

Revolutionizing HRD through Digitalization

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Author Note

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Abstract

Technology and its applications have had a significant impact on human resource development (HRD), and they will continue to do so at an ever-increasing speed. We used our *a priori* opinions and experiences to identify application areas. We then searched, within each of our identified areas to find published sources, including journals, blogs, and websites, to describe the application areas that have impacted, and will impact, HRD. Areas identified and described include authoring, performance management and coaching, personalization and continuous learning, analytic metrics, robotic continuous improvement, employee engagement and autonomy, employee wellbeing and life balance, attrition reduction, simulations, digital dialogues, communities of practice, credentialing, soft skills development, and ethics. Given the extensive impact on HRD, practitioners must be ahead of the wave of change. Further, academic programs must assess their curricula and make modifications so graduates of their programs will be well prepared to meet the demands of the marketplace. While a critique of these applications of digitalization and AI is important, that is not the purpose of our article; we limited ourselves to describing the applications only.

Keywords: HRD, digitalization, AI, machine learning, robots, transformation, curriculum reform, applications

Revolutionizing HRD through Digitalization

A revolution is heating up in human resource development (HRD). Technology, in various forms, has always interacted with HRD and its many functions, just as it has influenced the world of business generally. More and more attention has been directed at digitalization in HRD, driven primarily by rapid developments in artificial intelligence (AI) and machine learning. AI includes technologies in which computers mimic human functions, like learning, adapting, interacting, reasoning, and optimizing (Chedrawi & Haddad, 2022). Digitalization and AI are of universal interest. All organizations in all sectors, including academia, and societies are affected world-wide. Universities and professionals are organizing conferences, seminars, and hubs to discuss the topic and its implications. Researchers are publishing books, research papers, and reviews on the topic (e.g., Fernandez et al., 2021; Thite, 2022; Yorks et al., 2022). Practitioners and academics are writing blogs and contributing to websites to capture in real time their rapidly developing understanding of, and applications within, digitalization. HRD researchers and practitioners are both excited and afraid, trying to stay up to date, which is a difficult task. They are also concerned about misapplications of these tools.

In this environment, our purpose was, first, to explore and describe how digitalization, the application of technology to automate and optimize HRD processes, and AI have impacted, are impacting, and will impact HRD. Second, we reflected on the state of HRD curricula and their potential to develop HRD professionals as leaders in this transformation. To do this, curricula in HRD will need to be reformed.

Methods

Because our article is conceptual and descriptive, we did not develop research questions, nor did we need a theoretical framework. Further, as this article was solicited for this special issue with a very short timeline, there was insufficient time to conduct a systematic literature review. We acknowledge that this article could well be developed further with such an approach.

In this conceptual, descriptive article, we used our *a priori* opinions and experiences, and familiarity with some of the literature, to identify application areas. We then searched for each of our identified areas published sources, including journals, blogs, and websites, to describe our identified application areas that have been and will be most impacted within HRD. We recognize that it is unusual to include blogs and websites in a scholarly journal. However, given the nature of our topic, and the speed with which change is occurring, we wanted to retrieve information that was real time. Journal articles, while benefitting from peer reviews, also suffer from long time lags from the time of writing to the time of publishing, which can often be two years and even longer. We used an iterative, non-structured, and multi-layered process in our retrieval (Juntunen & Lehenkari, 2021).

We searched specifically within each of the thirteen topics that we had identified *a priori*, based on our experiences to identify and describe application areas.

Results and Discussion

The results are presented below, along with our reflections.

Impact of Technology on HRD

In this section, we elaborate on how digitalization and AI have impacted, are, and are likely to impact HRD. We want to emphasize, again, that we are not promoting these applications; we are only describing them.

Authoring

Especially in repetitive tasks, such as developing job descriptions, onboarding, training materials, and goal setting, among many others, AI is proving to be effective and efficient and is likely to become more so. For example, as Silva and Costa (2023) identified in their peer reviewed conference paper, ChatGPT, one of many AI authoring tools, can be applied to generate documents, such as internal communication forms, performance reports, employment and services contracts, and termination letters. It can also execute natural language processing tasks, such as text summaries, translations, and text creation. Another use of ChatGPT could be to mechanize repetitive tasks (it can be set up to perform tasks like virtual interviews, generation of performance reports, or categorization and analysis of resumes) (Silva & Costa, 2023). Additionally, it can provide accurate and up-to-date information (it can be trained to answer frequently asked questions about policies, benefits, and so on), and increase efficiency by improving recruitment, performance feedback, and training materials development, requiring companies to spend less time on such tasks).

In addition to ChatGPT, other specific tools have been used to save time for HRD practitioners, such as Cajon, an end-to-end capability-aware neural tool that generates job descriptions automatically with less involvement from humans (Qin et al., 2022). But humans are still involved in their creation, meaning that whatever biases those humans have can be built into

the software. And, because the authoring systems cannot create their own thoughts, they will reflect whatever biases are in the databases from which information is drawn. Substantial trials using real hiring data have shown that Cajon can be used to produce comprehensible and successful job descriptions. Specifically, Baidu software has implemented the Cajon framework as one of its talent acquisition tools (Qin et al., 2022).

Another tool that enables fast and automated tasks, such as job coding, is OPERAS, an adaptable decision-support tool (Langezaal et al., 2023). OPERAS has been shown to secure a high degree of accuracy in occupational classification and exposure assessment of job descriptions, significantly reducing the workload of HR practitioners. It performs noticeably better than other coding tools and expert coders (Langezaal et al., 2023).

The advances in these tools enable HRD professionals to allocate more of their valuable time to the strategic components of their work rather than to administrative tasks. In this process, automation transforms the operational aspects of HRD and fosters a culture of continual improvement (Agarwal et al., 2023).

Performance Management and Coaching

Two-way communication tools can provide instant feedback on performance, allowing supervisors to coach employees at the moment of need, also known as contiguity of feedback. Digital systems can improve the determination of whether performance lies in the system or within individual employees to support continuous improvement. Digitalization can provide data to assist in succession planning and determining when employee acquisition is needed. Metrics can also be useful in talent management, helping to identify high-performance workers, workforce adjustment needs, and so on.

Performance Management

A recent review (Gelinas et al., 2022) identified that the literature on AI and its applications in performance management can be divided into two main categories: literature that focuses on the benefits of the use of AI in performance management and literature that addresses the use of AI in tracking the performance of employees (Gelinas et al., 2022).

In the first category, studies have analyzed the use of AI in the performance management planning process to review past employee performance and also pertinent data from other sources to set key performance indicators (KPIs), if this is seen as desirable (we have major reservations about the value of KPIs). AI has also been used to monitor these indicators, providing managers and staff with instant, current, and reliable feedback (Jia et al., 2018). Another example in this category is the work of Rozman et al. (2022), who integrated artificial intelligence into a talent management model to increase the work engagement and performance of organizations. The model encompassed various facets of AI integration within HR management (HRM) activities focused on talent management, particularly in the areas of talent acquisition and retention, suitable employee training and development, organizational culture, leadership, employee engagement, organizational performance, and reducing employee workloads. The findings showed promising results, supporting the use of AI in these processes, while having a positive impact on the enterprise's performance and employee engagement.

The second category (the application of AI in employee monitoring) is an essential part of assessing employee performance. An example of this application is a study by Huang et al. (2021) that applied AI to enterprise knowledge management performance evaluation. They analyzed the relationship between knowledge management performance evaluation and balanced

scorecard metrics and built an index system at two levels to evaluate enterprise practices and relevant literature to build a balanced scorecard-knowledge management performance evaluation. They developed an analytic hierarchy process-fuzzy comprehensive evaluation (AHP-FCE) method to assess knowledge management performance and offer a quantitative evaluation method for knowledge management performance evaluation.

A recent review by Ekuma (2023) on the use of AI and automation in HRD concluded that, overall, the research indicates that performance management is being revolutionized by the use of automation and AI to offer continuous, data-driven feedback and evaluation. Solutions powered by automation and AI can assess employee performance data, identify areas for improvement, and offer customized development recommendations (Huang & Rust, 2021).

Additionally, AI appears to proffer management with some abilities, such as dynamically allocating tasks and closely coordinating workers' activities, continuously aggregating data and ratings to monitor worker performance, or strategically managing reward systems based on aggregated ratings (Duggan et al., 2023). While this replaces much of the work done traditionally by human managers and provides significant economies of scale, the impact on workers could be profoundly negative; such systems should be implemented with caution and with human supervision.

Coaching

Coaching is viewed in a variety of ways. Bachkirova et al. (2014) viewed coaching as a structured one-on-one discussion between a coach and a client with the goal of developing and supporting long-term transformations for the individual and possibly other stakeholders.

Coaching and mentoring are often confused; however, they have different goals. While

mentoring is about long-term career development, coaching is about improving performance, believing in the potential of the person being coached, and working towards that person's performance development. Mentors are experts in the specific field in which they are mentoring, and mentees are less experienced professionals. Coaches, on the other hand, believe in the full potential of their clients to perform at a high level and are experts in the art of asking powerful and transformative questions that help their clients reflect, learn, make performance changes, and transform their behaviors in the process. Coaching and mentoring will probably always need human intervention, as these transformations are mediated by the human connection between coaches or mentors and their clients, and many of those connections have a huge emotional component. While robots and AI developments cannot substitute for the power of humans, human connections, emotions, and associated body responses involved in these processes, they can probably aid in some areas, such as providing feedback on, and assisting in improving, performance. They can also help with certain tasks of the coaching and mentoring processes and make access to those programs more affordable.

In this line, Teblanche and colleagues (2022; 2023) studied the use of AI-mediated coaching, testing its effectiveness and reflecting on its use to bring coaching closer to professionals in a more affordable way. In their first study, they investigated the efficacy of Vici, an AI chatbot coach (Teblanche et al., 2022). They designed a randomized control trial study and showed that goal achievement increased in the treatment group significantly; however, the differences in the other variables measured (resilience, psychological wellness, and perceived stress) were non-significant. This is an example of AI coaching working well in a specific application (goal attainment) and, as the authors argued, it has the potential to democratize

coaching in a scalable and affordable way. However, given that they did not find differences in other variables, human involvement is still needed to have an influence in other areas.

In their second study, Teblanche et al. (2023) continued comparing the effectiveness of AI-mediated coaching and human coaching alone. They compared two equivalent longitudinal randomized controlled trials in which participants received coaching for ten months and, again, were assessed on increases in the clients' goal attainment. One group used human coaches while the other used an AI chatbot coach. Both approaches were effective in helping their clients achieve their goals. The authors argued that AI coaching could replace human coaches who use too simplistic approaches. Additionally, it could increase the demand of more specialized human coaches and could be used to democratize coaching. However, Teblanche et al. (2023) argued that empathy, emotional intelligence, and other human traits are still unique to humans, and AI is not able to match them yet. They highlighted the contribution of this study by showing that AI coaching can perform well in specific areas, such as goal setting. These tools, when applied specifically and rooted in well-studied theories (such as goal theory) might have the potential to democratize coaching and bring it to a much larger audience.

Another example of the use of AI in coaching with good results is the study by Blyler and Seligman (2023). They showed that coaches and therapists could use ChatGPT for their interventions, as it proposed different treatments and solutions based on different narrative identities for clients. However, the use of AI in coaching is controversial with others who have analyzed the pros and cons of the use of AI are more critical. For example, Bridgeman and Giraldez-Hayes (2023) reflected on the benefits and disadvantages of using AI-enhanced tools in coaching sessions using video review software. They analyzed interviews with 15 coaches who

used AI-enhanced techniques. The coaches thought about the sessions and used recordings and AI-generated data. Within the benefits, coaches who focused on skills development using AI made specific changes to their practice, giving them insights that drove deeper reflection and self-awareness and helped them gain confidence. Within the disadvantages, the coaches sensed that the software did not understand subtle meanings, feelings, and contexts of conversations, which are fundamental to the progress of the clients. They also found that coaches were nervous about the use of these technologies and their potential to analyze their performance.

Another example of a critical reflection of the application of AI in coaching is Graßmann and Schermuly (2021), who reflected on the suitability and potential of using AI developments in coaching practices. They questioned the technology's capabilities to establish cooperative relationships and guide clients through the coaching procedures. The authors argued that the major challenges that could jeopardize the effectiveness of AI coaching is in providing personalized feedback and identifying the problems of the clients. However, they also argued that, in most cases, AI seems to help clients through many of the coaching process. They agreed with Teblanche and colleagues (2023) and stated that AI coaching will probably change the coaching industry and offer a future HRD tool due to its lower costs and larger target groups.

The debate is open, and more research is needed to continue testing these tools in the performance management and coaching fields to get a better sense of the areas in which HRD can benefit from AI in these arenas and the areas that impose more risks for clients and organizations. While there is potential for using AI tools in coaching and mentoring, this should be done with specific functions, such as providing ideas for future actions or aiding with goal setting and goal attainment. However, at present, more development is needed, if ever possible,

to support human-machine interaction as machines, AI, and robots are not there yet. The removal of the more interpersonal and empathetic aspects of people management is unlikely to be effective, at least in the short term (Angrave et al., 2016). Professionals are humans, and human learning is mediated by emotion and body responses associated with it; therefore, for professionals to engage in powerful transformations and excellent performance, those variables cannot be left out.

Personalization and Continuous Learning

No longer will it be necessary to develop and deliver mass training. By tracking individual performance digitally, employees will be able to receive training that is individually customized, allowing for continuous learning in response to rapid developments in the workplace. The same is true for any application in which individualization is helpful.

AI tools can be used within HRD to personalize not only the training, but also the needs analysis, knowledge management, and results feedback processes (Chen, 2023). By individualizing training, the effectiveness of the training and the potential to increase transfer and the results derived from it increase as well.

Tapalova and Zhiyenbayeva (2022) proposed a framework to implement AI holistically in education. They addressed the use of machine learning, intelligent mentors, personalized educational systems, chatbots, social networking sites, expert systems, and virtual environments in the educational context. They argued that creating personalized learning pathways generate great advantages, such as the possibility of accessing training 24/7, the chance to adapt the contents of the training to personal needs and learning styles, and the opportunity for participants

to receive real-time and frequent feedback. This framework has the advantage of having a global view and could be applied, with some adaptations, to the context of HRD.

But what, specifically, are the tools that can be used for personalization? Due to the high speed of developments, it is difficult to keep up with their discovery and evaluation. But with the aim of providing a couple of examples, we have identified some in the following paragraphs.

The AI-assisted personalized feedback system (AI-PFS) (Xu et al., 2023) was designed based on a series of questions to students and provides individualized and, reliable feedback for each class based on learning analytics modules.

Another example is the Supervised Machine Learning (ML) techniques to identify students' preferences, needs, and backgrounds, scheduling individualized assignments (Fernandes et al., 2023). These techniques can be used to create a system that is trained based on academic factors, such as preferences for the assignments, proficiency, preference for remote vs. in-person training, interest level, and so on, and prescribes an individualized learning plan with the goal of maximizing the grade and satisfaction of the student.

The development and test of Supervised Machine Learning (ML) techniques and the different ML models that they can use (for examples, Logistic Regression, K-Nearest Neighbours, Support Vector Machine, Decision Tree or Random Forest) are still in progress. In the study by Fernandes et al. (2023), the Random Forest classifier was the most effective. However, the constant development of new techniques makes it difficult to keep up and makes evidence-based decisions difficult. In spite of this, these types of tools have the potential to be used for training design purposes to implement training and generate activities for participants, ensuring relevance to their jobs, maximizing content relevant and thorough for training transfer

(González-Ortiz-de-Zárate et al., 2021). HRD professionals should keep themselves updated in the new developments in the field and the possibilities that they offer.

Analytic Metrics

Many factors in addition to performance can be tracked digitally. Though connoting big brother, with subsequent invasion of privacy, such metrics can support a remote workforce, while also determining time on task, screen time, interaction time with colleagues and clients, time on training, wait times for client call-ins to improve staffing and robotic applications, and so on. Analyses of these metrics can provide insights not available previously.

AI (and other techniques, such as machine learning) are expanding the application of HRD analytics or people analytics. Organizations increasingly depend on algorithm-based prediction tools for HR-related decision making (Cho et al., 2023).

AI, together with analytics, can be applied in most HR functions, such as talent acquisition, training and development, engagement and performance appraisal, or retention. Organizations can enhance their productivity using these tools.

The areas of AI analytics application are growing. In health and safety, there is growing evidence of the successful application of AI. As an example, Selin et al. (2019) analyzed the use of AI, data analytics, and gamification in emergency exit planning. They compared various options for emergency exit, estimated the movement capabilities of the general population and special risk groups, and searched for the key areas for customer evacuation.

Silva and Costa (2023) suggested that organizations that use this technology for HR will spend less time and money on tedious administrative tasks and will free their agendas for the big decisions that have a larger impact, maximizing earning and outliving their competitors.

However, because of potential AI misconduct, public awareness is calling for a more sustainable and responsible usage of AI (Chang & Ke, 2023). Continued experimentation with the uses of AI tools will expand the areas of application and make a responsible and sustainable use of them.

Robotic Continuous Improvement

The applications of robots in manufacturing and customer service have been prevalent for some time (Singh et al., 2022). With digitalization, those systems can be improved automatically based on feedback loops.

Robotics are built from the developments of electronics, AI, nanotechnology, machine learning, and so on, and they can be seen as the art of building machines that can replicate human behaviors and movements (Vrontis et al., 2022). The technology that involves robotics has advanced at a high speed, accelerating the adoption of robots in the workplace.

Recent literature is mostly optimistic about the learning and training opportunities that the emergence of these technologies brings for professionals and organizations (Kim, 2022; Raj & Seamans, 2019); however, there is a real concern about the implications that embracing these technologies will have on work and employment. Some authors have pointed out that research should focus on three areas: learning opportunities, human-robot collaboration, and job replacement (Vrontis et al., 2022).

Within learning opportunities derived from the adoption of robots in the workplace, professionals will go through a learning curve. Robots can eliminate repetitive and routine tasks previously performed by humans. This offers the possibility for employees to engage in new functions, use their skills more effectively, develop new skills, and be exposed to learning opportunities (Vrontis et al., 2022). Professionals with these learning opportunities will need to

go through significant training to perform their new functions and work with, and use, robots in their everyday work activities.

In order to implement effectively human-robot collaboration or human-robot interaction (HRI), three areas need to be considered (Kim, 2022): human capabilities, including attitudes towards robots, technology readiness, and communication with robots; collaboration configuration, including human-robot team building, leading multiple robots, and systemwide collaboration; and attributes related to contact, including safety interventions and ethical issues.

As for job replacement, there has been an increasing number of predictions that there will be significant job replacement by automation, robots, and AI. While ordinary jobs that do not demand much creativity or humanity will vanish, others will be altered from the core (Schwab, 2016). Individuals might feel overwhelmed and may feel differently (perhaps optimistic, pessimistic, or skeptical) about the developments and their roles in the job market. How they feel appears to vary based on their values, perceptions of the changes, demographic profiles, and occupations (Nam, 2019).

Additionally, deconstructed jobs (job designs in which traditional job roles and responsibilities are broken into smaller, more flexible tasks or projects) have emerged as an alternative to traditional jobs (Boudreau et al., 2015). Jobs in these emerging shapes have been matched with knowledge, skills, and abilities in the workforce (Rogiers & Collings, 2024). Job deconstruction, together with digitalization and AI, are a new frontier in the study of work and organizations.

Researchers and practitioners seem to be fascinated by the idea of robots surpassing human performance. However, some voices have suggested that the focus should be on other

issues that are central to our everyday interaction with technology, moving from the concept of replacing humans to the issue of how well humans will interact with robots and technology (Dégallier-Rochat et al., 2022). While some encounters tend to be mechanized, others tend to empower humans. The second should be prioritized to coexist and grow with the technological advancements.

Duggan et al. (2022) conducted a qualitative study with a large number of gig workers who relied on technology platforms to perform their jobs. They found that the algorithmic management function used by platform organizations acts as a new, seemingly unmovable boundary to competency development. Specifically, this function serves to constrain severely the potential of individuals to develop.

Employee Engagement and Autonomy

Digitalization and the resulting metrics may allow employees to do their work with less human supervision. This autonomy allows employees to be more creative and more engaged in their work.

Several studies have analyzed the relation between the use of AI tools and employee engagement, and the relation seems to be positive. For example, Rozman et al. (2022) found that AI positively influenced employee engagement (among several functions of HRD); and Dutta et al. (2023) found an increase in employee engagement (and employee voice) using AI-enabled chatbots. Apparently, the use of these tools in different aspects of the HRD function and the employee cycle can make the processes more productive, reduce the workload, and enhance employee engagement (Saxena & Mishra, 2023).

Besides the positive influence of the use of AI applications on employee engagement, the role of leadership in the equation seems to be key. Apparently, leaders can leverage AI tools to foster skilled and engaged workers (Rozman et al., 2023) because it seems that, for the use of AI tools to increase employee engagement, leaders need to embrace their use and act as a catalyst in the organization, as change leadership seems to moderate the influence of AI on employee engagement (Wijayati et al., 2022).

Employee Wellbeing and Life Balance

When appropriately applied, employees in many jobs can choose their own work and break times. Further, accessing the benefits of digitalization may allow employees to be more efficient and effective, allowing for less stress and time on the job. Apps are available to encourage employees to have better mental health.

The literature shows examples of the application of technology in wellbeing management. A first example, described by Dutta and Mishra (2023) is technology-enabled nudges used for improving the physical wellbeing of employees (tracking steps, daily exercise and water intake, sleep patterns, and so on). Apparently, employees felt comfortable with them, showing potential to keep the employees accountable and monitor their progress.

In addition, some computer programs have been used to enhance the psychological wellbeing of employees (Avey et al., 2023). Specific chatbots have been used to enable mental wellbeing in organizations (Dutta & Mishra, 2023). Apparently, in most cases, health and mental wellbeing in organizations are still managed by humans. However, technology can be used to manage those programs together with humans, or humans can use technology to automate some of the areas managed. In some scenarios, a chatbot that includes sentiment analysis can be used

to identify cases in which employees might need support; then, the case can be moved forward by human intervention (Dutta & Mishra, 2023). This technology opens the door for the combined work of humans and technology to manage health and mental well-being.

Other examples include the use of emotional recognition technology for a variety of purposes, including increasing wellbeing (Spataro 2020), using emotional AI as a tool to combat stress-related work absences, and using affect recognition tools to augment management (Mantello & Ho, 2023).

In spite of the potential in these applications, some difficulties might arise with their implementation, such as the requirement for the workforce to upskill and reskill. With the fast pace of technological developments, there will be a great skill mismatch that can impact employees' well-being. Although organizations are committed to developing digital skills, they are often not properly developed and much more may need to be done in this domain (Cramarenco et al., 2023).

Attrition Reduction

Voluntary turnover that is not in the interests of the organization, especially of talented employees as they find opportunities in other organizations or sectors, can be a major problem for an organization, especially in tight job markets. Not only is it difficult to find qualified candidates, but once they are hired, they need to be trained and acculturated, using both financial and time resources of the organization. Prediction models can be created using AI to identify causes of attrition and behaviors associated with attrition. AI allows such models to include both internal and external factors that might influence attrition (Diaz & Salvador, 2023). Interventions can be applied using AI when attrition behavior is identified. AI's ability to provide feedback can

also help improve supervisor/management coaching when behaviors associated with attrition are identified. Systems within the organization can also be modified based on the prediction models, including such things as affirming flexibility approaches to the job, including off-site work; compensation and benefits packages; work processes, improving work conditions, and so on. David (2023) reported on a survey that found that the main reason that 63% of employees changed jobs was because of a lack of advancement opportunities. This challenges an organization to find ways to meet this desire; not an easy task. But the application of AI can help in identifying on an individual level what might meet this need for those employees. AI can provide insights to suggest a special project, a transfer to another location or another position, or a team assignment that might meet individual needs.

Simulations

Training is most effective when the training environment matches the work environment. However, in high-risk situations (such as the military or surgery), or when expensive products are consumed, simulations can be an answer. Tools such as virtual reality (VR) (Khandelwal & Upadhyay, 2021), augmented reality (AR) (Martins et al., 2023), and mixed reality (MR) can overcome these challenges. Given the ability to replicate a work environment virtually, the chances are that transfer will be maximized when the skills learned have to be implemented. The research in the area falls into three major topics: virtual HRD (VHRD) and socialization, VHRD related to learning, and VHRD and the psychological characteristics of the work environment (Rahimi et al., 2022). More research is needed on these developments, their applications, and the processes they affect in organizations.

Digital Dialogues and Communities of Practice

Digital dialogues are not new. In fact, we often use them today, either through our phones or computers. In this context, however, we are talking about a person interfacing with a digital device (Kim, 2022). Presently, this is at a mostly elementary stage, such as phone calls or websites designed to answer questions. Because of the elementary stage of their development, they are often imperfect and frustrating. As this function develops, as we are currently seeing with the use of ChatGPT, more and more complex conversations will be available, perhaps even developing to provide counseling in employee assistance programs (EAP), career development sessions, conflict management, employee assessment of organizational culture, and so on.

Additionally, communities of practice are already a reality. Digital platforms allow employees to have more dynamic interactions for purposes of collaboration to share knowledge, innovate, problem solve, build teams, and so on.

Credentialing

Through the application of technology, such as block chaining, employee skills can be tracked and verified, allowing organizations to provide employees with certification or credentials confirming their competence (Dash, 2023). We have already reached the point when employees being interviewed for a position in a new organization or in another part of their existing organization are required to produce evidence of their competence as displayed in their current position, thus streamlining the recruitment and selection processes by reducing the time and cost involved.

Quora (n.d.) explained that AI can enhance credentialing with “automated data extraction and verification, credentialing decision support, continuous monitoring and compliance management,

predictive analytics for risk assessment, streamlined provider onboarding, interoperability and data integration, and enhanced fraud detection and prevention” (p. 1).

Soft Skills Development

As digitalization increasingly takes over routine tasks, it becomes increasingly necessary for employees to develop emotional, cultural, and spiritual intelligence; innovation and creativity; people management; cognitive flexibility; and critical thinking (Gray, 2016). These are competencies that digitalization is not likely to develop for a long time, if ever. Thus, HRD will need to focus more effort on development in these areas (Dolev & Itzkovich, 2020). As they observed,

soft skills are key at the workplace and are non-cognitive skills and abilities that computers lack, that allow people to collaborate with machines and complex systems. They include the ability to constantly adjust to change and manage increasing stress levels, demonstrate empathy and moral judgement, build relationships and be creative and innovative. (p. 55)

Ethics

The continuing development of digitalization will require more attention to its ethical application (Harrison et al., 2020). This will require attention to transparency, equal access to the benefits of digitalization, attention to copyrights, accuracy of metrics, and so on.

Most ethical malfeasances occur when humans abrogate their responsibilities to check on the outcomes from such processes. While celebrating the opportunities that AI provides to HR, Hunkenschroer and Luetge (2022) also highlighted the risks identified in their review of more than 50 articles based on the relationship between AI and HR, including humans foregoing their

obligations to ensure ethical application of AI. The fear with all applications of AI will outrun the ability of humans to control AI, thus losing control over what AI can and will do, in spite of the best efforts of humans. Given that AI-created documents are meta-analyses of what exists on the web, and humans cannot determine whether copyrights are violated or the sources of information, plagiarism, inadvertently, can easily be committed.

David (2023) cautioned that AI can unintentionally perpetuate biases and stereotypes present in historical data. To accomplish this, AI systems should comply with the five pillars of responsible AI: explainability and interpretability; bias mitigation and fairness algorithms; data robustness and granularity; data quality and rights; and accountability through regular audits and monitoring of the AI's decision-making process. Is the solution transparent? Can you easily explain how its algorithms work? What bias mitigation is in place? What client onboarding experience can be expected and what training is included? Major risks exist if these questions are not asked and answered appropriately.

Harrison et al. (2020) elaborated on the critique and ethicality in relation to machine learning (ML) and asked some interesting questions: how can we teach ML and AI ethics? How do we get them to think in terms of ethics and compassion? How do we make sure that they are acting right morally and ethically? How can that be continuously updated to meet the changes between cultures and time? Another relevant aspect is including the human touch in machine actions. HRD practitioners need to be aware of the ethical relevance of the use of robots and machines. Timmer et al. (2018) highlighted six key ethical concerns to consider related to the irruption of digitization: privacy, autonomy, safety and security, balance of power, human dignity, and justice.

HRD practitioners need to reflect on the profound concerns related to digitalization and, especially, AI. What are their functions, whom do they serve, and how should they act? These are especially important questions given that AI tends to be designed and deployed by people who have no background in HR or HRD. Heterogeneous teams or groups of professionals who deeply know HRD and have the knowledge should develop them with meaning and appropriate functions. Some relevant questions to ask in implementing digitalization are: To what extent do HRD professionals participate in the development and use of AI? As AI becomes more widely used, how long will the HRD function be viable? What moral obligations do HRD specialists have when selecting suitable AI systems?

The Future of Digitalization within HRD

All of these applications will persist and continue to develop, perhaps even to the point where society will need to redefine work and our economy. Many decades ago, two bold and futuristic thinkers anticipated a future that we may be encountering based on the impact of technology. Skinner (1948) envisioned a society in which work is defined as being anything that people enjoy doing, not their contribution to productivity nor based on their level of competence. Buckminster Fuller, well known for his contributions across many fields and many decades, challenged our economic model. As quoted in an interview with Barlow (1970), Fuller said that the idea that everybody must make money is absurd. He held that just one in 10,000 people is needed to create a technological disruption to support everyone else. Today, we create new jobs because of the delusion that, based in Malthusian Darwinism, everyone has to work to justify their existence. Society encourages people to go to school to prepare for employment, or to get a job, as they have to make money. Who among us will have the courage, professionally and

politically, to suggest such dramatic societal changes, though digitalization may make such changes mandatory? Who will tell the emperor (i.e., HRD) that we have no clothes? Is HRD on the way to becoming, partially if not completely, technology driven and developed?

Responses to Digitalization within HRD Curricula

We then reflected on how HRD curricula must change, and quickly, in response to the challenges of digitalization to continue to develop HRD professionals as leaders during this transformation. When launching his professional career, McLean (1967) found that higher education was lagging behind industry in technology. Since then, studies of both undergraduate and graduate education (in the U.S.) have shown little interest in the technological competencies required of HRD professionals (Gaudet & Vincent, 1993; Kuchinke, 2002; Lim & Rager, 2018), except for those programs situated in departments associated with technology. Where will higher education fit into this transformation? The lag has been significant, and HRD programs may continue to rely on industry to develop such competencies among HRD graduates who are ill-prepared in the area of digitalization.

What will it take for this transformation of curricula to be successful? First, existing faculty members may require significant in-service development so they can be competent in the areas of digitalization. This will not be easy as many HRD faculty are tenured and would need to undergo this development voluntarily. There will also be significant costs involved that, presumably, would need to be covered by universities. Who is prepared to offer such in-service education? What incentives can be offered to faculty to undergo such in-service education? When could it be offered when many faculty teach during the summer as well as during the year?

Second, faculty recruitment would need to focus on selecting faculty who already have these competencies. But how will this be possible when most faculty applicants come from programs that do not have such a focus? And doctoral students in HRD do not typically have an appropriate undergraduate or master's degree major to support such competence. And those students who have the desired background may find themselves recruited into industry offering far more lucrative livelihoods than is available in academia, keeping the pool of available recruits for universities limited.

Third, the curriculum itself would need to change. Given how invasive digitalization is becoming in HRD, every course may have to be modified to reflect this digitalization. Who among our current faculty are currently competent to make such modifications? And there will likely be a need for at least a couple of courses focused on digitalization (and especially the application of AI). HRD curricula are already overloaded with courses. What courses will be merged or even eliminated to make room for the new courses?

Fourth, there are potential turf issues within universities. Other programs are already teaching courses in AI and digitalization. Can HRD programs make the case for the subject-specific application of their proposed new courses? And, if they are unsuccessful, how can an HRD program be offered that is relevant to today's workplace environment?

Fifth, there will be a need for an industry-based advisory group to work with the faculty in creating a transfer-rich HRD curriculum. Do our programs have significant connection with industry to put together a committed group of industry experts willing to give of their time and expertise in helping create HRD curricula? Will industry connections assist faculty in placing students (and even faculty) in internships in which they can develop their digitalization skills

even further? Both foci will be difficult for those programs that are situated in non-urban settings.

Sixth, there will be budgetary implications of meeting the requirements imposed by being relevant with AI and digitalization. These costs could be extensive, including both equipment and software. Will university budgets be sufficient to cover such costs?

Transforming HRD curricula to meet the needs of our students is going to be a very difficult task. Some steps forward have been taken in other contexts that could be useful, such as in Europe (The Netherlands) (van Beurden et al., 2024) and India (Sidhu, 2024), where they are implementing actions to ease this transformation in higher education curricula. For instance, van Beurden et al. (2024) identified the necessary knowledge and competencies that are needed to implement effectively technological developments, according to HR professionals. They reflected on how HR higher education programs are integrating, and should be integrating, technological developments in their curricula and expanded on the key knowledge and competencies related to technology development for HR professionals and HR education (van Beurden et al., 2024). We have made transitions in the past; some of which have been significant (given the roots of many HRD programs). With the appropriate commitment, this transition can be made as well.

Limitations and Future Research

We acknowledge that there are limitations in our use of a conceptual, descriptive approach, with a language limitation of studies published in English and Spanish. Our article does not offer a synthesis based on a comprehensive, systematic literature review. While our article does not offer definitive statements, that was not our focus or intent. Future researchers

can conduct a systematic literature review to determine if the areas we identified are accurate and sufficient. Additionally, we did not include an exhaustive search of all possible evidence on a given theme, given time and space restrictions. Therefore, researchers interested in this topic could select a specific area and perform a systematic review (Juntunen & Lehenkari, 2021). Further, researchers with appropriate language literacy could broaden the scope of this article by reviewing literature published in other languages to capture additional examples from other cultures.

One area we did not cover was *how* HRD programs can implement digitalization education within their curricula. If programs are to be effective in preparing HRD professionals for a digitalized workplace, they need to know specifically what to do and what their curricula should include. It is also important to identify the competencies that faculty need to develop in both skills and knowledge to make the transition. Another area that we did not explore in any detail, as it was outside our scope, was a detailed critique of digitalization, especially AI, in HRD. While we covered some of this in some themes and especially the section on Ethics, describing some of the identified risks (Hunkenschroer & Luetge, 2022), such as the chance of the perpetuation of biases and stereotypes (David, 2023), and some other ethical concerns related to the application of these technologies in HRD (Harrison et al., 2020; Timmer et al., 2018), much more could be explored in relation to the dark side of AI to identify the ways in which digitalization might negatively impact HRD. We encourage academia to take on research in this area and develop new frameworks for ethical AI, as some authors are already doing (e.g., Wang & Pashmforoosh, 2024). Researchers and journal editors will need to change their mindsets on what is acceptable evidence in this topic. As we found and described earlier, blogs and websites

are more likely to be real time than journals that use peer reviews. However, with open access journals becoming more popular, with faster turnaround times, the length of time from conception to publication is becoming shorter. Despite the global focus and approach of the manuscript, we acknowledge the importance of discussing specific cross-cultural case studies and regional examples that could provide a richer, more nuanced understanding. Virtual HRD enables international HRD. Research, then, is needed to focus on the difficulty of navigating cross-cultural issues and technology access. Both are key to successful international or transnational organizations. Different regions might face unique challenges and have varying levels of technological adoption and regulatory environments. There is not much written in this area. However, some articles might inspire expansion of the research in this area. Chin et al. (2024) studied the combination of artificial and human intelligence applied to humanitarian logistics. Bennett and McWhorter (2017) discussed issues of culture, knowledge, learning, technical capacity, and the goals and boundaries of international HRD to manage cross-cultural knowledge. Anglani et al. (2023) crossed digital frontiers with cultural intelligence. Future research could address these challenges.

Given the speed at which digitalization is moving, it is unlikely that most HRD programs will have faculty competent to lead the needed changes in curricula. Research, then, is needed on how programs have developed their faculty and modified their curricula in response to technology. Partnering with practitioners will also need to become commonplace to keep HRD faculty and curricula current. Research can focus on how programs have accomplished these changes effectively.

Conclusion

We identified and described 13 application areas in which HRD has been affected by digitalization and AI, and how they are likely to be impacted moving forward. We also reflected on how HRD curricula will need to respond to fulfill their potential in developing HRD professionals as leaders in this transformation. Digitalization and AI confront HRD with difficult challenges. If the field does not respond appropriately and quickly, HRD may not survive. It is almost certain that it will not survive as we have known it, either in academia or in organizations.

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