



Industry 5.0 and the Role of AI in Corporate Learning & Development (L&D)

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ABSTRACT

Industry 5.0, articulated by the European Commission (2021), reframes industrial transformation around human centric, resilient, and sustainable systems in which people and intelligent technologies collaborate. This paper examines how this paradigm reshapes corporate Learning and Development (L&D) and the role of Artificial Intelligence (AI) in enabling continuous workforce capability development. Drawing on an integrative review of policy, academic, and industry research, four findings emerge:

1. Rapid skill disruption, with approximately 39% of core skills projected to change by 2030.
2. A persistent technology workforce readiness gap, as organizations adopt AI faster than they upskill employees.
3. Improved outcomes when AI-enabled learning is implemented through human-centric leadership and social learning.
4. The growing strategic importance of uniquely human capabilities such as creativity, judgment, and leadership.

The paper proposes an AI-augmented L&D capability framework aligned with Industry 5.0, emphasizing dynamic skills intelligence, experiential learning, responsible AI governance, and multi-level impact measurement. The findings suggest that repositioning L&D as a strategic capability-building function is essential for sustainable human-AI collaboration.

Keywords: Industry 5.0, Learning & Development, Corporate Training, Artificial Intelligence, Workforce Skills, Human-Centric Innovation, Reskilling, Organizational Change, Training Effectiveness, Continuous Learning.

INTRODUCTION

Industry 5.0, introduced by the European Commission (2021), represents a shift beyond Industry 4.0's emphasis on automation and efficiency toward a human-centric model of industrial development. Rather than positioning technology as an end in itself, Industry 5.0 frames advanced systems such as AI, robotics, and intelligent automation as tools designed to augment human capabilities, improve resilience, and support worker well-being. This approach is particularly relevant for manufacturing and technology-intensive sectors, where human-machine collaboration is becoming integral to daily operations.

As AI and automation reshape work, job roles are evolving rapidly. Employees increasingly move from executing routine tasks to supervising, interpreting, and collaborating with intelligent systems, requiring a broader mix of technical, cognitive, and social skills. However, evidence consistently shows that workforce development is lagging behind technological investment, creating a growing skills deficit that threatens the value organizations can extract from advanced technologies (Adecco Group, 2025; Qualtrics, 2026).



In this context, corporate Learning and Development functions face mounting pressure to evolve. Traditional, event-based training models are poorly suited to an environment characterized by continuous skill change. This paper argues that L&D must transition from a training delivery function to a strategic capability-building system, using AI to personalize and scale learning while retaining strong human oversight. The study synthesizes empirical evidence on skills disruption and readiness gaps, and proposes a human-centric, AI-augmented L&D framework aligned with Industry 5.0 principles.

METHODOLOGY

This study employs an integrative literature review to capture the multi-faceted nature of Industry 5.0 and its implications for corporate L&D. We analyzed a range of sources, including policy and industry reports, academic research, and global surveys. For instance, we drew on the European Commission's Industry 5.0 policy brief (European Commission, 2021) for definitional context, and on academic works (e.g., Brković & Čulibrk, 2023; Warhurst, in Cedefop, 2024) examining the anticipated skills gap and workforce dynamics under Industry 5.0. We also reviewed consulting and industry studies that provide quantitative forecasts and best practices, such as Deloitte's workplace skills surveys (Deloitte, 2024) and the Adecco Group's AI readiness survey (Adecco Group, 2025). Additionally, data from corporate learning and workforce surveys (e.g., Qualtrics, 2026) and manufacturing-focused analyses (World Manufacturing Foundation, 2024) were incorporated for sector-specific insights. By cross-referencing multiple sources, we identified consistent trends and evidence. The findings and propositions in this paper are grounded in these triangulated insights. No new primary data were collected; instead, we synthesize existing knowledge to propose a forward-looking model for L&D in the context of Industry 5.0.

KEY FINDINGS

The literature review reveals four interrelated findings that define the workforce development challenge under Industry 5.0.

Accelerating Skill Disruption

Workforce skills are changing at an unprecedented pace. By 2030, approximately 39% of core work skills are expected to be disrupted or obsolete (Qualtrics, 2026). While automation may eliminate some roles, its larger impact lies in reshaping existing jobs, with an estimated 40% of roles undergoing significant task changes. Manufacturing exemplifies this trend: projections suggest 2.1 million U.S. manufacturing jobs could remain unfilled by 2030, placing nearly \$1 trillion in output at risk if skill shortages persist (Deloitte & The Manufacturing Institute, 2021). These figures underline that talent availability, not technology, is increasingly the binding constraint on growth.

Technology Adoption Outpacing Workforce Readiness

Organizations are adopting AI and advanced technologies faster than they are developing employee capabilities. Around 63% of organizations cite skill gaps as the primary barrier to technology adoption (Qualtrics, 2026), yet only ~10% have robust plans to support workers through AI-driven change (Adecco Group, 2025). This adoption-readiness gap often results in underutilized systems and stalled returns on investment, highlighting the need to integrate workforce development directly into digital transformation strategies.

Human-Centric Implementation Enhances Learning Outcomes

Evidence shows that how AI-enabled learning is implemented matters as much as the technology itself. Programs supported by visible leadership sponsorship, social learning, and blended delivery consistently display higher engagement and skill transfer. Conversely, self-paced digital training alone is often insufficient for complex capability development. These findings reinforce Industry 5.0's core principle: technology adoption is most effective when it is implemented with, rather than imposed on, people.



Human Capabilities Gain Strategic Importance

Rather than diminishing human relevance, AI increases demand for uniquely human skills. Surveys indicate that employees rank teamwork (65%), communication (61%), and leadership (56%) above advanced technical skills, including AI integration (54%) (Deloitte, 2024). As AI automates routine tasks, organizations increasingly depend on judgment, creativity, ethical reasoning, and adaptability - often described as fusion skills to translate technological potential into business value.

DISCUSSION: WHY TRADITIONAL TRAINING FALLS SHORT

Collectively, the above findings indicate that L&D practices need a radical overhaul. Traditional corporate training approaches - periodic classroom sessions, static e-learning libraries, or one-size-fits-all seminars - are proving slow, inflexible, and insufficient for the continuous learning demands of Industry 5.0. Several issues stand out:

First, workplace learning must shift from an occasional activity to a continuous, embedded process. When nearly half of core skills can change within a few years, organizations cannot rely on annual training events or ad-hoc courses; instead, L&D must function as an always-on capability-builder, seamlessly integrated with the flow of work.

Second, many organizations still use outdated metrics (like training hours delivered or course completion rates) to gauge success. These measures do not necessarily reflect whether employees gained useful skills or improved their performance. In fact, surveys suggest nearly 47% of organizations do not measure whether training actually improves job performance, and about 39% lack a formal upskilling strategy - even though 71% of executives acknowledge that workforce upskilling is critical for long-term success (Worldmetrics, 2025). This disconnect indicates a tendency to treat L&D as a compliance exercise rather than a strategic necessity.

Third, L&D is often reactive and siloed: companies frequently introduce training only after performance issues emerge or technology deployments falter, rather than proactively building skills ahead of change. The earlier finding of the adoption readiness gap (Section 3.2) illustrates this technology initiatives often proceed without parallel capability development, causing adoption problems that could have been mitigated by earlier training and better change management.

Finally, organizational context and culture critically affect training impact. Even the best-designed course will have limited impact if employees return to a workplace that does not encourage or enable use of new skills. For example, if a manager does not allow time or encourages an employee to apply newly learned techniques, the training's effect dissipates quickly. Traditional L&D often overlooks this, focusing on the training event itself and neglecting what comes after.

In summary, the conventional training model treat learning as a discrete event and assume the job is done when a course ends - is insufficient for Industry 5.0. A new approach is needed: one that is continuous, outcomes-focused, integrated with strategy, and entwined with organizational support systems. The next section outlines a framework for such an approach, leveraging AI to amplify L&D's reach while anchoring it in human-centric principles.

PROPOSED FRAMEWORK: AI-AUGMENTED L&D CAPABILITY MODEL

To meet Industry 5.0's talent challenges, we propose a holistic AI-augmented L&D capability model. This model reimagines corporate learning as a continuous "capability engine" that is technology-enabled yet firmly human-centric. It consists of six interrelated components:

- 1. Dynamic Skills Intelligence & Planning:** Continuous sensing of evolving skill needs. L&D teams should leverage AI-driven analytics and workforce data to maintain real-time visibility into skill gaps and emerging competencies required by the business. For example, machine learning systems can scan internal



performance data and external labor market trends to predict upcoming skill requirements (say, proficiency in a new automation tool), enabling proactive upskilling rather than reactive training. This dynamic skills intelligence informs strategic workforce planning, ensuring training priorities are aligned with future needs instead of only current gaps.

2. **Business-Aligned Learning Architecture:** Design training as a direct enabler of strategic goals. L&D initiatives must be explicitly linked to business outcomes and key capabilities that the organization needs. This means collaborating with business leaders when developing programs so that each major learning initiative answers: What strategic objective does this support? For instance, if a company is implementing a new AI-driven manufacturing process, L&D should co-develop a training program that equips technicians and engineers with the necessary skills to run and improve that process. By making learning business-driven, companies ensure that L&D investments yield tangible performance gains and are viewed by executives as essential to strategy execution rather than ancillary.
3. **Workflow-Embedded & Experiential Learning:** Integrate learning into daily work and leverage hands-on experiences. Embracing the Industry 5.0 ethos of human-machine collaboration, skill development should occur as close to the work itself as possible. On-the-job training, stretch assignments, and rotational programs allow employees to learn through real challenges. AI and digital tools can support this by providing in-the-moment guidance - for example, augmented reality (AR) systems offering step-by-step instructions during a complex task, or an AI virtual coach that answers questions in real time. Moreover, encouraging peer-to-peer learning (communities of practice, mentoring) helps share tacit knowledge that is not easily codified in courses. By transforming work itself into the primary site of learning, L&D fosters a culture of continuous development, and employees are more likely to retain skills because they immediately apply them.
4. **Human-Centric Change Management & Adoption:** Drive cultural and behavioral shifts alongside technical training. Technical upskilling efforts must be paired with robust change management practices that address the human side of innovation. This includes clearly communicating the purpose and benefits of new technologies or processes, setting expectations that everyone (from leadership down) will be learning continuously, and actively managing resistance or anxiety. For example, involving employees early in technology pilots or training content creation can increase buy-in and reduce fear of AI. Managers play a pivotal role here: they should be trained to coach their teams, allocate time for learning, and reward innovative use of new skills. In effect, upskilling should be treated not as an isolated HR program but as a core element of organizational change, with champions, feedback loops, and a narrative that highlights growth opportunities for employees.
5. **Governance & Responsible AI Use:** Ensure ethical, transparent use of AI in learning. As AI tools become more prevalent in L&D (e.g., for personalized content recommendations, learner analytics, or even AI-generated training materials), companies must establish guidelines for responsible AI use. This means safeguarding employee data privacy, mitigating biases in algorithmic recommendations, and being transparent about how AI is assisting in training. Setting up an L&D governance board or integrating with existing data ethics committees can help oversee these aspects. Additionally, L&D departments should educate their employees about AI literacy and ethics - so that the workforce not only uses AI-driven learning tools confidently but also understands their limitations and risks. Aligning with Industry 5.0's human-centric approach, the goal is to harness AI's benefits in learning without compromising trust, fairness, or inclusivity.
6. **Impact Measurement & Continuous Improvement:** Rigorous evaluation of learning outcomes at multiple levels. To cement L&D's role as a strategic function, it must systematically measure its impact on both people and the business. We advocate adopting a multi-level evaluation framework similar to or extending the Kirkpatrick model: measure learner engagement and satisfaction (Level 1), learning outcomes or skill acquisition (Level 2, via assessments or skill badges), behavior change or skill application on the job (Level 3, via manager observations or performance data), business results attributable to the training (Level 4, such as productivity gains, error reduction, retention improvements), and even strategic outcomes (Level 5, such as increased organizational agility or innovation capacity linked to improved skills). Capturing data at all these levels allows L&D to identify what's working and continuously refine programs. It also provides a stronger evidence base to demonstrate the return on investment (ROI) of L&D activities. Notably, many companies still struggle with this - over 90% report difficulty in directly connecting learning to performance outcomes (Qualtrics, 2026). Nonetheless, pushing for better metrics is crucial; when L&D



can show, for example, that a new AI training saved X hours of manual work or improved service quality by Y%, it secures greater organizational support and can iterate programs based on feedback.

RECOMMENDATIONS FOR L&D LEADERS

Building on the above framework, we suggest several immediate actions for L&D leaders to re-align their departments with Industry 5.0 objectives:

1. **Establish cross-functional “future skills” governance:** Create a council or task force that brings together L&D, business line leadership, and technology strategists to jointly plan workforce development. This group should maintain an evolving skills roadmap tied to company strategy and forthcoming tech deployments. By formally linking tech initiatives with talent initiatives, organizations ensure that any introduction of AI or automation is accompanied by early training and adaption support for employees.
2. **Promote responsible and inclusive AI adoption:** When implementing AI-powered learning solutions, do so transparently and ethically. Clearly communicate to employees how AI is used in training (for instance, an AI recommending courses) and solicit their feedback. Include training on AI literacy and ethics in development programs so employees understand how to work with AI responsibly. Also design upskilling initiatives that reach all segments of the workforce - accommodate different learning styles and access needs to avoid leaving any group behind. This inclusive approach builds trust and encourages broad adoption of new tools.
3. **Implement multi-level impact metrics:** Shift L&D evaluation beyond participation and quiz scores. Deploy the multi-level measurement model described above (or a similar rigorous approach) in a few pilot programs to measure real-world impact. For example, after a sales AI training, track not just who completed it, but subsequent changes in sales cycle time or customer satisfaction. Present these findings to senior management to demonstrate tangible outcomes. Over time, refine your training content and methods based on what the data shows about effectiveness. By emphasizing impact and improvement, L&D will develop a culture of accountability for results, which elevates its credibility.
4. **Share success stories and scale gradually:** Finally, as new L&D approaches prove successful on a small scale, communicate those wins both upward (to executives) and outward (to employees). Highlighting a case where an AI-driven learning program led to a clear performance boost can secure buy-in for broader rollout. At the same time, be mindful to scale initiatives at a manageable pace. Transforming L&D into a continuous, AI-enhanced function is a significant change; it should be implemented iteratively, learning from each step and building momentum.

These recommendations require commitment and investment, but they are increasingly feasible due to rapid advances in learning technologies and a growing recognition among CEOs that talent is the lifeblood of innovation. Organizations already on this journey report better alignment between their people and technology strategies, suggesting that these actions help deliver the promise of Industry 5.0.

LIMITATIONS

This paper provides a strategic perspective on L&D in the Industry 5.0 era, but it is not without limitations. The scope of our evidence is broad but largely secondary - we synthesized diverse sources rather than conducting original empirical research. As a result, some claims (especially related to emerging practices of AI in learning) are based on early data and may need further validation over time. Additionally, the Industry 5.0 paradigm and its workforce implications are still evolving, and thus the frameworks proposed here should be considered conceptual. Different industries and regions might experience these trends unevenly. For example, the pace of automation and skill disruption in a manufacturing context may differ from that in a service sector or a developing economy; our general recommendations might need tailoring to specific organizational contexts. Moreover, measuring L&D outcomes is inherently challenging - while we advocate multi-level metrics, isolating the effect of training on performance is complex due to many confounding factors. Finally, implementing the transformation we describe requires managing internal change within L&D departments themselves (e.g., upskilling L&D professionals in data analytics and digital design, securing stakeholder buy-in and funding), which we acknowledge but do not deeply cover here. Future research could supplement our

review with longitudinal case studies or experiments to empirically test the model's effectiveness in various settings.

CONCLUSION

Industry 5.0 paints a vision of technology and humanity advancing together, positing that the next wave of industrial transformation must be as much about empowering people as about deploying intelligent machines. To realize this vision, organizations must invest as seriously in developing their workforce as they do in acquiring new technologies. This paper has argued that an AI-augmented, human-centric L&D function is a linchpin for success in the Industry 5.0 era. The current state of play reveals urgency: many core skills are at risk of obsolescence within the decade, and most organizations remain unprepared to reskill at the required speed and scale. Traditional training approaches fall short of what is needed. However, by reimagining L&D as a continuous capability-builder - one that harnesses AI for personalization and efficiency while upholding strong human elements - companies can turn the challenge of constant change into an opportunity. Organizations that effectively bridge the technology-talent gap will likely lead their industries, outpacing competitors who fail to mobilize their human capital. In line with Industry 5.0 principles, success will come from integrating high-tech with high-touch: using AI to amplify learning and performance, but always guided by human insight, empathy, and ethical considerations. When technical and human skills are cultivated in tandem - indeed viewed as “symbiotic” aspects of innovation (Deloitte, 2024) - the workforce becomes not only more capable, but also more engaged and resilient. In conclusion, the journey to Industry 5.0 is not defined solely by the adoption of advanced technologies; it is equally a human journey of continuous learning and growth. Embracing that journey will be vital for businesses to thrive in the years ahead.

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