Lost in Transition:

Fixing the “learn-to-earn” skills gap

Transforming workforces to unlock trillions in trapped value

Economies and societies run on skills. But aging populations and technological disruption are accelerating skills gaps, which threaten to become a skills chasm without the right interventions.

Those include a greater focus on making learning more effective and rethinking pathways to success in school and at work. Such changes would produce benefits to the global economy in the trillions of dollars – and create more opportunities for hundreds of millions of people at all stages of their lives.

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Our education systems and the routes into work that many of us followed were not designed for the world we live in today. In 2025, this challenge is becoming more urgent than ever – for two very big reasons.

Demographics

One is demography. All over the world, with few exceptions, populations are rapidly getting older. Fewer children are being born; global fertility rates have dropped sharply in the past couple of decades and show no sign of reversing course.[1]

At the other end of the scale, people are living longer than ever before,[2] and the World Health Organization estimates that by 2050, 22 percent of the world's population will be over 60–up from 12 percent in 2015.[3]

Let's consider a few of the implications: highly productive older workers create "talent cliffs" in companies as they retire and take their experience with them. Fewer young people step into key roles in healthcare, education, social services, manufacturing, and skilled trades, putting greater pressure on those who do enter those fields to make up for shortages.

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From a skills gap to a skills chasm?

Artificial intelligence

Now let's add a second major disrupter, exponentially advancing technologies, especially artificial intelligence (AI). Generative AI is already displacing work by automating routine tasks. Some affected jobs will vanish completely; many others will change radically. And it's not just jobs like data entry or retail checkout that are at risk. "Agentic" AI – a system of AI agents that operate on their own, without human guidance – is beginning to automate even non-routine knowledge-based work in professions such as customer service, sales support, and social care.[4] Moreover, the rapid pace of improvements to AI capabilities will soon force workers to upskill at an even faster rate. By one estimate, 65 percent of the skills required for jobs will change by 2030.[5]

The rapid pace of improvements to AI capabilities will soon force workers to upskill at an even faster rate. By one estimate, 65 percent of the skills required for jobs will change by 2030.

That's likely just a start to the reskilling that will be needed in the decades ahead. The emergence of AI systems with supercharged reasoning and decision-making powers will spur demand for new skills – think prompt engineers, data curators, or responsible AI specialists – as well as for complementary human skills such as critical thinking, judgment, empathy, adaptability, and problem solving. But every industry and profession will be affected to some degree. One study indicates that professionals in technology/information/media (71%), retail (71%), wholesale (68%), financial services (66%), and professional services (64%) were those most likely to be disrupted by new forms of AI.[6] AI will change not just individual roles, but the dynamics of teamwork and human-machine collaboration, as AI agents take on more specialized roles and hybrid human-AI teams become the norm.

Without intervention to build these skills of the future, there will be major economic consequences, reaching to the trillions of dollars. For individuals, much is in play, from lower lifetime earnings to a deepening sense of uncertainty at work, as job requirements continually shift. Schools and students, including those in higher education, scramble to adapt and turn to temporary solutions. Many companies, with many unfilled jobs, see hoped-for growth dwindle. The emergence of "superstar" firms, which concentrate economic power in the hands of a few, also presents a serious challenge to governments struggling to foster job growth, increase prosperity, and reduce widespread inequalities.[7] The stakes for national economies, businesses, and individual students and workers are high.

What's at stake

Quantitative analysis reveals the urgency of the situation – and also provides cause for optimism.

A growing body of research shows that learning and skills formation are critical to national economic growth and improved labor market outcomes. Start with national economies. One influential study of 23 OECD countries shows that a one-standard-deviation increase in cognitive skills is associated with a 1.74 percentage point increase in a country's annual economic growth.[8] That's a major increase, especially in times of economic uncertainty.

The workforce also benefits in a big way. Another global study shows that a one-standard-deviation increase in numeracy scores* measured by the Programme for the International Assessment of Adult Competencies (PIACC) – a widely used international benchmark of adult skills – is associated with an average increase in hourly wages of about 20 percent and an eight-point increase in the probability of being in work.[9]

Similarly, ensuring that people become better learners is likely to increase occupational resilience to automation disruption. Examples of better learning include becoming more skilled at absorbing new information and tools into problem solving, as well as using the right methods for cementing knowledge and skills. Our statistical analysis across 800+ occupations in the US finds that occupations that have a bigger component of key learning behaviors and strategies tend to have a lower degree of current automation – even after allowing for other relevant factors, such as the nature of the role, wage rates, and prior education required for the occupation.**

Ensuring that people become better learners is likely to increase occupational resilience to automation disruption.

To better understand what's at stake, we estimated the potential earnings losses from gaps in learning transition paths in the United States (see **Lost in Transition: The economic opportunity from closing gaps in learning paths**). We looked at three critical moments in employee career paths: the move from school or college to work; unemployment due to redundancy; and displacement caused by new technologies. We estimate annual transition losses of $1.1 trillion for the US economy, or about five percent of annual US GDP. Behind these transition losses are people facing lost incomes, diminished job security, and the emotional toll of being left behind.

* In this context numeracy refers to the ability of adults to access, use and reason with mathematical concepts and ideas essential to everyday life. See OECD: https://www.oecd.org/en/topics/sub-issues/adult-numeracy-skills.html

** Using data from the US O*NET (Occupational Information Network) database–which provides data on skills, education, knowledge and worker characteristics for almost 1,000 occupations in the US–we were able to investigate the relationship between different aspects of how people learn and the degree of occupational automation today. The degree of automation refers to how automated a particular occupation currently is. For example, according to O*NET, travel agents have a high degree of automation, whereas animal caretakers are hardly automated at all. After data cleansing, the occupational dataset was reduced to 846 valid observations on occupations. The analysis shows that each one percent increase in "active learning" scores is associated with a 0.62 percent reduction in the degree of automation for different occupations. Similarly, a one percent increase in "use of learning strategies" scores is associated with a 0.35 percent reduction in the degree of automation across occupations.

What's at stake

With appropriate policy and business interventions, these losses can be reduced and turned into new earning and growth opportunities. For example, shortening the average transition time between formal education and work from 24 weeks to 18 weeks could deliver an additional $40 billion to annual US earnings.

How can stakeholders rapidly intervene to prevent the skills gap from becoming a skills chasm? How can we continually develop skills at the pace required? To ensure a comprehensive understanding of how to make that happen, we conducted a thorough review of both peer-reviewed research and industry data, enriched by interviews with leading academics and industry experts in their respective fields.

These insights, spanning diverse sectors and international perspectives, form the foundation of this report. As a result of our research, we see two key areas of focus: helping people learn more effectively and efficiently, and combining that with better and clearer skilling pathways. Both are critical to accelerating skills development, but in combination they have the potential to prevent the skills gap becoming a chasm.

In the US alone, annual losses at key transition points – from school to work or job to job, for example – amount to $1.1 trillion.

Lost in Transition

The economic opportunity from closing gaps in learning paths

To estimate the potential earnings losses from gaps in learning paths in the United States, we focused on three of the major transition points in an individual's work cycle: moving from school or college to work; involuntary job losses owing to corporate mergers; business restructuring; economic fluctuations; and displacement caused by new technologies.

Having identified the three key transition points, we estimated the number of affected workers for each one, the average duration of unemployment, and the average wages for that group. Based on this, we calculated the estimated earnings loss for each transition point. We used a combination of publicly available datasets, such as those from the Bureau of Labor Statistics, the National Center for Education Statistics, and the National Association of Colleges and Employers. We also incorporated data from Pearson's Faethm database, which tracks emerging and trending skills and occupations, as well as the impact of 33 different technologies.

The transition points

1

The transition from school to work.
Many employers report that it is challenging to find graduates that are ready for the world of work. This can delay the length of time it takes for individuals to find full-time employment and begin earning.

2

The transition from one job to another for those laid off.
Here we focused on involuntary job separations, such as layoffs and discharges, where individuals are least likely to be prepared for their next role, as they are not the ones that have instigated the change.

3

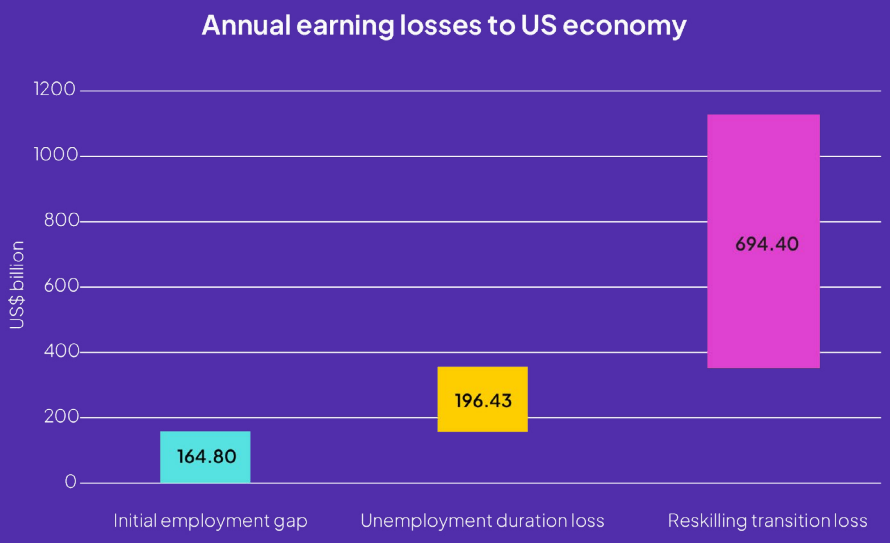
The reskilling cost from automation disruption.
When significant portions of tasks have been automated (for example payroll clerks), individuals need to find another role.

Findings

Based on this approach, we estimate that these three transition points cost the US economy around $1.1 trillion annually in lost earnings, or about 5 percent of US GDP in 2023 (see Figure 1 for breakdowns by transition point.) Most of this stems from disruption by automation, with US$694 billion in earnings at risk, as automation technologies – such as robotic process automation, large-language-model chatbots, and autonomous mobile robotics – require individuals to reskill for changed or completely new tasks.

Shortening the time it takes individuals to transition through these key points could mitigate those losses. For example, shortening the average transition time between formal education and work, from say 24 weeks to 18 weeks, could deliver an additional US$40 billion of earnings. And reducing the typical time it would take to retrain or upskill individuals affected by automation would have a significant impact too. For instance, reducing the average upskilling time by 20 percent would yield additional employee earnings of around US$139 billion.

Figure 1: Breakdown of annual earnings losses to the US economy, from gaps in learning transition paths



Data used in calculations is for 2023, or latest year available.

Further research

Our estimates are conservative, as we have not factored in other transition losses. For example, some workers would like to work full-time but can't find a full-time role; others may suffer from a "skills discount" – that is, they can't find a job that fully matches their skills and thus earn less.

In addition, our calculation is based on an individual's existing earnings and disruption from automation, not projections. This is useful as it reflects the impact on people, and we believe this is important because of the role that skills and employment play in an individual's well-being. However, it is worth noting that at the macroeconomic level, the loss – or potential opportunity from interventions – is even higher.

How to make learning more effective

The workforce is underprepared for the pace of learning required in the future of work. As increasingly rapid technological disruptions transform economies, upskilling and reskilling take on ever greater importance.

The implication is that career advancement will more so than ever be defined not just by what an individual knows, but also how effective they are at learning it. Research supports this, increasingly pointing to the need for a deep focus on helping individuals of all ages and stages of life to improve how they learn; in short, people need to learn to learn.

What does "learning to learn" mean?

Ultimately, it's about actively and consciously planning the way you learn, which means investing energy to understand how to approach learning something new. The term covers a number of skills that involve behavioral (doing) and metacognitive (reflecting) strategies. Behavioral strategies improve the learning process by making learning more efficient and more effective. This might look like scheduling uninterrupted time blocks, asking insightful questions, or organizing new information. Metacognitive strategies help learners to understand and regulate their learning behaviors, such as goal setting, giving or receiving feedback, or maintaining a mindset to persist through difficult tasks.

Behavioral and metacognitive strategies can be developed and refined, but they need to be taught. Research shows that when individuals are made aware of how those strategies can be used, and why they promote effective learning, they can apply their ability to learn to other challenges. But this is not easy for many. A survey of 74 staff and 118 students from five institutions in Australia, Belgium, the UK, and the US found that both staff and students do not have a clear understanding of how to transfer learning to new situations.[10] As Mark Williams, Professor at the School of Sport, Exercise and Health, Loughborough University, noted, "a lot of people engage in 'maintenance practice.' That is, they learn to perform a task adequately and then continue to practice in exactly the same way. What they fail to engage in is deliberate practice or growth practice – specific, purposeful practice to improve an aspect or weakness in performance."

People need explicit instruction in learning-to-learn skills, as well as opportunities for application. Linda Nilson is the Founding Director Emeritus of the Office of Teaching Effectiveness and Innovation at Clemson University. She puts it well: "People have Teflon brains: what they learn today often doesn't stick tomorrow. They need to be taught the right methods to ensure they know how to remember. People need to understand how their brain works to learn effectively – learning doesn't move information seamlessly from your eyes into long-term memory. It's not the same as learning how to walk."

How to make learning more effective

Ultimately, it's about actively and consciously planning the way you learn.

Mounting evidence indicates that explicit instruction of learning-to-learn skills can have a powerful impact on student performance. One study of students in Saudi Arabia showed that such skills can explain about ten percent of the variance in student academic performance.[11] Another study of a public university in the United States found that eight out of ten learning and study strategy variables (such as attitude, use of study aids, time management, and self-testing) were statistically significant factors associated with students' grade point averages.[12]

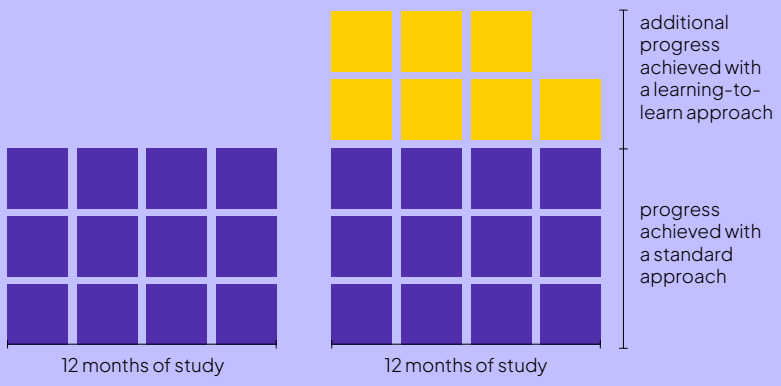
Perhaps most compelling: a meta-study of 246 studies by the Education Endowment Foundation found that metacognition and self-regulation approaches to teaching (essentially, helping pupils to think about their own learning more explicitly, through specific strategies for planning, monitoring, and evaluating their learning) rank as having the most effective impact on student outcomes and can add seven entire months of progress over the course of a year.[13] That's a powerful multiplier effect.

Since the 2020s, literally thousands of articles per year have been published on learning to learn and related topics (such as metacognition and self-regulated learning). But it's still not consistently integrated into formal educational systems. As Rose Luckin, CEO of EDUCATE Ventures and Professor at the UCL Institute of Education, noted in our interview, "It's not part of the way teachers are routinely trained, so they are not comfortable with it. They need to be taught to integrate it into the classroom."

Our research and expert interviews time and again reinforce the point that this is not difficult or expensive to achieve. According to Linda Nilson, "Teachers and professors simply need to integrate short activities and assignments into the class. Like asking the students to reflect on the most valuable or surprising concept from their reading and explain it in their own words. This sets off a positive cycle of self-regulated learning as the student senses their progress and wants more. So many psychological experiments show that this really works." This alludes to the crucial ingredient of enjoying – let alone loving – learning, as we feel the benefits.

Teaching of metacognition & self-regulation can add 7 months' progress over the course of a year.

– Education Endowment Foundation meta-study



How to make learning more effective

While researchers and teachers are well aware that the majority of learners do not adopt these effective approaches, recent data published by the OECD in November 2024 brings the scale of the opportunity to light. As part of the Programme for International Student Assessment (PISA) 2022 study, the OECD surveyed 700,000 15-year-olds from 81 economies (representing 29 million learners) to explore the extent to which the next generation of workers employ the strategies known to help them obtain, validate, absorb, and retain information.[14] The findings are stark: fewer than half of students regularly employ these strategies.

> Fewer than half of students regularly employ these strategies.
>
> – PISA

If the cohort in the OECD study had room to improve, what about the current workforce, who are even less likely to have received specific instruction in learning to learn? "We assume by the time you leave secondary education, that you would already have reasonable self-regulation of learning in place. In practice that doesn't happen automatically," observes Daniel Muijs, Professor of Education at Queen's University Belfast. "The challenge is that where learning to learn is not embedded in primary and secondary education, we then have to address that problem later on with adult learners."

Yet interest in one-off workshops, talks, and online courses suggest that there is appetite among non-school populations to engage in becoming more effective learners. Introducing the foundations of these learning-to-learn skills is a meaningful starting point, but we will need to go further than this to see the benefits at scale.

Enter AI-driven learning experiences: these are evolving rapidly and transforming the speed and scale of potential improvements in learning. AI-based models will accelerate the progress of those users who are motivated to learn and who understand how to prompt the AI systems most effectively. As always, new tools have the potential to generate new divides between those that have effective access to them and those that don't. This only goes to further highlight the importance of raising learning-to-learn skills across all levels of society, in preparation for the coming era of disruption in learning and work.

Learning to learn works. It works remarkably well. And it's efficient to implement. We need to embed it consistently throughout formal education and we need to continue to foster these effective learning approaches in the workforce. Here are four ways to begin.

> AI-based models will accelerate the process of users who are motivated to learn and who understand how to prompt the AI systems most effectively.

1. Make learning to learn a priority objective

The importance of being an effective learner needs to be intentionally interwoven into the worlds of education and work.

Education predominantly focuses on the "what"–mastery of topic-based information – rather than the "how" – the progression of skills required to flexibly and effectively approach new topics. Although research has documented the benefits of emphasizing learning-to-learn skills in the classroom, theory has not been translated to practice. Multiple barriers stymie progress, including a lack of appropriate training, time constraints in lesson planning, and differing views on who is responsible for developing such skills.

> Evidence shows that learning-to-learn skills lead to effective and efficient learning – what's needed now is successful implementation.

Expecting overburdened teachers to adopt learning-to-learn techniques independently is unrealistic. Support must come from institutions and government policy, backed by teacher training and curriculum adjustments. Evidence shows that learning-to-learn skills lead to effective and efficient learning – what's needed now is successful implementation. While several governments have begun to incorporate a focus on learning to learn in their education systems in recent years, the latest PISA survey highlights that even they need to further emphasize learning to learn to replicate the success found in smaller research studies. What's more, this new data provides an opportunity for governments and researchers to work together to identify good practice in implementation at scale.

Similarly, the business sector must also reprioritize and take a more systematic approach to learning to learn. An analysis of skill transfer in companies showed that workplace climate and manager support were most critical to the successful transfer of skills.[15] From mission statements to employee development and job ads, enterprises must create a learning culture that encourages and rewards effective learning.

People at all levels of organizations have a role to play. As Rose Luckin observes, "There's an argument for shared responsibility that has to start at least with the employer or educator. But with the aspiration that over time, part of the success is evaluated through the extent to which the employee actually starts to take over some agency and some responsibility for their own development in this respect." Thoughtful crafting of performance assessment criteria – both for the supervisor and supervised – can ensure that each is incentivized to both teach and learn better, building a shared culture of responsibility around improved learning.

2. Embed learning science in teacher and manager training

Most teacher training today does not provide enough focus on the ongoing learning and development needed to adapt to new educational practices, tools, and research.

A common complaint is that education systems overly incentivize "teaching to the test" rather than "teaching to learn." Likewise, manager training in the workplace does not focus on why and how to develop employees as learners.

The solution is training for teachers and managers that helps them understand the foundations of how the brain learns and what needs to be done to help their students or employees learn effectively.

The good news, in the words of Daniel Muijs, is that, "there are a lot of effective and good professional development programs out there around metacognition and self-regulation. We're absolutely not starting with a blank piece of paper." For example, the Thinking Matters program at the University of Exeter is primarily aimed at training educators, equipping them with tools and techniques to foster metacognition and self-regulated learning.

In the workplace, managers will be increasingly concerned about how quickly and effectively employees can master new skills. As Andreas Schleicher, Director for Education and Skills at the OECD, puts it, "we used to learn to do the work and now learning is the work." Manager training should include a focus on how to recognize and encourage effective learning in the workplace. A first step would be to give managers more training in the basic tenets of learning science, so that they understand the importance of techniques such like spaced repetition of learning, the nature of the practice environment, and the role of deliberate, purposeful practice in building skills.

> "We used to learn to do the work and now learning is the work."
>
> – Andreas Schleicher, OECD

3. Foster opportunities to teach and apply learning to learn

Learning-to-learn skill development is often fragmented and not systematically integrated into curricula or the workplace. While some educators recognize the importance of teaching students how to learn, these skills are often emphasized in isolated activities like study skills sessions or cross-curricular projects.

However, the integration of learning to learn into the core curriculum is inconsistent, and assessment practices rarely align with these skills, limiting their development and recognition.

Institutions can prioritize learning-to-learn skills by directly integrating skill development into core subjects across the curriculum, ensuring they are not just supplementary but fundamental to learning. This could involve embedding learning-to-learn competencies within the objectives of each subject area, allowing students to develop these skills intuitively through their academic work. The emphasis is on the introduction of techniques that build these skills as a natural part of learning, whatever the topic.

Adults can benefit from explicit instruction on learning to learn. That's because, as Barbara Oakley, Professor of Engineering and an expert on learning, explains, "as children, we learn more 'automatically' (in neuroscience terms, their basal ganglia system helps them learn unconsciously), while as adults we get stronger at learning 'declaratively' – consciously, or on purpose." On top of this, adults are often set in their ways, meaning that many will need to unlearn bad habits before relearning new ones.

Explicit instruction is also important to make learners more aware of which strategies they're using, and how effective they are. Applying learning-to-learn strategies alongside explicit instruction can help learners connect what they have learned in a way that is relevant for their needs. Marcel Veenman, the Director of Research and Training at the Institute for Metacognition Research, states it well: "People need to understand why learning strategies are relevant. They need to see that if they act in a certain way, it takes them less time, and they make fewer mistakes and get better results."

Learning to learn while working also requires regular, structured reflection and feedback. This brings us back to the importance of managers as coaches: they can play a crucial role in helping set learning goals, monitor progress, and adapt strategies. AI-driven tools are likely to play an increasingly helpful role in this process. So, we can imagine a future where AI-empowered managers, supported by insights derived from vast datasets on each employee's learning history, can be the employee's partner in their metacognitive growth. We can also imagine AI taking a more active and continuous role, by nudging people toward more effective learning habits and behaviors during the course of everyday work.

4. Assess an individual's approach to learning

If we accept the idea that what gets measured gets practiced, then the measurement void is perhaps the greatest obstacle to progress in learning-to-learn adoption and usage. Currently, the vast majority of institutions and enterprises do not implement ways to monitor and track skill progression.

To solve this, we can start by learning from the existing research-based methodologies to assess learning-to-learn skills. Methods like self-reporting, problem-solving tasks, and think-aloud protocols can help track skill development. These approaches can be incorporated into job interviews, recruitment tasks, and employee and student surveys.

Measuring learning-to-learn skills longitudinally and in various scenarios provides the clearest view of a learner's full potential.

However, self-awareness – a critical learning-to-learn skill itself – can influence the accuracy of self-assessments, as some individuals are better at reflecting on their abilities than others. Combining multiple assessment methods and educating learners on the purpose and value of these assessments can enhance both accuracy and awareness. What's more, regular and consistent assessment is needed to drive change.

To achieve progress at scale, we need clear target outcomes and definitions to guide the development and assessment of learning-to-learn skills. This includes clear definitions of core competencies, progression standards, and a shared language that transcends regional and institutional differences. Governments and organizations must collaborate to build these shared definitions and approaches, ensuring consistency and clarity in how these skills are understood and implemented.

We also need to measure skills over time and across contexts to assess retention and transfer. As Mark Williams explains, "In experimental design, you have to measure retention and transfer a period of time down the road." Additionally, transfer tests are needed to evaluate whether a skill improves performance in different settings, such as the workplace. Measuring learning-to-learn skills longitudinally and in various scenarios provides the clearest view of a learner's full potential.

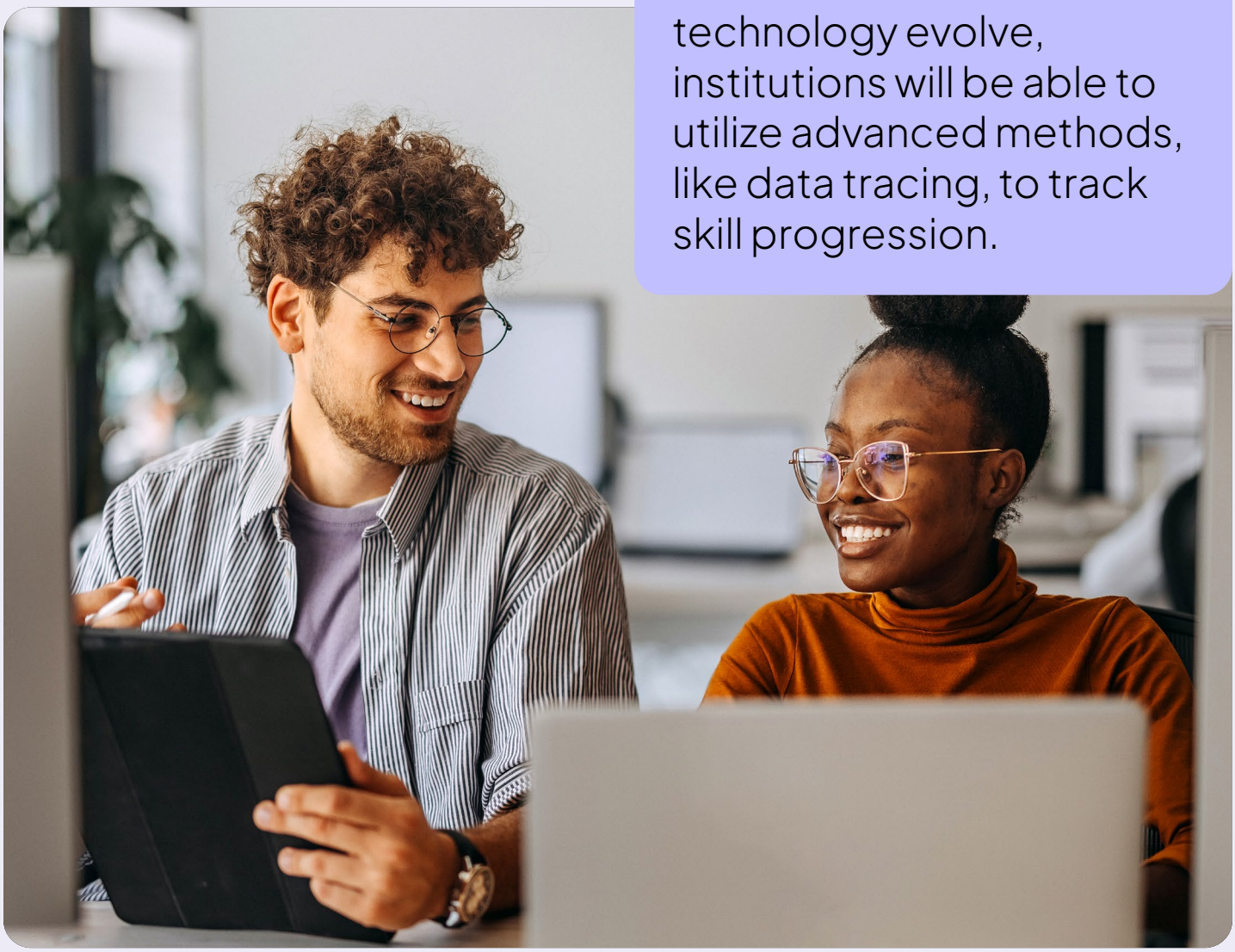
How to make learning more effective

Where can we look for inspiration? Singapore's Ministry of Education designed frameworks and tools to quantify learning-to-learn skills, creating guidelines and benchmarks to monitor progress. Singapore aligned parts of its assessment efforts with international benchmarks like the Programme for International Student Assessment (PISA), which evaluates the changing levels of many relevant skills across many countries. These are the kinds of building blocks that must be assembled across governments and institutions to work toward a shared approach to assessment, and thereby toward improvement.

Perhaps most excitingly, advancing technology offers new opportunities to refine these assessments. Rose Luckin points to the potential data bounty from AI: "AI is powerful because it can create advanced analytics. Incorporating "data tracing" – tracking data from its source to its destination – into the workplace is the most logical way to measure learning-to-learn skills because you get temporal and statistical data." As assessment and technology evolve, institutions and enterprises will be able to utilize advanced methods, like data tracing, to track skill progression. For example, you can trace how users are interacting with an AI assistant in a learning tool – are they asking thoughtful questions, reflecting on their learning, and independently requesting knowledge checks? As Rose Luckin puts it, fundamentally, these changes are about accepting "that we've just got to get a lot more sophisticated in the way that we think and learn. That's what really matters."

But being able to learn efficiently will only get you so far if the pathway ahead is not clear.

As assessment and technology evolve, institutions will be able to utilize advanced methods, like data tracing, to track skill progression.



Developing clear skilling pathways

For too long, formal education systems have been misaligned with the realities of the labor market. Many students leave school uncertain about what their credentials qualify them to do, often struggling to find relevant, well-paying work. Likewise, employers cite a mismatch between university graduates' competencies and the skills employees need.[16]

A recent OECD report supports this, showing that nearly one-third of workers in OECD countries are not a good match for their jobs in terms of their qualifications, skills or fields of study.[17]

This is only getting worse as the concept of a career evolves. It is changing from a single, linear trajectory into a more dynamic journey involving career pivots, lateral moves, and multiple routes toward the same goals. Many current degree or certification programs, designed for a different time, take too long and cost too much. Few can afford to spend a couple of years at multiple points in their lives obtaining skills that may be out of date in less than five years. As Nate Anderson, Senior Advisor to Jobs for the Future, explains, "we don't really build career pathways; we build training programs for jobs. Everything is working against a real career pathway design and a lifelong learning model. That's a major change that needs to come."

But what would an efficient pathway look like in practice? The What Works Clearinghouse practice guide for designing and delivering career pathways at community colleges provides a useful overview: "When designed and implemented well, career pathways offer students a clear blueprint for educational and employment advancement... Multiple exit points aligned with employment opportunities offer participants flexibility to access employment at different stages of the career ladder. Individuals may enter and exit career pathways at multiple points as they advance in their careers." [18] Addressing these challenges requires rethinking how skilling pathways are designed, making them more adaptive, transparent, and responsive to the evolving world of work. So how do we do all this?

"Everything is working against a real career pathway design and a lifelong learning model. That's a major change that needs to come."

– Nate Anderson

1. Define a common language for skills

The lack of a commonly accepted vocabulary around skills acts as an obstruction to pathway building at every level.

At the micro level, not knowing or recognizing language and terminology can obscure pathway opportunities for individuals, whether they are being searched for manually or automatically generated. At the macro level, there are unnecessary complications around the migration of skilled workers and the international recognition of their qualifications. As individuals learn more throughout their lives, the importance of a common language around skills will only increase. In more dynamic skilling pathways, with learners moving in and out of formal and informal learning environments, this common language will be essential for linking experiences across lifelong learning journeys.

The sheer number of existing skills taxonomies, and the speed at which skills change, means a single, unified, universal system is likely impractical. This perspective was widely shared by the experts we interviewed, with Peter Cheese, Chief Executive of The Chartered Institute of Personnel and Development, clearly describing the challenge: "The problem with taxonomies is that it might look great for now, but five years down the line, half of it's irrelevant. The more job specific skills are likely to have changed but we will still need the essential human skills such as collaboration, communication, critical thinking."

A more feasible solution may lie in improving linkages between systems providing clearer navigation for individuals, while maintaining flexibility across contexts. Nate Anderson describes it as "building a scaffolded set of pathways." He says: "It's never a singular pathway, never. It's always skill clusters that connect to skill clusters, tied to an occupational title so you can make sense of it." There is also a large role for "crosswalks" and skills translation tools to better link different parts of the skills ecosystem. AI will increasingly help deliver these solutions efficiently. The key is to standardize the skills marketplace so that "like" skills can be compared and evaluated.

Finally, if we're talking about a common language, it's worth asking "common among who?" The answer is the full set of stakeholders around learning. Governments, employers, education systems, and the entire learning ecosystem need to be involved in developing the language through which they will communicate with one another, and upon which their shared tools and processes will be based. Governments play a particularly important role because they encourage standardization and provide incentives. As Andreas Schleicher describes it, "the one thing that government could really do is to make skills a currency". Governments can create the environment where all stakeholders work together to build, adopt, and sustain a shared skills language.

2. Align skilling pathways with careers of the future

What do we really understand about the skills that will be required in the future? The term "skilling pathways" implies a route into the future. But when labor market data is used, it usually focuses on the current status only, ignoring future trends. This matters a lot when trends are moving so fast.

A pathway may look clear today, but may no longer exist tomorrow, as automation and emerging in-demand skills radically reshape career projections. Conversely, a job that seemed to have a predictable, narrow path may suddenly represent the first step to a plethora of new pathways that we didn't predict, or which aren't captured in more linear "laddered" career pathways. For example, theology students might find themselves exploring positions in ethical AI, or a plumber might find themselves designing real-life sanitation scenarios for augmented reality training. Predicting future careers is not simple, which has a number of implications for implementing clear skilling pathways.

Realistic and hands-on experience becomes even more crucial as learners are exploring career options, making it less likely that they will waste time on training for a career that isn't a good fit. "We lose a lot of people along the way because they realize too late that they're in the wrong training program," says Nate Anderson. "The classic story in the United States is healthcare. People will go into nursing programs. They like the academics of it, then they end up in a clinical setting and somebody throws up on them, or they have to deal with blood and they're like, oh, this isn't for me." Learning in a work environment avoids these scenarios by exposing candidates to the reality of a job before they've committed to a full-time position.

Virtual reality training increasingly plays a role here, simulating difficult or dangerous scenarios (like performing surgery, operating heavy machinery, or practicing safe lifting) without actually placing the learner in danger. A short, intense, immersive training experience can quickly help you decide if you need to take a different fork in your pathway

Realistic and hands-on experience becomes even more crucial as learners are exploring career options.

Developing clear skilling pathways

In addition, to help young people make more informed choices, we need to help them engage with other young people just slightly ahead of them on that pathway. Laurence Gates, CEO of WorldSkills Europe, explains: "The easiest way for a young person to imagine a successful job is to see and hear from another young person doing that job."

Finally, career and interest inventories remain an important tool for self-discovery during career exploration. Young people need to understand themselves, their interests, and their options in order to make informed career decisions. Learning-to-learn skills, as we discussed earlier, are a key enabler here as well. These skills will help individuals take an active and intentional approach to exploring careers and planning the steps they need to reach their goals.

Once someone has chosen a pathway, they need to know it aligns to future careers. Tools and models that provide accurate, robust and timely data on skills and labor-market trends are invaluable to maintain this alignment.[19] The skilling pathways themselves also must be agile in response to changing industry and job requirements. An important way forward is to continually align educational curricula with competencies that are required in the job market and that are tied to industry skill standards, certifications, or licensing requirements. As these standards and requirements evolve, so should the curricula. For example, we've seen an increased emphasis on English in international curricula, since mastering a global lingua franca is viewed as crucial for future mobility, and the rise of remote working means employers are tapping into more geographically dispersed talent pools.

Lastly, pathways need to ensure learners gain the skills and experiences directly valued by employers. Work-based learning models, like apprenticeships and project-based learning, are critical because they integrate education with hands-on experience, making learning immediately applicable. What better way to align learning with real work than to learn while working? "Skills are very hard to develop in the abstract," says Andreas Schleicher. "Authenticity is important. The workplace setting is important. That's why systems that are better in integrating work, and work in education, have much lower issues of drop-out and non-attendance." In order to be valued by employers, the skills developed through a pathway should also be validated by a meaningful and widely recognized credential.

Stronger connections between people, between institutions, and between databases, can help smooth the increasing complexities inherent across learning, work, and careers.

> "Authenticity is important. The workplace setting is important. Systems that are better in integrating work, and work in education, have much lower issues of drop-out and non-attendance."
>
> – Andreas Schleicher

3. Ensure personalized learning opportunities that adapt to a lifelong learning journey

Many groups face barriers to accessing skilling pathways into good, well-paying jobs. These barriers can take the form of unnecessary gatekeeping (for example requiring a certain type of degree) lack of information, social capital, financial capital, or digital access.

These barriers are compounded in a lifelong learning context, because the support systems that are available are usually restricted to traditional, linear learning experiences that do not fit into the daily lives of adult learners.

Certainly, the financial challenges can be daunting for many individuals. "While you're going to retrain, how are you going to pay your bills?" asks Laurence Gates. "If you're talking about complete career change, then the biggest hurdle you've got is financial. How are you going to keep the family going whilst you're training? Especially for an adult, if you look at apprenticeships, the financial support is not enough." Given the benefits of reskilling to firms and the wider economy, better financial support for individuals undergoing training is essential.

Put simply, pathways to accessible learning are often blocked, skewed, inefficient, or simply non-existent. Multiple interventions are necessary to create new and better arteries between and within the worlds of education and work.

> "We need to challenge the system to meet people where they are."
>
> – Nate Anderson

As a starting point, learning providers should create and run programs with a much greater focus on the needs and circumstances of the individual learner. As Nate Anderson underlines, "We need to challenge the system to adjust to meet people where they are. If it's a non-traditional learner – which is really most people these days – they need adult-friendly, working-friendly, family-friendly, flexible content that could be delivered asynchronously or during hours that match their availability. They need support structures that match the times learners need support, so AI avatars or real people who can help outside regular hours."

Developing clear skilling pathways

Consider how language learning is embracing new technologies to overcome old barriers that traditional systems have struggled to address. The rise of online platforms and apps made bite-sized lessons and activities accessible to anyone with a smartphone.

Virtual tutors and AI avatars now allow novice learners to practice authentic conversation in a judgment-free environment, overcoming a common anxiety in language acquisition. A more learner-centered approach acknowledges the barriers and provides solutions.

Mentorship opportunities can address the barriers that arise from a lack of social capital. Jean Eddy, President and CEO of American Student Assistance®, author of Crisis-Proofing Today's Learners: Reimagining Career Education to Prepare Kids for Tomorrow's World, points to the pivotal role of mentorship in shaping life chances: "Connecting young people with mentors is more than just an act of guidance; it is an investment in their future – particularly if you look at the number of young people who don't really have the social networks they need in order to discover what's really out there and what's available to them. Mentorship provides necessary support for young individuals to explore their potential and achieve their goals." On that front, many educational institutions can draw on a deep well of expertise through their existing alumni networks to turbocharge upskilling and reskilling efforts. Governments can also create incentives for educational systems to reengage alumni or other graduates with additional training opportunities.

> "Connecting young people with mentors is more than just an act of guidance; it is an investment in their future."
>
> —Jean Eddy

Learning support services also need a revamp to include a focus on careers as the outcome, rather than just a job. Individuals need skills to navigate labor markets and make informed decisions about the directions they want to go and what they need to get there. Nate Anderson describes the importance of career guidance as "not [just] helping students make sense of the job market and how to apply, but also helping them to actually create the content they need to apply. Helping them develop their articulation for why they should be hired is really, really important. Particularly where these are candidates who may not look like typical hires." These approaches will ensure career advising helps individuals advance in their careers, not just attain their first job.

As more people adopt "non-traditional" pathways, we need a better solution for capturing the full breadth of an individual's learning and working journey. Digital wallets or similar platforms are incredibly useful here. Lydia Logan, Vice President of Global Education and Workforce Development and Corporate Social Responsibility, IBM SkillsBuild, describes the potential of digital wallets like this: "Students and career-seekers can have a portfolio and portray the variety of skills they've developed - whether that's AI skills, cybersecurity expertise, or project management - giving a more holistic and accurate view of their knowledge and experience than a simple transcript or resume. In order to enhance the pipeline of talent, we need to think about how we are giving people options for multiple ways to communicate what they know."

Developing clear skilling pathways

How will all this be paid for? Education financing models must adapt to lifelong learning. Andreas Schleicher describes the current environment, "public funding is hugely biased towards academic routes... If you choose an alternative pathway, you're on your own, more or less." The Workforce Singapore Career Conversion Programme (CCP) illustrates one innovative approach to this challenge, helping mid-career individuals undergo industry-recognized training with up to 90 percent financial support. Between 2017 and 2024, government funding via the CCP helped employers and training providers place 47,000 individuals in new careers.[20]

Government policy changes can also smooth out financial constraints for students and other learners. Diego Angel-Urdinola, Senior Economist, Education Global Practice at the World Bank, describes an innovative approach in South Korea where the government incentivizes learners to "go from lower-secondary school into the job market, become productive and then go back to education through their 'Meister High schools' and 'Work-First, Study-Later Schemes'. You work first, gain experience, make money, pay taxes, and that makes you eligible to have simpler requirements and scholarships to access higher education. It's a win-win situation."[21] Lifelong-learning accounts are another tool that can defray the costs of ongoing training through incremental investment by individuals and their employers.

Achieving truly accessible skilling pathways that fit into the lives of learners throughout their careers will require a coordinated effort. Educators, employers, policymakers, and funding institutions will need to work together to remove barriers, enhance flexibility, and financially support lifelong career development.

Achieving truly accessible skilling pathways that fit into the lives of learners throughout their careers will require a coordinated effort.

4. Leverage data to build trust and demonstrate value

When it comes to measuring the value of skilling pathways, Peter Cheese likes to quote the aphorism: "Not everything that can be counted counts. And not everything that counts can be counted."

Too often, skilling pathways gravitate toward outcomes or performance on tasks that are easier to measure, but may be less useful to determining long-term value – to the individual, business, or society. In other words, the focus ends up on outcomes like program completion or job attainment rather than wage growth or career progression.

The answer seems to lie with better data, but data systems – whether at the corporate, educational, or national level – are typically fragmented and cannot follow learners across a lifelong learning journey. Nate Anderson underscores the nature of the challenge: "We lack the data systems to capture lifelong learning data, much less pay for it, much less tie it to outcomes, much less make it accessible to workers so that they can continue to engage." In the future, AI assistants could play a pivotal role in addressing this challenge, by analyzing patterns in skills data and industry demand, making it easier to match people with the right opportunities.

The way forward must start with a recalibration of outcomes and standards. Career progression and lifelong learning outcomes should be the focus of skilling pathway measurement. With a multiplicity of decisions to make about skilling opportunities, there is a greater need for a standardized way to compare skilling pathway outcomes and costs, so that the ROI of different skilling pathways can be determined. Governments will likely play a role here by establishing new performance metrics for job training programs that include skilling pathway features, and which go beyond job attainment as the core outcome.

Market-based approaches have a part to play. Skilling pathways need to be incorporated into a more standardized and accessible marketplace, where consumers (both workers and employers) can compare different training options with respect to program costs, post-program wages, employment opportunities, career advancement opportunities, and additional education needs.

There needs to be more sharing of public-good type data across systems, bridging both learning and work divides and the public and private sectors.

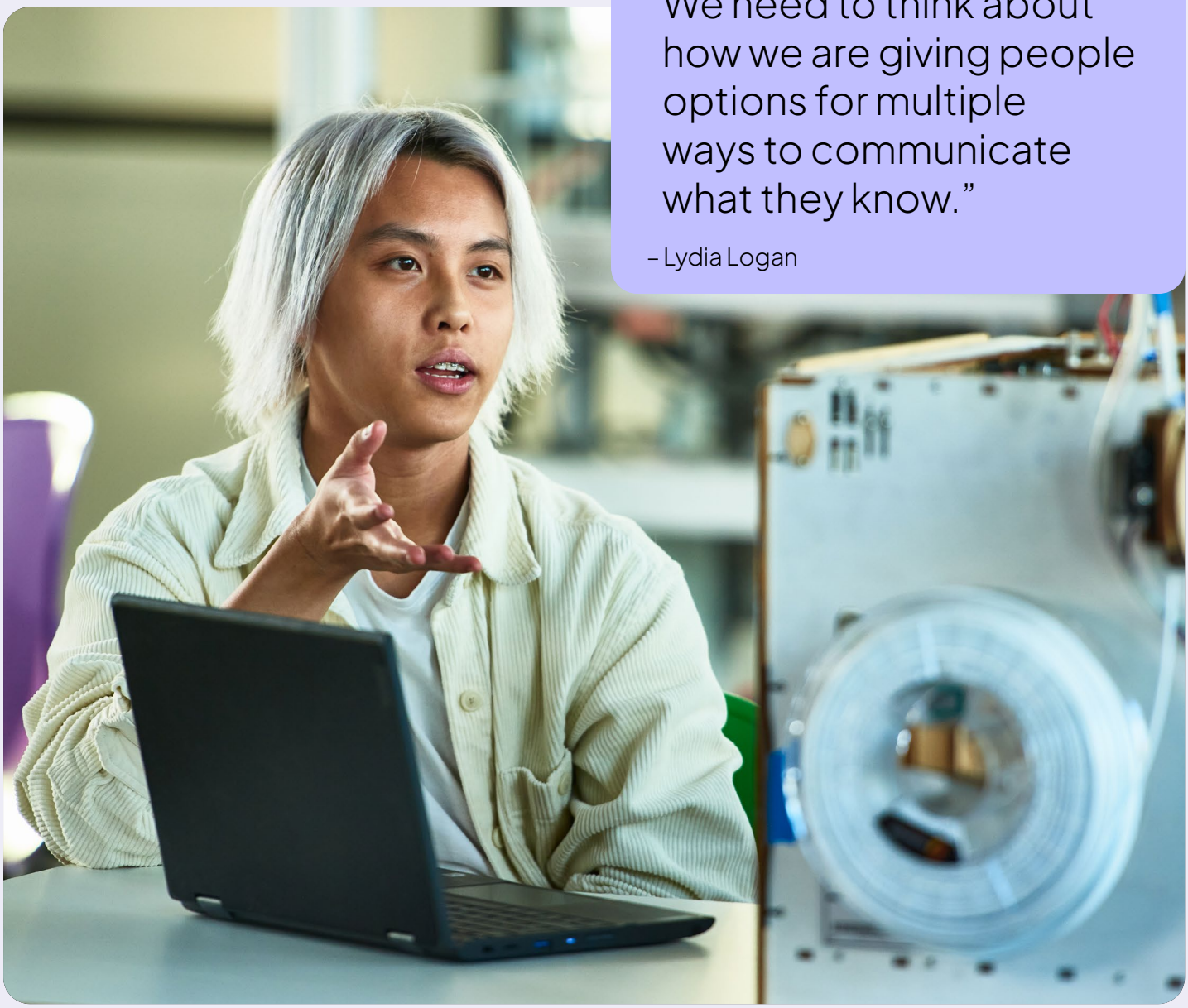
Developing clear skilling pathways

Institutions and enterprises rigorously guard their data, often for good reasons. But, subject to the appropriate safeguards, there needs to be more sharing of public-good type data across systems, bridging both learning and work divides and the public and private sectors. Incentives to both share and weave together disconnected data (academic records, tax records, work history, and on-the-job training) could yield far more robust insights into education and work histories, again within strict privacy protocols.

Digital and next-generation technologies could also transform our ability to understand and track learning pathways. Digital wallets could enable workers to capture the entirety of their work and learning history, and to choose which pieces of that history are shared with employers and education institutions. Applicant tracking systems could utilize digital wallet content to determine their fitness for open jobs, while still utilizing more traditional signaling devices like degrees. Job seekers would be able to advocate for their expertise and work readiness in job interviews based on the skills they display, and the evidence from their digital wallets.

By shifting to more meaningful success metrics and promoting secure data sharing, skilling pathways can become more transparent, empowering learners to make more informed career decisions while building trust across the entire skills ecosystem.

> "We need to think about how we are giving people options for multiple ways to communicate what they know."
>
> – Lydia Logan



The collaboration imperative

As economies and societies approach the middle decades of the twenty-first century, widening skills gaps represent one of today's greatest global challenges.

At stake are trillions of dollars in lost output to the global economy, as well as the future incomes and life prospects of millions of students and workers, many of whom are just entering the workforce. Rapid population aging and the feverish pace of technology disruption from AI make the case for action ever more urgent.

Many of the solutions are already at hand. In an environment of rapid change, where skills needs and boundaries are constantly blurring and evolving, the ability to assess, self-regulate, and adapt one's learning – what we have called learning to learn – becomes of paramount importance. Greater prioritization and systematic integration of learning-to-learn principles and methods – from the classroom to the workplace to the home – will make a key difference here. So too will better measurement of how people learn and accumulate skills over time.

The ability to assess, self-regulate, and adapt one's learning becomes of paramount importance.

Yet improving learning to learn in a vacuum –without the necessary opportunities to direct, nurture, and apply those capabilities along relevant pathways – will likely prove insufficient to tackle the scale of the skills challenges currently facing us. Actions to improve learning to learn must work in tandem with efficient skilling pathways, providing multiple entry and exit points across education and the workplace to continually update and augment skills.

And this is where economies and societies today face yet another major obstacle. Many of those skilling pathways remain underdeveloped, fragmented, incomplete, or non-existent.

Given the scale and scope of the challenges, progress requires a multi-stakeholder approach, involving not just individual learners and workers, but educators, businesses, institutions, and governments. Yet, in the current state, collaboration is lacking. Institutions and organizations often guard their territories, viewing themselves as operating within distinct mandates, missions, and priorities. This leads to siloed approaches, overlapping strategies, and an absence of shared goals.

The collaboration imperative

The entire learning ecosystem must now work together, in partnership, to prepare students and workers for fulfilling careers, and to expand and advance their life opportunities. They must foster more effective learning that leads to faster skill development via constructive networks of industry experts, learning providers, and policymakers. And they also need to collaborate to devise clear pathways that enable people to efficiently move into future careers faster than ever before. In combination, these actions will pay strong dividends – for individuals, businesses, economies, and societies – in the years and decades to come.

We must work together to foster more effective learning that leads to faster skill development and devise clear pathways that enable people to efficiently move into future careers faster than ever before.

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