3

Digital Competence Revolution and Human Resource Development in the United Kingdom and Switzerland

Elena Hubschmid-Vierheilig, Monika Rohrer, and Fotios Mitsakis

3.1 Introduction

Drawing on digital competences’ theories (Prifti et al. 2017; Bilal et al. 2017; Ilomäki et al. 2016; Pan and Seow 2016; Hartmann and Hundertpfund 2015; European Union 2015), recruiting in the digital age looks for certain digital competences on behalf of graduates. However, digital competency moves beyond simply assimilating information (information literacy) to include critical, creative and adaptive thinking, cultural agility, ability to connect and co-operate with others, trans-disciplinary/learning ability and abstraction capability (Brown et al. 2009).
Although most of these competences can be viewed as traditional skills setting up the foundation of digital competency, technological advancements and reinvention of work (e.g. remote work, virtual teams) suggest a more sophisticated explanation and use of them. It is also challenging to specify who requires digital competences to perform their work as these are increasingly demanded across all sectors and professions. Therefore, both from a national and from an organisational human resource development (HRD) perspective, HRD/National HRD (NHRD) should encompass change and development within their organisational and national agendas respectively to enhance knowledge in relation to human resource management and development, strategy and digital competency.

Eventually, digital competence revolution becomes topical for the future economic success of most countries and businesses. Discussing such a contemporary topic through the lens of two different national contexts, namely of a country being within the European Union for many years and out of it in the coming years (the UK), and a second one not being a member at all (Switzerland) could offer a synchronic/synoptic view to shed light onto the future direction of the UK’s approach to competence development outside the EU’s borders. This chapter further aims to capture current HRD strategies and models, both at national and at educational levels, to inform and debate the future role of HRD in accelerating digitally dynamic workplaces.

### 3.2 Learning Outcomes

The learning outcomes of this chapter have the following aims:

1. To understand and evaluate digital competences (e.g. definition, classification), as well as to demonstrate the necessity of digital competences on behalf of graduates, as a tool to support individual and organisational goals, innovation, change, job quality, productivity, competitiveness and sustainability.
2. To analyse and evaluate how digital competence revolution could drive the economic success of both countries and their businesses.
3. To compare, contrast and evaluate national and educational HRD strategies and practices, and to suggest how HRD can play a leading role in accelerating the skills of the future workforce.

To address our learning outcomes, the chapter is structured in a way that follows the suggestions offered above. Thus, considering that the extant literature on digital competences in relation to HRD is rather heterogeneous, a thorough literature review could be justified concerning the implication of HRD on organisational and national policies.

3.3 Literature Review on Digital Competences

Interestingly, there is not a common definition of digital competence. While there is a consensus that digital competence is a transversal key competence which associates with the acquisition of other key competences (Ngoasong 2018; Vuorikari et al. 2016), a universal competence framework to enable organisations to drive digital transformation in the context of the new work order is still needed (Murawski and Bick 2017; Pan and Seow 2016; Bedwell et al. 2014).

According to Brown et al. (2018) and Ilomäki et al. (2016), digital competences encompass instrumental knowledge and an extensive set of capabilities such as information technology (IT) tools and media usage, advanced skills and knowledge for communication and collaboration, digital information management, learning and problem solving, meaningful participation, understanding and successfully work with people from different cultural contexts (e.g. cultural agility), as well as creative and adaptive thinking to allow change and adaptation (e.g. situational adaptability) to new business and environmental circumstances (e.g. economic crisis, Brexit, Covid-19 pandemic). Following on from the definition above, quite similarly, Hammermann and Stettes (2016) identify the following set of digital competences: consolidation of information and knowledge, social intelligence and understanding, critical and flexible
thinking, dealing with cultural and social heterogeneity, abstraction and modelling, use of digital tools, creative and productive thinking, informal and self-determined learning and virtual co-operation.

Evidently, digital competences move away from the traditional information technology literacy (ITC) notion to present a new type of digital competence classification that involves new components and greater complexity at the same pace the business and social contexts are becoming more digitalised (Ferrari et al. 2012). The chapter further argues that digital competency has a generic character and thus needs to be tailored to specific target groups and specific contexts (e.g. national, institutional, professional) as it could differentiate from country to country, between industrial sectors and professions.

Several ways are suggested to classify digital competences, starting from the mere distinction between hard and soft skills down to elaborate competence matrices aiming to provide practical support to businesses (Erpenbeck 2012). According to the author, the various aspects suggested above could be categorised into four digital competences’ blocks to support their operationalisation from organisations (ibid). Concerning digital competence matrices/frameworks, Erpenbeck’s four digital competence building blocks are adopted to inform our discussion of digital competence revolution and human resource development in the UK and Switzerland.

Following Erpenbeck’s (2012) digital competence classification, digital professional expertise encompasses graduates’ informational technology literacy (e.g. ability to use a wide range of technology tools in assessing risks and provide solutions to address them) while digital methodical expertise associates with critical thinking (e.g. assess and determine the deeper meaning of key information to inform decision-making and thus contribute to the success of the organisation) and abstraction capability (e.g. translate complex data into meaningful information to inform data-based reasoning and thus to make data-based decisions). Digital social competence includes cultural agility (e.g. ability to understand cultural differences and successfully work with people from different socio-cultural backgrounds) and social intelligence (e.g. ability to connect and co-operate with others either in a physical or virtual environment). Lastly, the digital self-competence category comprises of trans-disciplinary and
learning ability (e.g. ability to understand concepts across different disciplines to inform decisions and project development through constant learning curiosity) and creative/adaptive thinking (e.g. ability to respond to unique unexpected circumstances and inform decisions/work processes to suit particular needs).

3.4 Digital Professional Competence

Technological development and the management of various digital networks raise demand for technical expertise. Although for those employed in non-tech professions this might not be a key requirement, they still have to know how to use software applications which could have a certain or wider impact on their daily work routine (Schweizerischer Bundesrat 2017; Sure 2016).

Consequently, everyone should understand how new technologies work and can be applied. With the increasing regulation of the virtual sphere, knowledge on data protection laws as well as on the rights and possibilities to protect one’s identity and anonymity is critical (Sure 2016). To evaluate data, the ability to perform statistical analysis is also required (Davies et al. 2011). Thereafter, in addition to basic technological skills, general business knowledge and understanding of business links become crucial in the digital age.

Hammermann and Stettes (2016) suggest that for graduates to be digitally competent they should possess broad interdisciplinary knowledge and understanding. The increasing use of global and network mobile teams further requires excellent language competences, or at least fluency in English as a lingua franca, because most technical data are produced in English (Aepli et al. 2017). Therefore, it is of crucial importance that businesses carefully consider whether their existing workforce possess the competences required. In addition, organisations also need to develop the most appropriate recruitment and selection practices, and training and developmental initiatives, to attract and retain highly digitally competent graduates to contribute positively in driving the business forward.
3.5 Digital Methodical Competence

The ability to prioritise and select data according to specific business problems is also critical (Ashoff 2017). Analytical competences, such as critical, process-orientated and networked thinking are highlighted as critical attributes for graduates (Eilers et al. 2017). Therefore, employees should not only be able to work with big datasets and focus on relevant information, but also be competent in using the appropriate technology and processes to analyse, evaluate and contextualise the given data (abstraction capability).

According to Murawski and Bick (2017), graduates should adopt a critical, innovative and reflective approach at work which should also incorporate the use of various research skills (e.g. data collection and analysis from various sources, problem solving, planning and scheduling, critical thinking and writing). Finally, as work moves beyond routine tasks, project orientation and project management skills are also needed (Herrmann 2017). Therefore, many organisations welcome graduates who could offer such a skillset to support their business growth, success and sustainability.

3.6 Digital Social Competence

Digitalisation requires graduates to apply advanced reading, writing and speaking skills in relation to the use of various IT tools to successfully communicate on daily basis either through emails, through the production of relevant web-contents (e.g. internet and intranet) or face-to-face. Employees are also expected to communicate at ease via social media or through video conferences, both of which require presentation and moderation skills (Schweizerischer Bundesrat 2017). Having online shops replace classic retail models, customers often utilise their consulting services (e.g. online chats, FAQs, 360° view of a product, customer help and support) prior to ordering the goods/services online. Thus, specific consulting capability, as well as social competence, is required from graduates/existing employees to effectively perform their work. Even routine
jobs, such as that of a cashier, now incorporate other roles such as consultants (e.g. informing customers about other options being available as well as explaining how products/services work) at their checkout stations in many organisations, with that highlighting the increasing need of social competence at work.

Furthermore, the interconnectedness of technologies forces experts from diverse disciplines to work together on a temporal or virtual basis, as well as to embed in rather fluid (holocratic) and heterogenic structures, call for high levels of communication and co-operation skills (Sure 2016). Organisational holocratic structures welcome bossless/post-bureaucratic business environments to boost flexibility and engagement through increased socialisation and interaction (e.g. peer reliability and adaptability) (Bernstein et al. 2016). Moving to a digital era, bureaucracy seems to be a thing of the past. Instead, Holocracy emerges as an alternative to shed the traditional/formal management structure in favour of leaderless, self-organising teams, and an individual and business culture of constant development (Larche 2016). Owing to the rapid change of business and technological environments, a holocratic structure calls for employees’ autonomy, empowerment, collaboration, information sharing and decentralised decision-making (Morgan 2014). In addition, interdisciplinary/cross-departmental co-operation could enhance constructive competition and better decision-making (Toshiyuki 2019). Considering all the above, Eilers et al. (2017) emphasised the importance of assertiveness, teamwork and the necessity to coach and motivate other team members. Following the digitalisation of work (e.g. remote work, virtual teams), graduates are expected to be familiar with new communication forms (e.g. blogs, social media, instant messaging, virtual reality, teleconferences) as well as to be empathetic and willing to co-operate (ibid).

The main challenge in teams is to motivate team members to work towards a common goal by communicating effectively with each other. In the context of globally dispersed and multicultural teams, intercultural competence/social perceptivity is deemed to be critical as an important digital social competence (Erpenbeck 2012). Therefore, graduates should be able to discern others’ emotions and show appropriate reaction to them; thus, they should develop their emotional intelligence (Aqqad et al. 2019). One argues that being able to support and take care of
others, as well as showing empathy towards employees and customers, will be increasingly important in the digital age. Thus, digital social competent graduates who are capable of understanding, connecting and cooperating with people of different cultures could serve as effective and respectful global citizens both for the benefit of their organisation (e.g. enhance brand image) and of their society (Caruso et al. 2019).

### 3.7 Digital Self-competence

Fresh graduates and employees alike face various challenges associated with digital transformation resulting in adapting their approaches to rapidly changing workplaces. Therefore, they need to understand their role and the interaction with new automated processes. Consequently, lifelong learning through self-reflection, self-management and the ability to find a proper work-life balance are all of high significance.

Graduates, and existing employees, are more likely to work remotely, having their work became more project orientated. Thus, it is argued that they need to remain well informed of all developments and trends occurring in the labour market, as well as develop themselves beyond their narrow field of expertise (learning ability) to collaborate effectively with others for better decision-making through trans-disciplinary cooperation. Graduates/employees should be receptive to new learning approaches (e.g. e-learning, virtual and augmented reality) and learning in groups (e.g. virtual classrooms) as well as becoming more flexible and adaptable in their career aspirations to meet new business and labour conditions, and thus to succeed in the digital world (Brynjolfsson and McAfee 2014). Creating one’s own differentiating but congruent ‘brand’ is essential not only in the context of employability but also in the context of employer branding in the digital age, as organisations of all kind can benefit from positive employee self-images using them as immediate ambassadors (ibid). Thus, this chapter argues that with the advent and evolution of digital presence (e.g. social networks, web, online communication) this becomes even more prominent.

Anything is possible when people are willing to embrace change and are willing to go out of their comfort zone (Neuburger 2015). Lehmann
and Wendt (2001, s.219) use the term innovation ability, while Herrmann (2017) calls it entrepreneurial spirit. Both terms suggest that creativity and out-of-the-box thinking are important competences, both of which are lacking from robots despite the progress made in Artificial Intelligence. Brynjolfsson and McAfee (2014) further elaborate on this idea by also emphasising the need for humans to learn to work effectively with machines and robots and to keep themselves on a continuous learning curiosity.

The implications of digital competence revolution to organisations and their HRD strategy could be evidenced, either explicitly or implicitly, through an increasing emphasis on the importance of all digital competences. Demirkan and Spohrer (2015) argued that more focus should be placed on the development of T-shaped careers, suggesting that employees should have a generalist profile as well as a specialisation that could enhance their profile. Digitalisation of work results in a new range of skills and knowledge on behalf of graduates. T-shaped employees will demonstrate wider knowledge and skills across various disciplines, yet they will also be experts in one particular area (ibid). In line with Erpenbeck’s (2012) digital competence blocks, t-shaped employees will be open-minded, creative and adaptive, global network collaborators, critical thinkers, life-long learners, IT literate and empathetic communicators (Demirkan and Spohrer 2015). Thus, one can reason that owing to the digitalisation of work (e.g. remote work, virtual teams, online communication) this type of employee is spreading widely across all business sectors and groups of people to allow t-shaped individuals to effectively work in multicultural and multifunctional contexts. For instance, General Electric welcomes the recruitment of t-shaped graduates and rewards employees who focus ‘on going deep—not wide’ as part of its efforts to develop industry experts (Linebaugh 2012). Cantonal Hospital of Winterthur, in the Canton of Zurich, is offering a mandatory course on general management and HR for its physicians and nurses. The goal is to strengthen their competences and make them fit for a working world that is characterised by digital healthcare solutions. Another fine example of supporting the need of t-shaped employees can also be evidenced when a financial data programme should be developed. Software developers and financial experts should collaborate and understand their respective needs
to ensure the right software is built. Therefore, wider knowledge from both is required (e.g. basic understanding of finance from software developers and respective IT understanding on behalf of financial experts). In essence, it becomes necessary for graduates to shape their knowledge and skills in such a way to ensure that they meet the description of a t-shaped profile. The rise in demand for t-shaped employee profiles does not suggest that I-shaped (specialist in one area), Dash-shaped (generalist), and H-shaped (specialist in two areas) profiles will disappear (Donofrio et al. 2010).

Therefore, HRD professionals are called to design and deliver training programmes to ensure that they keep up-to-date in relation to digitalisation. In addition, HR professionals should create recruitment and selection processes to attract digitally competent graduates who could contribute to business competitiveness and sustainability (Patterson 2017). Overall, HR/HRD professionals should remain sensitive to all changes performed within business environments to stay ahead of competition. With that in mind, the following sections discuss NHRD and HRD education provision in the UK and Switzerland respectively to inform policymaking and practical implications for organisations.

3.8 National Human Resource Development in the United Kingdom

The term ‘National Human Resource Development (NHRD)’ emerged as a comparative tool of the similarities and/or nuances of institutional HRD policies and strategies across the globe (Lynham and Cunningham 2006; Cho and McLean 2004). Yet, the scope of NHRD has dramatically changed following the latest global economic and business developments. More specifically, NHRD in the UK is described as being multifaceted and diverse, as well as being largely affected by national economic and political conditions. Following the UK’s decision to leave the European Union (EU), NHRD policies are expected to be re-examined and revised to reflect the new circumstances being developed.
With the signing of the ‘Bologna Agreement’, EU states agreed to establish a universal framework. However, a recent governmental survey notes that digital skills gaps exist across various UK business sectors, further reporting that 72% of large firms and 49% of SMEs are lacking the necessary digital skills. That could indicate a mismatch between the skills offered on behalf of employees and those demanded by employers (Ecorys UK 2016). Notably, another report identifies that 18% of the workforce lacks the basic digital skills required, while 21% lack the digital skills needed to perform their work duties efficiently (GOV.UK 2019a). That could imply the ineffectiveness of the EU’s digital competence framework.

As the world becomes increasingly digitalised, resulting in the high demand of a digitally trained workforce to meet particular sectoral needs, business sectors and industries as well as governmental policymakers need to ensure that the necessary training is offered. However, Thursfield (2001) noted that in relation to uptaking digital competences, differing perspectives are identified across business sectors and of the people involved, thus making it difficult to come up with a universal digital skills framework that suits individual and company-specific needs. National governments are also urged to focus on upskilling their workforce’s digital competences through life-long learning initiatives which eventually could inform the understanding, development and provision of HRD across the globe.

### 3.8.1 Governmental Initiatives to Upskill Workforce’s Digital Skills

In an effort to enhance the UK workforces’ digital skillset, the British Government introduced the so-called Essential Digital Skills Framework, following the European Union (EU)’s digital skills suggestions, yet featuring a slightly different digital skillset in terms of wording (GOV.UK 2019a). The aim was to introduce and agree a digital skills framework to allow transferability and progression of those digital skills required to boost the UK economy. The UK government, either within or outside the EU, aims at fostering digital competences of its workforce across all industries and sectors; thus, several skills councils were also introduced,
all aiming to provide consultation through government-led initiatives in relation to skills development (Lee 2004). Initiatives such as Learning and Skills and the Qualifications and Curriculum Authority both represent efforts to develop the UK workforce. This could be a positive indication of the UK Government’s educational and philosophical orientation in upskilling UK workforce to maintain its competitiveness across national and international borders.

The Learning Skills Council

The Learning and Skills council aimed to enhance young individuals’ (aged under 22 years old) skills through offering and supporting a system of apprenticeships across several sectors. The initiative was abolished in 2010 and replaced by the Skills Funding Agency and the Young People’s Learning Agency, both of which aimed at funding post-16 education and training as well as offering company placements for young individuals in an attempt to gain relevant experience and increase their job-related skills. Both were replaced by the Education and Skills Funding Agency (GOV.UK 2019b). While the aim remained the same, the establishment/upgrade of those councils to their current state supports governmental efforts in remaining sensitive to the latest economic and business developments. Similar initiatives are also offered by most UK universities and their employability services, mainly through student placements in partnering companies.

The Qualifications and Curriculum Authority

Another council focusing on the provision of vocational training, across all industries and occupations, is the Qualifications and Curriculum Authority (QCA). Its main aim is to work with other professional bodies to monitor and accredit programmes and qualifications offered by UK colleges. The Department for Education and Skills sponsors the body with the latter’s role being to focus on upgrading the UK workforces’ competences and preparing them to meet the increasing demands of the
twenty-first century (QCA 2019). That could also ensure that the UK economy is one of the most dynamic knowledge-based economies across the globe. As such, QCA offers a few relevant qualifications and certifications to people interested in enhancing their digital skills.

3.8.2 Quasi-Government Organisations: Professional Bodies

Several other initiatives are developed through the collaboration between employers and industry experts with the government. These include initiatives such as the National Occupational Standards and Modern Apprenticeships Framework, as well as of professional bodies such as Investors in People and the Chartered Institute of Personnel and Development, all highly related to the provision of HRD education.

The National Occupational Standards and Modern Apprenticeship Framework

National Occupational Standards (NOS) and Modern Apprenticeships Frameworks are developed by experienced professionals and employers, along with governmental bodies such as the Department of Education and the Ministry of Labour. The NOS suggest the performance standards required from employees across all sectors as well as the occupational competences and skills and the knowledge they need to perform their work safely and effectively (UK Commission for Employment and Skills 2011). Those standards are informed by evidence-based, UK-wide benchmarks of outstanding performance across sectors and highly inform the vocational learning and training and developmental needs of the workforce (ibid). One argues that due to the digitalisation of work and the rapid change of business and economic environments, there is a continuous need for developing new employability skills to address the increasing demands of the global labour market. Therefore, the role of NOS is also to develop and introduce policy initiatives which support the development of employability skills on behalf of the workforce to secure employment for all.
The government, along with all other stakeholders involved, demonstrates its commitment to developing new and digitally focused vocational qualifications for existing and new industries/professions emerging from the rapidly changing business and socio-economic landscapes (UK Commission for Employment and Skills 2011). Thus, in line with digital competence revolution, this chapter argues that prioritisation should be given to those skills and knowledge included within the digital competence framework to ensure compliance with newly established or updated regulations and/or to meet constantly accelerating employability needs.

The Investors in People Professional Body

Investors in People (IiP) represents another professional body which focuses on ensuring that UK organisations are committed to HRD (IiP 2019). IiP also aims to ensure that training on digital skills is offered across all organisations being accredited by the body (ibid). Such initiatives could indeed foster HRD’s strategic positioning both nationally and within organisations. A similar initiative associates with several university rating systems, all of which aim at standardising the provision of HRD programmes, and of other related qualifications, offered by UK universities. Such initiative is highly welcomed by UK universities yet it cannot directly ensure the inclusion of digital skills training/modules on behalf of the educational institutions.

The Chartered Institute of Personnel and Development Professional Body

The Chartered Institute for Personnel and Development (CIPD) (2017, 2018, 2019) calls for employers and employees to build digital resilience through developing their digital skills. CIPD awards national vocational qualifications, while personal professional development could lead to different levels of membership which indicate the depth of knowledge and expertise within the HR profession either at academic or professional levels. The body emphasises the evolution of technology and other factors, all of which demand a digitally skilful workforce to meet the
increasing demands of today’s business world. CIPD could influence HRD policy and practice and thus to have a long-term and profound impact on how NHRD shapes and offered now and in the future.

3.8.3 Higher Education

UK universities, colleges and all other educational bodies are equal partners in preparing students to become digitally equipped (Nania et al. 2019). Today, a wide range of philosophical and methodological approaches support the delivery of most HRD programmes offered by UK universities, varying from critical studies to storytelling, all of which equally inform and influence NHRD and vice versa (Kispeter 2018). The HRD educational provision is discussed in subsequent sections.

To conclude, the government promotes a multi-stakeholder workforce development system by welcoming several partners (e.g. universities, professional bodies, governmental councils, organisations) in establishing a nation-wide approach in relation to the UK workforces’ skills development. All inputs offered have a profound effect on the conceptualisation of HRD, both from an organisational and national perspective as well as allowing the development of courses/programmes that focus on digital skills enhancement. Therefore, all stakeholders involved in the process should accept responsibility for enabling, developing and facilitating academic, professional and vocational training programmes that could adequately accommodate digital skill development and application on behalf of the UK workforce.

3.9 Human Resource Development Educational Provision in British Universities

It is widely recognised that universities should play a leading role in developing the skills of the future workforce. Relevant courses/programmes to enhance their students' digital competences should represent a key objective of their educational agenda to contribute to UK economy’s competitiveness globally.
A key issue is identified within the relevant literature though, which suggests that in many cases the education system fails to provide graduates with the necessary skills required to sufficiently align with organizational requirements (Ecorys UK 2016). Data skills teaching makes up part of some undergraduate degrees, mainly across Social Sciences and Science, Technology, Engineering, and Mathematics (STEM) programmes (Universities UK 2015). The report also identified that the quantity and quality of provision varied considerably amongst institutions and degree programmes (ibid). Therefore, digital competency should be embedded as a core requirement on behalf of graduates regardless of their degree subject. Ecorys UK (2016) suggests that there are many routes to meet the UK market’s digital skills supply and demand. These consist of all further education, higher education and other public or private learning institutions, all of which could be seen as digital competences suppliers. Yet, for this to successfully happen, educational curricula should be revised to include the provision of relevant digital competency courses (ibid).

All businesses operating within the UK market also hold equal responsibility for upskilling their workforce through continuous professional developmental programmes to allow them to bridge any digital skills gaps identified. Traditionally, successful and competitive businesses would seek to employ higher education graduates who have already acquired the digital competences they require to avoid additional costs relating to training. Yet, other organisations believe that due to the endlessly changing business environments, relevant digital competences should be developed on-the-job to ensure full compliance with business requirements (UKDS 2014). However, in many cases, employers find it difficult to attract and employ digitally competent graduates and mostly blame higher education institutions and the government for not developing strategies which aim to enhance the digital competency of graduates and/or of existing employees attending apprenticeships programmes. In contrast, the authors of this chapter contend that upskilling existing and future employees with digital competences should be a shared responsibility of both the education sector and all businesses, a suggestion that becomes increasingly evident through the extensive collaboration between the two counterparts (Scandura 2016; Wang et al. 2016).
A CIPD (2015) report identifies that the provision of HRD programmes, either at undergraduate or postgraduate levels, in the UK is informed by the respective actions and dynamic interaction of three key players, namely professional bodies (e.g. accountancy, legal and marketing), universities and academics, and the central government. This chapter asserts though that such co-operation could prove difficult in relation to HRD education provision, especially if there is not a consensus amongst those groups and excluding organisations. Stewart and Sambrook (2012) wrote that although each stakeholder might pursue a different agenda, all should work under a common purpose which is nothing else than satisfying supply and demand of those capabilities required within the market. Therefore, in relation to current governmental policies and educational frameworks, HRD education provision is largely informed by market forces (e.g. demand and supply) to secure an equilibrium between the two (ibid). It is further noted that HRD education provision neither is exclusively offered by universities through undergraduate or postgraduate programmes nor is its context exclusively informed by them. Instead, their curricula are heavily informed, and in many cases are accredited, by the professional body (CIPD), indicating the influence the latter has and limiting the input from other UK quasi professional bodies, such as the Institute of Directors, the Institute of Training and Organisational Learning (ibid). Therefore, it is posited that all of the above key players relating to HRD education provision should align their priorities (e.g. digital competence upskilling of graduates and existing employees), a suggestion that is not always the case though.

UK universities, and their academics, also play a critical role in HRD education provision as a graduate’s digital competency will depend heavily upon the digital competencies held on behalf of those teaching them. The digital awareness of academic staff is crucial in securing adaptability to constantly changing skills requirements (Windsor and Mateos-Garcia 2015). The importance of an established partnership between the universities, the industry (organisations across all sectors) and the central government could ensure such awareness in relation to designing and implementing effective and well-informed HRD programmes to supply digital skills the market.
The provision of HRD programmes in the UK varies according to the mode of delivery and the provider as well. CIPD is one of the main HRD education providers offering a wide range of programmes at different levels (e.g. Certificate, Diploma), with these further varying in relation to their length. Universities offer similar programmes as well with these lasting three or four years depending on whether these include a work-placement or not. Morse (2006) outlined the perceived value of work-placements for postgraduate HRD students by arguing that work-based learning helped them to understand better all underlying HRD theories by putting them into practice. As such, UK universities offer in-company programmes and apprenticeships programmes which are designed and delivered to meet the particular training and learning needs of the partnering company (Stewart et al. 2015; Stewart and Sambrook 2012). The teaching and learning methods vary with case studies, student-led seminars, guest lectures, consultancy projects and presentations included to offer an outstanding learning experience to students (Lawless et al. 2012).

UK universities offer both CIPD accredited and independent HRD programmes. These are either offered as undergraduate or postgraduate courses. However, in many cases, HRD programmes are offered as a subservient element of HRM education with that hindering the strength and provision of HRD education in the UK (Sambrook and Stewart 2010). Considering the tight interrelation with the respective professional body (CIPD) one could argue that HRD education provision could be strengthened owing to the CIPD’s focus on HR and people development. It is posited that HRD education can contribute more to business education through its narrow subject area and can deliver desirable learning outcomes as suggested in existing HRM programmes.

Apparently, the provision of HRD education is not an exclusivity for UK universities as it continues to be shaped by the complex interrelation of key stakeholders identified earlier (e.g. central government, professional bodies, organisations). Although current HRD curriculum is informed heavily by specific requirements set by CIPD, a more critical input on behalf of HEIs and of their academics is required to drive and strengthen the presence and provision of HRD education in the UK.
3.10 National Human Resource Development in Switzerland

The Swiss education system is a key contributor to the economic success of the nation (Hoffman and Schwartz 2015). The real strength lies in a dual education system with high permeability and a focus on vocational education and training (Hoffman and Schwartz 2015). According to the IMD World Talent Ranking (2018), Switzerland is leading the talent ranking for the fifth consecutive year. This is mainly due to the quality of apprenticeships, educational system, university education and management education (ibid). Also, the Worldwide Educating for the Future Index (WEFFI) ranks Switzerland number two in terms of provision of future skills education (World Economic Forum 2019). It is not a coincidence that Switzerland is one of the few countries worldwide that has increased its GDP share of total public spending in relation to education. However, it is surprising to see that the percentage of university graduates in the Swiss population is lower compared to other European countries (Deissinger and Gonon 2016).

Ultimately, the Swiss NHRD is built upon strong foundations. Nevertheless, the current Swiss education system seems not to be able to support the digital transformation of society and professional world appropriately (McKinsey Global Institute 2018). For instance, in terms of information literacy competency, Swiss students are not above average compared to other EU countries and almost 30% do not even reach the lowest thresholds of competence (Seufert 2017). Even more surprisingly, although belonging to the digital native generation, Swiss students apparently lack sufficient internet skills (ibid). For Switzerland to leverage on the opportunities presented by digitalisation, it has to ensure that the required skills are being promoted. The challenge for schools and academia is to prepare the young for life-long learning, a progressively more complex society and a world of work in constant change. Eventually, all citizens have to be able to use ICT in order to participate competently in political, social, economic and cultural processes, as well as to ensure they know how to deal with online risks in an informed and independent manner (ibid).
In 2017, the Swiss Confederation issued a report on Challenges of Digitalisation for Education and Research in Switzerland, and formulated the Digital Switzerland strategy which sets out the guidelines for ICT and digitalisation (Swiss Confederation 2017). The resulting action plan include improving of digital competencies at school level, making use of ICT in general and vocational education, as well as the rapid adaptation of the education system to the requirements of the market (Swiss Confederation 2018). Finally, it calls for co-ordination and co-operation in the field of education (State Secretariat for Education, Research and Innovation 2019a). The actions also encompass both content and delivery of educational programmes with the aim of using teaching information and communication technologies for knowledge transfer (State Secretariat for Education, Research and Innovation 2019b). The on-demand availability of knowledge is leading to an adjustment of learning processes and changes in the roles of teachers and students (Seufert 2017). Thus, the need to enhance digital competences (including social, emotional and Meta skills) is evident.

Although the Swiss education system is excellent in creating outstanding engineers and professionals, only 4.9% of the current workforce are ICT specialists (compared to Finland leading with 7.2% and the UK with 5.1%) (Eurostat 2019). However, in 2016 almost one-third of all students in Switzerland have been registered in STEM programmes and the tendency is increasing (Federal Statistical Office 2017). With regards to elementary school, the Swiss public-school system has recently launched a new project to target a more competency-based approach including the integration of digitisation in primary schools (Swiss Conference of Cantonal Ministers of Education 2015; Seufert 2017). Since 2010, ICT apprenticeships have also increased (Federal Statistical Office 2019a), being ranked fifth in terms of popularity (State Secretariat for Education, Research and Innovation 2019b).

In 2016, 75% of the Swiss population, aged from 15 to 75 years old, had completed training (15.6%) or further education programmes (62.55%), with the age group 35–44 years old being most active in non-formal education (76%) (Federal Statistical Office 2019b). With regards to digitisation, one out of ten people attended ICT training (ibid). Non-formal education is also strongly supported by organisations. In 2015,
89% of the companies in Switzerland supported further training courses and 44% of all employees in organisations with at least ten employees took part in digital training courses (Federal Statistical Office 2019b). Nevertheless, Swiss companies only contribute to 45% of the training costs which is below the European average of 49% (ibid). This is likely to include offering hours credits since lack of time is by far the main obstacle for attending an educational initiative (Federal Statistical Office 2019a). Additionally, organisations are advised to resort more to people analytics methods to track talents (Schellekens et al. 2018). A more evidence-based approach to people development would enhance organisational capability in identifying skills gaps. Furthermore, aggregated data used by organisations can provide relevant insights to support the strategic enhancement of their development programmes.

In terms of employability, 69% of international workers in Switzerland (vs. 59% globally) expect their employers to provide and support developing training opportunities (Ravaux et al. 2018), whereas 61% of Swiss workers see themselves as responsible for acquiring new skills (Schellekens et al. 2018). When it comes to life-long learning, education and costs, 72.2% of the Swiss population believe these to be the responsibility of both the employer and the employee (Schellekens et al. 2018). This shared responsibility can therefore be seen as an important part of the psychological contract between the two parts. Furthermore, this shows a high level of self-directedness on behalf of the employees which can ultimately stem from certain values inherent in the Swiss education system, such as equality and participation. Such preconditions can be deemed ideal to promote the increase of digital skills. However, according to Ravaux et al. (2018), Swiss employees lag behind their global peers in relation to their digital competences as they focus more on technical and job-specific skills. This shows the potential for Swiss NHRD in advancing digitalisation of work. Hence, the effective promotion of life-long learning requires a close collaboration between the private and public sector (McKinsey Global Institute 2018). Switzerland already benefits from an advanced collaboration between organisations, industry associations and the department of labour in the field of apprenticeships (ibid), ensuring that the apprentices obtain the skills required by organisations. Deissinger and Gonon (2016) outline the high influence key
stakeholders (such as social partners, political parties and the public) could play. By way of consensus, this close collaboration is an important pillar for youth education, employment and social stability and the success of the Swiss economy in general (ibid). However, this collaboration seems less strong in the context of academia as the Swiss education system often fails to bridge the gap between learning and labour market requirements (Schellekens et al. 2018). Switzerland is among the top five countries when it comes to relevant pillars of digitalisation like skills, labour market and innovation capability (ibid).

3.11 Digital Competences in the Swiss Higher Education System

Before looking more closely at the digitisation level in the Swiss higher education system, it is worthwhile noting that there are two types of higher education institutions: the traditional universities which focus on basic research and the universities of applied sciences (UAS) which are generally more practice-orientated and base their teaching on applied research (State Secretariat for Education, Research and Innovation 2018). The role of the Swiss higher education institutions, in terms of digitalisation, is perceived as vital and therefore a closer collaboration between universities and industry is welcomed (McKinsey Global Institute 2018). Schellekens et al. (2018) argue that universities could offer a plethora of skills to foster their graduates’ digital mastery (e.g. knowledge such as computer science, AI, encryption, rigour of thought, but also cultural knowledge, leadership, entrepreneurial skills, design thinking, collaboration, self-assessment skills and concept creation). Therefore, digital skills need to be developed in all subject areas (State Secretariat for Education, Research and Innovation 2019a).

Swiss Universities issued a short-term proposal to strengthen digital application skills in academic teaching (Maret 2018). The proposal further enables Swiss universities to adapt the challenges of digitalisation as well as to promote and implement projects aimed at strengthening the digital skills of academic staff and students through promoting the
exchange of good practices and lessons learned (ibid). To date, 300 project proposals have already been submitted. For instance, the University of Basel (2018) has launched a strategy called Digitalisation in Teaching, aimed at creating the conditions and qualification offers that could enable their graduates to become independent and active members of an increasingly digital society. In 2018, the University of Zurich announced the creation of 18 new professorships for digitalisation with the goal to increase interdisciplinary co-operation between faculties as well as offering new courses such as minors in digital sciences and machine learning (von Daenikon 2018). With these immediate actions, the University of Zurich recognises its social role and responsibility to create university graduates who fit to the labour market, politics and society in general (ibid).

Finally, since UAS maintain particularly close relationships with the professional world, their role is substantial in promoting digital competences. For instance, the Zurich University of Applied Sciences (ZHAW) has launched the strategic initiative ‘ZHAW digital’, aiming at actively dealing with ‘the opportunities and challenges that arise from the digital transformation of society as a whole’ (ZHAW 2019a). A third of the 800 plus further education programmes that are offered include the word digital in their programme title while the concept of blended learning is also present, indicating universities’ efforts in promoting digitalisation across the various study programmes (ZHAW 2019b). Such efforts can be seen as a testimony of the eager implementation of the digital strategy.

In terms of study programmes in the field of HR, there are only six programmes offered by Swiss universities and UAS at postgraduate level and none at undergraduate (Studyscan 2019). However, only one of these programmes offers a Master of Arts degree, whereas the other degrees are Master of Advanced Studies which are further education programmes. There are no studies focusing on HRD in particular as this component forms an integral part of HRM studies. At Certificate of Advanced Studies (12–15 ECTS) level, only two of the UAS offer a programme exclusively on HRD (Studyscan 2019). Given the fact that HRD is a very practice-orientated field, and builds on the foundation of practical experience, it comes as no surprise that the further education programmes of UAS are dominant in this field.
3.12 **The Case of the UK and Switzerland**

Comparing NHRD in the UK and Switzerland, it is key to note their similarities and nuances. Evidently, both countries are short of digital talent and their educational systems are currently not fully developed in meeting the increasing demands of the business world (e.g. limited number of HRD programmes offered), regardless of the governmental national frameworks developed and of other private-initiated efforts brought forward to promote national digital competence. The co-ordination of all initiatives is key to digital transformation whereas one of the major challenges may rest in aligning both UK and Swiss academic curricula with business needs.

Considering that both countries are non-EU members, it is suggested that they may continue to experience a shortage of digitally competent labour due to new immigration restrictions from outside the EU’s borders. It is therefore of utmost importance that both educational systems focus on enhancing digital competences through digital HRD initiatives and learn from each other. Recent developments like the Covid-19 pandemic force both countries to invest into digital tools that enable digital/online teaching and remote working. Not embracing the EU Digital strategy, as non-EU members, urges both countries to carve out their own way of developing a digitally skilled workforce.

Another critical factor may be the level of self-directedness that is key for effective learning. As discussed earlier, this seems to be the case for a large proportion of the Swiss workforce resulting from an inherent self-conception of the Swiss education system. For the UK, the respective levels of self-directedness on behalf of university students are moderate despite enormous efforts being brought forward from UK higher education institutions to demonstrate that self-directedness in learning is closely related to employability (Kim et al. 2015; Boden and Nedeva 2010). Regardless of the levels of self-directedness in learning on behalf of the current and future workforce (e.g. university students, fresh graduates, existing employees), HRD professionals and HRD educators should transform their strategies and curricula respectively to adapt to the changing needs of their customers (e.g. employees, students) in light of
workplace and technological changes (aka the digital era). One argues that both HRD scholars and practitioners should share knowledge and practices to identify and eliminate barriers which prevent their collaboration, to encourage continuous professional development through supporting and recognising self-directedness in learning and to drive personalisation of learning experience through tailored programmes. Overall, it is suggested that they should tackle digital competence revolution to empower learners to engage in self-directed learning, amongst other offerings, to foster the use of relevant digital competences in the workplace.

### 3.13 Human Resource Development and the Challenge of Digitalisation

Organisations face new challenges every day, with digitalisation representing an opportunity for HRD to reposition itself as a strategic business partner in organisations. Webber (2018) highlights that the vast majority of HR leaders experience major issues relating to the acquisition of the skills required to support the digital transformation of their business. In addition, most HR leaders argued that their workforce should develop their digital competences either through self-initiated or organisational-led training to make the most of new ways of working (ibid). Eventually, when it comes to training and development (T&D), HRD has a key role to play. Its role could start with identifying the skill(s) gaps, set and plan the relevant learning objectives and then design and implement the most appropriate learning initiatives to ensure that employees possess the necessary competences to perform their work effectively. Building a learning culture is also essential to ensure that the right behaviours are established within the organisation, having these further integrated in the recruitment process to guarantee that graduates and employers share the same values. An effective learning culture can support innovations by adapting to, or even anticipate, customer needs at a fast pace (Lindner et al. 2017). However, Goerzig and Bauernhansl (2018) state that many organisations often find themselves in a conflict
to meet long-term strategic goals and to live up to the challenge of a fast-paced digitalisation of their business environment. Thus, it is proposed that in high turbulent environments, relying on past knowledge and procedures is no longer an option as existing concepts do not offer a strong fit to provide answers to completely new challenges and settings. Instead, improvisational capabilities such as creativity and out-of-the-box thinking are required (Pavlou and El Sawy 2010) and which are considered essential elements of the digital competence blocks discussed earlier in the chapter.

Concurrently, due to other unforeseen business and economic circumstances (e.g. global financial crisis, BREXIT, Covid-19 pandemic), organisations are confronted with the challenge of constrained resources (e.g. due to tight financial controls, budgeting). This leaves them only a limited scope of action to respond to the rising complexity of their business environment (Lindner et al. 2017). Either due to an organisation’s compliance of legal requirements or owing to any other reasons related to their internal environment, HRD could, and should, play a strategic role in relation to organisational vision, mission and strategy. To address digital transformation, it is advised that HRD professionals ensure they focus on their people (i.e. being people-centred), thus recruiting individuals and enabling the development of their critical competences to support the digital transformation of the workplace (Bajer 2017).

One major challenge associated with HR/HRD digital transformation is some employees’ resistance to change. This is due to continuous change and regular updates which are not always easy to follow owing to the costs associating with them (Larkin 2017). Last but not least, Bajer (2017) identified the lack of a digitally skilful HR team as a major setback in relation to HR/HRD’s digital transformation. One argues that organisations could grasp many benefits by addressing those challenges, such as digitalising home office workspace to promote flexibility, creativity and innovation, as well as to foster virtual collaboration and to ease the pressure on heavy infrastructures (Lindner et al. 2017). To do so though, they need to ensure that their workforce is digitally competent enough to meet those challenges and thus drive the business forward.

A whole range of new capabilities is needed on behalf of existing and future employees (e.g. graduates entering labour market) to assist
organisations to stem the challenges of digitalisation. Consequently, HRD professionals and scholars/educators should design and implement relevant training and/or learning programmes to meet the increasing need of a digitally competent workforce. Such initiatives could be designed and delivered either at national or educational institutional levels, upon taking into considerations all associated implications to policymakers and the organisations.

3.14 Concluding Remarks, Policy and Organisational Implications

The chapter discussed the role of HRD in coping with digital competence revolution. It offered an overview of the relevant literature, as well as drawing on national policies and strategies to inform readers about the similarities and/or nuances of the NHRD approaches in two different countries. Furthermore, the provision of HRD education was discussed to outline how educational institutions, in both countries, address this topical challenge, as well as to inform policy implications and offer practical suggestions for organisations to follow.

The comparison between the UK and Switzerland in relation to digital competence revolution and HRD highlights a few emerging concerns. Both the UK and the Swiss Governments urge to promote digital competences at a national level in order to sustain the growth of their national economies and remain globally competitive. They also need to implement their digital strategies through a combined effort of public and private institutions and all other stakeholders being involved. Although both countries recognise the essence of life-long learning, the focus lies clearly on promoting digitalisation in the young, that is by integrating apprenticeships programmes and university curricula, regardless of the subject. However, to follow the idea of life-long learning, there seems to be a lack of co-ordinated initiatives for the more mature workforce by means of vocational training and further education. Although the focus of the chapter is on graduates’ digital competences, it is acknowledged that the need of digital competence for employees comes from all age groups.
Until recently, the need to collaborate and drive the digitalisation of workplace forward within national and organisational agendas has obviously lacked a sense of urgency. However, the Covid-19 pandemic seems to urge the necessity of immediate action in terms of digitalisation. With an increasing focus on securing business viability due to a forthcoming prolonged recession in the aftermath of the pandemic, organisational and national HRD confronts unprecedented times with new challenges to address. Investments in IT and automation have become evidently vital for market competitiveness in this new setting. Therefore, one could argue that it remains to be seen how NHRD approaches will mobilise all stakeholders to master such a crisis successfully.

The digital competence revolution has multifaceted implications to organisational HRD relating to job quality, organisational productivity and efficiency, business structures, as well as product and services trading. Due to digitalisation, job substitution and polarisation (e.g. new skillsets and/or disappearance of routine jobs) are key challenges related to labour market (Arntz et al. 2016). This is not limited to the high-tech industry and digital services and product companies only, but to all sectors featuring routine, low-skilled tasks (Kuusisto 2017). Of course, not all jobs will disappear as many require a blend of related skills, yet skills polarisation (e.g. demand of high-skilled occupations) may also result in a polarisation of wages (e.g. earnings stagnation for middle- and low-class workers) and thus deepening wage inequality amongst employees.

Additionally, digital competence revolution and digitalisation of workplaces are expected to offer more flexible work arrangements. Although many suggest that flexibility coming from digitalisation is presented to be positive to graduates (e.g. millennials generation) as are those seeking flexibility at work (Pieterson 2016), it is also suggested that such flexibility might cause a work-life balance disruption for those being on-demand as well as for those with childcare responsibilities (Stacey et al. 2017). Eventually, job quality associates with digital competence revolution. Therefore, HRD practice in organisations, through revised training, performance management and reward schemes, should support digital transformation and adopt new approaches and methods that could serve an agile and digitalised workplace.
This chapter further demonstrates that digitalisation is also expected to impact on job quality and organisational productivity and efficiency and thus have implications on HRD practice. For instance, job quality could lead to higher employment and could be seen as a major driver of employees’ well-being (Arends et al. 2017). It is argued that the positive aspects of digitalisation of the workplace associate with greater flexibility, autonomy and time management due to the use of digital tools. It is further suggested that despite a few negatives of digitalisation (e.g. technical problems, less social interaction, closed monitoring of work), job quality will be enhanced through better work planning and reduction of boredom due to repletion of work. As job quality is affected in several ways, organisational productivity and efficiency will also be affected. Productivity and efficiency can be increased through innovative and technologically advanced processes which could lead to favourable working conditions and save valuable time (de Groen et al. 2017). Consequently, HRD professionals should design and deliver appropriate training and learning initiatives to make sure that the necessary skills are present to operate those technologically advanced processes. Respectively, graduates should be digitally competent to ensure a fit with the organisation they join and its new operating contexts.

Organisational structures are also expected to shrink due to digitalisation. As many jobs are subject to scrutinisation, business structures are subject to change. Many organisations will turn into virtual businesses (digitalised business processes, e-customer service, e-commerce, workforce geographical distribution) with that having direct implications to HRD which should ensure that organisational learning constantly aims at fostering innovation, process efficiency and individual and organisational absorptive capacity (Kuusisto 2017). Eventually, training and learning initiatives should either embed digital technologies to existing traditional programmes or fully redesign new initiatives to meet new needs. Graduates should also ensure that they not only possess the digital competences required to join an organisation, but also ensure that they can offer a best fit with the newly structured organisational contexts.

Lastly, digital revolution is fundamentally changing the way societies trade through e-commerce, e-customer support and e-payments (OECD 2018). That is why many organisations create a virtual, digital product of
their physical one to help them understand how digitalisation works through the data receiving from their digital twin (Pavlou and El Sawy 2010). Yet, most organisations have gone through this initial phase and they e-trade with their customer base. Eventually, understanding such technologies, as well as the capability of making sense of a vast amount of data derived from the sensors, is an important capability that can be assigned to employees/graduates’ essential skillset to meet digital transformation. Respectively, implications for HRD relate to the design and delivery of relevant training to enhance the workforce’s digital competences to successfully compete in the digital era.

The discussions around the digital revolution and digitally competent workforces should be driven by HRD professionals as relevant experts. They should not only embrace and promote a broader concept of digital competences but also refrain from developing elaborate, expensive and inert training programmes with uncertain return on investments (ROIs). Therefore, it is vital for HRD to adopt a more individualised approach in understanding the specific competency needs and gaps in the organisations. Again, a common understanding of the requirements criteria for HRD professionals—jointly created by public and private institutions—could not only enhance the standing of HRD but also be beneficial for both organisations and, eventually, both the UK and Switzerland’s national economies, particularly for the UK economy right after the country’s exit from the European Union.

References

Aepli, M., Angst, V., Iten, R., Kaiser, H., Lüthi, I. and Schweri, J. 2017. Die Entwicklung der Kompetenzanforderungen auf dem Arbeitsmarkt im Zuge der Digitalisierung. https://www.seco.admin.ch/seco/en/home/Publikationen_Dienstleistungen/Publikationen_und_Formulare/Arbeit/Arbeitsmarkt/Informationen_Arbeitsmarktforschung/kompetenzanforderungen_digitalisierung.html (Accessed on 12 November 2019).

Aqqad, N., Obeidat, B., Tarhini, A. and Masádeh, R. 2019. The relationship among emotional intelligence, conflict management styles, and job perfor-
mance in Jordanian banks. *International Journal of Human Resources Development and Management*, 19(1), pp. 225–265.

Arends, I., Prinz, C. and Abma, F. 2017. *Job quality, health and at-work productivity*. https://www.oecd-ilibrary.org/docserver/43ff6bde-en.pdf?expires=1586951764&id=id&accname=guest&checksum=7234BDF3AE1E5ABB7A380858150EE672 (Accessed on 15 April 2020).

Arntz, M., Gregory, T. and Zierahn, U. 2016. *The risk of automation for jobs in OECD countries: A comparative analysis*. https://www.oecd-ilibrary.org/social-issues-migration-health/the-risk-of-automation-for-jobs-in-oecd-countries_5jlz9h56dvq7-en (Accessed on 17 March 2020).

Ashoff, S. 2017. *Digitale Kompetenzen? Fehlanzeige! Wissensmanagement*. https://www.wiso-net.de/login?targetUrl=%2Fdocument%2FWIM__9348A17257F8443599B484D47AEF180C (Accessed on 20 April 2019).

Bajer, J. 2017. Digital transformation needs the human touch. *Strategic HR Review*, 16(1), pp. 91–92.

Bedwell, L.W., Fiore, M.S. and Salas, E. 2014. Developing the future workforce: An approach for integrating interpersonal skills into the MBA classroom. *Academy of Management Learning and Education*, 13(1), pp. 171–186.

Bernstein, E., Bunch, J., Canner, N. and Lee, M. 2016. *Beyond the holacracy hype*. https://hbr.org/2016/07/beyond-the-holacracy-hype (Accessed on 5 April 2020).

Bilal, A.R., Naveed, M. and Anwar, F. 2017. Linking distinctive management competence to SMEs’ growth decisions. *Studies in Economics and Finance*, 34, pp. 302–330.

Boden, R. and Nedeva, M. 2010. Employing discourse: Universities and graduate employability. *Journal of Education Policy*, 25, pp. 37–54.

Brown, L., George, B. and Mehaffey-Kultgen, C. 2018. The development of a competency model and its implementation in a power utility cooperative: An action research study. *Industrial and Commercial Training*, 50, pp. 123–135.

Brynjolfsson, E. and McAfee, A. 2014. *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. New York: W.W. Norton and Company, Inc.

Caruso, D.R., Mayer, J.D., Bryan, V., Phillips, K.G. and Salovey, P. 2019. Measuring emotional and personal intelligence. In *Positive psychological assessment: A handbook of models and measures*, Edited by Lopez, S.J., and Snyder, C.R. Second edition. USA: American Psychological Association. (pp. 233–245).
Chartered Institute for Personnel Development (CIPD), 2015. *Learning and development*. https://www.cipd.co.uk/Images/learning-development_2015_tcm18-11298.pdf (Accessed on 12 November 2019).

Chartered Institute for Personnel Development (CIPD), 2017. *Digital disruption—Transforming the workplace*. https://www.cipd.co.uk/news-views/nutshell/issue-69/digital-disruption Accessed on 30 October 2019.

Chartered Institute for Personnel Development (CIPD), 2018. *Digital resilience in a 24/7 world*. https://www.cipd.co.uk/news-views/changing-work-views/future-work/thought-pieces/digital-resilience-24-7-world (Accessed on 15 December 2019).

Chartered Institute for Personnel Development (CIPD), 2019. *About us*. https://www.cipd.co.uk/about (Accessed on 20 October 2019).

Cho, E. and McLean, G. 2004. What we discovered about NHRD and what it means for HRD. *Advances in Developing Human Resources*, 6, pp. 382–393.

Davies, A., Fidler, D. and Gordis, M. 2011. *Future work skills 2020*. https://www.downes.ca/cgi-bin/page.cgi?post=20 (Accessed on 12 May 2019).

De Groen, W.P., Lenaerts, K., Bosc, R. and Paquier, F. 2017. *Impact of digitalisation and the on-demand economy on labour markets and the consequences for employment and industrial relations*. https://www.eesc.europa.eu/resources/docs/qe-02-17-763-en-n.pdf (Accessed on 10 January 2020).

Deissinger, T. and Gonon, P. 2016. Stakeholders in the German and Swiss vocational educational and training system. Their role in innovating apprenticeships against the background of academisation. *Education and Training*, 58, pp. 568–577.

Demirkan, H. and Spohrer, J. 2015. T-shaped innovators: Identifying the right talent to support service innovation. *Research-Technology Management*, 58, pp. 12–15.

Donofrio, N., Spohrer, J. and Zadeh, H.S. 2010. *Research-driven medical education and practice: A case for T-shaped professionals*. https://www.semanticscholar.org/paper/Research-Driven-Medical-Education-and-Practice-%3A-A-Donofrio-Spohrer/c981265467da99c55e60ae1cee62994a5044b333 (Accessed on 6 April 2020).

Ecorys UK, 2016. *Digital skills for the UK economy*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492889/DCMSSDigitalSkillsReportJan2016.pdf (Accessed on 21 November 2019).

Eilers, S., Möckel, K., Rump, J. and Schabel, F. 2017. *HR-Report 2017: Schwerpunkt Kompetenzen für eine digitale Welt*. https://www.hays.de/docu-
Erpenbeck, J. 2012. *Der Königsweg zur Kompetenz. Kompetenzmanagement in der Praxis.* Band 6. Münster: Waxmann.

European Union, 2015. *Digital skills and jobs.* https://ec.europa.eu/digital-single-market/en/policies/digital-skills (Accessed on 12 May 2019).

Eurostat, 2019. *ICT specialists in employment.* https://ec.europa.eu/eurostat/statistics-explained/index.php/ICT_specialists_in_employment#Relative_share_of_ICT_specialists_in_the_total_workforce (Accessed on 16 December 2019).

Federal Statistical Office, 2017. *Studierende und Abschlüsse der Hochschulen in den MINT-Fächern.* https://www.bfs.admin.ch/bfs/de/home/statistiken/kataloge-datenbanken/publikationen.assetdetail.2140048.html (Accessed on 16 December 2019).

Federal Statistical Office, 2019a. *IKT-Ausbildung.* https://www.bfs.admin.ch/bfs/de/home/statistiken/kultur-medien-informationsgesellschaft-sport/informationsgesellschaft/gesamtindikatoren/bildungswesen-bibliotheken/ikt-ausbildung.html (Accessed on 16 December 2019).

Federal Statistical Office, 2019b. *Informatik-Weiterbildung.* https://www.bfs.admin.ch/bfs/de/home/statistiken/kultur-medien-informationsgesellschaft-sport/informationsgesellschaft/gesamtindikatoren/bildungswesen-bibliotheken/informatik-weiterbildung.html (Accessed on 16 December 2019).

Ferrari, A., Punie, Y. and Redecker, C. 2012. Understanding digital competence in the 21st century: An analysis of current frameworks. In *21st century learning for 21st century skills,* Edited by Ravenscroft, A., Lindstaedt, S., Kloos, C.D., and Hernández-Leo, D. Berlin and Heidelberg: Springer. (pp. 79–92).

Goerzig, D. and Bauernhansl, T. 2018. Enterprise architectures for the digital transformation in small and medium-sized enterprises. *Procedia CIRP,* 67, pp. 540–545.

GOV.UK, 2019a. *Essential digital skills framework.* https://www.gov.uk/government/publications/essential-digital-skills-framework/essential-digital-skills-framework (Accessed on 20 November 2019).

GOV.UK, 2019b. *Education and Skills Funding Agency.* https://www.gov.uk/government/organisations/education-and-skills-funding-agency (Accessed on 24 November 2019).

Hammermann, A. and Stettes, O. 2016. *Qualifikationsbedarf und Qualifizierung: Anforderungen im Zeichen der Digitalisierung.* https://www.iwkoeln.de/studien/iw-policy-papers/beitrag/andrea-hammermann-oliver-stettes-qualifika-
Hartmann, W. and Hundertpfund, A. 2015. *Digitale Kompetenz*. https://www.hep-verlag.ch/digitale-kompetenz (Accessed on 10 June 2019).

Herrmann, G. 2017. LinkedIn-Studie: Soft skills dominieren die Berufswelt. https://www.presseportal.de/pm/64022/3733927 (Accessed on 10 November 2019).

Hoffman, N. and Schwartz, R. 2015. *Gold standard: The Swiss vocational education and training system*. http://ncee.org/wp-content/uploads/2015/03/SWISSVETMarch11.pdf (Accessed on 15 December 2019).

Ilomäki, L., Paavola, S., Lakkala, M. and Kantosalo, A. 2016. Digital competence—An emergent boundary concept for policy and educational research. *Education and Information Technologies*, 21, pp. 655–679.

IMD World, 2018. *Talent Ranking*. https://www.imd.org/wcc/world-competitiveness-center-rankings/talent-rankings-2018/ (Accessed on 15 December 2019).

Investors in People, 2019. *Our story*. https://www.investorsinpeople.com/our-story/ (Accessed on 21 October 2019).

Kim, S.J., Kim, H.S. and Lee, J.K. 2015. Employee self-concepts, voluntary learning behavior, and perceived employability. *Journal of Managerial Psychology*, 30, pp. 264–279.

Kispeter, E. 2018. *What digital skills do adults need to succeed in the workplace now and in the next 10 years?* https://assets.publishing.service.gov.uk/govern-ment/uploads/system/uploads/attachment_data/file/807831/What_digital_skills_do_adults_need_to_succeed_in_the_workplace_now_and_in_the_next_10_years_.pdf (Accessed on 10 December 2019).

Kuusisto, M. 2017. Organizational effects of digitalization: A literature review. *International Journal of Organization Theory and Behavior*, 20, pp. 341–362.

Larche, N. 2016. *Leaderless, and not: Holacracy in human resources*. https://www.linkedin.com/pulse/leaderless-holacracy-human-resources-nicholas-larche (Accessed on 5 April 2020).

Larkin, J. 2017. HR digital disruption: The biggest wave of transformation in decades. *Strategic HR Review*, 16, pp. 55–59.

Lawless, A., Sambrook, S. and Stewart, J. 2012. Critical human resource development: Enabling alternative subject positions within a master of arts in human resource development educational program. *Human Resource Development International*, 15, pp. 321–336.
Lee, M. 2004. National human resource development in the United Kingdom. *Advances in Developing Human Resources*, 6, pp. 334–345.

Lehmann, J. A. and Uepping, H. 2001. Neue Dimensionen der Verantwortung für das HR-Management. In: R. Lombriser & H. Uepping: Employability statt Jobsicherheit. pp. 61-126. Kriftel: Luchterhand.

Lindner, D., Ott, M. and Leyh, C. 2017. Der digitale Arbeitsplatz—KMU zwischen Tradition und Wandel. *HMD Praxis der Wirtschaftsinformatik*, 54, pp. 900–916.

Linebaugh, K. 2012. *The new GE way: Go deep, not wide*. https://www.wsj.com/articles/SB10001424052970204571404577257533620536076 (Accessed on 6 April 2020).

Lynham, S. and Cunningham, P. 2006. National human resource development in transitioning societies in the developing world: Concept and challenges. *Advances in Developing Human Resources*, 8, pp. 116–135.

Maret, A. 2018. *Federal project contributions: Strengthening digital skills in teaching*. https://www.eduhub.ch/export/sites/default/files/Antoine-Maret.pdf (Accessed on 15 December 2019).

McKinsey Global Institute, 2018. *The future of work: Switzerland’s digital opportunity*. https://www.mckinsey.com/~/media/mckinsey/featured-insights/europe/the%20future%20of%20work%20switzerland%20digital%20opportunity/the-future-of-work-switzerland%20digital%20opportunity.ashx (Accessed on 3 December 2019).

Morgan, J. 2014. *The future of work: Attract new talent, build better leaders, and create a competitive organization*. Hoboken, NJ: John Wiley & Sons.

Morse, S.M. 2006. Assessing the value: Work-based learning placements for post-graduate human resource development students? *Journal of European Industrial Training*, 30, pp. 735–755.

Murawski, M. and Bick, M. 2017. Digital competences of the workforce—A research topic? *Business Process Management Journal*, 23, pp. 721–734.

Nania, J., Bonella, H., Restuccia, D. and Taska, B. 2019. *No longer optional: Employer demand for digital skills*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/807830/No_Longer_OPTIONAL_Employer_Demand_for_Digital_Skills.pdf (Accessed on 14 December 2019).

Neuburger, R. 2015. Die digitale transformation: Vernetzte Wirtschaft, vernetzte Gesellschaft, vernetztes Wissen. *Wissens Management*, 17, pp. 8–10.
Ngoasong, M.Z. 2018. Digital entrepreneurship in a resource-scarce context: A focus on entrepreneurial digital competence. *Journal of Small Business and Enterprise Development*, 25, pp. 483–500.

Organisation for Economic Co-operation and Development (OECD), 2018. *Implications of the digital transformation for the business sector*. http://www.oecd.org/sti/ind/digital-transformation-business-sector-summary.pdf (Accessed on 20 December 2019).

Pan, G. and Seow, P-S. 2016. Preparing accounting graduates for digital revolution: A critical review of information technology competence and skills development. *Journal of Education for Business*, 91, pp. 166–175.

Patterson, R. 2017. *The T-shaped person: Building deep expertise AND a wide knowledge base*. https://collegeinfogeek.com/become-t-shaped-person/ (Accessed on 8 April 2020).

Pavlou, P. and El Sawy, O. 2010. The “Third Hand”: IT-enabled competitive advantage in turbulence through improvisational capabilities. *Information Systems Research*, 21, pp. 443–471.

Pieterson, W. 2016. *Modernising PES through supportive data and IT strategies*. https://op.europa.eu/en/publication-detail/-/publication/696323df-ec37-11e6-ad7c-01aa75ed71a1/language-en (Accessed on 12 February 2020).

Prifti, L., Knigge, M., Kienegger H. and Krcmar, H. 2017. Competency model for industries 4.0 employees. https://www.wi2017.ch/images/wi2017-0262.pdf (Accessed on 5 November 2019).

Qualifications and Curriculum Authority, 2019. *About us*. https://www.qca.org.uk/7.html (Accessed on 24 October 2019).

Ravaux, J., Schwartz, J., DeSousa, R., Wallenstein, J., Liedtke, A., Roos, T. and Renard, A. 2018. *Future-proofing the workforce. Accelerating skills acquisition to match the pace of change*. https://future-skilling.adeccogroup.com/downloads/Adecco_-_Future_skilling_report__2018.pdf (Accessed on 15 December 2019).

Sambrook, S. and Stewart, J. 2010. Teaching, learning and assessing HRD: Findings from an UFHRD/BMAF research project. *Journal of European Industrial Training*, 34, pp. 710–734.

Scandura, A. 2016. University-industry collaboration and firms’ R&D effort. *Research Policy*, 45, pp. 1907–1922.

Schellekens, H., Siegrist, S., Tritt, N., Castle D. and Job, A. 2018. *Top talent in Switzerland. What should we prepare for in the next five-ten years?* https://digitalswitzerland.com/wp-content/uploads/2018/11/DS-TopTalent.pdf (Accessed on 15 December 2019).
Schweizerischer Bundesrat, 2017. Auswirkungen der Digitalisierung auf Beschäftigung und Arbeitsbedingungen: Chancen und Risiken - Bericht des Bundesrates in Erfüllung der Postulate 15.3854 Reynard vom 16.09.2015 und 17.3222 Derder vom 17.03.2017, https://www.newsd.admin.ch/newsd/message/attachments/50248.pdf (Accessed on 2 October 2019).

Seufert, S. 2017. Digital competences. https://www.swir.ch/images/stories/pdf/en/Exploratory_study_3_2017_Excerpt_Digital_Competences_SSIC_EN.pdf (Accessed on 16 December 2019).

Stacey, N., Ellwood, P., Bradbrook, S., Reynolds, J. and Williams H. 2017. Key trends and drivers of change in information and communication technologies and work location. https://osha.europa.eu/en/publications/key-trends-and-drivers-change-information-and-communication-technologies-and-work/view (Accessed on 12 February 2020).

State Secretariat for Education, Research and Innovation, 2018. Higher education and research in Switzerland. https://www.usi.ch/sites/default/files/storage/attachments/press-higher-education-and-research-switzerland-sefri.pdf (Accessed on 15 December 2019).

State Secretariat for Education, Research and Innovation, 2019a. Digitalisation. Action plan for education. https://www.sbfi.admin.ch/sbfi/en/home/seri/digitalisation.html (Accessed on 15 December 2019).

State Secretariat for Education, Research and Innovation, 2019b. Vocational and professional education and training in Switzerland—Facts and figures 2019. https://www.sbfi.admin.ch/sbfi/en/home/services/publications/data-base-publications/vocational-and-professional-education-and-training-in-switzerland.html (Accessed on 15 December 2019).

Stewart, J. and Sambrook, S. 2012. The historical development of human resource development in the UK. Human Resource Development Review, 11, pp. 443–462.

Stewart, J., Mills, S. and Sambrook, S. 2015. HRD programs in the United Kingdom. Advances in Developing Human Resources, 17, pp. 162–179.

Studyscan, 2019. Personalmanagement Master studieren. https://www.studieren-studium.com/master/studieren/Personalmanagement-Schweiz (Accessed on 15 December 2019).

Sure, M. 2016. Neue Kompetenzen im Zeitalter von Industrie 4.0. https://www.wiso-net.de/login?targetUrl=%2Fdocument%2FPWI__B904736D06CF2A8DCE6F3499426EE713 (Accessed on 31 March 2020).

Swiss Confederation, 2017. Auswirkungen der Digitalisierung auf Beschäftigung und Arbeitsbedingungen: Chancen und Risiken. https://www.newsd.admin.ch/newsd/message/attachments/50248.pdf (Accessed on 2 October 2019).
Swiss Confederation, 2018. Digital Switzerland strategy. https://www.bakom.admin.ch/bakom/en/homepage/digital-switzerland-and-internet/strategie-digitale-schweiz.html (Accessed on 16 December 2019).

Swiss Conference of Cantonal Ministers of Education, 2015. Lehrplan 21. The key facts at a glance. https://www.lehrplan21.ch/sites/default/files/The%20key%20facts%20at%20a%20glance.pdf (Accessed on 16 December 2019).

Thursfield, D. 2001. Employees’ perceptions of skill and some implications for training in three UK manufacturing firms. Human Resource Development International, 4, pp. 503–520.

Toshiyuki, M. 2019. Heterogeneous impact of import competition on firm organization: Evidence from Japanese firm-level data. https://www.rieti.go.jp/jp/publications/dp/19e086.pdf (Accessed on 5 April 2020).

UK Commission for Employment and Skills, 2011. NOS Strategy 2010–2020. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/304235/nos-strategy-2011.pdf (Accessed on 10 April 2020).

UK Digital Skills Taskforce (UKDS), 2014. Digital skills for tomorrow’s world: The independent report of the UK Digital Skills Taskforce. http://www.ukdigitalskills.com/wp-content/uploads/2014/07/Binder-9-reduced.pdf (Accessed on 14 October 2019).

Universities UK, 2015. Making the most of data: Data skills training in English universities. http://www.universitiesuk.ac.uk/highereducation/Documents/2015/MakingTheMostOfDataDataTrainingSkillsInEnglishUniversities.pdf (Accessed on 25 September 2019).

University of Basel, 2018. Strategy. Digitalization in teaching. https://www.unibas.ch/dam/jcr:83c7f75e-2ff8-4dcb-a933-1b8e06e17f64/Strategy%20Digitalization%20in%20Teaching.pdf (Accessed on 15 December 2019).

Von Daenikon, T. 2018. 18 new professorships for digitalization. https://www.news.uzh.ch/en/articles/2018/Digitalization.html (Accessed on 15 December 2019).

Vuorikari, R., Punie, Y., Carretero, S. and Van den Brande, L. 2016. DigComp 2.0: The digital competence framework for citizens: Update phase 1: The conceptual reference model. https://publications.jrc.ec.europa.eu/repository/bitstream/JRC101254/jrc101254_digcomp%202.0%20the%20digital%20competence%20framework%20for%20citizens.%20update%20phase%201.pdf (Accessed on 14 August 2019).
Wang, Y., Hu, R., Li, W. and Pan, X. 2016. Does teaching benefit from university-industry collaboration? Investigating the role of academic commercialization and engagement. *Scientometrics*, 106, pp. 1037–1055.

Webber, A. 2018. *HR must be more involved in digital transformation plans*. https://www.personneltoday.com/hr/involved-digital-transformation-skills-leadership/ (Accessed on 25 October 2019).

Windsor, G. and Mateos-Garcia, J. 2015. *Analytic Britain: Securing the right skills for the data-driven economy*. https://www.nesta.org.uk/report/analytic-britain-securing-the-right-skills-for-the-data-driven-economy/ (Accessed on 12 August 2019).

World Economic Forum, 2019. *Finland, Switzerland and New Zealand lead the way at teaching skills for the future*. https://www.weforum.org/agenda/2019/03/finland-switzerland-new-zealand-lead-at-teaching-skills/ (Accessed on 15 December 2019).

Zurich University of Applied Science, 2019a. *ZHAW digital*. https://www.zhaw.ch/de/ueber-uns/leitbild-und-strategie/strategische-initiative-zhaw-digital/ (Accessed on 17 December 2019).

Zurich University of Applied Science, 2019b. *Blended learning*. https://www.zhaw.ch/en/study/e-learning/#c112029 (Accessed on 17 December 2019).