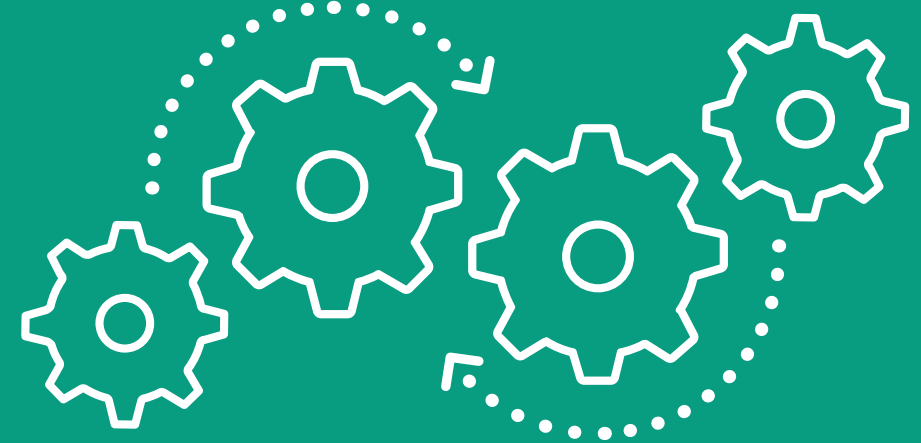
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## Appendix 1

### Consulted experts

#### Experts in the field

- Erik Barendsen, Professor of Science Education Research, Radboud University
- Jeroen Bottema, senior researcher in Teaching, Learning & Technology, Inholland University of Applied Sciences
- Bert Bredeweg, Professor of Science and Mathematics Education, Amsterdam University of Applied Sciences
- Gerton Cazemier, senior researcher in Teaching, Learning & Technology, Inholland University of Applied Sciences
- Barend Last, Specialist Blended Learning, Maastricht University
- Jeroen van Merriënboer, Professor of Educational Development & Research, Maastricht University
- Fleur Prinsen, Professor of Digital Didactics, Rotterdam University of Applied Sciences
- Robert Schuwer, Professor of Open Educational Resources, Fontys University of Applied Sciences
- Jan Vermunt, Professor of Learning and Educational Innovation, Eindhoven University of Technology, Eindhoven School of Education
- Joke Voogt, Emeritus Professor of Educational Sciences, University of Amsterdam
- Brenda Vos, education adviser, Acceleration Plan

#### Policymakers

- Nieke Campagne, policy adviser for education, VSNU
- Johanna de Groot, Acceleration Plan programme manager and strategic project manager, SURF
- Juriaan van Kan, senior policy adviser for higher education & student grants, Ministry of Education, Culture and Science
- Jaap Mulder, coordinator staff development higher education, University of Groningen
- Josephine Verstappen, policy adviser for educational innovation, VSNU

#### The supervisory committee

- Wim Berkers, senior HR policy adviser, Inholland University of Applied Sciences
- Wieteke Boulogne, Professional Development zone project leader, Acceleration Plan
- Marian Kat-de Jong, Professional Development zone coordinator, Acceleration Plan, education team coordinator, Avans University of Applied Sciences
- Christine Kemmeren, Professional Development zone member, Acceleration Plan, researcher/senior lecturer, Saxion University of Applied Sciences
- Caroline van de Molen, Strengthening Human Capital zone project leader, Acceleration Plan, Dean, Saxion University of Applied Sciences
- Kim Schildkamp, Professional Development zone project leader, Acceleration Plan, professor of data-informed decision making for learning and development, University of Twente
- Ronald Spruit, Professional Development zone project leader, Acceleration Plan, Learning and Innovating adviser, Avans University of Applied Sciences
- Josephine Verstappen, policy adviser for educational innovation, VSNU

## Appendix 2

### Comparison between this framework and existing frameworks

Main dimension	Subdimension	DigComp-Edu <sup>18</sup>	iXperium Competentieset Leren en Lesgeven met ICT <sup>31</sup>	Digital Teaching Professional Framework <sup>35</sup>	JISC <sup>64</sup>	ISTE <sup>17</sup>	UNESCO <sup>73</sup>
Designing, implementing and evaluating education	Designing and implementing innovative digital education	●	●	●	●	●	●
	Facilitating and monitoring learning	●	●	●	●	●	
	Evaluating and modifying education	●	●	●	●	●	
Empowering students for a digital society	Digital literacy for living, learning and working	●	●	●	●	●	
	Digital literacy for the profession/discipline			●			
Professional conduct as an lecturer	The learning professional	●	●	●	●	●	●
	Innovation with IT	●	●	●	●	●	
	Communication and collaboration	●	●	●	●	●	
Digital literacy for lecturers	Basic IT competences		●	●	●	●	●
	Information, data and media literacy	●	●	●	●		
	Computational thinking		●				



*The Acceleration Plan for Educational Innovation with ICT is a four-year programme focused on bringing initiatives, knowledge, and experiences for digitalisation together. The programme is an initiative of SURF, the Netherlands Association of Universities of Applied Sciences, and the Association of Universities, and is organised in eight acceleration zones. In the zone Facilitating professional development for lecturers, 16 institutions are working on improving the professional development of lecturers in Dutch higher education.*



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