

Chapter 15

Learning and Aging

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When we think about learning we often think about it in relation to formal education. Yet, education and learning are not necessarily the same things; one can go to school and not learn anything, while others learn without participating in formal schooling. Nonetheless, in sociology, the study of learning has largely centered on the study of education and its institutions and structural features, with an attendant focus on inequality and the individuals and groups most typically served by the system, namely, younger people. Although the adult educational complex has certainly expanded in recent years, 248% from the 1970s to 1990s in the United States (Hamil-Luker and Uhlenberg 2002:S324), there remains a considerable degree of age-based compartmentalization when it comes to learning, with an emphasis on training young people for the labor market. Hence, there continues to be an overall lack of scholarly attention to learning later in life.

A long tradition of research and theorizing affirm that industrialized societies and individual lives are largely organized around school and work relationships and that education is a significant determinant of the social and economic success of people and of nations (Comeau and McMullin 2010; Canada Council on Learning/CCL 2009a; Kohli 1986). Disparities in educational and occupational attainment based on class, gender, race, and ethnicity are a primary focus in research and policy; however, age is often treated as a constant or neglected altogether (McMullin 2010). The prevalence and duration of lifelong career jobs in many industrial sectors are being reduced, which has implications for patterns and experiences of learning and working over the life course. Yet, little is known about the extension of educational careers beyond adolescence and early adulthood. These matters are increasingly salient in the context of a changing economy, given the centrality of information and as people switch jobs or careers more frequently throughout their lives.

Lifelong learning (LLL) represents a recent and popular policy initiative that conceives of learning as an ongoing and voluntary pursuit having either personal or professional motivations. Ongoing learning is largely perceived as beneficial and can positively influence income, job satisfaction, political participation, and health and well-being as well as a nation's economic productivity and competitiveness (CCL 2008). Importantly, LLL recognizes learning over the entire life course and in many situations, not just early in life or in the classroom. The basic goals are appealing, to widen participation in learning activity and reduce inequalities (Morgan-Klein and Osborne 2007).

Although LLL is an attractive concept in theory, significant barriers and concerns emerge in its interpretation and application (e.g., Jackson 2003; Martin 2003; Schultz 2000). In some policy circles, it takes on the character of a buzzword and has been contested and criticized for its conflation with adult education (Morgan-Klein and Osborne 2007) and for the way in which it discursively masks certain social, economic, and political shifts (Martin 2003). Schultz (2000:72) points to an abundance of "lip service" but an overall lack of serious commitment to providing authentic learning

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opportunities over the life course. Similarly, Jackson (2003:367) argues that “a learning society that is ‘grafted on’ can only continue and replicate the structural inequalities of gender, class and other differences, where only certain types of knowledge, skills and work are valued.”

While education and learning comprise a wide base, including, for example, personal growth, community development, social justice, and esthetic endeavors, LLL policy tends to be tied closely to skill development associated with the economy and labor market. In a new economy context in particular, there is a heightened emphasis on LLL insofar as it presumably enables workers to keep pace with technological and workplace changes and gain or maintain employability. Returning to school is one way people may “catch up” and better their economic and life circumstances. This is not always a choice, though; restructuring trends and the nature of work in knowledge-intensive fields often compel ongoing learning. To remain economically active, many workers are advised, and in some cases, obligated, to upgrade their skills and education (CCL 2008; Elman 1998).

In this chapter, we examine what it means to learn, work, and age under changing social and economic conditions. The inquiry begins with the new economy concept and the current context for learning over the life course. This is followed by an overview of sociological perspectives on learning, largely through the study of formal education, which is institutionally structured for the early part of the life course. In the third section, we address some ideas that generate promise for learning throughout life, including advancements in brain science and a better understanding of the social correlates and conditions for excellence in learning. The chapter closes with a consideration of policy implications and new directions for research and thinking.

Changing Contexts for Learning, Working, and Aging

Much of the learning that occurs beyond initial and compulsory schooling is job-related. Thus, work, employment, and larger economic forces are salient in considering later life learning. In the sociology of work, learning is often taken up in the context of an emergent “new” economy and a focus on the skills development of individuals and workforces. The new economy concept taps the idea that old ways of doing business are waning, attributable to technological advancement, the commodification of knowledge and the need to be globally competitive (McMullin and Marshall 2010; Ranson 2003). Under such circumstances, individuals are confronted with shifting labor markets and changing skill requirements, which can have ramifications that extend across the life course.

Technology is critical to the new social and economic context. Information and Communication technologies (ICTs) have essentially transformed life in many industrialized societies. They are now an integral part of everyday life, penetrating deeply into learning, work, and communication activities as well as culture and entertainment. One of the typical canons of the rate of technological change in recent years is its propensity to create new jobs (e.g., 20 years ago there were no web developers) and growth in certain employment sectors (e.g., information technology [IT]), fundamentally altering and even destroying old ones (e.g., manufacturing). The adoption of new technologies can thus render the knowledge and skills of some workers obsolete, making ongoing learning and the ability to reskill more important today than in the past.

The case of IT serves as an example. In this sector, knowledge and innovation are key sources of economic activity and jobs require increasingly higher order skills and a wider knowledge base. Workers need to be “self-programmable” in Castells’ terms – flexible, adaptable, and quick to retrain (Adams and Demaiter 2010; Castells 2000). The rapid pace of technological change in this industry not only transforms types of jobs, work content, and skill requirements; it also drives the need for workers to stay current, especially if they wish to maintain or improve their labor market prospects. Thus, compulsory schooling and initial forays into postsecondary education, generally

concentrated in the earlier stages of life, no longer sustain an individual throughout his or her life (McMullin 2010). Returning to school and engaging in concentrated periods of learning in order to gain new or more relevant knowledge and skills are increasingly a requirement for many IT workers. As work continues to be transformed by technology, the likelihood is that this trend will emerge in other industries as well.

Another feature associated with a new economy is the reorganization of employment relationships (e.g., McMullin and Marshall 2010; Smith 2001). Among certain segments of the population, education and work careers have been quite stable and predictable, shaped by the bureaucratic tendencies of large organizations and a fairly linear understanding of time and achievement: “The sheer passage of time necessary to accumulate skill [gave] a person standing and rights – value in a material sense” (Sennett 1998:96). Within the current context, this seems to be somewhat unraveling and sustaining lifelong employment in one firm is increasingly rare (McMullin and Marshall 2010). Traditional industrial sectors like manufacturing are in decline and large corporations are restructuring, displacing many workers in the process. As a result, educational and employment trajectories may take on different, often more disjointed forms, even among formerly stable groups.

Transformation and trends in technology and the global economy have coincided with particular social and demographic changes. For example, there have been shifts in the incidence and frequency of marital and parental events over the life course, which influence educational and work trajectories (McMullin 2010). Related demographic patterns (e.g., smaller families) and increased life expectancies have led to population and workforce aging, which are occurring in industrialized nations at unprecedented rates. An aging population is not a crisis per se, but it can introduce potential challenges, including perceived threats to prosperity and the possibility of labor and skill shortages in certain industrial sectors (McMullin and Marshall 2010; Statistics Canada 2008a). The primary source of new skills and workers in the economy used to entail the integration of “new” people into the labor force, usually young adults, and sometimes immigrants; however, population aging is reducing the supply of workers. Retention and training of those already in the labor force emerges as a strategy for addressing workforce aging (McMullin and Marshall 2010). Thus, in order to remain employed and adapt to changing labor markets, workers of all ages may need to retrain or upgrade. Learning may no longer be a luxury (Eisen 2005) and learning throughout the life course is required of more and more people.

These shifting economic and social contexts generate new uncertainties and demands, which bring us to another significant trend, and the last one we address here: individualization and the resultant need for people to become more active in managing to safe-guard their own lives. Some thinkers argue that there is a loosening of traditional institutions and a decline in biographical continuity, which necessitates more life planning and self-monitoring (e.g., O’Rand 2003; Beck and Beck-Gernsheim 2002). The increasing diversity of the social milieu calls for openness to the ideas and beliefs of others, the ability to question institutional assumptions, and a greater capacity for self-reflection (Taylor and Lamoreaux 2008). People are expected to be flexible, to tolerate uncertainty, and to handle greater diversity, new ideas and new situations (Butler 2005:67).

Under such conditions, individuals are able to pursue a wider variety of life trajectories; however, they also face a large number and variety of choices, a great deal of instability, and few guidelines or roadmaps to help (Macmillan 2005; Beck and Beck-Gernsheim 2002). There is pressure to take *personal* control of one’s life and *personal* responsibility for successes and, especially, failures. Individuals are therefore required to bear more of the risks in navigating the life course (Shuey and O’Rand 2004; O’Rand 2003; Smith 2001). This is particularly so given that social institutions are providing less protection. It is generally left up to individuals to alleviate personal risk via accessing, monitoring, and interpreting information and choosing among alternatives (O’Rand 2003:695). One way to mitigate risk may be to engage in ongoing learning but as the next section suggests, there can be significant challenges associated with doing so.

Education, Learning, and Life Course Structure

In this section, we draw on select insights from the sociology of education, which has primarily focused on formal schooling and the early stages of the life course. Indeed, McMullin and Marshall (2010:19) note that work and aging are interrelated, dynamic processes that influence personal development and well-being; yet, aging has been generally ignored in studies of paid work. This observation can be extended to learning, training, and education. Hence, after considering educational sociology, we turn to a discussion of learning and life course structure, followed by an overview of studies in the field of adult education.

The Sociology of Education

Learning is highly institutionalized and educational systems, through their age-graded and standardizing functions, contribute to the construction of normative life course trajectories. Schools are quintessential social institutions and systems of education are primary sites for youth-centric learning activity. They support processes of socialization and selection via mandated and hidden curricula and contribute to the organization and legitimation of knowledge (Comeau and McMullin 2010; Lehmann 2007; Davies and Guppy 2006). Theorizing about education draws from sociology's foundational thinkers, including Durkheim, Marx, and Weber, and ranges from the functional to the interpretive to the critical. While some lines of thought have fallen out of favor more generally (i.e., functionalism), all of these strands are present in contemporary theories and research.

Human capital theory, originating in the field of economics, is highly influential in education policy and holds currency in the popular imagination as well. It offers a perspective on why people invest in education and why education may provide differential returns. Human capital amounts to a stock of resources – skills, knowledge, abilities, etc. – embodied in people (Becker 1993). This approach is premised on a direct link between education, skills acquisition, and income. Education and training are thus seen as investments that will yield returns collectively (e.g., competitive advantage and economic growth) and personally (e.g., higher earnings and better labor market prospects). In this view, education primarily imparts skills and knowledge associated with productivity and employability and the role of learning is largely economic (Davies and Guppy 2006; Jackson 2003). Though important, job-related skills and instrumental value are not the sole motivators for learning (Pallas 2003). Nonetheless, most educational participation by adults tends to involve work-related training (e.g., Statistics Canada 2008a; Hamil-Luker and Uhlenberg 2002).

That workers almost invariably wish to optimize their labor market potential is a key assumption. Training and education are believed to equip people with the skills and knowledge required to do this. Yet, skill development is limited to the supply side, which places the onus on individuals to pursue appropriate training in order to realize personal returns. Employers and economies also stand to gain, even if they only minimally support participation in education. Human capital also helps justify and legitimize the allocation of people to various occupations and social standings, largely on the basis of their individual efforts and educational investments. This point ties into perceptions of accessibility and the presumption that everybody has a roughly equal chance of acquiring and leveraging education; however, critical perspectives point to differential experiences among social groups.

Reproduction theories of education, derived from Marxian lines of thinking, contend that dominant groups shape educational systems in self-interested ways (e.g., Bowles and Gintis 1976). Taking a conflictive stance rooted in Weber's work on power, monopoly, and social closure, educational attainment also conveys and maintains status (Davies and Guppy 2006). Education and

credentials may indeed serve as a rough measure of skill or ability (human capital); however, they are also found to tap attitude and potential (signaling) and status (credentialing) (Adams and Demaiter 2010; Arkes 1999; Collins 1979). Thus, educational systems are also places in which societal inequalities are reproduced and where already-privileged groups solidify and maintain their advantages (Comeau and McMullin 2010; Lehmann 2007).

A large body of literature points to connections between socioeconomic status (SES) and education. Put simply, those whose families have higher levels of education and greater financial security are more likely to participate in higher education (e.g., Comeau and McMullin 2010; Lehmann 2007; Davies and Guppy 2006; Jackson 2003). People with more education are also likely to enjoy better health and live longer, and those who are healthy are more likely to be in the workforce, further opening up opportunities to learn and achieve (McMullin 2010; Leighton 2007). SES is fundamental in understanding variation in educational attainment; however, critical perspectives have adopted a wider focus on inequality and structured social relations, including patterns and experiences that vary along gender, racial, and ethnic lines as well as according to time, place, and citizenship (e.g., McMullin 2010; Jackson 2003; Martin 2003; Elman and O’Rand 1998).

More recently, *intersections* among structured social relations and the application of other forms of capital have been leveraged to better understand disparities in educational achievement (e.g., McMullin 2010; Davies and Guppy 2006). There is a complex interplay between personal agency and structural factors; social background simultaneously structures the choices individuals make and shapes the structures in which they can exercise choice (McMullin 2010; Pallas 2003; Settersten and Lovegreen 1998). In addition to financial aspects, social, and family backgrounds also mediate social and cultural capital, such as the form and degree to which education is valued and supported in a household and exposure to people and experiences which enhance learning (Davies and Guppy 2006).

Age and historical period also shape one’s chances in higher education, although these factors are less often the focus in educational research and theorizing (Comeau and McMullin 2010; Jovic 2009). Given current economic, social, and demographic changes and enduring patterns of inequality over time, issues of age, time, accumulation, and social change are particularly salient (McMullin 2010). Using logic akin to “the rich get richer while the poor get poorer,” invoked sociologically by Robert Merton in 1968, Dannefer (2003) extends the “Matthew effect” to aging and the life course, noting the interaction of age and social structure in producing heterogeneity within cohorts. Referred to in life course studies as cumulative advantage/disadvantage (CAD), this perspective proposes a systemic tendency for initial inequalities in a given characteristic (e.g., education, health, money, status) to be magnified over time (McMullin 2010; Dannefer 2003; Elman and O’Rand 1998).

Cumulative (dis)advantage is highly relevant for educational participation. In fact, many later life outcomes can be traced back to early stratification processes in elementary and secondary schools, which have been amplified over the life course (Comeau and McMullin 2010; Davies and Guppy 2006; Elman and O’Rand 1998). Empirical studies are consistent with the presence of CAD in multiple life domains, including education. There are systemic and institutional barriers to later life learning and disproportionate access to higher education by more advantaged groups, including middle and upper classes and professionals (e.g., Comeau and McMullin 2010; Pallas 2003; Elman 1998; Elman and O’Rand 1998; Settersten and Lovegreen 1998; Quinnan 1997).

Although learning occurs throughout the life course, the timing, sequencing, and outcomes of educational participation, especially later in life, have been examined less frequently (Jovic 2009; Hamil-Luker and Uhlenberg 2002; Elman and O’Rand 1998; Jacobs and Stoner-Eby 1998). We know little about processes of human capital acquisition and the experience of education and learning beyond early adulthood (Elman and O’Rand 2007). And, as the next section shows, it seems age-graded structures in education may have increasingly less bearing on contemporary lives.

Learning, Earning, and Returning: The Institutionalized Life Course

In most societies, there is a rough outline of how lives are expected to unfold over time across inter-related life domains (e.g., education, family, work, health, etc.). Many life events, transitions and domains of activity are linked to socially constructed meanings of age, which can be quite strongly entrenched in institutions, organizations, and culture. Thus, the life course tends to be structured into stages based, at least loosely, on chronological age. Learning activity is highly institutionalized through systems of education and within the life course. Age has traditionally been a reliable determinant of educational participation and this holds to some degree. However, in the North American context in particular, there is a greater tolerance for educational “late blooming” (Levin and Levin 1991). Moreover, broader social and economic changes and associated shifts in institutional provisions and social policies are leading to declines in the uniformity and predictability of learning and work trajectories (O’Rand 2003). There is an increasing array of possible life course configurations, which has ramifications for learning over the life course.

State and economic institutions impose a considerable degree of order on lives, framing and indexing aging and life course patterns. In one influential view, the life course, at least in many industrialized countries, is divided into three periods of activity: education/preparation, work/activity, retirement/leisure (e.g., Kohli 1986; Cain 1964), or more colloquially, learning, earning, and returning (or serving). This tripartite or “three-box” model of life links age and life stage, with activity domains roughly corresponding with childhood/adolescence (and increasingly, young adulthood – Macmillan 2005), adulthood and old age, respectively. The three boxes are linked via their relationship to paid work and there is a presumed temporal lockstep between them (Kohli 1986), with learning largely confined to the early part of the life course. Certain achievements as well as cultural exemplars of lives are predicated on this model and the assumption that it is normatively, if not universally, experienced.

The tripartite view captures major stages and transitions in life as well as some of the institutionally-mediated relationships to the rhythms of chronological aging, presenting them as a familiar and relatively common life pattern. Yet, it also implies considerable homogeneity, a gendered demarcation of stages and a one-way linearity that does not correspond with many people’s lives, especially in light of recent changes. Although there is no longer (and may never have been) a rigid order, pace, or sequence regarding participation in education and work, lives continue to be divided into a time and place to acquire knowledge and skills (youth, school) and a time and place to apply them (adulthood, the workplace). This model also fails to adequately capture the complexity of experiences of education and learning. Nonetheless, it continues to anchor social policy and institutions (Marshall and Mueller 2002; Settersten and Lovegreen 1998) and represents an influential timetable for how lives “should” unfold over time – neatly, steadily, and predictably.

In the three-box life course, education precedes work activity, particularly a person’s first “real” job. Following high school, the typical options are to enter the labor force or to matriculate to post-secondary training. Increasingly, people are opting for higher education and there has been tremendous growth in college and university attendance (Comeau and McMullin 2010; Davies and Guppy 2006). Compulsory, early educational pathways are institutionalized, ensuring that young people between the ages of 18 and 24 comprise the bulk of the traditional postsecondary population (Comeau and McMullin 2010). There is a corresponding, intense concentration on education and learning processes in the first 20 or so years of life, and research and policy initiatives overwhelmingly address patterns, access, and outcomes among young people, usually not past age 30. This focus is not entirely misplaced; younger people indeed make up a substantial proportion of student populations and significant numbers of youth face difficulties with labor market integration and un- and underemployment (e.g., McMullin 2010). However, there has been a steady increase in the number and proportion of older students enrolled in postsecondary institutions (e.g., Hamil-Luker and Uhlenberg 2002; Elman 1998; Jacobs and Stoner-Eby 1998).

Clearly, age is not always a reliable indicator of involvement in learning and education (e.g., Levin and Levin 1991). It is increasingly important and necessary to consider multiple sequences of learning and educational participation and their consequences across the life course. Many adults follow varied and disjointed educational paths, returning to school to increase job security, improve current prospects, pursue new career possibilities, or prepare for future job changes (Jovic 2009; Elman 1998; Settersten and Lovegreen 1998). Sociological research has tended to focus on structural factors and patterns of participation (Jacobs and Stoner-Eby 1998), and in many cases, the experiences of women (e.g., Bradburn et al. 1995). Less is known about the personal and career-related experiences and outcomes of educational reentry and transitions back to the workforce later in life.

Corresponding shifts in patterns of educational consumption are often acknowledged; however, the tripartite view is the implicit life course structure. Learning efforts throughout life and the experiences of learners outside the youth demographic tend to be examined less frequently in research and surface less often in educational and workplace policy (Jovic 2009; Elman and O’Rand 2007; Settersten and Lovegreen 1998). That said, there has been some telling recent work in adult education, a topic to which we now turn.

Adult Education

More adults are engaging in postcompulsory education and learning endeavors, in part because of the imperatives of a shifting economy and labor market. In fact, educators are well aware that large numbers of people turn to education during times of change, as they seek opportunities to enhance skill sets and improve employment prospects (Butler 2005). The most prominent form of adult learning is workplace or job-related training (e.g., CCL 2009a; Hamil-Luker and Uhlenberg 2002). There is a rich tradition of research and theorizing in adult education (e.g., Morgan-Klein and Osborne 2007; Selwyn et al. 2006; Jarvis 2004), that is associated and sometimes conflated with aspects of LLL. Yet, in much educational research, adult learning is often treated as a separate chapter, a footnote or a specialist niche. Schultz (2000:80) reminds us that learning comes in various forms “with access never to be limited by age.” Thus, there is thus a need to balance the unique needs and barriers faced by these learners (e.g., Settersten and Lovegreen 1998; Quinnan 1997) within a more integrated and inclusive framework for learning over the life course. In order to get a sense of the field of adult education, we distinguish three forms of learning and consider some of the challenges and barriers adult learners may confront.

Table 15.1 presents three categories of settings in which purposeful learning takes place (Statistics Canada 2008b; Hamil-Luker and Uhlenberg 2002). This distinction is salient for adult learners as they often do not have the same compulsory obligation and institutional attachment to education as youth and young adults.

Table 15.1 Types of learning

Type	Location	Credential ^a	Structured ^b	Intentional ^c
Formal	Educational/training institutions, schools	Yes	Yes	Yes
Nonformal	Workplaces, community settings, civic organizations, etc.	No	Yes	Yes
Informal	Daily life activities in work, family, leisure, etc.	No	No	Yes/no

^aLeads to certification in the form of a degree or credential

^bStructured in terms of learning objectives, learning time, or learning support

^cIntentional from the learner’s perspective

Source: Derived from Statistics Canada (2008b)

Formal learning covers the official, age-graded education system from elementary through postsecondary and comprises general academic study as well as specialized technical or professional training. Nonformal education has a much broader base, occurring in places like libraries and religious institutions or within community groups (Hamil-Luker and Uhlenberg 2002). Although informal modes of learning may impart relevant skills and knowledge, it is generally not recognized by governments and employers (CCL 2008).

About half of the adult population in the United States and Canada were enrolled in organized forms of adult learning and training in 2002 (Statistics Canada 2008a). As they age, people tend to engage in learning less frequently and become even less involved with career-related learning, speaking to the association of adult education with work-related training (Statistics Canada 2008b). Younger people are thus most likely to take advantage of opportunities for learning and training (CCL 2009a; Statistics Canada 2008b; Hamil-Luker and Uhlenberg 2002); in fact, in Canada, younger and single workers are more likely than older and married or divorced workers to participate in training and to obtain a credential (Zhang and Palameta 2006).

Vulnerable groups, including those with low literacy levels, low SES, older adults and less educated adults, are least likely to engage in formal education (Comeau and McMullin 2010; Rubenson et al. 2007). There is evidence of cumulative advantage; in short, learning begets more learning. Later educational participation reflects stratification processes that start early in life and initial levels of attainment, literacy, and skill are thus significant determinants of participation in adult education (Comeau and McMullin 2010; CCL 2009a; Statistics Canada 2008b). So, contrary to its purpose, adult education may actually amplify rather than attenuate inequalities in education and labor market outcomes (Rubenson et al. 2007:38; Morgan-Klein and Osborne 2007).

Marshall and Mueller (2002:11) suggest an effective model of lifelong education which entails a vaccination approach, “with repeated exposures over time needed to maintain an optimal level of functioning.” However, unlike inoculation programs that promote public health more broadly, the cost, insecurity, and responsibility for postcompulsory learning are placed largely on individuals. A large proportion of adult learners thus pursue training on their own, without the financial assistance of employers (Statistics Canada 2008a). Firm size is a strong determinant of participation in employer-sponsored training, with workers in small firms less likely to be offered such opportunities (McMullin and Marshall 2010; CCL 2009a; Statistics Canada 2008a; Gorard and Selwyn 2005). Similarly, employer support for training tends to favor already high-skill workers in jobs with high skill requirements, keeping with the cumulative advantage hypothesis.

Assumptions and stereotypes about age and optimal learning and the perceived value of making later educational investments may present additional barriers to participation. Older learners tend to face more challenges in returning to school, personally and structurally (Comeau and McMullin 2010; Settersten and Lovegreen 1998; Quinnan 1997). This is in part due to time and financial costs and the fact that most adult learners take on learning activity on top of existing work and family responsibilities. Additional barriers include fiscal practices, such as rules relating to pensions, scholarships, and student financial aid (Settersten and Lovegreen 1998; Quinnan 1997). Institutional mechanisms are similarly implicated, as age biases and administrative imperatives in schools, such as class scheduling or admissions procedures, can discourage would-be learners (Jovic 2009; Elman and O’Rand 2007). Moreover, there are further challenges with “fit” and socialization with one’s learning cohort as well as anxieties regarding academic performance, fear of failure, concerns about rusty academic skills, and a general sense that one may be “too old” to learn well or efficiently (Comeau and McMullin 2010; Jovic 2009; Leighton 2007; Butler 2005).

Although these latter concerns may weigh heavily on the minds of individual learners and run rampant in educational and employment systems, recent research suggests that they are unfounded or at least necessitate some qualification. In the next section, we consider emergent fields of inquiry and address how their development and application is expanding our understanding of learning and aging.

Learning and the Aging Brain

Thus far, this discussion has centered on some of the social structural factors that shape patterns and experiences of learning over the life course. We have established that adult participation in education is mostly work-related; however, learning certainly goes beyond the transmission of labor market skills and bodies of knowledge. It also encompasses the cultivation of identities, citizenship, and culture. As the previous section indicates, chronological age does not necessarily tell us much about an individual's capabilities or potential (McMullin 2010; Butler 2005). Although talents, abilities, and attitudes are distributed unevenly and can change over time, age-related declines are not inevitable (Corna 2009). Everybody can become a better learner (Leighton 2007). In this section, we address developments in brain science and metacognitive knowledge that can be integrated with sociological perspectives in order to better understand and potentially enhance learning throughout the life course.

Learning physically alters the brain, which lends credence to the edict of “use it or lose it” (Zull 2006). Advances in imaging technology and rapid growth in cognitive neuroscience are enabling researchers to observe the detailed architecture of the brain and its functions. For example, they can identify which areas of the brain are activated during different learning tasks (Zull 2002). This is useful for confirming and enhancing optimal strategies for learning. We are not going to delve further into physiological, cognitive, or neuroscientific detail here; suffice it to say that the brain changes as we age *and* as we learn.

Metacognition involves knowledge and awareness about learning, thinking, and problem-solving, generally and personally (Pintrich 2002). Educators and psychologists have made strides in understanding the practices and characteristics that promote excellence in learning. Many of the ideas and strategies target younger people, but they can be extended or adapted for all learners. As with educational attainment, SES is significant in promoting or thwarting conditions for optimal learning. For children, SES is thought to represent a rough measure of environmental stability and the degree to which basic human needs, such as food, shelter and love, are being met (Leighton 2007). Though this may appear self-evident, fundamental needs are sometimes easy for older learners to overlook – being tired or hungry or dehydrated, for example. Generally, less is known about this mechanism of SES in the case of adults; however, the situation is presumably complicated as many older learners participate in education precisely to improve their stability and security via income and labor market prospects.

Leighton (2007) offers a succinct overview of three elements that promote excellence in learning: deliberate practice, mentorship, and the nurturing of personal dispositions. Although these factors are articulated with young and exemplary learners in mind, they capture insights that, with some tweaking and recognition of barriers unique to older students, may apply to learning throughout life. As people become aware of metacognition and the conditions for optimal learning and enact them, they will tend to learn better (Leighton 2007; Pintrich 2002).

Deliberate practice refers to the fact that learning entails hard work as well as the motivation to engage in hard work (Leighton 2007). This is reflected in what is popularly known as the “10,000-hour rule” (e.g., Gladwell 2008). The most accomplished individuals in a given field have spent tremendous amounts of time – thousands of hours – engaging in intense and focused practice, whether in music, sport or computer programming. Obviously, the typical adult does not have that many free hours to sink into dedicated learning, nor do they necessarily need to in order to learn the new office accounting system. In most cases, they are not writing the software program. However, the principle of learning as labor applies here and it is important for older learners to recognize this, since they are often layering learning on top of other responsibilities, such as working and caring.

Mentorship is another condition for optimal learning. Good mentors inspire, motivate, and support, helping learners understand what they need to do and provide detailed feedback to direct and enhance learning (Leighton 2007). For adults, mentorship can be complicated by a tendency to engage in individualized learning (e.g., self-teaching) without mentors as well as what might be

termed a paradox of age and competence. There is an inherent assumption that mentorship typically flows one way, from older expert teacher to younger student. Moreover, learning has an emotional foundation and feelings of uncertainty or fear can impact thinking, decision-making, and ability to retain information (Zull 2006). In a culture that favors competence, dislikes failure, and often dismisses the value of experience, particularly in some new economy fields, older learners who find themselves as neophytes in a given subject may experience some discomfort (Butler 2005; Sennett 1998). Thus, it is useful for learners to seek out mentor relationships and for both mentors and learners to think through age-related presumptions and biases.

Personal dispositions also promote optimal learning. There are four characteristics at the core of metacognition (Leighton 2007): reflecting (thinking about learning goals and strategies for achieving them); leveraging (taking stock of abilities, identifying and using strengths and improving weaknesses); framing (thinking constructively about performance, learning from failure and mistakes, taking risks); and control (taking charge of one's learning). Settersten and Lovegreen (1998:526–528) identified a series of similar personal attributes, including planful competence, motivation, coping, and risk-taking as well as contextual ones related to resources and responsibilities. These orientations and habits permit learners to grasp the importance of deliberate practice and the benefit of constructive feedback and mentorship. They also provide strategies for approaching learning tasks and improving performance, and thus underpin transferable skills and critical “learning to learn” qualities (Leighton 2007). Like many habits, these dispositions are perhaps more easily instilled earlier in life, but can be acquired at any time.

Those who are aware of conditions and strategies that support optimal learning will be more likely to use them and Pintrich (2002:223) identifies a need to explicitly relate this knowledge to learners. Metacognition is particularly salient for adult learners, who may have been estranged from formal learning for some time (Leighton 2007). Older people may approach learning with strategies that are less efficient, outdated, or inappropriate. Further, internalized age stereotypes about trainability and attitudes toward change can also impact one's perceptions of one's abilities. Adult learners require current and accurate knowledge about different learning strategies (e.g., memorizing, extracting meaning from text) and cognitive tasks (e.g., solving general vs. specific problems), as well as knowledge about themselves and their dispositions (Pintrich 2002). Metacognitive knowledge tends to be directed at individual learners; however, mechanisms of cultural and social capital (e.g., Comeau and McMullin 2010) presumably shape tendencies in both individuals and groups. Sociological perspectives can thus provide additional insight regarding the social correlates of optimal learning. Policy-makers and providers of educational services can help maximize learning at all ages by recognizing barriers and taking them into account in activity design and program delivery.

As social and economic imperatives push and pull more people toward ongoing learning, concern about age-related declines emerge. Workers wonder about their capacity and desire to learn and ability to keep skills and knowledge current, especially when it comes to new technology (McMullin and Comeau 2011). For example, a reader poses the following question to a newspaper advice column: “Given the fact that memory and concentration skills tend to decline with age, how difficult would it be for a person in their 50s to work on a master's degree?” (Troyer 2009). The simple answer is not too difficult, given some basic metacognitive knowledge and appropriate compensatory strategies.

Cognitive ability can be understood as a combination of two types of intelligence: “*Crystallized intelligence*, or acculturated knowledge, is believed to accumulate over time through educational, occupational and cultural experiences and pursuits. It is reflected in tests of vocabulary, information accumulation and specific knowledge-based activities. *Fluid intelligence*, on the other hand, encompasses information processing, reasoning, short-term memory, abstract thinking, reaction time and regulatory processes” (Corna 2009:3). People can experience certain cognitive declines as they age, but this is not an inevitable aspect of aging (Corna 2009; Zull 2006). In fact, research is revealing that the human brain is “almost infinitely malleable” – even in adults (Carr 2008:2).

Windows for learning in select areas, such as visual development or language, may begin to close off in adulthood; however, research strongly indicates that “there is no age of finality for any learning” (Zull 2006:7). Moreover, there is presumably enough variation in baseline abilities related to learning, such as memory and recall, that difficulties are not necessarily linked to age. When age-related declines are observed, they tend to be associated with fluid intelligence – processing speed, ability to concentrate, and short-term memory (Corna 2009; Troyer 2009; Zull 2006). However, losses in these areas tend to occur slowly, allowing for gradual compensation (Corna 2009; Eisen 2005). Many people are thus able to maintain cognitive function as they age. Further, stereotype-driven self-doubts and the fast pace of a lot of educational programming are believed to be larger deterrents to later life learning than any changes in intellectual capacity (Eisen 2005).

While certain cognitive abilities may decline with age for some people, other capacities actually improve (Troyer 2009; Corna 2009; Zull 2006). Knowledge and experience help build neural networks, essential for thinking and decision-making, which become denser and more elaborate with age (Taylor and Lamoreaux 2008; Zull 2002). Learning entails continuous modification of what is already known and when faced with new information, the brain seeks patterned connections to existing information (Taylor and Lamoreaux 2008; Zull 2002, 2006). Over time, it becomes increasingly efficient at “cutting to the chase” when analyzing complex connections. With age, then, people have the capacity to gain wisdom via the ability to delineate the critical elements of complex knowledge, identifying what is important and discarding what is not (Zull 2006).

Keeping with the metacognitive perspective, adult learners can assess their strengths and weaknesses, including potential changes in cognitive ability, and adjust their learning practices accordingly. There are a range of techniques and strategies that will help people proactively compensate for abilities that do diminish as well as those they might lack in the first place (Troyer 2009; Leighton 2007; Zull 2006). Although there is evidence supporting the effectiveness of cognitive training, more research is needed to understand how these practices relate to learning (Corna 2009). Returning to would-be master’s candidate, the expert respondent, a clinical neuroscientist, identifies three potential challenges for older learners: slower intake and processing of new information, increased vulnerability to distraction, and difficulty with short-term memory. The advice she provides is simple and highly practical: stay on top of the workload, allow extra time in new learning situations, focus on one task at a time, study in a quiet place, and employ repetition strategies to retain new information (Troyer 2009:L3). Insights from cognitive psychology and brain science indicate that learning may be enhanced if educators and learners align practice with how the brain functions (Zull 2002), particularly if social structural factors are also taken into account (Leighton 2007).

Discussion

Sociologists have often turned to the economy and the domain of paid work to understand patterns and experiences in education and learning. Links between educational systems and labor markets receive a lot of attention, in part because of their connection to social stratification and inequality. Put simply, education is a major conduit to occupational attainment, financial reward, and social advancement, as well as personal and social well-being (e.g., Comeau and McMullin 2010). People tend to look to education for solutions to many social problems and higher learning is perceived as one of the more accessible avenues for upward social mobility. Yet, the egalitarian and socially inclusive aspects of education and LLL directives often take a backseat to economic imperatives (e.g., Martin 2003).

Information is increasingly salient across life domains, and more and more people are expected to pilot complex, knowledge-intensive terrains, including employment, health, well-being, finance,

civic participation, entertainment, and culture. Informed and engaged citizens are better equipped to confront the critical issues of the day, such as poverty, conflict, and ecological responsibility. Education thus has important and lasting effects on future life chances and also on the shape and experience of social and individual lives. Economic opportunity and social engagement are increasingly linked to a person's ability to direct his or her own life (Beck and Beck-Gernsheim 2002). Learning may serve as a protective factor in this regard because it can enhance one's sense of control in managing one's life, creating opportunities, solving problems, and mitigating risks (Leighton 2007). Thus, the focus in education and learning cannot be confined to youth and employment preparation.

People of all ages are being advised to engage in ongoing learning in order to remain socially and economically active. Further, chronological age reveals increasingly less about one's capabilities, state of health, level of active engagement, or future potential (Butler 2005:63). It is troubling, then, that the sociological study of learning is so robustly associated with educational systems, labor market preparation, and the early part of the life course. There have been important economic and demographic shifts producing tighter links between learning and work in many employment sectors as well as unprecedented numbers of later life learners (Eisen 2005; Elman 1998; Jacobs and Stoner-Eby 1998; Levin and Levin 1991). The retention and retraining of workers over the life course is a significant issue in many industrialized countries (McMullin and Marshall 2010). This entails a complex set of challenges that require policies and programs which better attend to the changing learning needs and capacities of people over time and throughout their lives. In this regard, Settersten and Lovegreen (1998) suggest that despite a myriad of barriers to adult participation in education, there are opportunities for greater flexibility in the life course more generally.

Government policy tends to approach education and learning largely economically, with an emphasis on building a skilled, productive and flexible workforce, and a focus on the economically active and their competitiveness (CCL 2009a; Rubenson et al. 2007). Perhaps as a result, education is often analytically treated as fixed at the "highest" level of schooling. Although this approach is convenient and measurement-friendly, it does not adequately capture informal learning, upgrading, and retraining throughout life, learning pursued for nonwork-related goals, or circumstances in which general education (e.g., a bachelor's degree in sociology) may be sought at one type of institution, followed by occupationally-specific training at another (e.g., a certificate in database administration). Thus, we need more systematic examinations of understudied aspects related to learning, retraining, and requalification over the life course.

There are indications that returning to school and efforts to provide retraining may not be meeting the needs of many older learners (e.g., Jovic 2009; Settersten and Lovegreen 1998; Quinnan 1997). We need to work toward identifying and creating more favorable conditions for ongoing participation in learning, to allow people to better harness their capacities in order to meet everyday circumstance as well as life's challenges. In this regard, attention to the quality of programs, instruction, and learning, especially that which targeting adult students, is significant. Rising enrolment and higher levels of education inflate the value of credentials and additional educational investment does not guarantee improved or even similar prospects. There is a need to better understand how credentials and learning opportunities are evaluated and applied by employers and workers. In knowledge-intensive fields like IT, skills acquisition does not necessarily happen in formal settings; rather, alternative, leisure-based methods (e.g., hobby programming) can be more salient (Adams and Demaiter 2010; Jovic 2009).

Career management and development, including the acquisition and maintenance of relevant skills, are encouraged by governments and employers, yet responsibility is largely offloaded onto individuals. There are tax subsidies and programs to encourage retirement savings and investment for children's future educational needs, but fewer incentives for people to seek out the training they need over the life course (Schultz 2000:79) – to navigate changing labor markets as well as the increasingly complicated and information-heavy domains of health, finance, and culture. To help

people engage in the learning necessary to function in social life, more inclusive approaches to responsibility for learning are needed, ones that bridge employers, educational institutions and governments, as well as individuals and families. Optimal learning is predicated on social relationships and personal dispositions and we need to foster more favorable conditions for learning over the life course, including a solid foundation via the cultivation of basic skills and attitudes as well as guidance and support regarding how to direct one's learning efforts.

There remains a need to rethink so-called "normative" educational and career pathways (e.g., Marshall and Mueller 2002; Settersten and Lovegreen 1998) and provide more and better opportunities for learning and (re)training across the life course, "when people are young, before workers lose their jobs, when they lose their jobs" (Schultz 2000:79). This requires greater flexibility and responsiveness to needs that change over time, including the impact of events like parenthood, marital breakdown, and unemployment as well as provisions for smoother transitions between ages and stages. If this is not the case, then learning has the potential to become yet another demand stacked upon already-overburdened individuals. Research shows that employer support for training tends to favor those already at the higher end of the spectrum in terms of skills and skill requirements. There is a need to better balance the investments of government, employers, and individuals in learning and training.

At the same time, it is important to broaden the focus of learning beyond economic and labor market applications. Many people feel they do not have a pressing economic need for or interest in ongoing learning (Gorard and Selwyn 2005) and this is a valid position; however, given the ubiquity of information and technology, and especially, the internet, certain skill sets like literacy, numeracy, and critical thinking, are needed not only in the workplace but in most life domains. The increased flow of data tips heavily into social and cultural environments and people are left with little choice but to deal with it. This is especially the case in areas that become increasingly salient as we age, such as health, health care, and financial planning. People need to be able to take in, process, and evaluate large amounts of highly specialized information, or at least know where to seek out simplified yet reliable sources.

This leads to an emergent and highly interesting perspective on some profound changes in how we learn: "In becoming information-rich, we have become attention-poor." Technology commentator Peter Nicholson (2009:A21) cuts to the quick of a key contemporary challenge for learning – the tradeoff between the depth of what we know and how fast we can retrieve it. He employs an apt river-vs.-lake metaphor to capture the difference between a flow and a stock of knowledge. Similarly, Nicholas Carr (2008) wonders if *Google* is making us stupid, proposing that the internet and ICTs may be "reprogramming" us, shaping our brains to process information rather than understand or even remember it. Both commentators expound on the social and biological consequences of a glut of information, including scattered attention, diffused concentration, and potential impacts on deep thinking and the cultivation and application of expertise. The volume and flow of information is rapid, leaving less time to think and reflect. Thus, there may be an eroding of the "deep, integrative mode of knowing" associated with the 10,000-hour rule (Nicholson 2009:A21). Fostering the skills required to navigate information flows, particularly the ability to read, cut through, and access what is needed, will be an important challenge for learners of all ages and exploration of these themes is a significant future direction for researchers in science and social science.

The intersections of learning, work and technology, particularly ICTs, are drawing much academic and political interest (e.g., CCL 2009b; Selwyn et al. 2006). ICTs are believed to offer solutions to many barriers to learning, especially with respect to access and the provision of flexible, convenient and ongoing learning opportunities for people of all ages. However, as we have seen, determinants of participation in education and learning are deeply rooted in structured social relations and family background as well as matters of time and place (e.g., Comeau and McMullin 2010). Research indicates that these enduring patterns seem to hold, whether learning is aided by

technology, leading Gorard and Selwyn (2005:85) to observe that, so far, the “e-learning” society seems to be “remarkably similar to its nontechnological predecessor.”

Aging and learning are biological, psychological, and social processes. As the knowledge base grows in each area and their various dimensions and intersections are fleshed out, we uncover new problems and questions. It is as necessary as ever to recognize and target enduring barriers to learning in the form of structured social relations and to take into account processes of time and cumulative (dis)advantage. Experiences with and orientations toward learning early in life shape later life learning. Similarly important is the attenuation and possibly reversal of individualizing trends with respect to learning, both in terms of cultural values (such as the personalization of success and achievement) and structural factors (educational institutions, workplaces, policies); otherwise, we will miss, in Gladwell’s (2008:32) words, “opportunities to lift others up onto to the top rungs.” Promoting optimal learning over the life course is not an end in itself; rather it is a means to an end, which is a better life (Leighton 2007) – a goal we ideally have for everybody.

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