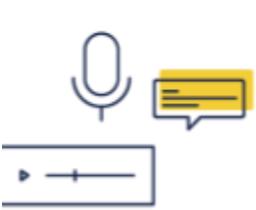


SKILLRISE

AN ISTE INITIATIVE



SkillRise literature review

Advancing Edtech and Adult Learning for the
Future of Work

2019

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Introduction

For the American economy to remain competitive in a global market, U.S. workers must build their proficiency in digital age skills, as the rapidly changing workplace necessitates reskilling to provide workers with the necessary tools to be able to succeed in a dynamic work environment. This increasingly important skill set includes interpersonal skills, higher-order cognitive skills and systems skills (Bakhshi, 2017). As the demand for digital, social and emotional, and higher cognitive skills in the workforce is rapidly expanding (Bergson-Shilcock, 2017; Boaler et al., 2018; Bughin et al., 2018; Burning Glass Technologies, 2016), gains in digital literacy and problem-solving can have transformative effects on workers' lives and organizational productivity (Castek et al., 2018; Jacobs & Castek, 2018; see also Frank & Castek, 2017). STEM skills are also essential for career development to boost the technological literacy of the workforce in the U.S. (Feller, 2011). But despite the promise of upskilling, there are many barriers to meeting such needs, and in particular, training service-sector workers can be challenging due to personal life and family factors that limit the time and resources workers have to dedicate to lifelong learning (Fechner et al., 2017).

Adult educators are currently pursuing various options to help narrow the rising skills gap. Work-based learning is one possible method to address the discrepancy between what is needed by industry and what workers can currently do. However in order to be effective, these programs must acquire sufficient administrative and monetary support, and integrate career preparation, training and mentorship (Cahill, 2016; Greenfield & Stevens, 2018). Likewise, investment in educational technology (edtech) can accelerate the collective impact in adult learning, and emerging data-driven information technologies can help align workforce program processes (Peterson, 2017; NASWA, 2018). Digital learning technologies are an effective mechanism for training low-skilled adults, particularly among sensitive and diverse populations (Matsunaga et al., 2016; Murphy et al., 2017; Silver-Pacuilla, 2016). As such, edtech offers promise to the field, including workers looking to advance their careers through upskilling.

The retail sector, in particular, is in dire need of workforce reskilling, and frontline workers represent a unique opportunity for workforce development (Martin et al., 2016). Retail, health and leisure industries represent nearly one-third of the U.S. workforce, and the vast majority of retail workers in the U.S. have limited literacy, numeracy, or digital problem-solving skills, and service sector advancement possibilities are limited, which reduces retention (Bergson-Shilcock, 2017). Work-based learning strategies are particularly adept at addressing workforce reskilling in the retail workplace (Wright, 2018). This necessity, coupled with the current expanding technological skills gap in the retail workforce, present a unique opportunity to develop workforce training procedures focused on reskilling the retail sector to adapt to an increasingly technologically based world.

The development of technology-based training is essential to the modernization and reskilling of the American workforce, and investments in newer technology such as blockchain and web 3.0 technology make the utilization of adult education resources

more efficient (Gregori, 2018; Halili, 2018; Inverso et al., 2017; NASWA, 2018; USCCFCEW, 2018). Additionally, social media platforms can support collaborative learning in adult education, in part due to the fact that such social networks already are leveraged by workers and the companies that employ them (Asunda, 2010; Careless, 2015; Shokri & Dafoulas, 2016). Investment in technology, therefore, can accelerate collective impact in adult learning. However, increasing the effectiveness of Adult Basic Education (ABE) requires substantial increases in financial support (Newman, 2015; Peterson, 2017; Rosin et al., 2017).

This literature review explores implications of technology-driven changes in the workforce, including the impact of such changes on worker skills, skill gaps and ways to reduce such gaps through learning opportunities. This essay explores five topics: trends in retail sector work, technology trends in the workforce, work-based learning, technology in adult learning and technology in workforce development. An investigation into trends in these areas reveals promising directions for the future of adult learning, including both basic education and workforce development.

Trends in the retail sector

AI has the potential to redefine the retail experience, but such a redefinition requires retail workers to develop their own skill sets. Microsoft (2018) has identified five ways in which this can happen: by personalizing a storefront for each customer, guiding discovery based on shopper's needs and preferences, capturing reactions, extending consumer outreach based on real-time information, and responding to customer feedback based on R&D. Each of these shifts requires teaching new skills to service sector employees.

Frontline workers represent a unique opportunity for workforce development because of a mismatch between job openings and job seekers. Too many low-wage workers currently lack the middle-level skills that new jobs require (Martin et al., 2016). Strategies exist for addressing these skill shift needs, including enhancing internal communications on developmental opportunities; accelerating tuition assistance programs and providing external educational opportunities; and providing formal apprenticeship opportunities. Additional training and partnership recommendations (Bergson-Shilcock, 2017) for reskilling retail workers include:

- Participate in sector partnerships to identify talent gaps and meet training needs. For small and mid-sized companies, sector partnerships, also known as industry partnerships, can provide an effective way to aggregate talent demand within an industry.
- Explore and sponsor registered apprenticeship or pre-apprenticeship programs.
- Partner with training organizations and community colleges to help workers upskill through opportunities such as vocational English language classes, foundational credentials such as high school equivalency, industry-informed

training, integrated education and training models, “blended” online/classroom learning, and industry certifications.

Additionally, the following policy recommendations regarding reskilling opportunities for retail workers that touch employers, workforce boards, and training providers can influence and incentivize ongoing learning for incumbent workers:

- Make sector partnerships America’s way of doing business. Policymakers can encourage communities to implement this approach by creating better alignment between existing federal upskilling investments and local, industry-led partnerships; and/or investing to enable additional communities to launch their own partnerships, particularly in the service sector.
- Fully fund federal investments in adult education.
- Support the expansion of work-based learning opportunities.
- Fund and support industry-sector partnerships.
- Advance effective Integrated Education and Training (IET) models.
- Support job-driven financial aid policies.

Technology trends in the workforce

Technological change – particularly driven by automation and artificial intelligence – is altering the nature of work in America, resulting in a more dynamic, advanced and precarious labor market for workers (Alden & Taylor-Kale, 2018). Failure to provide training for adapting to technological change risks diminishing national competitiveness and national security. As such, the U.S. needs to provide new and better career training opportunities for workers in order to remain competitive.

Artificial Intelligence and automation will accelerate the pace of necessary skill shifts in the workforce – one such trend involves the shift from manual labor toward more technological and emotional labor. A recent report by McKinsey (Bughin et al., 2018) suggests that by 2030, the time spent using advanced technological skills will increase by 50 percent for American workers. Such changes do not necessarily result in fewer jobs in advanced economies, despite panic echoed in various publications.

“Rumors of a coming wave of similar stores and robot-run factories have provoked apocalyptic predictions of mass unemployment among pundits and politicians. Doomsday headlines such as ‘You Will Lose Your Job to a Robot – and Sooner Than You Think’ reflect fears that artificial intelligence and robots will replace human labor on a mass scale and computers will become so intelligent that people will simply be unable to compete. But such a gloomy outlook is unwarranted. Recent analyses from the Organization for Economic Cooperation and Development (OECD) and the McKinsey Global Institute paint a very different picture. Yes, these reports conclude, automation will displace some people from some jobs, but there will still be work for the foreseeable future. The total number of jobs may not even decline significantly, especially in more advanced economies.” (Kinder, 2018)

Arguably, many current studies have minimized the extent of job creation that will likely result from workforce changes (Bakhshi et al., 2017). As a result of these changes, some jobs may disappear, and other jobs that do not yet exist will become commonplace, so the workforce will need to align its skillset to keep pace (Gray, 2016). Rather than panic, employers, workers, workforce boards and training organizations must look to new opportunities for workers in the advanced U.S. economy.

Technological applications of the job/employee-finding process are expanding due to the increasing need for labor specialization and increasing worker job mobility. A recent publication from JP Morgan (2016) describes new capabilities in data processing that offer workers and employers new possibilities for employment matching:

“As technological innovations have boosted data collection and processing capabilities in the last decade, tools and platforms using this technology have changed or accelerated how job seekers and employers find each other. Combined with overall labor market trends that see workers changing jobs more frequently and a higher need for more specialized skills, these matching technologies will have a continued and increasing role to play in the labor market far into the future.” (JP Morgan, 2016).

While this is generally good news for workers and employers, it raises equity-related concerns that workers with limited digital skills may be left behind in the new economy. However, this need around building one’s digital literacy capacity isn’t isolated to low-skill workers. Middle-skill jobs represent a substantial portion of national employment, and those that require digital skills – including strong fluency in basic data management and communications tools – are outpacing those that do not.

“In the middle-skill job market, the world is increasingly divided between the jobs that demand digital skills and those that don’t – and the ones that don’t are falling behind. Much of the debate over technology in the workforce has focused on sophisticated skills, such as writing code. But the more significant impact on the middle-skill job market is in the humbler world of everyday software: spreadsheets and word processing, programs for medical billing and running computerized drill presses. To a large extent, a job seeker without the ability to use this software won’t even get in the door. Middle-skill jobs, roughly defined as those that require more than a high school education but less than a bachelor’s degree, comprise 39% of U.S. employment. These jobs matter because they have long sustained a middle-class lifestyle for millions of Americans, and because they’re increasingly pressured by changes to the economy. Two-thirds of Americans don’t have a college degree, and these jobs represent important career opportunities for them. Middle-skill jobs that require digital skills are outpacing those that do not.” (Burning Glass Technologies, 2015)

Work-based learning

Work-based learning offers workers the ability to learn in an authentic settings to support tight alignment between learning and work. The U.S. Department of Education (2018) identifies three components for work-based learning:

- The alignment of classroom and workplace learning.
- Application of academic, technical and employability skills in a work setting.
- Support from classroom or workplace mentors.

Work-based learning is effective, especially when it's implemented in ways that align with relevant best practices (Cahill, 2018). Effective work-based learning:

- Supports entry and advancement in a career track.
- Provides meaningful job tasks that build career skills and knowledge.
- Offers compensation to learners.
- Identifies target skills and how gains will be validated.
- Rewards skill development.
- Supports college entry, persistence, and completion.
- Provides comprehensive student supports.

Another reason that work-based learning is effective is that it helps solve a common problem for workers and jobseekers: that of gaining “relevant work experience” that may be difficult to gain outside of a work environment (Cahill, 2018). But access to work-based learning opportunities is not currently equitable – in particular, such opportunities need to become more accessible to marginalized populations.

“Despite the clear advantages of work-based learning experiences, there are far too few available for those who would benefit the most: low-income young people and adults without the connections and formal support services to help them find the internship that will give them a leg up in the labor market. Further, the experiences that are available tend to mimic the current siloed thinking of ‘education or work.’” (Greenfield & Stevens, 2018).

Work-based learning strategies are particularly effective at addressing reskilling in the retail workplace, especially since retailers regularly employ workers with limited work experience and underdeveloped employability skills (which are oftentimes cultivated on the job). Such training can also be helpful for pre-employment youth in order to provide jobseekers a sense of what work will look and feel like: such programs can quickly get workers and jobseekers up to speed with new jobs and responsibilities (Wright et al., 2018).

But to be effectively leveraged in workforce development, work-based learning programs must navigate several challenges. Three such challenges to implementation (Greenfield & Stevens, 2018) include:

- Lack of integrated career exploration continuum through career preparation, training and mentorship.

- Difficulties leveraging new technologies due to cost limitations and privacy protection for minors.
- Lack of administrative and employer buy-in.

Integration across various educational systems could support increased awareness about the world of work for students. Current education about career options is relatively underdeveloped in most middle and high school environments (Greenfield & Stevens, 2018), yet despite such challenges, well-designed work-based learning programs offer great promise for both workers and jobseekers. For example, virtual counseling platforms, such as CollegeWise and 100Mentors, are becoming available and could be expanded. Dashboards that allow students to align their secondary experience (class selection, extracurricular classes, college selection, interests, soft skills, etc.) with desired postsecondary experience are being designed and beginning to be deployed.

Assessments and platforms (such as C'reer and MyKlovvr) are in development that leverage machine learning to help students find the best scholarship, college and/or career match. Additionally, the streamlining and integration of materials needed for the college application process (transcripts, college essays, recommendations, scholarships, etc.) between higher education institutions and high schools has become more standard through platforms like Naviance and Xello (formerly named Career Cruising). Because of the large number of schools using solutions like these, there's an opportunity to build in more capacity on these platforms to connect to work-based learning opportunities. Programs are also being designed to increase STEM/STEAM career awareness, such as DefinedSTEM, Life Journey and Couragion Career Exploration. Virtual field trips have become more available through applications like Google Expeditions, Nearpod and Discovery VR. These platforms could be expanded to include more virtual work-based learning experiences. Extended reality (AR/VR) experiences have potential to allow students to engage in work-based learning experiences that are immersive and authentic. And several platforms, such as Launch Path, 100mentors and Nepris, allow for real-time or recorded interactions between students and industry professionals.

Additionally, some solutions not rooted directly in technology platforms hold promise to provide many local opportunities along the work-based learning continuum. Two impressive programs are the Cristo Rey Network high schools, which provide work-based learning opportunities for all their students, and the CAPS network, which connects high school students with local businesses. Some programs allow young people to use platforms to maintain and manage their own store, where they may sell products they have designed in or outside of class time. Real World Scholars' Edcorps, for example, includes an online store where students sell their work, and many students are taking advantage of consumer platforms like Etsy. Social entrepreneurship projects and other project-based learning programs, such as Real World Scholars' EdCorps and Whatever It Takes, are being designed for students to have a social impact. Micro-badging or micro-credentials allow students to gain and demonstrate skill-specific proficiency when applying for a job or college. LRNG, for example, connects young people to out-of-school learning opportunities that can provide work-based experiences. Similarly, Raise Your Flag, which supports young adults in gaining career skills for non-college

career pathways and helps them connect to jobs, uses badges to indicate to employers which skills have been attained, and Launch Path includes badges based on work through internships. Finally, many high school students are able to graduate with entry-level career certifications or earn college credit for work completed in career-related courses or work-based learning experiences. Programs and platforms designed to train the workforce to address rising technological needs is as of yet underdeveloped, yet the promise for such training opportunities holds a wealth of possibility.

Technology in adult education

Technology offers great potential to expand learning opportunities for workers and job seekers through both workforce learning as well as basic education, and investment in technology can accelerate collective impact in adult learning (Inverso et. al., 2017; Peterson, 2017). At a basic level, investments in technology make the utilization of adult education resources more efficient, especially given many of the barriers adult learners in need of basic education face, such as low computer access and digital literacy skills, transportation limitations, concern over wages lost due to instructional time, pace of instruction, and the need to juggle multiple responsibilities associated with work and family. Strategies for addressing these barriers in effective adult learning programs (Silver-Pacuilla, 2016) include:

- Act collectively with multiple stakeholder groups to raise awareness and take joint ownership of solutions.
- Transform opportunities for youth and adults to assess, improve and use foundation skills.
- Make career pathways available and accessible in every community.
- Ensure that all students have access to highly effective teachers, leaders and programs.
- Create a “no wrong door” approach for youth and adult services.
- Engage employers to support upskilling more frontline workers.
- Commit to closing the equity gap for vulnerable subpopulations.

Web 2.0 technologies are a conspicuous example of this shift to new learning formats and opportunities. Such technologies provide learners and teachers opportunities to communicate and interact electronically, thus making learning schedules and formats more flexible. Such technologies have also improved both instructor feedback as well as social learning. Google Docs, for example, provides rich methods to assess student writing, and multimedia resources available via YouTube, Twitter, podcasts and blogs offer learners unprecedented access to new learning content (Halili, 2018). Access to these resources not only enhances teaching and learning, but necessitates new pedagogical approaches that rely more on learner collaboration than traditional teacher-centered instruction. In essence, traditional teaching is being replaced with technology-enhanced media that enable ubiquitous learning. In some cases, learners’ social networks are supporting new social distributions of knowledge, which is a more democratized collaborative learning process (Careless, 2015; Shokri & Dafoulas, 2016).

Finally, educational experiences enriched by social media can help prepare learners for some of the ways in which these networks affect commercial output and productivity (Asunda, 2010). Such experiences help learners bridge the world of social media in their personal lives to how such tools are used in the world of work. New web 3.0 technology presents many new opportunities for adult learners, showcasing a more intelligent marketplace that leverages artificial intelligence and machine-learning technologies to help employers more effectively source and grow talent, and learners to find new opportunities for upskilling and careers (USCCFCEW, 2018).

Market investments in adult education are necessary to address the rising demand for technological reskilling of the American workforce, but such investments must be made intelligently.

“To capitalize on the opportunity for and strong interest in learning technologies from the field, the adult education community should continue to address structural challenges that hinder the market’s efficiency. Efforts to reduce sales channel fragmentation, augment support for educational programs’ procurement efforts and create greater leverage with program funding resources will directly benefit suppliers active in the market, as well as those entering it.” (Newman, 2015)

Increasing the effectiveness of adult basic education with technology can be accomplished without substantial increases in financial support (Rosin et al., 2017). Such resource-efficient measures both avoid costly mistakes in program design and implementation, and are designed to meet learners where they are geographically, as well as regarding skill levels and needs. These considerations include:

- Adjusting proxy contact hour policy in ways that align with federal guidelines.
- Forming online learning circles or peer communities to support social learning.
- Conducting access surveys to understand learner resources.
- Leveraging distance-learning models that are cell/smart phone compatible.

As in adult basic education, technology offers substantial promise for workforce development, but this field still has far to go.

“As technology disrupts industry after industry, the United States needs better ways to help Americans access the many new opportunities technology is also creating, in particular by strengthening the link between education and employment prospects. The country needs stronger support for job creation, especially for better-paying jobs.” (Alden & Taylor-Kale, 2018)

As in K-12 education sectors, workforce training programs that use digital learning technologies can support learners across the skill spectrum, but require instructors to adopt a new role, that of facilitator and coach (Murphy, et. al., 2017). Additional suggestions for instructors include:

- Integrate technology use as part of face-to-face instructional time.
- Connect learners with programs that may subsidize device and internet access.
- Make sure to adequately pilot-test products before rolling out for widespread learner use.
- Provide extra support around online strategies for learners unfamiliar with digital tools.

Conclusion

Any thriving economy of the near future will be comprised of a workforce demonstrating command of a wide array of technological proficiencies. Thus, skill gaps between worker capacities and employer needs threaten the competitiveness of the American workforce and the viability of the U.S. economy. The rapidly changing workplace environment increasingly relies upon a technologically savvy skillset, and successful navigation of this terrain depends on workers' capabilities to adjust to new ways of shopping, working and living. The pace of this change continues to grow, and current infrastructure and training capacities are both underdeveloped and underutilized. This presents enormous opportunity in the arenas of both basic education and workforce training and development, including the retail sector. The barriers to upskilling the workforce are surmountable, but require substantial investment of time, support, and financial resources. Various established programs and utilities show measurable promise, and further investment in work-based learning programs and educational technology require expansion to address the needs of an increasingly technology-driven economy. Such innovation in reskilling and digital literacy education can catapult the U.S. economy into the future, growing the competitiveness of a national economic engine, while also bringing new opportunities to American workers and ultimately, their families.

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