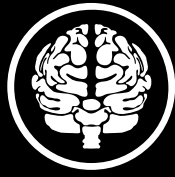


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LYCEUM



Preparing the Workforce of Tomorrow:

Learning & Development for a Changing World

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ABOUT THE AUTHORS



Dr. Ulrik Juul Christensen, Executive Chairman of Area9 Group and CEO of Area9 Lyceum, is an expert in learning technology.

He has pioneered adaptive learning and data-driven content development, as well as medical simulation and debriefing technologies. Area9 ApS (a part of Area9 Group) was sold to McGraw-Hill Education in 2014. Dr. Christensen was part of the McGraw-Hill Higher Education leadership team from 2011 to 2014, and MHE Executive Leadership from 2014 to 2016. He holds a number of board and advisory board positions with organizations in education.



Nick Howe, CLO of Area9 Lyceum, is an award-winning Chief Learning Officer and business leader.

He is a strategic advisor to the Institute of Simulation and Training at the University of Central Florida, and board advisor to multiple EdTech startups. For twelve years Nick was the Chief Learning Officer at Hitachi Data Systems where he built and led the corporate university and online communities serving over 50,000 employees, resellers and customers. He has more than 25 years of global sales, sales enablement, delivery and consulting experience with Hitachi, EDS Corporation and Bechtel Inc.

EXECUTIVE SUMMARY

Corporate learning and development (L&D) programs today must address an urgent problem: reskilling workers for the technology-enabled workplace, with greater efficiency and effectiveness to keep pace with a dynamically changing world. Across the business landscape, robotics, artificial intelligence (AI), the internet of things, and other advanced technologies continue to drive change in the digital era. Now, to make most of the human-plus-machine partnership, higher-level skills are being demanded of workers. For example, 21st century skills known as the 4Cs—communication, critical thinking, collaboration, and creativity—increasingly will distinguish what humans uniquely bring to the workplace. Yet how can learners build such competencies when so much time is spent acquiring and mastering knowledge, which traditionally has been the focus of training?

Clearly, new learning approaches are needed. Educators, policymakers, and L&D professionals, alike, must recognize that 21st century skill development requires a 21st century training approach. Static models of the past no longer suffice. Every learner is different; therefore, formulaic and one-size-fits-all models suit no one.

Technology is part of the solution. Specifically, and as this paper will discuss, adaptive learning must be deployed to meet the personalized needs of learners, not only in K-12 and higher education where these models are regularly deployed, but also in corporate L&D where adaptive learning has been less frequently used.

Adaptive learning brings together the best of computer science with cognitive research and has been shown to improve efficiency and effectiveness in learning. As L&D professionals seek to demonstrate return on investment (ROI) for the training delivered, data generated and collected by advanced adaptive learning models provide deeper insights into how people are being equipped with the skills they need to execute the company's strategies.



“Technological advances may disrupt labour markets as traditional jobs change or disappear, even as the number of young job-seekers continues to grow.

Retraining will be needed at previously unimaginable scales.
Education must adapt, from the earliest grades.

And the very nature of work will change....”

” UN SECRETARY GENERAL ANTÓNIO GUTERRES
Address to the 73rd UN General Assembly

EVOLVING BUSINESS LANDSCAPE

Change is occurring today on a seismic scale: greater globalization and heightened competitiveness, new and evolving occupations and job functions, and rapid expansion of technology. The impact on the job market is significant. On one hand, there is the potential landslide from erosion in the lower-level job market due to the fourth industrial revolution (Renjen, 2018). On the other, greater use of automation means humans must develop new skills to work with intelligent machines (Coy, 2018). More employers recognize that rapidly changing job requirements demand more training. Early adopters of AI must find the right mix of talent among employees possessing not only technical skills but also the business acumen to deploy advanced technology. This involves both retraining the current workforce and hiring new people. The result is a “strategic approach to talent that automates what machines do best, while still capitalizing on human judgment and creativity” (Loucks, Davenport & Schatsky, 2018, p. 1). The challenge for L&D professionals is delivering training and education capable of keeping pace with this rapidly evolving reality.

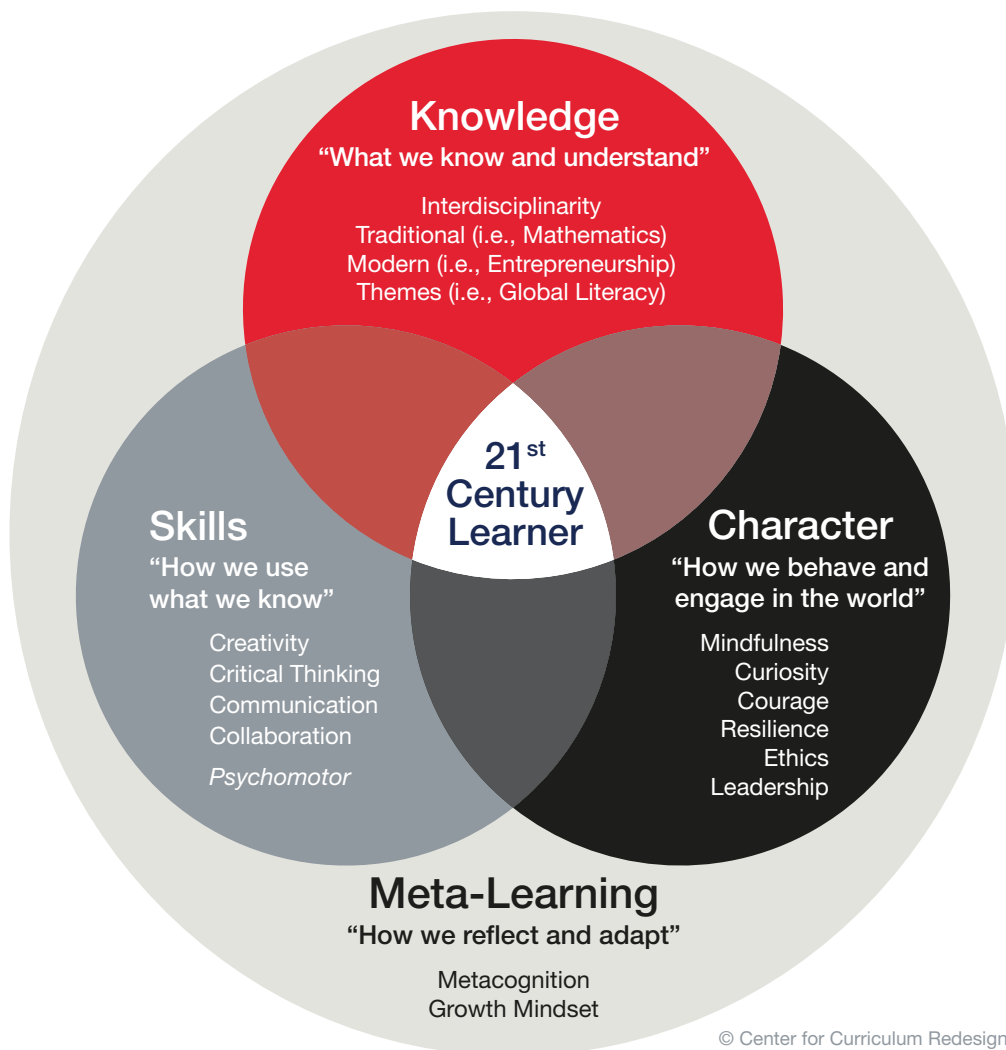
A recent survey of hundreds of top business executives and higher education institutions revealed eye-opening discoveries: only about one-quarter of their workforce (27%) and students (20%) have the necessary skills to work with and use emerging digital technology. Despite this awareness, both businesses and educators have been slow to redesign education, update training models, and collaborate with each other. Moreover, neither camp believes the other is fully capable of doing its part to prepare the workforce of today and tomorrow (Bahl, Cook and Nerurkar, 2018). Widespread skills gaps and a poorly prepared workforce undermine the competitiveness of business and the productivity needed to sustain growth. As the global population approaches 9 billion, sustainability becomes even more crucial. While greater deployment of advanced technologies, such as AI and robotics, is the wave of the future, it also poses a significant problem if more people and developing economies are left behind because they lack the requisite higher-level skills.

The only way to bridge this gap is with a 21st century learning approach. Within professional L&D, the century-old “factory model” of training must be brought into the digital era, largely with AI to update learning approaches with greater personalization. Bahl et al observed, “By putting AI into organizational workflow, L&D teams can also make on-the-job training relevant, tailored, and focused” (2018, p.16). But how can L&D training (along with K-12 and higher education) implement effective 21st century solutions? A curriculum framework devised by The Center for Curriculum Redesign for K-12 learners offers important insights for corporate L&D. The framework spans four dimensions: knowledge, skills, character, and meta-learning (Fadel et al, 2015).

“At the heart of the future of learning are the compressed timeframes in which the workforce needs to be continuously skilled and reskilled, content needs to be curated, and training needs to occur...

Ultimately, in order for the future of learning to function effectively, it must be supported with self-learning.”

” From “RELEARNING HOW WE LEARN”
(Cognizant, 2018)



KNOWLEDGE – WHAT WE KNOW AND UNDERSTAND



Knowledge in this discussion is composed of the facts and information acquired through experience or education. Every academic subject or job function requires specific knowledge to be mastered. In professional development, knowledge gaps must be identified and filled to improve performance, increase productivity, and avoid safety or liability issues. The challenge, however, is people may not be aware of their knowledge needs. When people think they know something but in fact do not, the result is “unconscious incompetence,” which can occur in as much as 20-40% of areas critical to job performance (Christensen, 2017). This heightens the importance of learners at all levels having the knowledge they need to perform accurately and successfully.

At a high level of competency, certain knowledge becomes second nature, allowing actions to become automatic. This level of knowledge mastery is known as “automaticity.” When under stress, people revert to automatic behaviors, what Daniel Kahneman calls “System 1” thinking. Building automaticity is the conversion of “System 2” (slower, more deliberate) thinking to the automatic responses of System 1 (Kahneman, 2011).

Although automaticity is important, it is absolutely not an end goal in itself. Rather, it is the means to an even greater end. It does not need to be achieved in all subject matter, but a certain knowledge baseline must be established. The objective is to gain a level of proficiency that provides internal access to knowledge more quickly and efficiently than looking up information.

SKILLS – HOW WE USE WHAT WE KNOW

Several skills can be thought of as knowledge that is put into action—in other words, how people use their knowledge. As discussed, reskilling the workforce for the digital age with greater use of AI and other advanced technologies has become a business priority (Bahl et al, 2018). But there are other skills that enhance humans’ unique capabilities. In making skills recommendations more actionable across the learning spectrum, Fadel (2015) focuses on the 4Cs: critical thinking, creativity, communication, and collaboration.

Bahl et al concur: “Companies are increasingly placing a premium on job applicants who demonstrate skills such as flexibility, self-motivation, empathy, resilience, creativity and communication capabilities, as they know ‘humanness’ will become a competitive advantage when working with intelligent systems” (2018, p.12). The importance of skills that distinguish and elevate the human workforce should not be underestimated.

More recently, Fadel has expanded the skills category with psychomotor skills, both “gross” (involving large muscle groups, such as in the legs and arms) and “fine” (smaller muscle groups, such as those found in the fingers) (Hill, Fadel & Bialik, 2018). There are countless psychomotor skills to be mastered across occupations, from carpenters and mechanics, who use tools with precision, to nurses, who must know how to correctly insert a catheter and perform other procedures. Psychomotor skills combined with the 4Cs enable professionals who work with the public to gain a competitive edge over automation. In professions such as hairstyling, for example, humans are highly unlikely to be replaced by robots, nor will caregivers such those who care for the elderly, because these types of occupations require a “human touch” and personal interaction.



CHARACTER – HOW WE BEHAVE AND ENGAGE IN THE WORLD

Fadel et al (2015) categorize character in six areas: courage, curiosity, mindfulness, resilience, ethics, and leadership. An example of resilience is “grit,” which researcher Angela Duckworth describes as passion and perseverance. The more grit a person has, the more likely he/she is to see failure as a learning experience rather than a setback. As Duckworth (2013) explains, grit sustains efforts toward long-term goals that may take years to pursue and eventually achieve.



META-LEARNING – HOW WE REFLECT AND ADAPT WORLD

Meta-learning refers to greater self-awareness in learning, particularly to take control of one's habits of perception, inquiry, and learning (Fadel et al, 2015). Two meta-learning domains are meta-cognition and developing a growth mindset. Meta-cognition is thinking about thinking, an activity that refers to ongoing reflection of oneself as a learner through learning goals, strategies, and results. A growth mindset encourages further development, among individuals and within organizations. Stanford University psychologist Carol Dweck defined a growth mindset as being open to accurate assessment of current abilities, being oriented towards learning, and possessing perseverance and resilience. This contrasts with a fixed mindset in which outcomes can be distorted or explained away, making it difficult for learners to know themselves (Dweck, 2006).

PURSuing EFFICIENCY IN KNOWLEDGE AND SKILL ACQUISITION

Given the time and resource constraints in professional development, accomplishing training goals is especially challenging. Plus, time spent in training is time away from the job, which makes efficiency paramount. Traditional, static e-learning cannot meet the multiple challenges of delivering engaging content, detecting and filling knowledge gaps, overcoming unconscious incompetence, teaching new knowledge, reinforcing skill-building, and increasing both competence and confidence. “One-size-fits-none” approaches, whether online or classroom-based, will always fall short.

For years, demonstrating the ROI for the investment made in training has kept chief learning officers (CLOs) up at night. *What is the company getting for this investment? What if the CEO asks me to explain?* Too often, the “measure” used is the number of employees who completed a course, as if attendance at a seminar or finishing an online training module were the objective. But completion statistics do not address how effective L&D is in achieving its main goal: building capabilities among employees to execute the company’s strategy. What’s needed is a personalized approach to L&D with content that is engaging and motivating, while providing evidence of skill mastery and knowledge acquisition. Trying to justify an economic return on a training investment seems premature if the CLO cannot even answer a basic question: “Did people actually learn anything?”

The key to efficiency and effectiveness is approximating a one-to-one approach—the classic tutor-and-pupil interaction which, as Benjamin Bloom’s research has shown, dramatically increases learning effectiveness compared to the traditional classroom (Bloom, 1984). Interestingly, it is not simply one-on-one interaction that is key; it is the opportunity that one-on-one interaction provides. Focusing on a single learner gives tutors the freedom to employ key elements of learning science: problem-based learning; keeping the learner at just the right difficulty of study; moving backwards and forwards through a subject as needed; using different approaches to the same topic; constantly assessing whether the learner is progressing; and many more. Group instruction of a worker population—whether in the classroom or by non-adaptive e-learning—produces poor outcomes versus what could be achieved with a one-to-one approach. Compared to traditional approaches, one-to-one development improves performance for virtually all learners, and the achievement curve among people is much tighter.

Obviously, it is not practical to tutor everyone in the workplace. However, a compelling ROI argument can be made for increasing *personalized learning* for every employee using advanced adaptive learning platforms.



Adaptive learning provides the ability to measure skills and competencies at the start and at the end of training. In this way, L&D program can capture not only the number of people served, but more important, evidence that each person was served in the best way possible.

The adaptive learning model adapts to the learner (as opposed to the other way around), presenting content only when necessary; students receive follow-up in areas in which they struggle. AI-powered biological models that mimic how the brain learns take adaptive learning to the next level, with greater personalization based on learners' needs to fill skill gaps and build greater competency, quickly and effectively.

Personalized, adaptive learning has been deployed extensively for millions of learners in K-12 and higher education, but relatively sparsely in the corporate space. Among L&D organizations that embrace adaptive learning (see Area9 Lyceum case studies) greater efficiency and learner engagement are reported. Often, the time to achieve mastery is cut in half (less time spent in training means more time on the job.) In addition, adaptive learning can identify areas in which people are unconsciously incompetent (they think they know something, but in fact do not). By making such incompetence conscious, the knowledge and skill gaps are uncovered. The next step is moving to conscious competence; learners have more awareness and greater confidence in what they know, resulting in better application of on the job, leading to better business outcomes.

AI adaptive learning models can also increase knowledge retention. This is significant, since people forget up to 70% of what they learn within 24 hours (Murre & Dros, 2015; Beer, Finnstrom & Schrader, 2016). Advanced models are able to predict when a learner might be at risk of forgetting content and present "refresh" activities as part of the learning process. The result is an optimized path to learner proficiency. Advanced adaptive learning platforms also provide feedback on aspects of skills such as critical thinking. In addition, specific adaptive courses can be used for psychomotor skill development and practice, including with a blended approach that combines in-classroom education, use of simulators, and computer-based adaptive learning. Sophisticated adaptive learning models can be used to impart and practice skills with feedback in areas such as critical thinking.

Further, in character-building, the most advanced adaptive learning models can monitor how learners respond when struggling to learn. Using complex algorithms, the model predicts the learner's level of "grit" and provides feedback to the learner, rewarding behaviors that lead to greater perseverance and resilience.

RESKILLING WORKERS FOR THE 21ST CENTURY

In summary, the pace of change continues to accelerate, increasing the risks that workers will be left behind. Globally, this can occur within economies, creating a divide between haves and have-nots in terms of education and access to opportunities, as well as between countries and from the developed to the developing world. By combining the unique talents of human teachers/trainers with the latest technological tools of advanced adaptive learning platforms, the result is a blended L&D training environment that can greatly improve efficiency and effectiveness in learning. It will require greater collaboration between business and higher education as well to improve worker readiness (Bahl et al, 2018). While the challenges are significant, the promise is even greater: more success for more people, now and in the future.



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Area9 Lyceum leverages more than 20 years of research to identify the human factors that influence learning, such as when students prepare for medical exams or health-care professionals prepare for continuing medical education. Other key industries include aviation, defense, heavy industry, telecommunications, professional services and higher education.



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