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the canadian journal for the study of adult education

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countries (Statistics Canada, 2013). Standardized tests on literacy and numeracy (as well as

surveys in 2004 (WALL 2004 Survey) and 2010 (WALL 2010 Survey) followed the same format and permitted documentation of trends in relations between these dimensions of work and learning (see especially Livingstone, 2012). A comparable survey was conducted in 2016 as part of the SSHRC-funded Changing Workplaces in a Knowledge Economy project (CWKE 2016 Survey). The 2016 survey focuses only on the employed labour force. As in prior surveys, all respondents are over 18 years of age and coverage is limited to those who speak English or French and reside in a private home in one of the 10 Canadian provinces. The 2016 survey was conducted by Leger Research Intelligence Group from January 1 to March 31.

The 2016 sample had two components. First, respondents were selected by random digit dialling and interviews were conducted over the telephone. A total of $n = 1,248$ responses were collected via telephone. Second, respondents were selected at random from the Leger Web panel of approximately 475,000 rotating members nationally. A total of $n = 1,770$ (13 (0)124anT6n 2.9132 421.7301 Tm[(= 1,770)13 (o)124anT6n 2.n-CA)/%Tppe777ing

Increasing Job Instability

Whatever the accuracy of predictions of the emergence of a third industrial revolution (Rifkin, 2014), it is clear that the labour forces in advanced capitalist economies have been experiencing increasing turmoil and uncertainty. The rapid diffusion of new information technologies has led to widespread changes in most sectors. Less than 40% of the employed Canadian labour force used a computer in 1989 compared to nearly universal use today. Computerization and automation of many jobs, along with offshoring of more portable jobs, have provoked extensive organizational restructuring of the employed labour force. There has been a very substantial decline of unionized manufacturing jobs with long-term security and benefits (e.g., Livingstone, Smith, & Smith, 2011). The growing movement into service-sector jobs has been characterized by increased job churning and transitory employment. The growth of precarious employment has been extensively documented (Vosko, 2006). According to our four surveys, the majority of the employed have experienced some combination of downsizing, increases in part-time work, job rotation, and multi-skilling in their paid workplaces during the past decade. While the 2008 Great Recession was particularly destabilizing in financial terms and business cycles

distinction of leading the advanced capitalist world in participation and completion rates in higher education for much of the past generation (OECD, 2015). As Figure 1 shows, a trend toward an increasing level of post-secondary education completion continues among the employed labour force aged 25 to 64. In 1998, about 40% had completed either university or community college programs. By 2016, the level has increased to over two-thirds. This is still among the highest levels of post-secondary education of any national labour force in the world. Post-secondary completion levels have continued to increase at least partly because higher parental educational attainments continue to stimulate higher educational attainments among their children. Canadians of all economic class, gender, and racial backgrounds express clear majority views that young people need a post-secondary education today (Clandfield et al., 2014). In addition, post-secondary enrolments have tended to increase in the wake of periods such as the Great Recession of 2008 because of relatively lower “opportunity costs” in the absence of good jobs (e.g., Brown & Hoxby, 2015). Recent increases have occurred in spite of high increases in tuition fees and student debt loads. Elsewhere, we have described this process as an “educational arms race” (Livingstone, 2009).

The recent participation rate in further education courses appears to follow a quite different pattern in the employed labour force. As Figure 1 shows, over half of the employed were enrolled in some form of further education in 1998. This includes any organized training or education beyond initial schooling, including courses, private lessons, correspondence courses (written or electronic), workshops, apprenticeship training, arts, crafts, recreation courses, or any other training or education of long or short duration. Such organized continuing adult education may vary widely in quality and the extent to which it is required to maintain job certification, for example. Much further education has tended to be job-related. In the present series of surveys, the proportion of the employed labour force who indicate that their further education is primarily or partially job-related has increased from less than two-thirds in 1998 to over 85% in the most recent surveys, indicative of a still more instrumental approach to further education in tougher economic times. However, the general participation rate, after holding steady from 1998 to 2010, now appears to have *dropped* to around 40%.

A positive relationship between level of formal schooling and participation in further education has been one of the most consistent findings in social research. In contrast, the current survey suggests that the level of formal schooling continues to increase while the further education rate declines. This finding requires further studies to assess the accuracy of the new hybrid sampling method and the reliability of the data. But, as Figure 1 shows, the post-secondary completion level has increasingly exceeded the further education rate since the turn of the century.

International comparisons using PIAAC 2012 data with prior International Adult Literacy Survey (IALS) 1994–1998 data found increases in further education in all participating

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Post-secondary completion and further education participation rates, employed labour force aged 25–64, Canada, 1998–2016.

Participation in further education by level of schooling, employed labour force over age 18, Canada, 1998–2016.

Table 1: Unmet Demand for Further Education by Educational Attainment, Employed Labour Force over Age 18, Canada, 2004–2016 (%)

	N	High School	Post-Secondary	College	University
2004	36	45	52	54	48
2010	36	46	48	56	48
2016	32	41	37	43	40
2004–2016	-4	-4	-15	-11	-8

Sources: WALL 2004 Survey ($N = 5,712$); WALL 2010 Survey ($N = 1,255$); CWKE 2016 Survey ($N = 2,881$).

survey (Livingstone, 2012), something new may be happening here in terms of disincentives to participate in further education.

In the 1998, 2004, and 2010 surveys, most recent surveys of adult learning have paid scant attention to informal learning, the learning activities that people do on their own and with colleagues without necessary engagement with educational institutions or employers. Empirical studies led by our colleague Allen Tough (1979) documented that the “iceberg” of intentional informal learning is far more extensive than organized further education. For example, it is now commonly estimated that job-related informal learning is responsible for over 80% of job training, much more than organized further education courses (e.g., Cross, 2011). The 1998, 2004, and 2010 surveys confirmed the much greater extent of informal learning than further education participation among Canadian adults in terms of paid job-related learning, housework-related learning, community volunteer work-related learning, and general interest learning (see Livingstone, 2012). The 2016 survey focuses on job-related informal learning among the employed labour force and compares this with similar profiles in the prior surveys.⁶

As Table 2 shows, the general incidence of participation in self-reported informal learning related to the job has remained much higher than the participation rate in further education. This is probably self-evident given the greater constraints on involvement in further education, such as qualification processes and fee payment. But there may also have been some recent changes in the incidence of job-related informal learning. About 90% of those in the employed labour force indicated that they had been involved in job-related informal learning activities in 1998, 2004, and 2010; the incidence drops to 75% in 2016.

The estimated amount of time devoted to such learning also appears to have dropped from a prior average of over five hours to under four hours now. In addition to this apparent general recent decline in the incidence of job-related informal learning, those with higher levels of schooling continue to report higher levels of participation in such learning than those with less schooling. Nevertheless, even a majority of those who lack a high-school diploma and do not participate in further education still continue to engage in substantial intentional informal job-related learning.

⁶ The 2016 survey does not address specific topical aspects of informal learning related to housework, volunteer work, or general interests. Therefore, it does not provide estimates of the full extent of self-reported informal learning that are comparable with the prior surveys.

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Table 2: Incidence of Job-Related Informal Learning by Level of Schooling, Employed Labour Force over Age 18, Canada, 1998–2016

	1998	2004	2010	2016
No diploma	7.9%	12.5%	15.1%	17.2%

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Topics of job-related informal learning, employed labour force over age 18, Canada, 1998–2016.

F 4

Age by participation in further education and job-related informal learning, employed labour force over age 18, Canada, 1998–2010 (averages) and 2016.

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Table 3: Employee Economic Class by Post-Secondary Completion and Participation in Further Education, Employees Only, Canada, 1998–2016

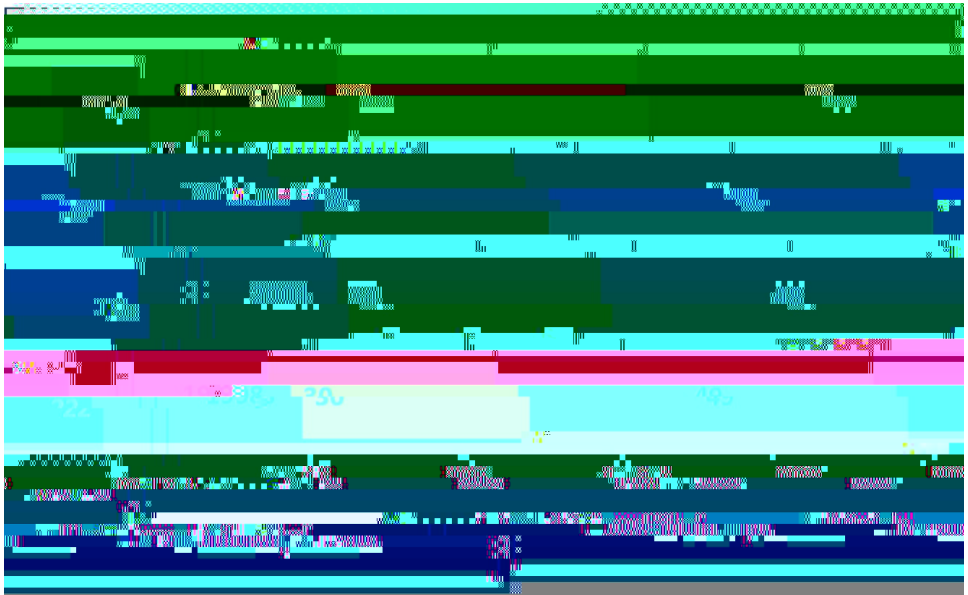
Economic Class	1998					2004					2010					2016				
	N	%	Participation	Completion	Change	N	%	Participation	Completion	Change	N	%	Participation	Completion	Change	N	%	Participation	Completion	Change
Professional employees	73	83	91	88	+15	75	67	72	51	-24	72	60	43	36	-9	72	51	24	19	-13
Managers	66	72	67	80	+14	71	68	63	42	-29	63	54	60	43	+6	63	54	60	43	+6
Supervisors	45	56	46	63	+18	37	54	60	43	+6	37	54	60	43	+6	37	54	60	43	+6
Service workers	31	50	56	59	+28	63	52	48	38	-25	63	52	48	38	-25	63	52	48	38	-25
Industrial workers	23	34	39	48	+25	45	41	44	36	-9	45	41	44	36	-9	45	41	44	36	-9
Total	41	56	60	68	+27	61	53	54	42	-19	61	53	54	42	-19	61	53	54	42	-19
N	948	5365	1243	2471		945	5436	1241	2446		945	5436	1241	2446		945	5436	1241	2446	

Sources: NALL 1998 Survey, WALL 2004 Survey, WALL 2010 Survey, CWKE 2016 Survey.

It should also be noted here that all economic classes in all four surveys exhibit similarly high rates of participation in job-related informal learning.

Sex and race are also important social background factors that should be considered as influences on schooling, further education, and job-related informal learning. Discriminatory effects of sexism and racism, as well as classism, on school attainments

Credential underemployment, employed labour force, Canada, 1998–2016.



Perhaps a more relevant question than basic literacy and numeracy levels now concerns competence with computers. As previously noted, use of computers in Canadian workplaces jumped from around 40% in 1989 to a nearly universal requirement today. One might expect significant underqualification as workers struggle to catch up with such rapid change. However, in the 2010 and 2016 surveys, around half of employed workers indicated that they have higher computer skills than they are able to use in their current jobs, while only around 5% said they are underqualified. In the wake of the very quick diffusion of computer literacy requirements, employed workers' learning activities may have kept them ahead.

Comparative evidence suggests that, at least on some measures, underemployment may now be greater in Canada than in most other advanced capitalist economies. For example, in our 2010 and 2016 surveys, over 40% of all Canadian workers described themselves as having the skills to cope with more demanding duties. This is a higher proportion than found on the same question in 2010 surveys of most European countries; the United Kingdom also had one of the highest scores at around 40% (Eurofound, 2012). As noted previously, Canada has one of the most highly schooled labour forces in the world, partly as a consequence of constructing a relatively accessible post-secondary educational system and partly as a result of selecting highly educated immigrants. Canada also has had a branch plant economy that has continued to be highly based on the harvesting and export of staple resources such as wheat and bitumen, with relatively limited priority to diversification into more knowledge-based industries (Bell, 2012; Laxer, 1989). Underemployment has been increasing most rapidly among Canadian post-secondary graduates. It may be that Canada now represents one of the most extreme cases in terms of the underutilization of the qualifications of the employed labour force in an advanced capitalist economy.

The unprecedented decline in participation in further education may be related to diminishing returns for individual investment in further education for those who have invested most heavily in formal schooling. Recent analyses indicate that those with graduate degrees have almost doubled as a proportion of low-wage earners in the Canadian labour force between 1997 and 2014 (Thomas, 2016). Disincentives for further education may be greatest among those who are experiencing continuing underemployment. Prior

Table 4: Credential Underemployment, Annual Participation in Further Education and Interest in Prior Learning Assessment and Recognition (PLAR), Employed Labour Force with Post-Secondary Credentials, Canada, 1998–2016

C	a	F (%)				LA (%)			
		1998	2004	2010	2016	1998	2004	2010	2016
Underemployed	M	64	55	52	39	68	63	60	59
Match		76	63	66	50	72	64	54	62
Underqualified		77	74	76	49	77	62	49	67
	a	71	61	61	45	70	63	56	61
N		365	2885	750	1879	355	2851	746	1708

Sources: NALL 1998 Survey, WALL 2004 Survey, WALL 2010 Survey, CWKE 2016 Survey.

We previously found that participation in further education may be becoming even more narrowly job-related while the participation rate has been decreasing more quickly for those with post-secondary credentials. We now find decreasing incidence of further education participation and diminishing expression of interest among the growing numbers of underemployed post-secondary graduates across all age groups. There is at least some support here for the argument that declining economic benefits to further education are now being experienced, especially among the most highly educated in the Canadian labour force.

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The most striking finding from the 2016 survey of the employed Canadian labour force is the growing gap between the increasing level of post-secondary education and the decreasing rate of participation in further education. This pattern is probably unprecedented in modern times. During the Great Depression of the 1930s, resources for providing both post-secondary education and further education may have declined. But even then and consistently since, the relationship between more schooling and further education was always positive, and motivation to engage in both actually increased in economic hard times. The increasing incidence of unstable employment conditions and relative cutbacks in educational provisions by neo-liberal governments in recent years may be responsible for some of the observed cessation of growth and subsequent decline in further education. But at the same time, post-secondary completion has continued to increase—in spite of government cutbacks and mounting relative costs to students. The relatively high accessibility of Canadian higher education, high normative expectations that a higher education is needed to cope with current life, and the continuing increase in credential levels required by employers for job entry, as well as decreasing opportunity costs of advanced schooling in the absence of good jobs, all conspire to drive growing student sacrifices to complete a higher education. Serious systemic differences in school attainment by economic class, gender, and racial background persist in 2016 and may become more pronounced with mounting student costs (see Marginson, 2016). However, once they get jobs, these increasingly highly schooled workers from all social backgrounds are increasingly finding

that their educational attainments are underemployed on the job. Underemployment of qualifications is becoming a more pervasive condition than ever before. The motivation to continue to pursue further education is therefore muted for growing numbers.

In the context of increasingly unstable employment conditions, increasing underemployment, and decreasing accessibility of and demand for further education, there are also indications that workers are becoming somewhat less engaged in intentional informal job-related learning. Informal learning remains the relatively pervasive basis of most job training, still dwarfing formal learning. But there are intimations in the current survey that this iceberg itself may be melting. The implications of these apparent declines in both further education and informal job-related learning should be highly worrying.

Generations of empirical research on informal learning have established that it is a dominant basis for much lifelong learning (see Livingstone, 2010). Continual informal learning may be seen as fundamental for humans to cope with our changing environmental conditions. If the economic and social organizations that we construct for ourselves begin to constrain and limit our practical learning activities, we also begin to imperil our survival capacity. It may seem outlandish to claim that the declines observed here in participation in further education and informal job-related learning are so serious. But the unprecedented nature of these changes should at least provoke some reconsideration of established relations between learning and work.

The supply of qualified workers has often exceeded demand in advanced capitalist economies as workers have sought further qualifications to compete and employers have encouraged workers to compete among themselves for jobs. But underemployment is now chronic and growing, particularly in Canada. The key problem is *not* a lack of relevant formal schooling and further education, nor is it a failure to engage in continual job-related informal learning. Whatever improvements are made in the form and content of formal schooling and further education, increasing numbers with advanced formal education cannot find commensurate jobs. Continuing escalation of the post-secondary educational arms race will continue to produce greater underemployment of learning and knowledge.

The unprecedented decline in further education and diminished interest in PLAR are indicative of a growing systemic failure of the economy as now organized to effectively use the skills and knowledge of growing numbers. These declines are not likely to be indications of less interest in learning per se, but there is mounting skepticism about the prospects of recognition or reward for further investments in job-related intentional learning under current conditions.

A resolution of this problem should be increasingly obvious: provide better opportunities for application of workers' knowledge through *economic* reforms. Such reforms should include redistribution of paid work so that older overworked employees can take more phased retirement while mentoring younger workers, and involuntary part-timers can work more while full-timers who want to reduce their hours can also do so. Greater democratization of paid workplaces should allow many more highly qualified workers discretion in designing their own jobs and contributing to organizational decision making. New job creation should give increasing priority to renewable energy and collaborative communications networks for future jobs to be sustainable. In short, there should be concerted efforts to create more decent fulfilling jobs for an increasingly knowledgeable labour force (Livingstone, 2004, 2009). There are signs here and there of the development of such reforms, but whether these tendencies can blossom into a third industrial revolution of zero marginal costs and

widespread knowledge sharing (Ri in, 2014) is a doubtful prospect at the moment in light of the dominant fixation on maximizing profit in private-sector workplaces.

In more immediate terms, further surveys and case studies documenting the actual organization of work processes, training provisions, and utilization of qualified workers' skills in different sectors and enterprises should be conducted to continue to assess the trends and gaps suggested here. Such comparative studies may also identify emerging forms of innovative work organization and workplace learning that can enhance skill utilization and sustainability in the economy and sinorms

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