Position Paper

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The Hard Problem of Lifelong Learning

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THE HARD PROBLEM OF *LIFELONG LEARNING*

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Abstract

As Canada navigates through the transformative forces of the knowledge economy and technological advancement, particularly AI, the need for a robust lifelong learning strategy becomes critical. This paper delves into the challenges and opportunities for establishing a comprehensive lifelong learning framework that aligns with the evolving demands of the labour market and the imperatives of an uncertain economic landscape. It emphasizes the important role of higher education, specifically continuing education, in fostering accessible lifelong learning opportunities across diverse demographic segments. Through an exploration of the biological foundations of learning and the practical implications of lifelong learning, the paper highlights the disparities in access and the pivotal role of policy in democratizing education. Recommendations are put forth to enhance the structural and financial support systems, ensuring that lifelong learning transcends traditional educational paradigms to become a truly inclusive endeavor. These strategies aim to mitigate the financial, strategic, and operational challenges that hinder lifelong learning, advocating for a national strategy that fosters educational resilience and socioeconomic inclusivity.

1. Introduction

Much has been written about the emergence of the knowledge economy, Industry 4.0, and the shifting demands for skilled work. Prognostications of future states regarding in-demand occupations have created a cottage industry of expert opinions on how Canadians need to adapt to the uncertainties of our times. Much of this is predicated on three simple propositions. First, the rapid advancement of technology - particularly artificial intelligence (AI) - and the global shift toward carbon-neutral economies, coupled with economic stagnation, are poised to cause not only significant turnover in required skills by 2030 but also long-lasting changes in labour demand. Second, occupational turnover is expected to increase during this period of technological and economic transformation – leading to what is increasingly referred to as a *cross-disciplinary career*. This means that the average duration of occupations defining a career is expected to decrease as businesses and industries adjust their operations in response to the rapid pace of change. Third, the concept of *atomization* **of skills and education** - the focus on micro-skills - is an increasingly prevalent and imposed reality for many seeking to remain relevant and competitive. The problem is that this latter point places the burden of action and outcome of success (and failure) on the individual - the fallacy of human capital theory. For many Canadians who read the headlines and follow the trends, it comes down to what Daniel Kahneman and Amos Tversky termed *prospect theory* - finding an optimal balance between investments that further one's socio-economic prospects and the realities of adult life where time, money, and attention are **limited affordances**. These factors can be exacerbated by stress and anxiety caused by rising inequalities (Ali and Tan, 2022). These diminishing affordances strip our attention and focus – the two key traits required for learning (Kahneman, 2011)

The objective of this position paper is to explore the role of higher education - specifically continuing education - in providing Canadians with meaningful lifelong learning opportunities that can fulfill the expectations of a changing labour market. More and more governments and institutions are adopting the ethos of lifelong (as well as life-wide) learning as key to providing the affordances necessary for individuals to meaningfully pursue upskilling and reskilling. With an increasing proportion of Canadians over the age of 30, it is imperative to develop a national strategy on lifelong learning that recognizes the importance of continuous lifelong education.

We will begin by exploring the foundations of lifelong learning - including the innate biological basis of learning - to better understand how learning strategies should be developed. Lifelong learning, far from being merely a slogan, is central to human cognition, and intelligence, and as such should be considered a fundamental right. We will then examine the key issues, challenges, and opportunities necessary to ensure that the pursuit of future skills remains accessible to all, not just those with the means to afford it.

> Ensuring access and affordability of learning opportunities for adults is the *hard problem* we must address.

2. The Biology Basis of Lifelong Learning

This may seem like an unusual starting point, but I believe that any discussion on the attributes and value of lifelong learning must begin with the recognition that learning throughout life is an innate biological process. Our ability to respond to the world around us is shaped by continuous, conscious and unconscious processing of information - a phenomenon that cognitive scientist Marvin Minsky (1988) famously described as a constant flow of mental processes adapting over time through dynamic, reactivatable networks. **Lifelong learning, therefore, is a natural and continuous orientation toward life.**

Natural selection has endowed all multicellular organisms with an inherent ability to process and respond to a wide array of stimuli, ultimately aiming to maximize individual survival and species persistence. Adaptive behaviors learned by previous generations are encoded within an organism's genetic makeup, forming a foundational blueprint for environmental interaction. However, these inherited behaviors are enhanced by real-time adaptations made possible through dynamic and complex neural processes. As neuroscientist Kevin Mitchell observed (2024), organisms are not merely passive recipients of genetic programming; they possess an innate capacity to learn and adapt throughout their lives, actively shaping their own paths. This perspective aligns with Minsky's vision of learning as an adaptable network, where new experiences continuously layer upon a network of memories and mental processes. He referred to these as **K-lines** (knowledge-lines) - *pathways that enable us to recall and activate relevant knowledge across varying contexts*.

In vertebrates, particularly humans, this capacity has evolved into sophisticated sensory-driven cognitive processes, resulting in higher-order modeling of the world. These internal models or **schemas** enable not only **sentience** - *the ability to perceive and respond to stimuli*—but also **sapience** - *encompassing metacognition, self-reflection, inductive reasoning, prediction, and abstract thinking* (Suddendorf and Corballis, 2007; Mitchell, 2024). This evolutionary advancement facilitates the transition from **percept to concept**, allowing humans to construct complex understandings of the world based on **embodied cognition** - *the ability to experience, interact with, and continuously learn from our surroundings* (**Figure 1 – competency-mind hypothesis**). In Minsky's terms, our minds utilize an ever-growing set of K-lines to connect and reconnect experiences, building a rich network that supports flexible and context-sensitive responses to life's complexities.

Our capacity to store experiences as memories creates a record of episodic events in our lives, allowing us to model cause-and-effect relationships and act as agents of our own

development. These memories shape and refine our mental schemas and world models, which are continually updated through new learning and experiences. This cumulative structure of knowledge resonates with Minsky's concept of learning machines, wherein each memory and experience add a new K-line - a connective pathway that enables us to approach similar situations more effectively by activating relevant mental processes.

Our **innate capacity for deep learning**, refined through trial-and-error feedback, is a remarkable feature of our brain's complex biology. The emergent properties of this intricate neural system give rise to both **the mind and a subjective sense of self**. As Daniel Dennett (1991) observed, consciousness remains one of science's greatest challenges, yet it is fundamentally linked to our ability to learn and adapt. This capacity, however, does not remain static. Cognitive processes associated with learning change as we age (see Ranganath, 2024 discussion on hippocampus decline; and Mertens *et al.*, 2024 for a discussion on Learning Motivation), underscoring the importance of **andragogy** - *adult learning theory* - in shaping effective curricula and assessment practices (Knowles, 1970). Recognizing these shifts in learning approaches across the lifespan emphasizes the need for lifelong learning strategies that cater to the distinct needs of adult learners.
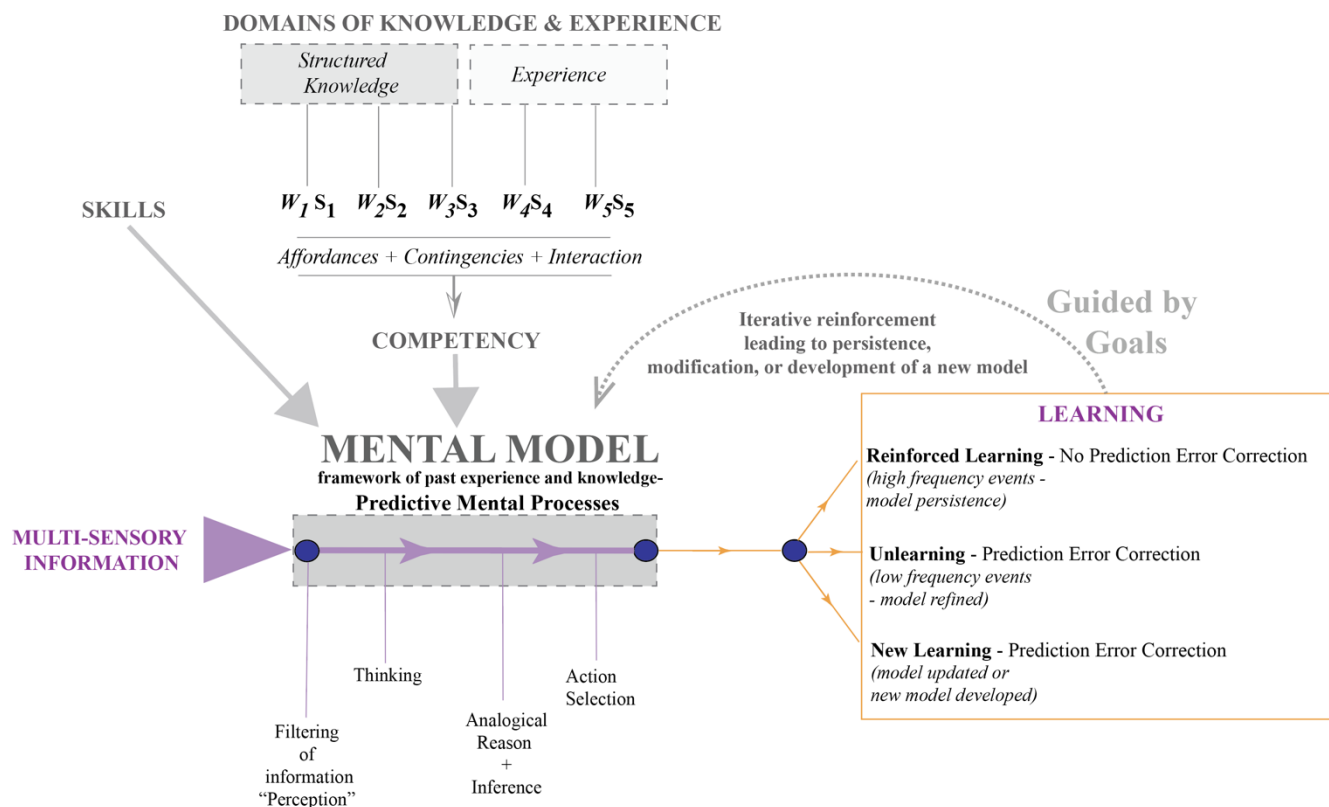
Figure 1. The Competency-Mind Hypothesis. Competency is conceptualized as a dynamic function of various skills (S_i), each derived from distinct domains of knowledge and experience accumulated over a lifetime. The relevance and influence of each skill are modulated (weights, W_i) according to the specific circumstances and context in which a problem is encountered. Both competency and skills are dependent on our knowledge networks, which can be acquired through formal or informal learning. Our mental models, which include both schemas and world models, help us perceive and sort information based on our predictive representation of the world. Learning processes can either reinforce what we know or modify our existing models. In this sense, learning is critical not only for uploading new knowledge but also for reinforcing and changing our internal representation of the world across both personal and professional dimensions (cf. Sprevak 2022; Clark 2023; Mitchell 2023).

3. The Pragmatics and Semantics of Lifelong Learning

Lifelong learning encompasses a continuum of educational and experiential activities pursued throughout an individual's life, aimed at enhancing knowledge, skills, and competencies across personal, civic, social, and employment-related domains. It is also, as mentioned, an innate biological process that enables us to adapt to our surroundings, making it a concept that is often challenging to define precisely (Nesbit *et al.*, 2007). Lifelong learning spans diverse settings, from structured educational environments, which may be **formal** or **nonformal**, to **in-formal**, incidental learning that occurs outside institutional frameworks and lacks formal structure. Interestingly, this in-formal learning is the constant form of learning that shapes our perceptions and understanding of the world. In contrast, structured, institutionalized forms of learning-though equally essential-are more effortful and comparatively limited in duration, relative to the expected human lifespan.

Formal learning refers to intentional learning activities within an organized and structured context, such as educational institutions, leading to recognized diplomas and qualifications (UNESCO Institute for Lifelong Learning, 2009). Informal learning, on the other hand, occurs in daily life and work, often unintentional and without formal certification. In the context of lifelong learning, these modalities are not mutually exclusive but rather complementary, contributing to an individual's holistic development. The semantics of lifelong learning have evolved to emphasize not just the accumulation of knowledge but the continuous adaptability and application of skills in a rapidly changing world – more on this later (Delors *et al.*, 1996; Field, 2006; Elfert, 2018).

Although lifelong (formal and nonformal) learning can encompass a wide range of educational offers, I will focus this term almost exclusively on continuing education - with specific emphasis on skill and workforce development programming for adults. This is consistent with others (Dunkin and Lindsay 2001) that have identified skilling as one of the central functions of lifelong learning. As Nesbit *et al*. (2007) stated "The implementation of lifelong learning in society, particularly in educational settings, is therefore considered a means of raising the skills of working people".

According to the Hamburg Declaration, lifelong learning is essential "to develop the autonomy and sense of responsibility of people and communities, to reinforce the capacity to deal with the transformations taking place in the economy, in culture and in society as a whole, and to promote coexistence, tolerance, and the informed and creative participation of citizens in their communities; in short, to enable people and communities to take control of their destiny and society to face the challenges ahead" (UNESCO, 1997). While few would dispute this vision, the real challenge lies in how societies can effectively make it a reality.

Historically, global efforts in lifelong learning have primarily concentrated on enhancing K-12 educational opportunities in developing economies, often through literacy programs and teacher capacity-building initiatives led by organizations such as UNESCO (Elfert, 2018 and 2019). Non-profit organizations, like JET Education Services, have also made significant strides in Africa and Asia, advancing skills development through multi-agency-funded lifelong education initiatives primarily aimed at youth rather than adult learners (e.g., Keevey and Paterson, 2024). In more developed economies, such as Canada, lifelong learning typically falls within the domain of higher education institutions, particularly within continuing education units that cater specifically to adult learners. However, nearly all adult education programs operate on a cost-recovery, market-driven basis, which limits opportunities for robust financial support.

3.1 Historical Evolution

During the 1960s and 1970s, the concept of lifelong learning gained significant traction as societies grappled with rapid technological advancements and shifts in the labour market due to mechanization and automation (e.g., Faure *et al.*, 1972; CSU, 1973) . This period saw the development of two primary streams of lifelong learning initiatives. The first stream, *Standard Formal Education*, focused on traditional educational pathways, including post-secondary degree programs that aimed to provide comprehensive academic and professional qualifications. This era marked a notable expansion in post-secondary education (**Figure 2**), as universities and colleges broadened their offerings to accommodate growing demands for formalized higher education. The second stream, *Non-Standard Adult Education* – in the form on continuing education, emerged to address workforce needs by offering programs focused on skill development and enhancement. These programs were designed to be more flexible and accessible, targeting adults seeking to update or acquire new skills relevant to the changing labour market. Beyond job-related skills, this stream also included civic education and community programs aimed at promoting social inclusion and active citizenship. Continuing and extension education units within universities and colleges played a pivotal role in these initiatives, contributing to the democratization of educational access and fostering lifelong learning as a societal value (Jones, 2001; Nesbit *et al.*, 2007).
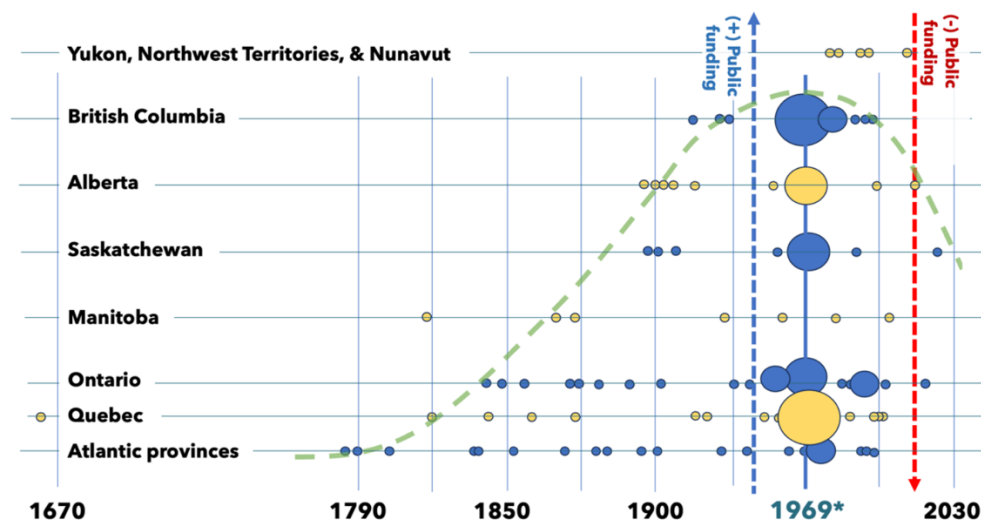
Figure 2: Proliferation of Post-Secondary Institutions in Canada by Region. This figure illustrates the substantial growth in the number of colleges and universities from the 1960s to the 1980s, with a notable peak in 1969, marking a period of unprecedented expansion in Canadian post-secondary education. During this time, increased government investment supported the educational demands of the baby boomer generation while addressing the shifting economic and labor market needs. This rise in post-secondary institutions also coincided with the **emergence of global lifelong learning initiatives** led by UNESCO and OECD and the **growth of continuing education programming across Canada**. Smaller bubbles represent single institutions, while larger bubbles indicate regions with eight or more institutions. Funding began to decline in the 2000s. Data were compiled from Colleges and Institutes Canada (CiCAN) and Universities Canada (2024).

3.2 Role of Continuing and Extension Education Units

Continuing and extension education units have historically served as bridges between higher education institutions and the broader community. They have been instrumental in:

- **Providing Access**: Offering educational opportunities to non-traditional learners, including working adults, marginalized groups, and those seeking personal enrichment (Grace, 2013).
- **Workforce Development**: Developing programs aligned with industry needs, thus enhancing employability and economic productivity (Bélanger and Federighi, 2000).
- **Community Engagement**: Facilitating civic education and community development initiatives that promote social cohesion and active participation in democratic processes (Brookfield, 2005).

These units have adapted to technological advancements by pioneering distance learning, online education, and flexible delivery methods, thereby expanding the reach and impact of lifelong learning initiatives (Garrison and Anderson, 2003).

3.3 Contemporary Perspectives

In today's knowledge-based economy, the pragmatics of lifelong learning involve addressing practical challenges such as accessibility, affordability, and relevance of educational programs (OECD, 2019). The semantics have also shifted to emphasize lifelong learning as a means of fostering innovation, competitiveness, and professional development. The integration of micro-credentials, recognition of prior learning, and competency-based education reflects a pragmatic approach to meet diverse learner needs and labour market demands. These developments underscore the necessity of flexible learning pathways, and the validation of skills acquired outside traditional educational settings.

3.4 Implications for Policy and Practice

Understanding the pragmatics and semantics of lifelong learning is essential for crafting policies that ensure inclusive and equitable access to education across all life stages. With Canada's aging population, it is particularly crucial for policymakers to focus on the learning needs of adults, who represent the majority of lifelong learners. While everyone engaged in formal education is, in essence, a lifelong learner, those following 'traditional' higher education pathways (e.g., degree programs) typically receive extensive support and financial aid. By contrast, adult learners in non-traditional pathways often lack access to similar resources, highlighting the need for targeted policy efforts.

Furthermore, it is worth noting that the expansion of higher education coincided with an unprecedented demographic explosion, as large numbers of young people (i.e., baby boomers) were coming of age. Consequently, most strategies developed at the time - including those linked to continuing education - were tailored to this demographic surge, with adult professional programs primarily designed for younger adults under 30. Those over 30 were often assumed to be engaging in leisurely or personal learning activities, perceived as having little or no direct connection to skills development or workforce enhancement. This historical focus partly explains the defunding of adult education programs and the persistence of attitudes toward adult learning that still influence policy today!

Effective policy development should prioritize:

- **Holistic Frameworks**: Building integrated strategies that encompass formal, non-formal, and informal learning opportunities tailored to adult learners, particularly those outside traditional higher education systems (UIL, 2015).
- **Collaborative Approaches**: Fostering partnerships among government agencies, educational institutions, industry, and community organizations to address skill gaps and meet the specific needs of adult learners, thereby enhancing workforce adaptability and social cohesion (UNESCO, 2016).
- **Lifelong Learning Culture**: Promoting a societal ethos that values continuous learning and personal development, positioning adult education as essential for individual fulfillment and community well-being (Delors *et al*., 1996).

These approaches are essential for supporting adults as they navigate evolving economic and social landscapes, ensuring that lifelong learning policies are responsive to demographic realities.

4. The Value of Continuing and Lifelong Education

4.1 Historical Context

In Canada, continuing and extension education dates back to the early 1900s with the establishment of extension schools offering courses to adults, aiming to engage communities and extend the reach of universities. Since the end of World War II, Canadian continuing and extension education units have increasingly focused on providing educational programs aligned with emerging labour market needs (Grace, 2000). These efforts, often driven by provincial and national initiatives, sought to address the expanding demand for labour in a period of unprecedented economic growth. By the late 1960s and early 1970s, numerous extension units had formalized their commitment to these efforts by adopting the term *continuing education*, signifying their role in fostering both personal and professional development for Canadians (see McLean, 2007). However, during this era of rapid post-secondary expansion (**Fig. 2**), rising demand for degree programs led governments to reallocate funding away from vocational and continuing education. This shift resulted in the establishment of self-sustaining continuing education units across Canada, where course and program fees supplanted provincially defined tuition rates, and units' strategic roles began to diverge from universities' core priorities (Coates, 2013). While this shift further separated degree and non-degree activities, it also compelled continuing education units to clarify their purpose. As a result, many units diversified and strengthened their roles in community development, offering programs that supported not only personal growth and social cohesion but also workforce and professional development opportunities.

Since the 1970s, Canadian university continuing and extension education units have committed to providing opportunities for lifelong learning that enhance socio-economic mobility. This commitment has been consistently demonstrated through the development of workforce-oriented programs, often in collaboration with provincial governments and industry partners. By aligning their offerings with the evolving needs of the labour market, these units have enabled both Canadian residents and newcomers to acquire crucial skills and certifications, facilitating their entry into specific job sectors and promoting career advancement. As job markets and educational demands shifted, these units adapted by diversifying their programs to include language training, degree pathways, and international education, thereby broadening the scope of opportunities for lifelong learning. This adaptive approach has significantly contributed to

enhancing socio-economic mobility across Canada, ensuring that education remains responsive and relevant in a rapidly changing world.

4.2 Current Significance

University continuing and extension education units have been central to reshaping educational opportunities for adults, driving advancements in distance and online learning, and expanding qualifications through innovative credentials and digital platforms. The 2023 bi-annual survey by the Canadian Association for University Continuing Education (CAUCE) and Academica reveals a consistent, strong demand for lifelong education among Canadians. Demonstrated by robust enrollment figures, over 450,000 course enrollments were recorded across 28 Canadian universities. Career and workforce development programs, comprising more than half of these enrollments, highlight the units' dedication to upskilling and reskilling within a dynamic job market. The array of programs offered, from micro-credentials to non-degree courses, showcases the adaptability and responsiveness of these units to the evolving educational and professional landscapes.

The majority of offerings from these units are non-degree credit and non-credit courses with assessed learning outcomes, ensuring that education remains both accessible and rigorous. Notably, 96% of these programs feature open enrollment, reinforcing a commitment to accessibility and inclusivity. Furthermore, university continuing and extension education units often develop custom programs in collaboration with local businesses and community organizations, thereby addressing specific local and regional educational needs. This collaborative effort not only underscores a proactive approach to workforce development but also strengthens community engagement, ensuring that educational offerings are closely aligned with the needs of the local economy and its residents.

Despite this strong uptake, challenges persist in offering affordable programming at a time when universities and units must balance their expenses. The escalating costs of higher education, coupled with insufficient funding to support continuous learning initiatives, risk creating a significant divide. This financial strain can hinder access to these crucial educational opportunities, potentially limiting socio-economic mobility for many individuals seeking to enhance their skills and employability.

5. The Hard Problem(s) of Lifelong Learning

The *hard problem* **of lifelong learning** centers on creating effective strategies that provide adults with affordable, accessible education throughout their lives. This challenge requires coordinated efforts between federal and provincial agencies to expand funding and support systems for Canadians beyond traditional post-secondary years (Duke, 2002; MacNeal, 2002; Tobias, 2003). Affordability has long been a barrier; as early as 1974, Cannell identified how insufficient funding and lack of subsidies limit access to continuing education and professional training for adults. Addressing this persistent issue is essential for building an inclusive and equitable framework that enables all individuals to benefit from lifelong learning opportunities.

The following sections summarize the key challenges and opportunities in addressing this hard problem.

5.1 Global Challenges in Higher Education

Since the mid-1990s, Canadian universities have faced ongoing reductions in government funding, leading to substantial budget deficits and a pressing need to find alternative revenue sources (Fallis, 2024; Usher and Balfour, 2024). To address these shortfalls, institutions have

increasingly turned to tuition revenue, shifting much of the financial burden to learners themselves. This reliance on learner fees marks a significant departure from the 1970s, when nearly 80% of university funding came from government support. By the early 2000s, government contributions had fallen to less than 45%, requiring institutions to fill this gap largely through tuition. However, recent federal changes affecting international enrollment introduce further financial uncertainty, with significant consequences anticipated across Canada in 2025 (Friesen 2024; Mulligan, 2024; Usher and Balfour 2024).

These funding constraints critically impact the ability of post-secondary institutions to provide affordable lifelong learning opportunities. Despite historical declarations emphasizing effective strategies, significant challenges remain. Globally, access to education is increasingly monetized and market driven. Publicly funded institutions in Western countries face declining support, while emerging economies contend with high population densities and infrastructural limitations that hinder the delivery of basic education. As pandemic lockdown measures ended in 2022, the urgency to apply lessons learned in improving educational delivery intensified, especially within a **shifting technocratic narrative (*the noise*) where micro-skilling and a proliferation of credentials are now seen as essential to maintaining relevance in a rapidly evolving knowledge economy** (Usher and Balfour, 2024; Marcus, 2024). This is not to say that job displacement won't result from the incursions of AI and automation (Russell, 2019); rather, during this period of rapid change and transition, there is a pervasive sense that everyone is chasing their tails, driven by the anxiety of not being left behind. Therefore, in times like these, when fiscal constraints and budget pressures loom large, we must be cautious not to be overly reactive to emerging needs, particularly when these needs are often poorly defined. The consequence of **rapid-fire programming** is that the costs are ultimately transferred to learners. I am not suggesting this is a pervasive problem; rather, the current conditions we face may inadvertently undermine the collective mission and purpose of lifelong learning - especially if we fail to cut through the noise (Lang, 2023).

As universities contend with financial strain, adult learners are increasingly expected to shoulder the costs of continuing education, which raises barriers to accessible, high-quality programs. This scenario underscores the need for a reimagined funding approach that prioritizes equitable access to education at all stages of life (Wells, 2024). The accelerating AI revolution only intensifies this urgency and noise, as it stands to reshape not only the mechanics of work, learning, and social interaction but also their underlying paradigms (Carpo, 2023). While government support for students has grown this funding has primarily targeted individual financial aid through tax credits, grants, and institutional support, rather than bolstering institutions directly. Consequently, adults pursuing lifelong learning face rising costs, a trend unlikely to reverse in the near future.

With domestic tuition fees largely unchanged since the early 2010s, the heavy dependence on learner contributions reveals an unsustainable model for the future of Canadian higher education. Addressing these challenges requires innovative, collaborative solutions that bring together governments, institutions, and stakeholders. A radical shift in strategy is essential to ensure sustainable funding models that maintain affordability and access to lifelong learning. Only through such systemic changes can Canada safeguard equitable, quality education for all, positioning lifelong learning as an accessible pathway for personal and professional growth in a knowledge-driven, AI-transformed economy.

These complexities create an increasingly uncertain present and future. A pressing question emerges:

Who will benefit from the opportunities to access lifelong learning?

Strategies must ensure lifelong learning remains inclusive and equitable, serving as a cornerstone for democracy, citizenship, and social justice. Coordinated efforts among governments,

businesses, and the educational sector are essential - such as those proposed in the UK's Manifesto for Lifelong Learning (Holford and Michie, 2024). Collaborations must support strategies that promote adult learning, exemplified by initiatives like UNESCO's Learning Cities and Fairground Universities.

5.2 Opportunities in Building Inclusive Learning Communities: from Learning Cities to Fairground Universities

Critical to establish guiding principles that promote epistemic integrity and facilitate the diffusion of knowledge

As nations grapple with the hard problems of lifelong learning, including affordability and accessibility, innovative educational models like Learning Cities and Fairground Universities offer compelling solutions. These models, as UNESCO defines, transform urban areas into vibrant hubs of lifelong learning, integrating educational opportunities deeply into their social and economic infrastructures. Notably, Edmonton, Alberta, became the first Canadian city in 2022 to join UNESCO's Global Network of Learning Cities, demonstrating a commitment to elevating educational access and quality through international collaboration and shared expertise. Learning Cities help achieve Sustainable Development Goal 4 (SDG 4) by promoting "inclusive and equitable quality education and lifelong learning opportunities for all" (Hirju and Georgescu, 2023).

Fairground Universities complement Learning Cities by establishing non-traditional educational spaces that emphasize community-driven learning. These programs adapt to diverse populations, making education accessible and empowering individuals to shape their socio-economic environments (Osborne *et al.*, 2013). This approach addresses disparities in educational access, ensuring that everyone, regardless of background, can contribute meaningfully within their communities.

Integrating lifelong learning into these models supports both workforce needs and societal goals, fostering digital literacy, critical thinking, and civic engagement, all crucial for democratic participation. They uphold inclusivity and equity in education and challenge oppressive societal structures by promoting reconciliation and cultural exchange, especially between Indigenous and non-Indigenous communities, through traditional knowledge and language revitalization. Amid global challenges like educational monetization and AI-driven shifts, these frameworks provide sustainable pathways for lifelong learning. Using UNESCO toolkits, Learning Cities create networks of municipalities, universities, and stakeholders to cultivate meaningful educational spaces, building a knowledgeable and resilient society. By embracing these models, cities like Edmonton advance lifelong learning as a pillar of societal growth, valuing continuous learning for both individual and collective benefit. These initiatives foster adult education that challenges oppressive structures and promotes a more equitable society (Gouthro, 2006).

While these specific examples, such as Learning Cities and Fairground Universities, may have limited application within the broader Canadian context, they nonetheless illustrate the potential of interlacing existing initiatives to enhance a network of learning. This interconnected approach could serve as a powerful means of bolstering continuous learning and expanding educational opportunities for Canadians, supporting both individual growth and societal resilience.

5.3 Challenges and Opportunities in Rethinking Skills, Competence, and Assessments

Advancing lifelong learning across formal, nonformal, and in-formal domains necessitates a realignment of educational access and recognition to incorporate individuals' life experiences that shape their cognitive schemas (Field, 2001; Ranganath, 2024). This includes the cumulative knowledge and skills acquired through personal and professional experiences outside traditional educational settings. Recognizing prior learning, especially in nonformal and in-formal contexts, demands a critical re-evaluation of terms like competence and skills, which have traditionally been viewed as static and easily measurable attributes (see Brockman *et al.*, 2011). From a cognitive science perspective, learning, knowledge and skill acquisition are dynamic processes embedded within social and contextual frameworks. Below is a brief overview of key concepts essential to understanding how we build knowledge, develop skills, and cultivate competence within a lifelong learning framework (see **Fig 1).**

What is knowledge? - The knowledge we accumulate throughout life is instantiated in our memories—including episodic, semantic, declarative, and non-declarative forms - and is subject to both change and loss over time (Ranganath, 2024). Our knowledge of the world and ourselves is primarily organized through our schemas, which (as already mentioned) allow us to filter vast amounts of incoming information, create abstractions, and rely on mental shortcuts (heuristics), that enable us to **engage in action selection** - our executive decision-making abilities (from intuitive judgements to more rational deliberations; Mitchell 2023). In short, the more we know, the more we are inclined to interpret the world through our internal knowledge frameworks. This is the transformative impact of formal, nonformal and in-formal learning. Knowledge instantiated in memories also allows us to assess attainment and foundational understanding through tradition testing which relies heavily on memory recall - *the bedrock of standard pedagogy*.

What are skills?- Skills represent the **application of knowledge directed toward a set goal or problem** (e.g., knowledge-based skills – McGrew, 2009). When faced with a novel but predictable problem or situation, we typically undergo an effortful process to find a solution, often relying on declarative memory – and often within a narrow band of knowledge. For example human resource problems presented to an HR professional will require the application of knowledge (skill) derived mostly from their HR training. If the problem or situation recurs, our response becomes more intuitive - or non-declarative - as described by Daniel Kahneman's (2011) concept of fast thinking (i.e., System 1). This is evidenced by our ability to add "1 + 1", drive a car, or read this sentence with relative ease. Such action selection typically leads to initiative judgement and decisions. Skills, then, are the narrow application of knowledge – where problems encountered do not depart significantly from expectation. In other words, **skills rely on deterministic world model**. This is what makes skills training so effective – providing a set of goals and or problems and identifying an optimal or standard solution (application) within a specific domain of knowledge (e.g., debugging a program, processing blood samples etc.; Binkley *et al.*, 2012; Rosen *et al.*, 2023). With some practice, we can train ourselves to apply existing knowledge to develop new skills (*upskill*), expand our knowledge framework to acquire additional skills (*reskill*), or transfer existing skills into a new domain (*transferable skills – include both soft skills (e.g., effective communication) and hard skills (e.g., digital literacy)*). These processes can be facilitated effectively through formal learning.

It should be noted that the evolution of skill development follows a progression from basic skill acquisition to proficiency, and ultimately, to expertise. Skills represent the application of knowledge to achieve specific goals, with training allowing individuals to respond effectively to predictable problems. With practice, these skills become more refined, transitioning into **proficiency** - *where the application of knowledge becomes intuitive and efficient across familiar contexts*.

Further development, coupled with extensive experience and **deepened knowledge**, leads to **expertise**—*a stage where adaptive skills, critical judgment, and nuanced understanding allow individuals to handle complex, novel challenges within their field*. This progression from skill to proficiency to expertise reflects increasing levels of mastery and cognitive integration, with expertise often achieved only after sustained immersion and reflective learning (*cf.* Kahneman, 2011).

A note on talent - **Talent** plays a foundational yet distinct role in the progression from skill acquisition to proficiency and expertise. *Talent* refers to an **innate aptitude or predisposition** that can make the initial stages of skill acquisition easier or more intuitive for some individuals. Those with talent in a specific area - whether technical, creative, or analytical - often show rapid early development and a heightened ability to grasp core concepts (Tansley, 2011). However, while talent can provide a valuable head start, it is only a potential advantage; without dedicated training, practice, and real-world application, talent alone rarely leads to proficiency or expertise. For employers, seeking "talent" can imply a search for individuals who not only possess relevant skills but also have the inherent qualities that allow them to quickly adapt, grow, and contribute meaningfully to their roles – something that is near impossible to assess based on standard hiring processes. Recognizing that talent is distinct from skill, employers should view it as a complementary trait to be developed through structured training and support. Ultimately, while talent may accelerate the development of proficiency and expertise, these higher levels of mastery still require sustained effort, practice, and experience. Thus, talent is inherently elusive, as it cannot be easily measured outside of observable performance and past experience. Context also plays a crucial role in defining talent, as cognitive ease in performing a task - the hallmark of talent—can vary significantly across different environments. Ultimately, while talent may offer an initial advantage (when identified), ongoing skill refinement and experience are essential for achieving *competence* (see "what is competence?" for more details on this term).

A note on the skills agenda - The traditional model of skills alignment has often used degree completion as a proxy for professional competencies. However, there is a growing shift towards skills-based employment, where identifying specific skills becomes a central goal. This shift is accelerating as occupations are increasingly disaggregated into micro-skills and discrete tasks, a trend that aligns with the rise of micro-credentials. This **atomization** *(i.e., decoupling of occupation into tasks)* not only clarifies the functional space of micro-credentials but also fuels discussions about the automation of occupational-tasks, raising concerns about the potential for scaled job displacement. Developing a national qualifications framework is essential to address skill gaps effectively. Such a framework could harmonize in-demand skills across regions, promoting a more cohesive and efficient model of education and training to meet Canada's workforce needs. The decoupling of occupations and the move towards recognizing task or (micro) skills further undermines the value and utility of National Occupation Classification (NOC) codes – *a topic for another day*.

What is competence? - Competence, however, is more challenging to define from a cognitive learning standpoint (Le Deist and Winterton, 2005). Competence is commonly used to describe a set of in-demand soft skills (e.g., critical thinking) within a Competency Framework or describe methods of learning, like supervised or unsupervised learning, where time-in-seat requirements may be prescribed or left open (in the case of competency-based education). While neither of these approaches are incorrect, they often fail to directly address how competence relates to cognitive processes. In the case of most Competency Frameworks these are often presented as list of behaviors, and professional characteristics desired by an organization (e.g., digital literacy) with a subset of qualifiers (e.g., Bohlinger, 2008; Bjørnåvold and Pevec Grm, 2010; Green and Levy, 2021). The problem is that these lists lack standards (Yilmaz *et al*., 2024). Although critical thinking may be common the variation in the qualifiers (what determines critical thinking) is often bespoke to the organization and thus difficult to universally define in terms of clear training

targeting. In essence, competence can be viewed as an abstracted application of skills, not focused on resolving a single, defined problem but rather on the ability to deal with *indeterminate* **or unexpected conditions (departures from the norm)**. In other words, competence is an integration of skills applied to complex situations where external causal factors are not only uncertain but unknown. While skills are often applied to expected goals or logically anticipated problems, competence enables one to navigate uncertainty with adaptability. Imagine a surgeon encountering a power outage in the middle of a complex procedure or a driver facing an unexpected hazard on the road. Competence, therefore, requires higher cognitive load and demands time and continuous trial-and-error assessment. In many regulated professions, competence training is evaluated through supervised performance under real-world conditions. It cannot be cultivated in an atomized, *micro* manner. Instead, it necessitates a holistic and sustained approach, underscoring the critical distinction between skill development and the broader, adaptive nature of competence. This is difficult – although not impossible - to do within unregulated occupations which lack standards and regulatory bodies. More often than not traditional assessments of competence often fail to capture the dynamic and complex nature of competency attainment, as most assessments overlook the influence of context, time, and social interactions on the development and application of a broad range of skills (See Kahneman 2011 for an in-depth discussion on the impact of social context on judgement and competence). Competence is not merely a collection of isolated abilities but is intertwined with spatial and temporal interactions that shape how skills are applied and evolve over time.

Skills and competencies are not fixed; they are influenced by ongoing experiences and interactions—particularly within professional environments where collaborative efforts and social learning play significant roles. Proficiency develops through contexts where skills are repeatedly applied, refined, and reinforced via iterative feedback processes (Bjork, 1999). This highlights the necessity of adopting a more holistic approach to assessing competence, one that acknowledges the **interactive space** where skills are developed and utilized. Therefore, it is imperative to revise our measures of learning to include contextual factors, temporal dimensions, reflective practices, and social influences. By deepening our understanding of competence and refining assessment methodologies, we can develop a more cohesive and comprehensive framework for lifelong learning. This framework would better capture the full spectrum of skills and knowledge individuals acquire over time, providing a more accurate reflection of their abilities and potential.

Integrating a cognitive science-based understanding of skills and competencies into a national lifelong learning strategy is essential for creating inclusive and responsive education systems. By grounding these concepts in research, we can establish a standardized, universal framework that ensures complex terms like skills and competencies are consistently and meaningfully woven into educational programs. This foundational understanding allows for more effective approaches to assessing outcomes, ensuring that measures of attainment truly reflect learners' progress. Such an approach is critical to enhancing the value proposition of lifelong education, as it recognizes diverse learning pathways and supports ongoing personal and professional development. In doing so, we not only strengthen the adaptability and resilience of the workforce but also foster a culture of lifelong learning that is essential in a rapidly evolving 21st- century economy. By redefining competence and recognition, we shift the focus of lifelong learning from mere credential accumulation to the continuous, dynamic growth of skills and knowledge, reinforcing accessibility, inclusivity, and the holistic development of all citizens.

5.4 Challenges in a lack of standards – the needs for something similar to a National Qualification Framework

Canada urgently needs a national qualifications framework (NQF) similar to those implemented in the EU and Southeast Asia, where structured standards ensure clarity, consistency, and quality across educational and training programs. By establishing consistent benchmarks, an NQF would create a reliable foundation for program development that is responsive to emerging skill needs, fostering trust and transparency in credentialing (Raffe, 2013). This standardization could further pave the way for expanded financial support structures for learners, as clear, validated credentials would make it easier for funding bodies to assess program value and impact. An NQF would help eliminate ambiguity around credentials, streamline program development, and standardize the use of terminology, ensuring programs align with current labour demands and skill needs. Furthermore, such a framework would enhance mobility and credential recognition for learners across provinces, supporting both domestic and international workforce readiness. This unified approach would not only strengthen educational pathways and workforce alignment but also ensure that learners across Canada can access well-supported, high-quality programs that lead to meaningful employment opportunities, reinforcing Canada's ability to meet evolving economic and technological demands with a resilient and adaptable workforce.

5.5 Socioeconomic Challenges of Continuous Learning

> Crucial to acknowledge the correlation between socioeconomic status and the capacity to engage in lifelong and life-wide learning.

The innate willingness and ability to learn is underpinned by rationality and motivated by need. Effective learning requires a low-stress environment where individuals can allocate time for thinking and reflection. Socioeconomic status correlates with the capacity to engage in lifelong learning. Individuals on society's margins often lack resources and time for learning, with daily stresses diminishing motivation and curiosity. If lifelong learning is a moral imperative, addressing disparities inhibiting participation by marginalized groups is essential. Without such efforts, lifelong learning risks remaining an exclusive privilege of those with greater socioeconomic advantages—a risk heightened by the increasing monetization of education. Establishing guiding principles that promote epistemic integrity and facilitate knowledge diffusion is imperative, mitigating risks associated with misinformation propagated through informal learning *echo chambers* (Winchester, 2023).

5.6. Challenges in Overcoming a Lack of Adequate Financial Support for Lifelong Learners

The current funding landscape for adult learners pursuing non-credit continuing education in Canada reveals critical gaps that hinder the capacity for continuous upskilling and reskilling. Adult learners are increasingly expected to adapt to a global labour market in flux, driven by rapid technological advancements and economic shifts. However, existing funding models remain predominantly employment-focused, often requiring that non-credit programs lead directly to immediate job outcomes to qualify for support. This approach overlooks the broader benefits of lifelong education, including personal growth, long-term skill development, and adaptability. Further complicating access, inconsistent reporting standards and lack of standardized outcome tracking across programs make it challenging to assess the efficacy of these non-credit offerings. The application process for funding is also poorly suited to short-cycle training programs, with significant disparities in financial support between degree and non-degree programs. Non-credit continuing education typically receives minimal financial backing

and lacks allowances for living expenses, presenting an additional barrier for learners. Addressing these issues requires a holistic review of funding frameworks to ensure they are inclusive, responsive, and flexible, supporting diverse learning pathways that meet the varied needs of adult learners. Following models like the **UK's Lifelong Learning Entitlement Act** (see Mahoney and Kiernan, 2024), Canada could benefit from policies that provide equitable funding access for lifelong learning, irrespective of program type. Such an approach would not only support continuous skill development but also foster economic resilience by empowering individuals to navigate an evolving job market.

Investing in a robust, national strategy for lifelong learning, including a flexible funding model, is essential for building a workforce that is adaptive, resilient, and equipped to meet the challenges of the 21st- century economy. This strategy would recognize the value of non-credit programs beyond immediate job placement, supporting a vision of lifelong learning that fuels both individual and societal growth.

6. Conclusion

As we face profound global shifts driven by technological advancement, artificial intelligence, and the transition to a carbon-neutral economy, the imperative to invest in lifelong learning has never been more critical. Lifelong learning is not just an educational goal but a fundamental human attribute that empowers us to adapt, innovate, and shape our futures. This foundation underscores the need for continuous learning opportunities throughout our lives, accessible to all. Despite Canada's complex educational landscape - comprising formal, non-formal, and informal pathways - ensuring affordable, accessible lifelong learning remains a profound challenge. For many adults, upskilling and reskilling come at a high cost. Time, money, and attention are limited resources, and the burden to balance these while pursuing ongoing education too often falls entirely on the individual. Funding models tend to prioritize immediate job placement and overlook the broader personal and societal benefits of lifelong education, leaving adult learners to shoulder these costs. Without addressing these financial barriers, lifelong learning risks becoming an exclusive privilege, widening socioeconomic divides and limiting collective progress. As Forrester (1998) stated "adult education thus becomes more than a right; it is a key to the twenty-first century".

The *hard problem* **of lifelong learning** is not merely an educational challenge; it is a societal one. To make lifelong learning attainable for all, Canada must adopt a comprehensive national strategy that prioritizes:

RECOMMENDATIONS	
Affordability and Accessibility	Develop **flexible, inclusive funding models** that support diverse learning pathways, including non-credit programs. Policies should provide direct subsidies and financial assistance for adult learners, alleviating the financial burden associated with continuing education. This includes covering the living expenses necessary for adult learners to participate in short-term, intensive training programs.
Investment in Flexibility and Responsiveness	Expand **federal and provincial investments** in post-secondary institutions to create and sustain skilling programs, as well as civic and culturally appropriate learning options. Institutions should be funded to innovate and maintain course delivery, avoiding the need to pass development and operational costs onto learners.
Inclusivity	**Remove systemic barriers to adult education**, particularly for marginalized and underserved groups. Ensuring equitable access across socioeconomic lines will require dedicated funding to establish community-based learning programs and create accessible opportunities in remote and Indigenous communities. Inclusivity also means recognizing the specific needs and challenges of each community in program design.
Recognition of Diverse Learning	Implement a system for **validating and recognizing skills and competencies** acquired outside traditional education settings. This includes formalizing processes to recognize prior learning and experience, which is essential to acknowledging the knowledge and abilities of workers transitioning between industries and those entering Canada with international qualifications.
Enhanced Access to Labour Market Information and Analytics	Labour market information must be readily accessible to the public, not just institutions and private companies. This **open access** will allow individuals, educators, and policymakers to make informed decisions about which skills are in demand and where employment gaps exist. It will also facilitate timely curriculum development aligned with emerging industry needs.
Creation of a Learning Network	Establish a **national framework to support greater mobility and seamless recognition of qualifications**, with special provisions for foreign-trained professionals. By enabling professionals to move more easily between industries or regions and fast-tracking qualification recognition, Canada can more effectively respond to demands in emerging digital, AI, and green technology fields, as well as other critical areas like business, agriculture, and healthcare.

Investing in lifelong learning is essential to creating resilient communities, social cohesion, and a strong democracy. It empowers individuals to navigate uncertainty, engage meaningfully in society, and contribute creatively to the economy. This strategy must go beyond credential accumulation to acknowledge the continuous development of skills and knowledge as a public good, benefiting both individuals and society.

A **national strategy on lifelong learning** is not just an educational initiative but a societal **commitment to equity and opportunity**. By tackling the hard problem of lifelong learning, Canada can establish a more adaptable, skilled, and inclusive workforce, paving the way for a vibrant future for all Canadians. The time to act is now, with urgency and dedication, to build a foundation that supports lifelong learning for everyone.

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