

Role of Artificial Intelligence in Workforce Development



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Stories about rapid changes in technology are peppering the news and resulting in correspondingly rapid shifts in the workforce all over the world. In response to emerging technologies such as artificial intelligence (AI) and big data, the World Economic Forum (2023) predicts that six in 10 current workers will require additional training within the next 4 years. Today, however, only half of workers have the necessary training options. Emerging technologies will likely lead to *both* job creation and reduction. Anticipated areas of job creation will include health care, climate change and environmental management technologies, and cybersecurity, whereas anticipated areas of job reduction will include postal service, banking (e.g., clerks), and data entry. Although these changes are liable to yield an increase in job numbers, employers will undergo a shift in the skills they demand. In this paper, we explore the role that advanced technology plays in creating flexible and affordable training programs necessary for building an inclusive, qualified workforce.

Skill Development in the Age of Technology

The accelerating shifts in skill demand have had a substantial effect in perspectives on job training programs in the 21st Century, with an emerging paradigm of skill building as a career-long enterprise. Over the last decade, therefore, new approaches to advanced learning and professional development have emerged in the form of online self-paced learning, massive open online course platforms, and stackable microcredentials. These educational avenues are proving valuable to those currently in the workforce, as well as those working toward entering their profession of choice (Goger et al., 2022). This technology allows learners, regardless of their location or educational background, to access high-quality training and gain industry-recognized credentials. Platforms like Coursera, Udacity, and edX offer a wide range of courses and programs at affordable prices. These platforms provide considerable

flexibility, allowing individuals to learn at their own pace, fitting their studies around work and other commitments. Through such learning platforms, both traditional and nontraditional learners can complete their foundation education and engage in coursework toward a credential or degree.

Although these skill development efforts and initiatives are admirable at both individual and organizational levels, we need a more agile (proactive rather than reactive) approach to tackling the challenge of accelerating shifts in skill demand.

New research suggests that AI can help accelerate learning and skill development (Brynjolfsson et al., 2023) and is fertile ground to be further explored (Xu & Ouyang, 2022). Such technologies could identify the changing job requirements as part of the system and then quickly develop the necessary training to address the new requirements (and then, perhaps, keep evaluating and continuously improving the training as long as it stays relevant). We contend that *technology/AI—the architect of our challenge—could be the solution!*

Instant content generation. Leveraging generative AI, a type of artificial intelligence system, can automate the creation of knowledge-based training content, reducing the time and cost of content development. Generative AI algorithms can analyze vast amounts of text and educational resources to create structured learning materials (Radford et al., 2018). This approach to rapid creation and adaptation of training programs could help keep pace with emerging technologies. For instance, [Pluralsight Iris](#) recommends content that builds on individuals' existing skill set by using natural language processing and machine learning. To this end, AIR has been doing considerable work with large language models (e.g., OpenAI's ChatGPT, Google's BERT) in some of its projects and has been building chatbots and extracting key pieces of information from a large corpus of textual data, which could be incredibly useful for generating training content. AI has a potential to create short, relevant, quickly adjustable programming that can meet industry needs at lower costs because of its leanness and brevity.

Although AI can help accelerate new employees' learning, the latest research suggests a need to more carefully examine existing AI tools to mitigate the potential of perpetuating inequities in employment prospects and outcomes for job seekers (Brynjolfsson et al., 2023; Ungerer & Slade, 2022). We must, therefore, continuously audit, refine, and validate AI algorithms against diverse data sets and must actively solicit feedback from a wide range of users.

Strategic content delivery. AI-powered virtual reality (VR) and augmented reality (AR) technologies are promising for creating immersive and interactive training environments (Al-Ansi et al., 2023; Xie et al., 2021), allowing learners to practice hands-on skills in a virtual setting. Although these technologies have high set-up costs, over time they can significantly reduce the cost and logistical challenges of traditional in-person training. For example, medical students use VR simulations to practice surgeries (Dhar et al., 2021), and technicians receive training in equipment maintenance through AR overlays

(Srinivasan, 2020). While AR/VR technologies have many benefits, there are also some potential negative aspects to consider (Blackburn, 2023).

Not all learners have access to the necessary hardware or internet connections required to use VR/AR technologies, and this deficiency can limit the ability to participate in trainings that use these tools. In addition, developing high-quality VR/AR content can be expensive. Funding opportunities may be necessary for educational institutions and small businesses to make their VR/AR technologies accessible and affordable to *all* learners. Note that AIR's [datacasting initiative](#) (American Institutes for Research, 2021), which supports students who do not have broadband connectivity and offers them access to educational resources in underserved communities, is a testament to our capabilities to use technology for addressing these access and affordability issues. To do so, AIR brings together stakeholders from state education agencies, libraries, and public broadcast stations to discuss best practices and ways to address potential hurdles.

Enhanced learning experience. AI-powered algorithms—better known as an intelligent tutoring system—can analyze individual learners' strengths, weaknesses, and learning styles to create personalized learning paths. An intelligent tutoring system provides learners with instant personalized feedback, digital mentoring, coaching, and guidance, thereby simulating the experience of having a human tutor (e.g., [VirtualSpeech](#) helps users practice different soft skills and provides immediate feedback based on their performance; Barnard, 2019). By tailoring the content and pace of the training program to each learner's needs, AI ensures a more effective and engaging learning experience. For example, AIR currently has [an exciting project with Per Scholas](#) to explore the way in which AI-augmented tutoring could provide customized support to learners, to advance them into high-wage jobs in the tech industry (American Institutes for Research, 2023).

Incorporating accessibility into the learner experience in training is crucial to ensuring that all individuals, regardless of their physical, cognitive, or sensory abilities, have equal opportunities to engage and succeed. Leveraging AI can broaden accessibility to learners with disabilities (e.g., [Microsoft's Seeing AI application](#) describes people, text, and objects to individuals with visual impairment).

Learning-performance measurement. AI applications are also capable of handling assessment and evaluation tasks in a highly accurate and effective manner (Ungerer & Slade, 2022). AI can develop adaptive assessments—for example, automatic item generation to facilitate faster question development for quizzes/tests, thereby ensuring that training programs have robust item banks to support the security and integrity of their evaluation processes. More specifically, automated grading systems powered by AI algorithms can grade assignments and projects or perform other practical assessments, providing instant feedback to learners. For instance, AI-powered coding platforms and assessment tools, such as [HackerRank and LeetCode](#), enable individuals to practice coding skills and receive scores on their coding performance. Needless to say, it is essential to vet these assessments from the perspective of test-development best practices; AIR has done [substantial work in the](#)

[assessment development space](#) to help organizations build and administer fair and unbiased assessments.

By leveraging AI technologies such as generative AI for instant content creation, intelligent tutoring systems for strategic content delivery, VR/AR for enhanced learner experience, and AI-enabled assessments and grading for training evaluation, we can build more accessible, engaging, and effective training programs. It is crucial for everyone to embrace AI as a powerful tool in designing and delivering inclusive and affordable training programs that meet the changing workforce demands, ensuring that a thriving workforce is ready to tackle the challenges and opportunities of the future.

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