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Leading Digital Educational Transformation

A Competency Framework

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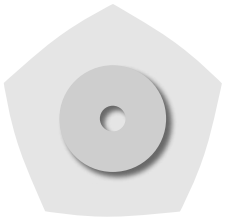


Introduction

Educational institutions in secondary vocational education and training (VET) and higher professional education (HE) face significant challenges. Collaboration with and alignment to the labour market need improvement, the need for flexible educational pathways that match various stages of a learning journey and life course is growing, and it is increasingly crucial to offer customised learning experiences, promote equal opportunities and develop students' digital literacy (see e.g. Diercks et al., 2021; Lemmens & Diercks, 2022; Tondeur et al., 2023; Van Amersfoort et al., 2021). In some cases, technological development is the immediate cause of the challenges facing education. Technological developments often progress so rapidly that education must continuously innovate (McCarthy et al., 2023). At the same time, technology can offer solutions to these challenges (see e.g. Tondeur et al., 2023; Van Loon et al., 2018). Technology can enable learning pathways that would not be possible otherwise, such as when students learn to guide their own learning processes through targeted support (Herrington & Parker, 2013). Improving education by repeating previously proved approaches is no longer a guarantee for success, as societal circumstances and technological opportunities have changed. Thus, systematic educational transformation is vital – with technology playing a key role.

In digital transformation, existing processes are fundamentally reorganised. Technology adds new value and leads to new working processes. Transformation goes beyond innovation: while digital innovation involves applying and implementing new resources and processes within existing contexts (Hinings et al., 2018), digital transformation goes further than that. It brings about (partially) new actors, relationships between those actors, structures, values and work processes. This has far-reaching consequences for cooperation within the organisation and external interactions (Hinings et al., 2018, p. 53).

In the educational context, digital transformation focuses on redesigning how people, data and processes collaborate to create better, technologyrich learning environments and ensure preparedness for future challenges and innovations (McCarthy et al., 2023). This redesign also affects the underlying pedagogy (Ertmer & OttenbreitLeftwich, 2013). It is crucial that students acquire the necessary skills to use technology intelligently and effectively. Digital transformation is not driven by technology itself, but by strategic organisational choices (Kane et al., 2015). Research by the Dutch Education Council indicates that educational institutions across all sectors struggle to integrate technology effectively into education in a way that is well thought out (Onderwijsraad, 2017). Purposefully deploying technology to achieve true educational transformation remains a major challenge.

Facilitating digital transformation increases the complexity of leadership tasks (Håkansson Lindqvist & Pettersson, 2019). Transformation occurs within a complex ecosystem involving diverse actors and factors (also called actants) with varying features, connections and behaviours that mutually influence each other (Latour, 2011; Van Loon et al., 2018). Actors include lecturers, students, leaders, support staff and the professional field. Factors include vision, physical infrastructure, ICT facilities, resources and assessment systems.

The success of digital transformation depends heavily on the people operating within the ecosystem. In tackling major societal challenges, such as inclusion or flexible learning, transformation cannot be imposed from the top down. Effective digital transformation demands a coherent set of bottomup initiatives and topdown policies, where innovations are interconnected and policies have broad support and lasting impact (Hargreaves, 2023). It calls for 'leader ship from the middle', aligning with the concept of shared or distributed leadership. There is a shared responsibility within organisations, with multiple individuals taking up leadership based on expertise, experience and affinity with specific topics (see e.g. Amels et al., 2021). Digital transformation will not succeed if only executives or managers bear full responsibility. The wider environment and teams them selves must be an integral part of the process (Vermaak, 2009).

Leadership is a social process in which one or more individuals influence others towards achieving a specific goal within complex social structures (Wallo, 2008). In such a complex context, where leadership cannot be entrusted to a single person, it is unproductive to define competences for individual leaders alone. Instead, this document addresses competences for leading digital transformation – intended for anyone in VET and HE who plays a leader ship role in ICTbased educational innovation and digital transformation. This includes not only programme direc-

tors, executives, and managers but also staff directors, team leaders, programme managers and even lecturers or support staff with informal leadership roles.

There is sufficient reason to describe the competences needed to lead ICTbased educational innovation and digital transformation effectively within the complex ecosystem of education, especially VET and HE. Although literature exists on specific aspects of this theme, such as educational innovation, digital educational transformation, leadership competences in education, and digitalisation in VET and HE, an overarching competency framework that integrates these aspects was lacking. The International Society for Technology in Education (ISTE) has developed 'ISTE Standards for Education Leaders' (2018), which describes the behaviour and knowledge that leaders need to enhance the implementation of ISTE standards among students and teachers (2016, 2017). However, these standards are not fully developed for the VET and HE context.

Frameworks by Jisc (focusing on higher education; Jisc, 2023) and the European Framework for Digitally Competent Educational Organisations (DigCompOrg) (Kampylis et al., 2015) target digital transformation in education but mainly describe organisational embedding, while paying less attention to (individual) leadership competences.

iXperium Centre of Expertise Teaching and Learning with ICT (hereafter: iXperium) developed a competency set for leading ICT and education in primary and secondary education (Coetsier et al., 2016), but this needs updating and contextual adaptation for VET and HE.

The aim of this study is therefore to develop a competency framework for leading digital transformation in VET and HE that is aligned with current insights and sources on leadership and digital transformation. The two central research questions are:

- Which components for a competency framework for leading digital educational transformation can be identified based on the literature and expertise in educational practice?
- Which competences can be linked to these components?

We first discuss the research design, then outline the identified components and corresponding competences and conclude with reflections on implementing the framework.

1. Research Design

We built on the existing competency set for school leaders in primary and secondary education to develop the competency framework for leading digital transformation VET and HE (Van Loon & Kral, 2016). We examined the extent to which this set of competencies fits the VET and HE context and what additions are needed, then updated the competences accordingly. Three research instruments were used: a comparison of the existing competency set with other relevant frameworks, a literature review and conversations with content experts, policymakers and educational professionals from VET and HE.

First, an inventory was made of existing frameworks related to organising and leading educational innovation with ICT and digital educational transformation. The components of these frameworks – such as target groups, (sub)dimensions and competences – were analysed. In addition, the sources on which these frameworks are based were also used as a starting point for the subsequent literature review. The following frameworks were compared:

- Competenties Leidinggeven aan onderwijs en ICT, developed by iXperium (Coetsier et al., 2016);
- ISTE standards for educational leaders (International
- Society for Technology in Education, 2018);
- Jisc Framework for digital transformation in higher education (Jisc, 2023);
- Theoretische en praktische inzichten rondom leiderschap in onderwijsinnovatie met ICT by Versnellingsplan Onderwijsinnovatie met ICT (Post et al., 2022);
- European Framework for Digitally Competent Educational Organisations (DigCompOrg) (Kampylis et al., 2015).

Several search terms were used for the additional literature review that combined three core themes: search terms for ICT/technology, for educational innovation/digital (education) transformation and search terms regarding leadership/leadership roles. The search focused on recent sources in English and Dutch (from 2018 onwards) covering at least two of the themes mentioned. The results of the literature review and the comparison of frameworks formed the basis for a preliminary model of competences for leading educational digital transformation.

While designing the initial model, several key principles were applied, partly derived from the literature study and partly based on partners' needs, to create a framework that fits the needs of VET and HE:

- The central theme is leading digital educational transformation in the context of VET and HE;
- The competency framework should be recognisable,
- clear and useful for the education context;
- The framework should provide starting points for reflection and development of leadership;
- It should be a generic framework that allows competences to be tailored to specific educational contexts;
- It should explicitly address current developments affecting digital educational transformation and ICTdriven educational innovation, such as flexibilisation, blended learning, customisation, inclusion, equipping students for the digital society and better alignment with the labour market;
- It must emphasise organisational redesign and empowering educational professionals for their roles in digital transformation.

The preliminary model was presented to experts and practitioners engaged with leadership in educational innovations (see Appendix 1). They provided input based on their expertise and sometimes suggested additional literature, which was included in the further development of the framework. Iterative sessions with various network partners and leaders explored the model's recognisability and practical usability. These sessions provided recommendations for refining the dimensions and competences and for practical application of the framework. We present the final framework and its underlying competences in the following sections of this report.

2. The Framework for Leading Digital Transformation in Education

Digital transformation requires creating frameworks that provide direction but also leave space to respond flexibly to unforeseen (technological) developments as they arise. Leaders play an important role by creating a shared vision that corresponds with future oriented education (Leithwood & Sun, 2012). The success of educational innovations depends largely on leaders' ability to develop a strategy that supports this transformation, is adjusted iteratively and provides room for professionals' autonomy (McCarthy et al., 2023).

To realise this strategy, it is crucial that leaders foster an organisation and culture that are in line with the vision for digital transformation in education (Petri & Zuylen, 2011). Leading change means not only transforming systems but also changing the mindset and roles of the people operating within those systems (Creasey, 2018). An organisation only changes when the people within it change (Vanlommel et al., 2023).

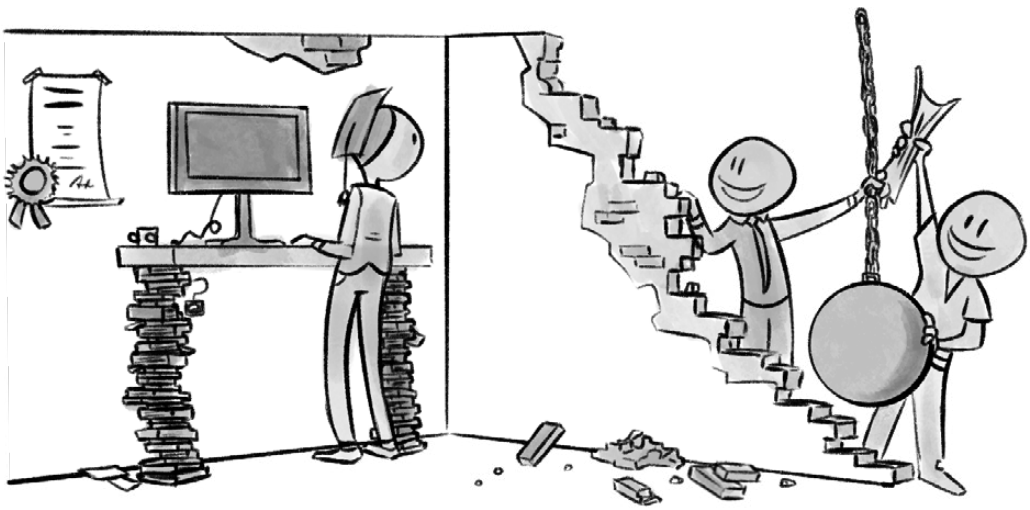
Changing people's mindsets across different levels within the organisation requires a shift towards an agile and innovative organisation (Kane et al., 2015) with a learning culture in which (teams of) teachers take ownership of educational content and actively seek innovative applications in education (Platform Onderwijs2032, 2016; Schiller, 2003). Although leaders play a key role in fostering this kind of learning culture (Coetsier et al., 2016; Hopsterden Otter et al., 2020; Jisc, 2023; Moolenaar et al., 2010; Postholm, 2012; Vermeulen et al., 2022), this culture cannot be imposed from above: It must emerge from within the organisation itself (Hargreaves, 2023).

Transformational leadership is crucial for stimulating a learning culture (Kral et al., 2019; Leithwood & Sun, 2012). This is also referred to as 'transformative learning' or 'transformative leadership'. In this study, we use the term transformational leadership, meaning: 'Transformational leaders inspire others to be creative and innovative and to develop new solutions; they are able to enthuse others to embrace a shared vision' (Paffen, 2011).

Digital transformation also means redesigning the organisation. Leaders must align what is necessary for digital educational transformation with the existing organisation. This cannot happen overnight: It requires room for innovation outside the existing system to facilitate and encourage people to think and work differently (Christensen et al., 2011; Engeström, 2011; Krijgsman et al., 2022). This gives rise to new practices and new ways of thinking that better fit the new direction the organisation wishes to pursue.

It also demands strategic partnerships, both internal and external, that focus on identifying innovations that can be scaled up and that address the issue of how organisational barriers can be overcome.

Leaders also need to be digitally literate themselves (Kral et al., 2019), enabling them to act as role models for their colleagues (Hopsterden Otter et al., 2020; Moolenaar et al., 2010), thereby increasing the chances of successful digital transformation (Cohen et al., 2019). Digital skills also empower leaders to use information and data effectively to identify areas for educational and organisational improvement (Jisc, 2023; Kral et al., 2019).



Digital educational transformation brings paradoxes and tensions (Hargreaves, 2023; Vanlommel et al., 2023). As a result, leadership agility – the ability to analyse the context, recognise people's needs and adapt leadership strategies accordingly – is essential (Visser, 2024). Leaders must maintain a learning attitude to ensure that they stay informed about new developments in educational innovation and in technology, dare to experiment, monitor relevant research findings and adopt a continuous learning approach (International Society for Technology in Education, 2018; Jisc, 2023; Kral et al., 2019; Post et al., 2022).
From the preceding, five core dimensions can be distinguished for the competency framework for leading digital transformation in education:

1. Setting a direction for digital educational transformation;
2. Fostering an innovative learning culture;
3. Redesigning the organisation for digital transformation;
4. Digital literacy;
5. Professional conduct.

These dimensions (as seen in figure 1) are strongly inter connected. The direction of transformation (1) determines the focus of the learning culture (2) and what organisational changes (3) are required in order to achieve the set ambitions. The learning culture (2) necessary for digital transformation is closely tied to the reorganisation of the institution (3) and developments in these dimensions also provide grounds for revising the vision and direction. Finally the personal skills and professional behaviour of leaders (4 and 5) are essential to succeed in the first three dimensions.
The framework was initially developed for VET and HE, but it is most likely also applicable to other education sectors. Although the framework offers no guarantee for successful digital educational transformation, applying the described leadership practices significantly increases the likelihood of success. In the next chapters, each of the five main dimensions and their associated competences will be described in more detail.

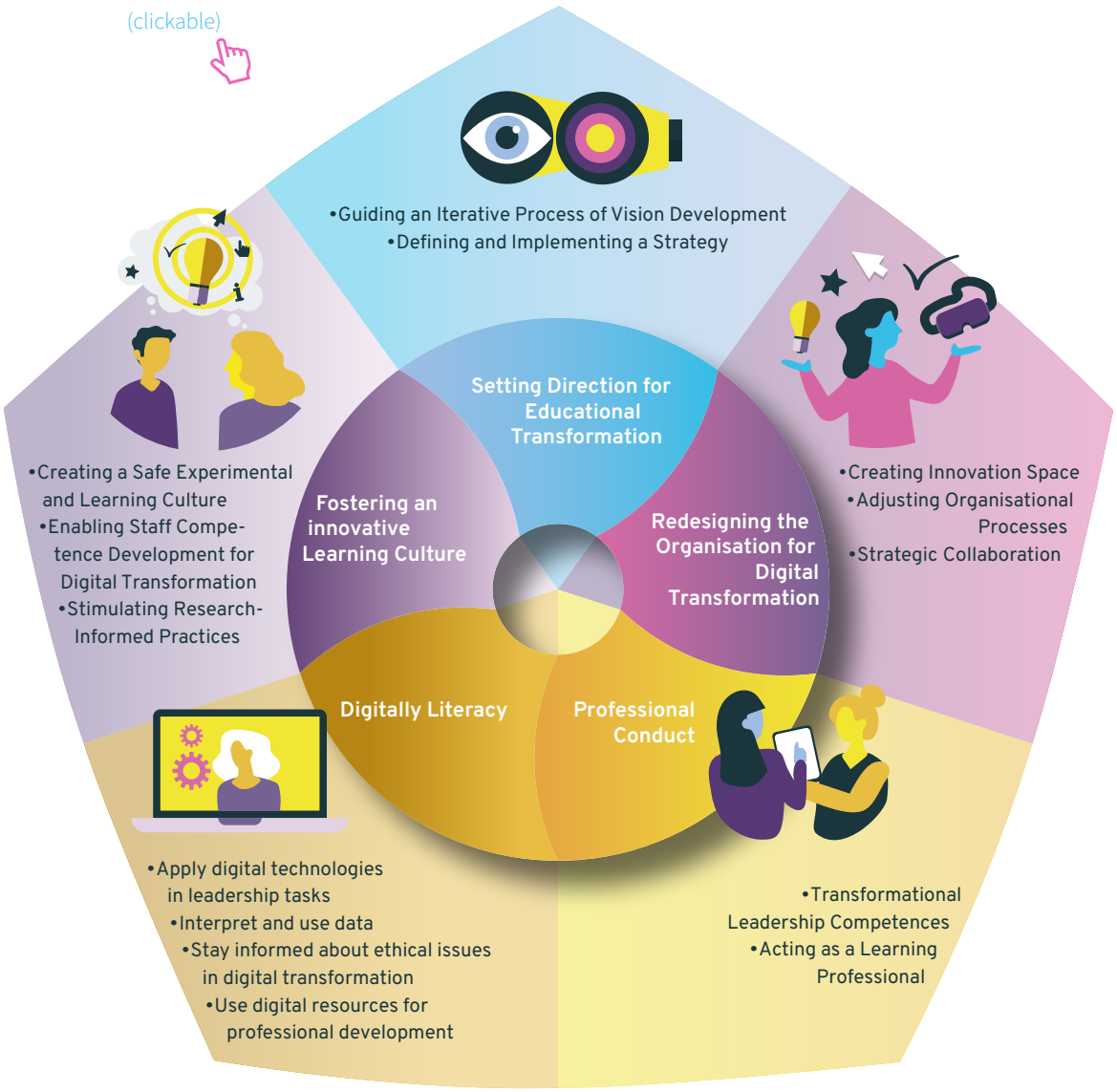


Figure 1. The Framework for Leading Digital Transformation in Education

2.1 Dimension: Setting Direction for Digital Educational Transformation

Educational innovation with ICT, particularly digital trans formation, demands idealistic and creative leadership (Feehan et al., 2019). Leaders need a clear understanding of the challenges VET and HE face and how these challenges should influence the institution's direction (Tabrizi et al., 2019). Various sources emphasise the crucial role of leaders in setting direction, taking into account all relevant actors and factors and their interactions within the ecosystem (see e.g. International Society for Technology in Education, 2018; Jisc, 2023; Leithwood & Sun, 2012).

A key competence for providing direction is **guiding an iterative process of vision development** (Kruschwitz, 2016). This includes developing both a general educational vision as well as a specific vision on the role of ICT in education (Vanderlinde et al., 2012). Building support and ownership among internal and external stakeholders is vital (Kennewell et al., 2000; Leithwood & Sun, 2012). Involving stakeholders in the vision development process helps them to understand, endorse and feel responsible for the digital educational transformation. Effectively communicating the necessity and structure of the envisioned change is equally important: Organisations that do this successfully are three times more likely to achieve transformation (McKinsey & Company, 2018). Within education, linking the necessity of change to longterm goals and student learning outcomes can enhance motivation for transformation (Schleicher, 2018).

When forming a vision, it is crucial to consider the values and beliefs of all participants and to involve both internal (institutional) and external (societal) perspectives (Boonstra, 2014). It is also important to anticipate technological, educational and societal trends to ensure futureproof education (Jisc, 2023). The vision should describe how the education system will prepare students for life, learning and work in a digital society, with explicit attention to inclusion and ethical considerations (Uerz et al., 2021). This requires rethinking curricula and content (Kampylis et al., 2015) and crafting a considered vision on how technology can genuinely enhance student learning (International Society for Technology in Education, 2018).

A strong vision for digital transformation should also address questions such as 'what work methods will be adopted?' and 'what roles will students and staff have?' (Kampylis et al., 2015; Van Loon et al., 2018). The vision must be developed iteratively, monitored regularly and refined when necessary (Boonstra, 2014). Successful vision development is not a oneoff event; it evolves over time through experimentation with new forms of education and the evaluation of realworld results and experiences (Onderwijsraad, 2017).

Defining and implementing a strategy to realise the vision forms the second key element in effectively guiding vision development (see e.g. McCarthy et al., 2023). Krijgsman and colleagues (2022) refer to this as a theory of improvement: a vision of how changes within the educational context can be successfully implemented.
This supports the shift towards a learning culture focused on continuous renewal. It is important to adopt a structured approach that clearly describes how staff competence development will be stimulated, how the change will be implemented and within what time frame, how various initiatives will be scaled up and embedded, and what success indicators will be used (McCarthy et al., 2023; McKinsey & Company, 2018). An institutionwide strategy, supported by adequate resources, enhances the likelihood of successful transformation more than isolated improvements (Fæste et al., 2019). By making the strategy explicit, it becomes a topic for dialogue among all stake holders, thus contributing to a shared understanding of how the innovation process should be structured (Krijgsman et al., 2022). Developing a vision and determining the strategy is an ongoing, iterative development process in which vision and strategy are regularly evaluated and adjusted where necessary (Coetsier et al., 2016; International Society for Technology in Education, 2018). This requires new, appropriate ways of evaluating progress on the strategic plan (Fæste et al., 2019). In the interviews we conducted, leaders also emphasised the importance of maintaining momentum in this process, linking the strategy for digital educational transformation to other strategic goals and addressing them by adopting an integrated approach.

Based on the above, we arrive at the following competences for the dimension 'Setting a Direction for Digital Educational Transformation':

Guiding an Iterative Process of Vision Development

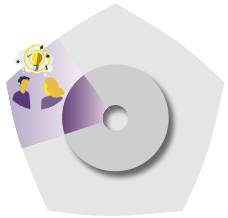
Leaders are able to:

- guide an iterative process of creating, evaluating, and adjusting a vision for digital educational transformation and the development of students' digital literacy;
- systematically consider the consequences of (future) technological, educational and societal trends during vision development;
- actively involve internal and external stakeholders (such as support services, lecturers, students, parents, partners and the professional field) in drafting, evaluating and adjusting the vision and use their input;
- communicate clearly about the necessity and design of the intended digital transformation.

Defining and Implementing a Strategy

Leaders are able to:

- guide an iterative process of developing, executing, evaluating and adjusting an institution-wide strategy for digital educational transformation;
- facilitate dialogue among all relevant internal and external stakeholders about the digital transformation strategy;
- link the digital transformation strategy to other strategic goals and address them by adopting an integrated approach;
- translate the digital transformation strategy into concrete actions (such as strengthening organisational culture and adaptation structures), into essential preconditions (including resources, support and professional development) and into clearly defined outcomes or success indicators.



2.2 Dimension: Fostering an Innovative Learning Culture

Achieving sustainable transformation in VET and HE requires creating a learning culture aimed at continuous renewal (Krijgsman et al., 2022). Such a culture enables continuous adaptation of education based on societal and technological developments and new insights from the evaluation of educational innovations and experiments.

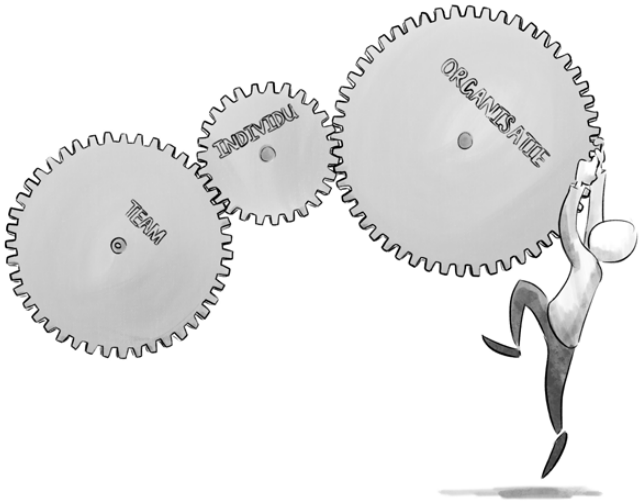
Leadership plays a crucial role in shaping and maintaining **a safe experimental and learning culture** centred on innovative educational practices making effective use of ICT and fostering students' digital literacy (Fullan, 2001; Kral et al., 2019; OECD, 2015). An open learning culture is characterised by learning with and from each other, openness to feedback and new ideas, having the courage to experiment, viewing mistakes as learning opportunities and making successes visible (Hopsterden Otter et al., 2020; Keane et al., 2020; Krijgsman et al., 2022; Leithwood & Sun, 2012). Trust and psychological safety are crucial prerequisites (Edmondson, 2019; Vangen & Huxham, 2003). These cannot be imposed from the top down but require transparency and leadership 'from the middle' (Hargreaves, 2023). Relational and collaborative leadership requires that leaders remain open to new ways of working and encourage others to do the same (Snoeren, 2021). Transformational leaders are leaders who inspire and motivate people, intellectually stimulate them, show genuine personal involvement and attract followers through their personal charisma (Paffen, 2011, p.49). Handling resistance to change effectively is also a key leadership skill (Henderikx & Stoffers, 2023).

A learning culture thrives when departments collaborate rather than work in isolation, sharing experiences and insights (Keane et al., 2020; Leithwood & Sun, 2012). Emphasising inclusion, diversity and dialogue, and encouraging interdisciplinary or crossboundary collaboration are crucial (Akkerman & Bruining, 2016; Engeström, 2011). Interdisciplinary collaboration integrates diverse perspectives, stimulates critical reflection and enables transformative learning (Akkerman & Bakker, 2011; Miedema & Stam, 2008; Schildkamp et al., 2021).

Creating a safe, inclusive digital learning environment also requires attention to ethical issues such as equal opportunities in digitalisation, privacy and information security (European Agency for Special Needs and Inclusive Education, 2022; Onderwijsraad, 2022; Vuorikari et al., 2022).

Another essential element of an innovative learning culture is **enabling the ongoing professional development of staff** (Joostenten Brinke, 2021; Koster et al., 2020; Krijgsman et al., 2022). Leaders play a key role in encouraging the professional development of their staff (Schildkamp et al., 2021; Schrum et al., 2011; van Loon & Kral, 2016). This increases lecturers' willingness to innovate in their teaching practices and to use ICT effectively (Geijsel et al., 2009; Tondeur et al., 2008). Recognising, valuing and assessing competence development is also an important part of lifelong learning (Joostenten Brinke, 2021).

Research shows that both the use of ICT and the feeling of being competent in using ICT in education decline when staff do not or rarely participate in professional development in this area (Kurver et al., 2023) – in other words: stagnation equals regression. The competences of lecturers to apply ICT in education effectively and to prepare students for digital literacy in life, learning and work should be seen as a shared responsibility between leaders and lecturers (SkantzÅberg et al., 2022; Uerz et al., 2021).



That is why it is important that leaders continuously encourage staff to keep developing professionally. This requires striking a balance between reducing the voluntary nature of professional development and respecting staff autonomy, while acknowledging individual differences. Research into behaviours associated with transformational leadership shows that such leaders set high expectations for staff professionalism and competence, encourage staff to reflect on and adapt their practices, and pay attention to individual professional growth (Leithwood & Sun, 2012).

An innovative, learning culture is also characterised by **research-informed practices** aimed at improving teaching and student learning (Ros et al., 2020; Snoeren, 2021). Data and insights from educational processes are used to evaluate and, where necessary, adapt educational practices, curricula and professional development initiatives for staff (Kral et al., 2019; Post et al., 2022). According to Brown, Schildkamp, and Hubers (2017), it is important to combine databased decision-making (where data from various sources are used to improve teaching, curricula and school performance) with researchinformed educational improvement (where teachers use research findings to enhance their teaching in combination with their professional expertise and contextual knowledge). Leaders play a crucial role in promoting researchinformed practices among lecturers (Kral et al., 2019). They are also expected to engage in researchinformed and datadriven practices themselves, thus serving as role models in line with the dimensions 'Digital literacy' and 'Professional Conduct'.

Based on the above, we arrive at the following competences for the dimension 'Fostering an Innovative Learning Culture':

Creating a Safe Experimental and Learning Culture

Leaders are able to:

- inspire, motivate and intellectually stimulate staff and teams to experiment with and explore innovative uses of education and ICT;
- foster internal and external multidisciplinary, cross boundary collaborations, knowledge sharing and knowledge creation aimed at developing innovative educational practices and strengthening student digital literacy;
- create an open, safe and inclusive learning culture;
- manage and safeguard an inclusive experimental and learning culture that encourages innovation while complying with legal, ethical and ICT safety standards;
- encourage staff to engage in dialogue, provide feedback and reflect collectively on digital transformation and the development of students' digital literacy;
- respond constructively to resistance to digital transformation by modelling desired behaviours, investing in professional development, fostering engagement and stimulating a culture of continuous improvement and innovation.

Enabling Staff Competence Development for Digital Transformation

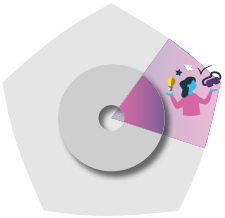
Leaders are able to:

- set clear expectations for staff development in innovative educational practices involving ICT and in fostering students' digital literacy;
- continuously stimulate and effectively facilitate the professional development of staff by providing time, space and support;
- value and constructively assess the development of staff members;
- attach positive or negative consequences to staff development related to digital transformation;
- acknowledge differences in needs, capacities and interests among staff regarding their competence development.

Stimulating Research-Informed Practices

Leaders are able to:

- inspire, motivate and equip staff to evaluate educational innovations with ICT based on data, draw meaningful conclusions and translate them into educational practice;
- encourage staff to link insights from (scientific) research to their own professional knowledge and use these insights to improve teaching and student learning.



2.3 Dimension: Redesigning the Organisation for Digital Transformation

The success of educational innovations – particularly digital transformation – is significantly influenced by the structure of the (educational) organisation, an aspect that is often underestimated (Vanlommel et al., 2023). Education can be seen as a system that must evolve to make innovation and transformation possible. Individual learning is closely intertwined with the development of innovative knowledge and practices (see e.g. Akkerman & Van Eijck, 2013). Engeström's CulturalHistorical Activity Theory (CHAT) (Engeström et al., 1999; Engeström, 2011) builds on this systemic perspective and emphasises the importance of a culture that encourages experimentation, risk-taking and creative thinking. According to CHAT, organisations are unstable systems in which ongoing innovation and adaptation are essential. The focus is not on the development of an individual within a single system, but rather on learning through engagement across multiple systems simultaneously. Learning can then be seen as a process of boundary experiences – that is, of transitions between and within systems.

In the context of digital educational transformation, this means that **innovation space** must be created outside the existing system. This space invites people to think and work differently (Christensen et al., 2011; Krijgsman et al., 2022). This separate innovation space is necessary because expecting innovative behaviour while the organisation is not designed to support it can lead to 'innovation fatigue' or resistance to change and innovation (Willermark et al., 2024). Engeström and colleagues refer to this innovation space as a Change Lab – an environment in which (education) professionals take a step back from their daily practice, analyse it collectively, and develop and test new working methods (Kerosuo et al., 2010). Examples include redesigning work processes, experimenting with new forms of teaching or creating a learning community around a specific theme (Gallagher et al., 2010; Mittendorff et al., 2006). Innovation space refers not only to a physical space (Change Lab) to experiment, but also to the allocation of time, flexibility in timetables, revised job descriptions, and tailored support, so that staff can be facilitated in appropriate ways. Additionally, it is important to foster a collaborative culture, as described in the previous dimension. Building on this, it is essential to create and facilitate processes and structures that enable and promote multidisciplinary or crosssystem collaboration.

This can include, for example, professional learning communities, communities of practice, social networks (van den Berg & Scheeren, 2021) and design teams (Hulsen et al., 2021). Multidisciplinary collaboration can also be supported and made visible in the physical space – for instance, through shared meeting rooms or the layout of workspaces. According to CHAT, a nontraditional setting that breathes innovation helps people detach from their own system, at least temporarily, and opens the way for learning and new behaviour (Engeström, 2011; Engeström et al., 1999).

It is important, then, that the experiences and knowledge gained in the innovation space are translated to the wider organisation. This must occur step-by-step; transformation processes should be gradually scaled up, and lessons should be drawn from experiences with small-scale innovations (Krijgsman et al., 2022). To ensure sustainable transformation, more and more colleagues must become – and want to become – involved. Leveraging internal and external networks, including professional field partners, can help broaden this involvement. Experiments from the innovation space can be evaluated to jointly determine which innovations should be scaled up.

Scaling innovations requires **adjusting organisational processes** so that the broader organisation evolves alongside newly emerging practices. This may cause tension between the processes and ideas developed in the innovation space and those of the wider organisation where these innovations must be implemented (Kerosuo et al., 2010). A systemic perspective is needed to deal constructively with such tensions. The educational organisation can be seen as an interconnected network of actors and factors (actants), each with distinct features, connections and behaviours that mutually influence one another (see figure 2; Latour, 2011; Van Loon et al., 2018).

For transformation in education, it is crucial that leaders understand how these actants interact – and that when one actant changes, others may need to change as well. For instance, policy decisions at the institutional level cannot be made without considering necessary changes in support services, such as the IT helpdesk. Developments, new insights and initiatives that arise in the innovation space can offer lessons to identify which actants obstruct innovation and therefore require attention. It is also essential to

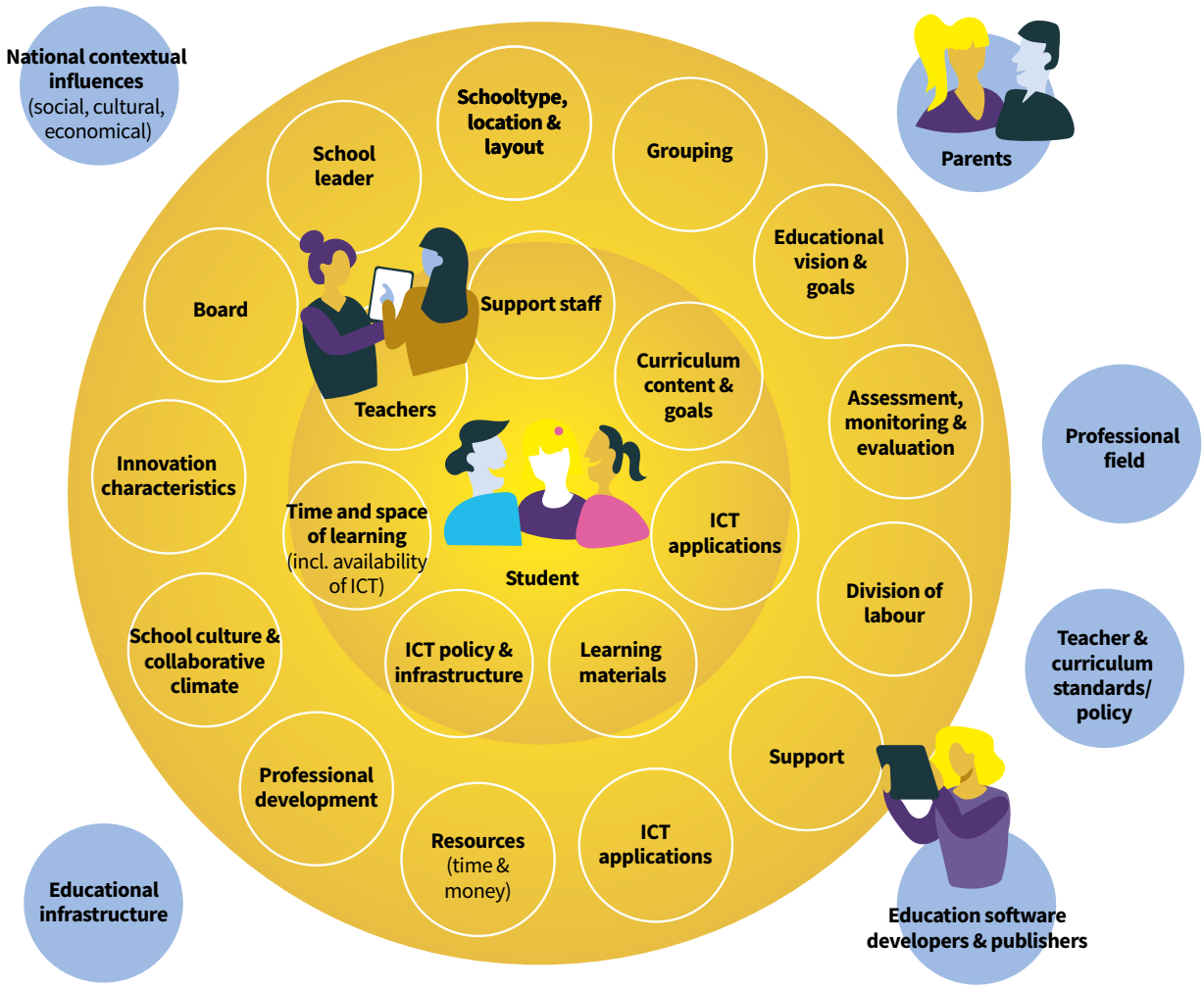


Figure 2. Network of Actors and Factors that Contribute to the Organisation of Personalised Learning (Van Loon et al., 2018).

use data from various sources to make informed decisions (Brown et al., 2017) and to ensure improvements are measurable (McCarthy et al., 2023).

One example of a systemlevel factor that must be reconsidered when scaling and implementing innovations is the organisation's HR policy.
In a learning culture, it is crucial that staff competence development is stimulated, recognised and valued (see e.g. Kennisrotonde, 2024). This has implications for policy and organisational structures. As also described in the dimension 'Fostering an Innovative Learning Culture', the voluntary nature of professional development in ICT for education must be eliminated, as competence levels will otherwise decline. This external encouragement must, of course, be aligned with the intrinsic motivation of staff to develop themselves regarding education with ICT. That is a matter of organisational design and therefore falls under this dimension of Redesigning the Organisation for Digital Transformation. To encourage professional development, a structure is needed in which competence development is integrated into HR processes, such as recruitment policy, staff induction and the performance and development review cycle (see e.g., Schouwenburg, 2023). This ensures that all staff members – not just lecturers – develop the competences needed for the intended digital transformation. This should occur within a culture of trust and with a focus on growth, so that it does not feel punitive or as a form of judgement (Edmondson, 2019; Vangen & Huxham, 2003).

A second factor that must also evolve is the content and structure of education itself. A 'digitally competent educational organisation' will, among other things, adapt assessment methods, teaching formats, professional roles and curricula to enable digital transformation (DigCompOrg; Kampylis et al., 2015). Digital transformation requires instructional leadership that influences educational processes such that lecturers can optimally contribute to student learning (Imants, 2014).

This also includes jointly shaping and defining the institutional vision (see also the dimension 'Setting Direction for Digital Educational Transformation'). Such a vision inevitably includes ambitions regarding the content and design of education, and this means monitoring is needed to assess which actions, initiatives and pilots contribute to the intended transformation and what is still required in terms of context and organisation. The intended innovation in education and the accompanying organisational changes must also be ethically responsible and inclusive (see e.g. Kampylis et al., 2015).

In digital transformation, **strategic collaboration** both within and beyond the institution is essential.
This requires horizontal leadership focused on collaboration and connection. In this context, the term '*altrocentric leadership*' is also used, in which leaders recognise that collaboration and teamwork are necessary to realise digital transformation (Henderikx & Stoffers, 2023).
Such leaders build strong teams and are continuously in contact with stakeholders. They give meaning to the organisation and delegate influence. This delegation of influence is necessary because leaders cannot achieve digital transformation alone. Shared or distributed leadership, in which multiple individuals take on leadership depending on their knowledge, experience and affinity with a given topic, is crucial (see e.g., Amels et al., 2021). Moreover, digital transformation requires the formation of (new) partnerships with public and private parties. These are necessary to build an ecosystem in which people, resources and capacities are brought together (McCarthy et al., 2023), and in which multidisciplinary, crossboundary collaboration is achieved (Van Meerkerk & Edelenbos, 2021). Collaborating with other educational institutions, training centres and organisations outside education contributes to the successful integration of ICT in education and the optimisation of educational processes and learning outcomes (Kral et al., 2019).

Based on the above, we arrive at the following competences for the dimension 'Redesigning the Organisation for Digital Transformation':

Creating Innovation Space

Leaders are able to:

- create innovation spaces outside the traditional system, allowing staff to develop and test new forms of ICTintegrated education;
- establish processes and structures that foster (cross boundary) multidisciplinary collaboration and learning regarding digital transformation;
- evaluate innovations collaboratively and decide which initiatives should be scaled up and sustained.

Adjusting Organisational Processes

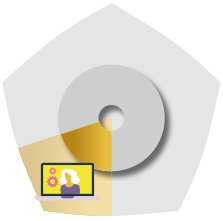
Leaders are able to:

- use evaluations to determine necessary organisational changes for scaling up innovations;
- together with stakeholders, rethink educational and organisational processes needed for sustainable digital transformation;
- ensure that organisational processes are adjusted to support new educational models using ICT, and actively monitor and adjust these processes;
- guarantee professional development is embedded within HR processes (such as recruitment policies and staff evaluation cycles);
- ensure all changes are inclusive and ethically responsible.

Strategic Collaboration

Leaders are able to:

- involve staff in making strategic decisions regarding digital transformation;
- promote multidisciplinary collaboration across departments and teams, and with external partners;
- delegate influence and responsibility to staff with specific knowledge and expertise;
- build partnerships with key actors inside and outside the institution.



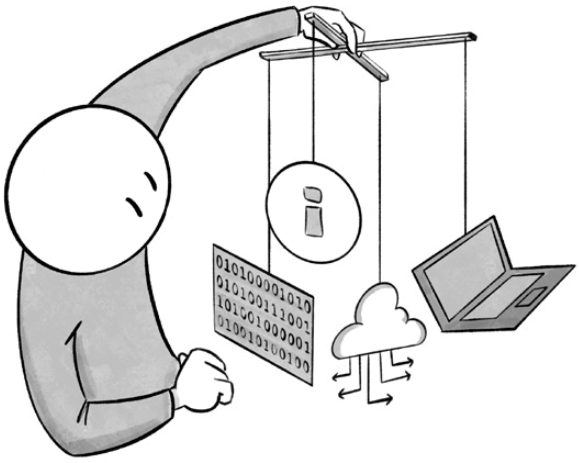
2.4 Dimension: Digital Literacy

For digital innovation and transformation in education, all staff members within the educational institution need to be digitally competent to a certain level (Kampylis et al., 2015; Kral et al., 2019; Post et al., 2022). Leading digital educational transformation – including setting the course for education and the ability to interpret technological and societal developments – demands digital literacy from leaders (Stuart et al., 2009). Without expertise in this domain, it is difficult to determine which technological opportunities and threats are at play in the professional fields for which students are being trained, or to understand what educational changes are necessary in response. In addition, digital literacy among leaders is essential for promoting an 'innovative technology culture' and for the success of transformation processes. Leaders who act as role models for the effective and innovative use of technology serve as a source of inspiration for others (Baylor & Ritchie, 2002; Post et al., 2022). Digital literacy is also indispensable for carrying out many leadership tasks. It is important that leaders use digital technologies – particularly social media – to communicate both within and outside their organisation. This benefits key tasks such as setting direction, fostering a learning culture and promoting organisational development. They can inspire teachers, create their own professional learning networks and encourage engagement from external stakeholders (European Agency for Special Needs and Inclusive Education, 2022).

Data literacy, in particular, is a necessary competency for leaders. As technological developments play an increasingly large part in education, more data are generated. These data can be used to evaluate and adjust educational and organisational processes (Kral et al., 2019). It is important that leaders are capable of using data from a variety of sources to identify trends, determine which adjustments are needed in educational approaches or organisational structures (Brown et al., 2017), and to base their decisions on data (Henderikx & Stoffers, 2022). Technology can assist in analysing problems and finding solutions within the educational context.

Digital transformation requires attention to ethical issues such as inclusion, privacy and safety, as well as to the opportunities and risks of new technologies. Leaders play a crucial role in realising inclusive education (European Agency for Special Needs and Inclusive Education, 2022). Managing digitalisation with equal opportunity as a guiding principle requires leaders to consistently make ethical considerations across various contexts. This goes beyond ensuring access to technological facilities; it also includes providing appropriate guidance, promoting knowledge and skills, and using algorithms and data responsibly (Dondorp & Pijpers, 2020). Digital transformation comes with risks such as data leaks, disruptions to ICT infrastructure, manipulation of data, and misuse or hijacking of technological facilities. Reducing these risks requires both organisational and technical measures, such as clear role and responsibility allocation, effective support systems and awareness among institutional staff about the risks of technology and the necessity of security measures (Kennisnet, 2021). Leaders are responsible for creating and safeguarding a secure educational environment.

To effectively lead digital transformation, it is also important that leaders themselves use ICT for their own professional development (Kral et al., 2019). Social media, for example, can be used to build a personal learning network – a space where they can acquire knowledge, receive feedback and discuss proven strategies (European Agency for Special Needs and Inclusive Education, 2022). Digital literacy also contributes to the willingness of others to explore and implement technology (Kooi et al., 2021; Stuart et al., 2009), which is an essential disposition when leading digital educational transformation. Digital literacy is thus closely connected to transformational leadership competences, which will be discussed in the next dimension.

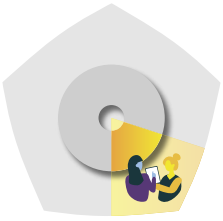


Based on the above, the following competences fall under the dimension 'Digital Literacy':

Key Competences for Digital Literacy

Leaders are able to:

- adequately apply relevant digital technologies effectively in their leadership tasks (e.g. communication, collaboration, project management);
- interpret and use data from various sources (including AI) to support decision-making and for researching and solving problems;
- keep themselves informed about ethical issues in digital transformation (such as inclusion, privacy, data protection, the opportunities and risks of AI, and the impact of emerging technologies) and act accordingly;
- use digital resources for their own professional development and to create a personal learning network.



2.5 Dimension: Professional Conduct

It is not always possible to foresee the consequences of educational transformation. Unlike small-scale change, transformation also alters organisational processes. This demands courage from leaders to take the leap into the unknown together with their organisation (Ofman, 2002). Transformational leadership competences are needed to inspire people to experiment with technology, to deal with resistance and doubts regarding the use of technology in education and to foster a learning culture oriented towards digital transformation (see e.g. Henderikx & Stoffers, 2023; Krijgsman et al., 2022; Paffen, 2011). While many of these competences are also relevant in the context of general – nondigital – transformations, they are essential in the case of digital educational transformation, which involves changing educational processes with and about new technologies within the complex ecosystem of VET and HE. Digital educational transformation, where it is often unclear what the posttransformation state of education will look like, requires leaders who are willing to set aside their own assumptions and take risks (Kennedy et al., 2019; Snoeren, 2021). Leadership behaviours that fit this description include recognising opportunities, being able to make quick decisions and not being afraid of failure (Henderikx & Stoffers, 2023). Good leadership in this context also requires what is known as leadership agility: being flexible in leader ship styles, connecting with others and being sensitive to what people need at a given moment (Visser, 2024). Digital educational transformation requires leadership that creates a climate in which technology is accepted as a natural component of educational innovation (SosaDíaz et al., 2022). According to Hargreaves (2023), this goes hand in hand with bridging a range of paradoxes – a core element of leadership in dynamic environments. Paradoxical leadership means that leaders are aware of their professional identity in relation to the tensions they face, are alert to those tensions, and learn to interpret and address them together with others (Vanlommel et al., 2023). One example is the balance between setting direction and offering space. Setting direction can feel restrictive for staff, whereas space is needed for self-development and experimentation. Too much space, however, can lead to uncertainty and indecisiveness. The art, therefore, lies in navigating between setting boundaries and creating room for development depending on the specific context, the stage of change and the needs of staff members (Smit et al., 2024) (see table 1).

Hargreaves advocates for a form of leadership that embraces both sides of these kind of paradoxes – so-called ‘both/and leadership’ (see also Vanlommel et al., 2023). In complex systems characterised by strong interdependencies, there are always countervailing forces that must be balanced. Simple solutions do not exist in such a complex context (Brughmans, 2016). ‘Both/and’ thinking creates opportunities to handle opposing ideas without choosing between two extremes or defaulting to a compromise. For example, in education there may be a paradox between bottomup and topdown innovation, or between step-by-step progress and largescale transformation. The ‘both/and’ approach holds that innovation must happen both from the bottom up and from the top down, and both gradually and on a larger scale. Small innovations make success tangible and build support for further innovation (Termeer & Dewulf, 2019). Largescale transformations are necessary for carefully monitoring how digital technologies are contributing to changing educational practices. Such transformation requires experimentation beyond the conventional boundaries of education (as described in the dimension ‘Redesigning the Organisation for Digital Transformation’), as long as it stays within safe and responsible limits, particularly in terms of privacy and data protection.

Planned strategy ↔ Room for adaptation	Autonomy ↔ Take away no-commitment
Direction ↔ Space	Top-down ↔ Bottom-up
Step-by-step ↔ Large scale	Experimenting ↔ Safety

Table 1 – Examples of paradoxes in leading digital transformation education.

In a continuously changing VET and HE ecosystem – and in order to foster a culture of learning – it is important that leaders themselves **act as learning professionals**. This means staying informed about new developments in educational innovation and in technology, daring to experiment with those developments, sharing experiences with colleagues and keeping up with relevant research findings (International Society for Technology in Education, 2018; Jisc, 2023; Kral et al., 2019; Post et al., 2022). In doing so, they make an active contribution to a culture in which learning and innovation are valued (Baylor & Ritchie, 2002). It also means that leaders have a clear vision for their own professional development, work actively towards it and use technology strategically to support that process. Krijgsman and colleagues (2022) recommend that (informal) leaders develop change management competences and 'theories of improvement' to understand how and why innovations succeed – a key factor in achieving sustainable educational innovation.

Based on the above, the following competences fall under the dimension 'Professional Conduct':

Transformational Leadership Competences

Leaders are able to:

- build strong relationships and interact effectively with others;
- sense different team needs and adjust leadership accordingly;
- move flexibly between offering structure and providing space for creativity;
- balance planning with adaptability, safety with innovation;
- take initiative and make decisions when outcomes are uncertain.

Acting as a Learning Professional

Leaders are able to:

- stay informed about new developments in educational innovation and technology;
- dare to experiment with new technologies and share findings with colleagues;
- formulate a vision for their own professional development and act accordingly;
- develop change management competences and understand why and how innovations succeed.

3. Conclusion

Institutions in VET and HE face major challenges. These include the need to improve collaboration with, and alignment to, the labour market; the growing necessity for flexible learning pathways that suit the various phases of a learning and life trajectory; and the importance of offering tailored education while promoting equal opportunities for all students. In many cases, technology is either a direct cause of these challenges or a contributing factor – and at the same time, it can offer solutions.

Digital transformation is not driven by technology itself but by strategy. Leadership and leaders play a key role in this process. Multiple studies have shown that transformational leadership, the (digital) competences of leaders and shared leadership are all necessary to enable digital transformation. This raises an important question: Which competences are required to lead digital educational transformation within the complex ecosystem VET and HE?
To address this question, iXperium has developed a competency framework for leading digital transformation in education. The framework was initially developed for VET and HE, but it is most likely also applicable to other education sectors. This framework was created based on a review of the literature – including existing frameworks – as well as discussions with experts and interviews with leaders from VET- and HE-institutions.

The framework consists of five main dimensions: three dimensions concern the kind of leadership that is required, and two dimensions concern the personal competences of leaders. The leadership-related dimensions are setting a direction for digital educational transformation (dimension 1), fostering an innovative learning culture (dimension 2), and redesigning the organisation for digital transformation (dimension 3). The dimensions relating to personal competences are digital literacy (dimension 4) and professional conduct (dimension 5). Each of these main dimensions is elaborated in sub-dimensions, each linked to specific competences.

Conversations with experts and practitioners in the field show that the framework offers a recognisable and usable model, as well as providing a clear overview of the necessary competences. To apply the framework in practice, however, a translation to the specific organisational context is required. Where and how leadership is positioned varies considerably between institutions. Making this translation is already a form of professional development in itself and can be supported by tools yet to be developed. One could, for example, think of an intervention that helps to visualise where in the organisation the various competences are located, and whether people are in the right roles – a kind of organisational scan or diagnostic tool. The framework could also support the development of a tool that enables individual leaders to assess where they stand and which competences they could further develop. This, however, requires reflection on the professional development of leaders and how that development should be organised. Who needs to be involved (which parties), and how should they collaborate? Could Centres for Teaching & Learning play a role in this? Together with various partners from the field, iXperium is developing tools, formats and professional development activities that align with the framework and are grounded in research. At the same time, iXperium continues to investigate what works in this domain and how the framework supports practice in realising digital educational transformation. We assume that the framework is dynamic – that it will be supplemented with real-world examples and updated as developments and new insights arise.

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Appendix 1: Experts and practitioners consulted

Group interviews with experts

Marijn Post: senior advisor ICT and education at HAN University of Applied Sciences
Femke Geijsel: academic director master Management Education at TIAS School for Business and Society
Arnoud Evers: associate professor at Open University
Jacob Nouta: HR policy advisor at Utrecht University

René Tönissen: (previous) Dean School of Sport and Exercise at HAN University of Applied Sciences
Ronald Spruit: educational advisor at Avans University of Applied Sciences
Martin Rodenburg: deputy director at Avans University of Applied Sciences
Annemiek Delissen: Dean School of Built Environment at HAN University of Applied Sciences

Individual interviews with managers

Katinka van Garderen: Dean of Sport and Welfare at Summa College
Petjo Molenaar: sector director Economy, Trade and Creative Industry at Aventus
Astrid Coesel: director of Operations at Aventus
Martha Hevink: director of Strategy & Education at Aventus
Harmen Neidig: Dean of School of Applied Biosciences and Chemistry at HAN University of Applied Sciences

Validation sessions

Ongoing input and feedback from partners of the 'Gelderse Professionaliseringsagenda (GPA)' and the working group 'Digitally Skilled Professionals' of HAN University of Applied Sciences.
Validation of the framework with 60 managers at Aventus (VET institution)
Validation of the framework with 50 managers at 2College (secondary education)
Meeting at the Education and Digitalisation Network of the 'MBO Digitaal' program

iXPERIUM
CENTRE OF EXPERTISE

‘Tomorrow’s learning is lifelong personalised learning in a technology-enabled social learning environment.’

iXperium Centre of Expertise Teaching and Learning with ICT

The iXperium Centre of Expertise Teaching and Learning with ICT is a Dutch innovation network aimed at teaching and learning with ICT. The HAN research group Teaching & Learning with ICT is at the centre of this network, working together with a large number of school boards from primary to higher education and teacher training institutions.

Thematic tracks

The research and innovation programme of iXperium consists of three thematic tracks:

1. Learning with ICT as a means, for personalised learning;
2. The organisation of personalised learning at micro, meso and macro level;
3. Fostering digital literacy for the digital society.

Practitioners, teachers, educators, leaders and researchers collaborate in practice-based research projects and design evidence-informed practice and teacher education and professional development.

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