

The Future of Skills

In the Age of the 4th Industrial Revolution



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-  /D2Linc
-  @D2L
-  @D2L_EMEA

GLOBAL HEADQUARTERS

151 Charles Street West, Suite 400
Kitchener, ON, Canada
N2G 1H6

EUROPE

6th Floor
2 Eastbourne Terrace
London, England
W2 6LG

ASIA-PACIFIC

1 Queens Road, Suite 1144
Melbourne, Victoria 3004
Australia

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Setting the Stage: The Rise of the Fourth Industrial Revolution

Human history is filled with examples of occupational transformation, but the rate at which it is occurring today is unprecedented. According to the World Economic Forum, 65 percent of today's school children will graduate into jobs that do not yet exist and by 2020 more than a third of the desired skill sets of most occupations will be comprised of skills not yet considered core to that job.ⁱ A study by McKinsey & Company suggests that by 2030, up to 375 million workers will need to switch occupational categories due to automation and all workers will need to adapt to co-exist alongside increasingly capable machines.ⁱⁱ

The Fourth Industrial Revolution has brought society and the workforce to a crucial juncture. Automation is increasingly replacing middle-class jobs and the rapid advancement of artificial intelligence (AI) is expanding into everyday life, taking on some of our basic tasks. D2L's previous whitepaper, "The Future of Work and Learning", explored the scope of the Fourth Industrial Revolution and how the education system and employers can adapt to face this new challenge. This paper will build upon that past work to address another critical aspect of the Fourth Industrial Revolution: understanding the skills of the future and how new models of learning must be embraced to address the challenges exposed with existing systems of learning.

A 2017 McKinsey Global Institute survey reported that 62 percent of business executives believe that more than a quarter of their staff will need to be retrained in part because of automation and digital technologies.ⁱⁱⁱ As automation is rapidly consuming basic tasks in the workplace, a premium is being

placed on skills that are not easily replicated by machines. Soft skills, which are skills that involve effective interaction with other humans, are difficult to measure but critical to the ecosystem of a successful workplace. Moreover, soft skills training is neither quick nor easy, especially since our conventional systems of learning—both work-based and in higher education—have been primarily focused on instilling hard, or technical, skills and knowledge in graduates and employees.

Just as traditional jobs are quickly being redefined in today's market, our systems of learning need to adapt to address the rising demand for soft skills and the increasingly diminishing lifespan of hard skills. While stakeholders from education, the private sector, and government understand the need and value of training and skills development, we need to develop a cross-sectoral framework for skills development for the Fourth Industrial Revolution.



Skills and the Education System

Discussions around preparing for the “future of work” often end with the still unanswered question – what are the skills of the future that we should be preparing students and employees to have? Initial conclusions tend to lean towards the “hard” skills, those that are technical or job specific in nature. However, in the age of the Fourth Industrial Revolution and increasingly sophisticated technology, more and more employers are seeking out students and employees with soft skills, those that contribute to adaptability, interpersonal interactions, and resiliency. Strikingly, a LinkedIn survey found that 57 percent of leaders say soft skills are more important than hard skills. The adaptable mindset that soft skills provide is a key reason for their increasing value, particularly as the half-life of hard skills is continually falling—now at only about 5 or less years.^{iv}

THE DURABLE SKILLS OF THE FUTURE

Hard skills are technical in nature and related to a specific job or function, with a limited amount of transferability across industries and even across companies within an industry.^v Given their intransigent nature and relation to specific functions, hard skills are more aptly referred to in this paper as job skills. Soft skills on the other hand are timeless and can be found in career categories across multiple sectors. Given the nature between job and soft skills and their growing importance for employers, the term “soft” has become too diminutive for the level of importance these skills have in the workforce. The life-long relevance of these skills also far supersedes the half-life of job skills, some of which are only relevant for 12 months.^{vi} As such, this paper will refer to these traditional soft skills as “durable” skills.

WHAT ARE DURABLE SKILLS?

Durable skills are the cognitive and non-cognitive skills necessary to engage in, interact with, and adapt to any work environment, including critical thinking, creativity, adaptability, emotional intelligence, and global competencies.¹ Emotional intelligence (EQ) is an increasingly important subsection of durable skills. Competencies such as collaboration, communication, and empathy are character traits that make for a resilient and effective worker.² Research has shown that roughly 40 percent of U.S. tech companies off-shore tasks but not those that require communication skills; exemplifying the importance of being able to communicate effectively in the workplace.³

¹ OECD, *Getting Skills Right: Assessing and Anticipating Changing Skill Needs*, Getting Skills Right (OECD Publishing, Paris, 2016), 36

² World Economic Forum, *New Vision for Education: Fostering Social and Emotional Learning Through Technology* (World Economic Forum, Geneva, 2016), 5

³ Thor Bergeret and Carl Benedikt Frey, “Structural Transformation in the OECD: Digitalisation, Deindustrialisation and the Future of Work”, OECD Social, Employment and Migration Working Papers, No. 193, (OECD Publishing, Paris, 2016), 24



Researchers have argued that durable skills, including cognitive skills, system thinking, and interpersonal skills, are the core skill set of the future.^{vii} The report “The Future of Skills: Employment in 2030” notes that cognitive skills, such as originality and active learning, are becoming more important to employers in an increasingly complex world.^{viii} Further underscoring their value, employees who have the underlying durable skills can be taught and retaught job skills more easily as needs, jobs, and careers change over time. The adaptive mindset instilled by durable skills brings an ideology of bend, not break, in adapting to new working environments.

Being able to comprehend one’s role within a global society through global competencies will also be necessary as technology continues to connect all corners of the world. Global competencies, a subset of durable skills, help students and workers understand unique perspectives to operate effectively with people from differing national, ethnic, or socio-cultural backgrounds.^{ix} With the proliferation of globalization and innovative technologies, organizations and companies will look to hire and develop workers who possess these vital skill sets.

One of the biggest challenges with durable skills, however, is that they are more difficult to train for and are not easily assessed. While transient job skills can often be acquired independently and then assessed for mastery, durable skills require continuous coaching, mentoring, and feedback to understand, apply, and master.

Global Competence, as defined by PISA, is “the capacity to examine local, global and intercultural issues, to understand and appreciate the perspectives and world views of others, to engage in open, appropriate and effective interactions with people from different cultures, and to act for collective well-being and sustainable development.”

Source: OECD. “PISA 2018 Global Competence.” OECD.org <http://www.oecd.org/pisa/pisa-2018-global-competence.htm> (Accessed December 6th, 2018)

SUMMARY

1. Job skills are becoming outdated more rapidly, lasting only 1 to 5 years.
2. Given the unknown nature of future jobs and their job skill requirements, soft skills are the durable skills of the future.
3. Durable skills are increasingly valued by employers for resilient and adaptable employees who can operate in a global economy.

EXISTING SYSTEMS OF LEARNING

Our current systems of learning are not adequately addressing the durable skills needs of all students and employees. As an example, while it was once acceptable for an accountant to excel solely at analyzing numbers, much of that basic analysis work is now done with technology. As such, the role of an accountant has changed into that of a strategic advisor and collaborator with clients or other stakeholders across a business. Subsequently, durable skills, including verbal communication, teamwork and leadership, are now necessary to fulfill the duties of the newly defined role.

Traditionally in higher education, durable skills development has been secondary to the more job-specific knowledge and skills development of a given program. This durable skills gap is seen in a LinkedIn survey of hiring managers that highlights the challenges of finding candidates with the right durable skills for 59 percent of open jobs.^x

The emphasis on job skills has contributed to today's higher education system typically being viewed by students as an "up-front" provider of education rather than a lifelong system of learning. Students mostly expect to attend for two to four years and learn the skills necessary for a particular job, and are often not focusing on, or aware of, the durable skills they should be acquiring and demonstrating to employers.

Employer-based training systems are now increasingly dealing simultaneously with an incoming and existing workforce that lacks durable skills and whose job skills have limited value over time. The intersection of these two forces has left employers struggling to provide the training necessary to up-skill and reskill their workforce. A survey by ATD Research and the Institute for Corporate Productivity

TRAITS OF A LEARNING CULTURE:

- Organizational values specifically refer to the importance of learning and development.
- Learning budget is adequate to address both current learning needs and preparations to meet future learning needs.
- Chief Learning Officer or other C-level position is responsible for learning.
- Learning function is staffed by qualified learning professionals.
- Learning is an integral component of organizational talent management.
- Learning is delivered when and where it is needed.
- Organizational communications reinforce the importance of learning.
- Organizational technologies support effective design and delivery of learning.
- Learning strategies are closely aligned with business strategies.

Source: Jaime S. Fall & Upskill America. "Build a Learning Culture and Use It In Recruiting," Upskilling Playbook for Employers (Aspen Institute, June 1st, 2017) <https://www.aspeninstitute.org/publications/upskill-playbook-build-learning-culture-use-recruiting/>



found that only 31 percent of companies have a well-developed learning culture.^{xi} The average employee is only provided 24 minutes per week for workplace training^{xii} while the majority of today's training time and funds (up to 70 percent) goes to already highly-skilled and senior staff.^{xiii} Today's reality is that employees who are most likely to be impacted by automation and other technology are left to fend for themselves—often piecing together their own professional learning through free sources or third-party providers such as associations and private companies, or returning to a degree program.

SUMMARY

- Systems of learning today are not adequately addressing the durable skill needs of students.
- An over-emphasis on job skills has left employers with a workforce lacking in durable skills and whose job skills are continually losing relevancy.

Restructuring for Lifelong Learning

The current model for skill attainment assumes we have a workforce where job skills have a long shelf life and employers only need to make a limited investment in skills development programs. As the workforce changes, so too must the systems that students and employees rely on to learn and stay relevant.

The concept of lifelong learning, along with soft skills development, must be at the crux of this paradigm shift. Opportunities to engage in training while in the workforce must expand both inside workplaces and in the higher education system. This requires investment by employers and a willingness by the higher education system to design programs in a manner that allows continual reengagement and learning.

Our systems of learning must change to meet the needs of a future workforce whose technical skill sets are constantly in flux and where employers are expecting postsecondary graduates to have the durable skills to adapt.

THE EDUCATION SYSTEM

Institutions that focus primarily on job skills development to prepare graduates for the workforce need to consider the longevity of those skills and give their graduates an advantage in the workforce by providing opportunities to obtain both the job skills and the durable skills that will span across multiple jobs, companies, and careers. This includes:

1. Modifying curriculum across courses and programs to more purposefully include durable skills development; and
2. Designing programs to allow employees to easily re-enter the education system periodically to refresh or attain the new skills

WHAT ARE GRADUATE ATTRIBUTES:

Graduate attributes are a collection of durable skills, attitudes, and values a student develops overtime. They are not specific to one discipline and therefore are distinguished from technical knowledge or disciplinary expertise. Graduate attributes are not always taught or assessed but, instead, are developed through meaningful experiences and the process of learning and feedback.

Examples of attributes include:

- Critical thinking and problem solving
- Enquiry and aspiration
- Creativity
- Effective communication and teamwork
- Leadership and proactiveness
- Self-awareness and emotional intelligence
- Global competency

EMPHASIZE DURABLE SKILLS

Modifying existing curriculum to include durable skills development and assessment is no easy feat. However, a growing trend among institutions of higher education has been the identification of attributes a graduate should possess upon completing their instruction. These “graduate attributes” are set typically by institutional leadership and are independent from disciplinary expertise.

Identifying graduate attributes is an initial step and should be followed by faculty engagement to build support and comprehension. Active endorsement by faculty will ensure that graduate attributes are embedded and emphasized within the curriculum and instruction. A top-down only approach risks being a more superficial strategy where attributes are merely mapped out onto existing programs and courses, which can create a superficial sense of developing these skills in graduates.^{xiv}

The explicit inclusion of durable skills development is necessary and requires rethinking curriculum to build the durable skills around the job-specific skills and knowledge. Faculty can tailor the durable skills by program or course to ensure they are relevant and relatable to the discipline-specific content. Integrating interdisciplinary programs to allow students to build skills across multiple disciplines can also be a way to synthesize the development of job skills and durable skills.

Assessing graduate attributes alongside job skills would create a visible profile of durable skills for students and create increased accountability for their explicit instruction. Unlike job skills which often can be measured in multiple choice questions, assessing durable skills is a more difficult task that many times requires observation or interaction. Utilizing peer-to-peer evaluation and technology, such as video-based assignments, though can make this task more efficient and effective.

FOR EXAMPLE:

The Business Technology Management (BTM) degree was first introduced in 2009 to address concerns that the typical Information and Communications Technology (ICT) graduate did not possess the business skills that are indispensable in the ICT sector.¹ BTM courses are designed to impart the fusion skills of ‘soft’ business and ‘job’ ICT knowledge to students. The curriculum and standards were developed in collaboration between industry, higher education institutions, and industry associations, such as the Information Technology Association of Canada (ITAC), to ensure that graduates would be equipped with the right skills to enter the labour market.²

BTM courses are currently offered at 19 higher education institutions in Canada and applications are increasing every year by roughly 24 percent.³ The success of multidisciplinary degrees like BTM can serve as one model to be considered for higher education institutions, as they adapt programs more closely match the changing needs of the workforce.

¹ ITAC. “Business Technology Management – Leading the Shift in Business Technology Education,” Accessed July 10, 2018, <https://itacalent.ca/talent-initiatives/btm/>.

² Ibid

³ Ibid

CREATING OPPORTUNITIES FOR REENGAGEMENT

As institutions of higher education are preparing students with the durable skills to be lifelong learners, it is equally important that they also provide opportunities to be lifelong learners. Despite concern over the growing skills mismatch and the declining shelf life of job skills, employers are not always able to support the skills development needs of all workers. Only 16 percent of executives, in a 2017 McKinsey Global Institute survey, reported they were “very prepared” to tackle their skills mismatch with roughly 32 percent feeling that they were “somewhat/very unprepared” for the reskilling revolution.^{xv} A growing change in attitude toward job and employer loyalty by employees is also making it more difficult for employers to justify investing in an employee who may be planning an exit. The majority of millennials (58 percent) say they plan to leave their jobs after three years or less^{xvi} while it typically takes three to five years to bring an employee to full productivity.^{xvii}

Institutions of higher education need to provide employees in the workforce with opportunities to reengage with the education system to refresh their job skills over time.^{xviii} Designing programs that allow experienced learners to reengage with the institution for specific technical skill training but without requiring them to leave the workforce or commit to a multi-year degree is essential.

One method of flexible program design is competency-based education (CBE). CBE has shown to be an effective method to allow individuals with a base layer of knowledge to rapidly proceed through a program where they have relevant skills and spend more time learning those skills they do not have. With online components, CBE programs can give additional flexibilities to employees who may not live near a physical campus or have the schedule availability for in-person courses.





FOR EXAMPLE:

Sinclair Community College transitioned some of its Computer Information Systems programs into a CBE model which has allowed individuals who already have IT skills, such as veterans, to move quickly through the program. In the first three years, Sinclair reported that its CBE students averaged just two terms to complete their first program, while non-CBE students took twice as long—averaging around four terms. CBE students completing degree programs are finishing in an average of just four terms, which is 35% faster than non-CBE students. In addition, graduation rates for CBE students were double that of non-CBE students over the three-year period of Sinclair's first CBE program offerings.

Source: D2L. "Sinclair Community College: The Journey to Competency-Based Education" D2L.com, 2018. <https://www.d2l.com/success-stories/journey-competency-based-education-sinclair-community-college/>

New educational pedagogies that revolve around credentialing can also alter the way in which we teach durable and job skills to students.

- Self-directed learning has become more common among students, and proof of competency through credentialing systems can provide an avenue by which students can chart their own educational journey.^{xix}
- An education marketplace, along with online learning platforms, are poised to experience a boost in adoption as workers and students take the responsibility to reskill upon themselves and become lifelong learners.^{xx} The higher education system is positioned to be a leader in program quality assurance in this new marketplace.
- Brief technical courses, including in the form of stackable and micro-credential programs, can drastically improve job opportunities for students.^{xxi}

Learning does not stop once you have obtained your cap and gown. Credentialing programs like micro-credentialing, CBE, and stackable credits can restructure education to cultivate a culture of lifelong learning.

FOR EXAMPLE:

The Australian state of New South Wales has adopted a stackable program model for vocational and educational training which allows students to build their own program with just the skill modules relevant to them.¹ MIT's MicroMasters is a similar program, awarding students credit for completing online courses and allows them to build upon their skill sets to obtain a Master's degree.²

¹ The Government of Canada. Department of Finance Canada. Advisory Council on Economic Growth. Learning Nation: Equipping Canada's Workforce with Skills for the Future. Ottawa: Canada. December 1st, 2017, 9

² Ibid, 9

THE EMPLOYER'S ROLE

To obtain and retain a stable and skilled workforce, employers have a responsibility to advocate for their employees and provide them with more opportunities to engage in upskilling and retraining. This should include employer-based training where possible and providing employees with opportunities to connect back to the higher education system.

Employer-based Training Opportunities

Skills development is not a quick or easy task. For durable skills in particular, mastery requires ongoing coaching, mentoring, and feedback rather than simply standardized curriculum, assessment, and certification. Traditionally, an employer-based training program has required face-to-face meetings with individuals or small-groups which can be time and resource intensive — limiting scalability, including in large companies.

Technology, however, is changing this dynamic. Many of those previously in-person activities of a training experience can be done online using the same technologies developed for the education system;

reducing costs for employers while still providing the same quality and benefits to individuals.

The use of technology to scale training opportunities also allows employers to develop more individualized training paths for employees. Training programs need to shift away from generalized offerings and move towards targeted training modules that recognize prior learning.^{xxiii} Many of today's employer-based training options are determined by the employer and limited to the common denominator skill requirements of all employees regardless of an employee's existing skill levels. By using a data system to assess employee skills, determine which skills are further required, and then deliver relevant training, employers can create more personalized learning tracks for their employees.

A system of education that can determine which skills are essential for an employee's success in a given profession while also identifying which of those skills that employee already has, and vice versa, is

FOR EXAMPLE:

Krempel Communications International provides executive level communication and presence training to companies around the world. Traditionally a face-to-face model of training, Krempel utilizes a learning management system and video-based social assessments to deliver training courses, focusing on the durable skills (especially global competencies), to individuals and groups anytime, anywhere.

Source: Erin Mills. "Change Experts Krempel Communications International Chooses D2L," August 22nd, 2018. <https://www.d2l.com/newsroom/releases/change-experts-krempel-communications-international-choose-d2l/>

more efficient and effective. This is especially relevant in mid-career-level training where assessment of a person's current skill level and designing a curriculum to meet market needs are integral to an individual's success.^{xxiii}

Investing in training programs is a 'no-regret' action. Fostering a lifelong learning culture in the workplace boosts engagement, develops highly skilled workers, and increases productivity.^{xxiv} All companies, regardless of their size, should invest in continued skills training.

Connecting to the Higher Education System

Establishing or scaling up an employer-based training system can take time. For smaller companies, the resource requirements for an in-house program, even when leveraging technology to provide efficiencies, can still be cost prohibitive. However, collaborating with the higher education system to address immediate needs can be a way for companies to leverage the strengths of post-secondary institutions in skills development. Providing time or financial assistance for employees to reengage with the higher education system can be a more efficient way to provide training opportunities.

Companies of any size can also leverage the higher education system to create a steady pipeline of skilled talent. Through cooperative partnerships, employers and institutions should work together to develop programs based on the skill needs of a sector with work-integrated learning opportunities.

FOR EXAMPLE:

Shopify, an e-commerce company based in Ontario, Canada, has partnered with Carleton and York Universities in Ontario to establish a software developer degree program—the Dev Degree. The program blends both classroom learning with practical

work experience; the objective of which is to break down the silos between academic knowledge and on-the-job skills. Shopify pays for the student's tuition and students earn a competitive salary for their work-integrated learning. The development of durable skills, along with the technical, is an important pillar in the Dev Degree program. Of the 25 hours each week dedicated to the work-integrated learning portion of the degree, five are devoted to personal growth and development skills; highlighting how important Shopify places on durable skills are in the workforce.¹ The Dev Degree seeks to train their students to think in a multi-disciplinary fashion; harnessing software engineering, entrepreneurship, and the development of durable skills into a single degree.

The Dev Degree program has so far been a success. The retention rate is 93 percent; roughly 23 to 33 percentage points higher than other computer science degrees from Ontario universities. While the cohort of students is still relatively small—around 10 to 15 people per university—around 50 percent are women and approximately a quarter are visible minorities.² The Dev Degree program is helping to increase the participation of women and visible minorities in a traditionally male dominated sector. Shopify's Dev Degree program illustrates how enterprise and post-secondary institutions can work in tandem to foster relevant skills development.

¹ Shopify. "The Dev Degree Model," Accessed December 11th, 2018. <https://www.devdegree.ca/dev-degree-model>

² RBC. "Humans Wanted," 36



Government Investing in the Future of Skills

While it is the education sector and employers that are tasked with the difficult role of establishing the new systems of learning that will meet the future skill needs of students and employees, both rely on the government sector to be the enabler of change. Government policy must provide higher education systems with the investments and necessary flexibility to design effective programs aligned to the needs of the workforce along with incentivizing both employers and higher education to act quickly and in sync with the needs of the workforce.

INVEST

The most critical need in developing and maintaining a world class education and workforce development system is investment. Globally, current levels of funding for workforce training are not adequate to keep up with the education and training demands of the digital age.

- The Advisory Council on Economic Growth for the Canadian federal government has argued that an additional \$15 billion must be invested in skills development in Canada to meet labour market demands.^{xxv}
- OECD countries, on average, have decreased their investment as a percentage of gross domestic product (GDP). From 1993 to 2015, U.S. spending on skills development programs decreased from 0.08 percent of GDP to only 0.03 percent.^{xxvi}

- Germany, often seen as an outlier providing higher levels of funding for skills development, has decreased its investment from 0.57 percent to 0.2 percent.^{xxvii}

Countries that are making the investment in workforce development are seeing gains in their education and training participation rates. Singapore, for example, supports both the supply (workers) and demand (employers) side by subsidizing training and providing credits in individual training accounts that allow learners to choose their own training programs.^{xxviii} The country has invested one billion US dollars on agencies and programs such as the SkillsFuture Singapore Agency and the Workforce Singapore Agency to build a highly skilled workforce.^{xxix} In 2017, 48 percent of the Singaporean labour force was involved in some sort of training program; a 12 percent increase from 2015.^{xxx} Part of the reason for the jump in participation rates is increased access. By using technology to deliver different types of training online, SkillsFuture was able to reach more workers more efficiently.

Denmark is another country that has heavily invested in training its labour force. The Scandinavian country has increased its expenditures on training and currently spends 0.6 percent of its GDP on workforce development.^{xxxi} In 2017, the Danish government earmarked US\$380 million to bolster retraining and upskilling programs over a four-year span.^{xxxii} Through its flexicurity model and



aggressive promotion of active labour market programs (ALMPs), Denmark is able to provide precise and fast training programs to newly unemployed workers or employees who want to upskill. Workers with little to no formal education can even access training on their first day of unemployment.^{xxxiii} The success of Denmark's ALMPs can be seen in the annual training participation rates, which are 20 percent higher than the OECD average.^{xxxiv} Denmark has made a concerted effort to support the availability and funding of training programs to all skill levels within the Danish economy.

IN PRACTICE:

Denmark's national skills anticipation system combines intricate labour market data and skills in demand for over 850 occupations across the country.¹ Through a collaborative model between employers, government, and other relevant stakeholders, this national skills anticipation system participates in activities such as skills forecasting, assessment, and employer surveys and disseminates the information to regional and municipal stakeholders.

¹ World Economic Forum, *Accelerating Workforce Reskilling for the Fourth Industrial Revolution: An Agenda for Leaders to Shape the Future of Education, Gender and Work* (World Economic Forum, Geneva, 2016), 9

Increasing investment is absolutely necessary to support policy initiatives that assist in addressing the skills gap. Increasing funding however should be done in a targeted fashion that addresses the actual skills gap that currently exists in a nation's economy and looks towards the next skill sets needed. A workforce development program addressing current and future skill sets could help



to reduce instances of unemployment if an employee can be upskilled prior to their existing skill sets becoming obsolete. This requires the use of quality labour market information. The quality and quantity of accurate labour market information is a crucial asset for informed decision making on how and where to invest in training programs, to identify relevant skills necessary in the labour market, and even to inform curriculum development.^{xxxv}

INCENTIVIZE

Though we see both higher education and employers increasingly demonstrating a willingness and desire to work together to overcome the skills challenges, government policy can often work as a disincentive for change and sometimes even prohibits it. Policymakers need to adopt policies that promote flexibility and provide opportunity.

Flexibility for Higher Education

Today, government funding for higher education and training to institutions is primarily based on program inputs (e.g. the length of a program, manner of instruction, seat-time requirements, etc.). Because education systems rely heavily on government funding, an inputs-based system creates a rigidity in the types of programs institutions of higher education are willing or able to offer. Alternative innovative programs that can shorten time to completion or reduce costs for learners, such as competency-based education models that allow students to demonstrate prior knowledge and skills and work at

their own pace, are often prohibited from receiving government support or limited to small-scale pilots.

Government policy needs to introduce flexibility and a mindset of change to higher education by shifting to an outputs- (or outcomes-) based funding system where program quality and funding accountability is measured by the expected outcomes of a successful graduate, such as:

- skills learned and mastery demonstrated;
- student employment after completion; or
- income level or earning potential increase of graduates

In an outcomes-based system, there can still be an expectation for government policy to require some program inputs. In particular, higher education programs should be expected to use labour market information to align programs with the jobs and skill sets that will be in demand.

Opportunities for Workers

Government policy should work to make education and training opportunities more affordable for workers who are supporting their own training needs outside of an employer-based system.

Promoting workforce integration and strengthening the safety net for unemployed or transitional



workers are policies that will protect workers as they engage in training in the digital age.^{xxxvi} Policies like the portable training rights recently enacted by the French government provide workers with a flexible framework to develop their own training program. The CPF (Compte Personnel de Formation) individual training account, established in 2015, is an employer-agnostic program that provides workers with funding to take up to 150 hours of training no matter where their career takes them.^{xxxvii} In the era of the gig economy, portable training credits are an equitable way to support upskilling across all segments of the labour force.

Everyone benefits from reskilling—from the tech-savvy millennial who is just starting their career to the experienced employee who wants to switch jobs or career fields—and policies that support people in becoming lifelong learners will foster a more productive and highly skilled labour force and citizenry.

FOR EXAMPLE:

In 2001, the South Korean government created a program for large companies to assist in the skills development of their smaller partners and suppliers which it says has improved communication and goodwill. Participating companies are providing their digital training courses on durable skills, including leadership and values, as well as functional job skills to smaller companies in exchange for a fee or licensing cost. The government subsidizes 80 percent of the training costs provided to by the large companies to the smaller companies.

Source: Advisory Council on Economic Growth, Learning Nation, 10

INNOVATE AND ENABLE

Government entities have the power to act as a convener, bringing both employers and education leaders together to solve problems. Defining a national skills framework, like the aforementioned Danish national skills anticipation system, that is synced to labour market needs can only happen if stakeholders coordinate with each other. Further, building sustained relationships between government, employers, and the education system can create opportunities that are more holistic for a national industry and economy than just a singular opportunity for one company.

Encouraging intra-industry skills development by leveraging the size and knowledge of major companies to assist their smaller partner companies down the supply chain. The benefits are an increase in the skill level of the workforce, a tighter knit community within the industry, and, for larger companies participating, a potential boost in public image.

A fragmented set of skills development programs will not be sufficient to address the monumental changes exacerbated by the Fourth Industrial Revolution. Government, education, and employers all have a stake in the skills development game and must work together to construct a framework of lifelong learning for everyone. Formal partnerships between the private and public sectors can facilitate the scaling of education and training programs to meet industry demands.^{xxxviii} Such collaborative efforts between the sectors can eliminate siloed and overlapping programs.

FOR EXAMPLE:

In the United States, the state of North Carolina, experiencing a growth in its biotechnology industry but a severe shortage of skilled workers, brought together industry groups and higher education stakeholders to design the BioWorks certification program.

Delivered through community colleges, the BioWorks curriculum was drafted in conjunction with relevant stakeholders to ensure the material was relevant and up-to-date.¹ The program, accessible to those who did not have any post-secondary qualifications, seeks to attract workers from the state's shrinking manufacturing sector and retrain them for higher-paying work in the biotechnology industry.² As of 2017, thousands of students have passed through the course and six community colleges in North Carolina offer the program.³

¹ Diana Rivera and Sarah Villeneuve, Pathways to Inclusive Innovation: Insights for Ontario + Beyond (Brookfield Institute for Innovation + Entrepreneurship, Toronto, 2018), 7

² Ibid, 7

³ Ibid, 16

Recommendations

As governments, employers, and higher education systems around the world grapple with the skill needs of a workforce in the midst of the 4th Industrial Revolution, we must develop a cross-sectoral framework to create a true, seamless lifelong learning continuum.

HIGHER EDUCATION

Place Greater Emphasis on Durable Skills

An overemphasis on job skills in higher education has left many students and graduates either lacking the durable skills they needed to develop as well or unaware that they may have developed them. As employers are placing increasing value on durable skills, some institutions have responded by identifying attributes all students should possess when they graduate. Graduate attributes should be ingrained directly in curriculum and instruction and, where possible, assessed.

Create Easier Opportunities for Workforce Reengagement

As institutions of higher education are preparing students with the durable skills to be lifelong learners, it is equally important that they also provide opportunities to be lifelong learners. Employers are not always able to provide for the skills development of all employees and many are not prepared to provide any training. Institutions need to develop new or restructure existing programs to provide employees in the workforce with opportunities to reengage with the education system to refresh their job skills over time. Designing programs that allow experienced learners to reengage without requiring them to leave the workforce or commit to a multi-year degree is essential.

EMPLOYERS

Increase Access to Employer-based Training Opportunities

Skills development programs are not easy to build and the return on investment can take time. Employers, however, have a responsibility to provide ongoing development opportunities for their employees, especially as the shelf life of job skills continues to fall. By leveraging technology to deliver training, employers can scale-up opportunities to reach more employees while maintaining quality and lowering cost per employee. By leveraging data, employers can also start to introduce more targeted training pathways for employees which recognize the skills an employee already possesses and only providing training in necessary or desired areas.

Collaborate and Leverage the Higher Education System

As institutions of higher education restructure their programs to create reengagement opportunities for individuals in the workforce, leveraging the higher education system to deliver training to employees is effective and cost efficient. As with in-house training opportunities, employers need to provide employees with the time to engage in the programs and, when possible, financial support to enroll.

As employers are increasingly seeking employees with durable skills and finding talent pools lacking, there also exists a responsibility for them to engage with the higher education system to help to identify



these necessary skills and incorporate them into curriculum and instruction. In large part, executives agree with this (77 percent), but, according to a Lumina Foundation survey, 71 percent still report that their companies are not collaborating on any initiatives.^{xxxix}

GOVERNMENT

Invest in Workforce Development

The most critical need in developing and maintaining a world class education and workforce development system is investment. Globally, current levels of funding for workforce training are not adequate to keep up with the education and training demands of the digital age. Increasing funding however should be done in a targeted fashion that addresses the actual skills gap that currently exists in a nation's economy and looks towards the next skill sets needed. A workforce development program addressing current and future skill sets could help to reduce instances of unemployment if an employee can be upskilled prior to their existing skill sets becoming obsolete.

Enable Employers and Higher Education to Innovate

Higher education and employers are increasingly willing to work together to overcome the skills challenges, government policy needs to promote flexibility and provide opportunities for education and workforce development programs to try new forms of learning and engagement. Basing education funding on accountability for student outcomes, such as employment levels or skills learned, rather

than program design elements, such as seat time or method of instruction, will allow education systems to more rapidly adapt to meet the needs of learners and employers.

Act as a Convener to Make Progress

Government entities have the power to act as a convener, bringing both employers and education leaders together to solve problems. Defining a national skills framework that is synced to labour market needs can only happen if stakeholders coordinate with each other. Further, building sustained relationships between government, employers, and the education system can create opportunities that are more holistic for a national industry and economy than just a singular opportunity for one company.

Closing

As technology and automation continue to change the meaning of work and the skills required of the workforce, our education systems need to adapt and require action and support from governments. We hope this paper serves as a starting point for dialogue on how to address the future of skills.

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