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# Understanding the Incumbent Worker's Decision to Train: The Challenges Facing Less-Educated Workers

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# Understanding the Incumbent Worker's Decision to Train: The Challenges Facing Less-Educated Workers<sup>1</sup>

*"Learning is an act of hope" - Carol E. Kasworm<sup>2</sup>*

## Introduction

Labor economists estimate that more than two million manufacturing jobs will go unfilled in the next decade (Deloitte and the Manufacturing Institute, 2018). This number will be driven not only by the retirement of a rapidly aging workforce, but also by the adoption of new technologies as the fourth industrial revolution continues to transform manufacturing. Crucially, the shift to more automation and digitization will demand a different set of skills from the manufacturing workforce (Autor, Mindell, and Reynolds 2019, 2020).

Recruiting youth into the manufacturing workforce will not be sufficient to address this labor shortage. It will be just as critical to develop incumbent workers, a population not usually targeted by an American training system focused largely on the young and the unemployed. To this end, several models for upskilling existing workers have emerged, from public-private partnerships to schools and tech companies developing online manufacturing programs and certifications. Massachusetts alone has invested millions of dollars in workforce development programs to train the next generation of manufacturing workers (Massachusetts EOHED, 2019). Still, manufacturing companies most commonly choose to upskill employees through on-the-job training (PWC, 2016).

However, there is reason to doubt that manufacturing workers are sold on the benefits of training, particularly if they have lower levels of educational attainment. Starting near the end of the last century, the manufacturing worker became the emblem of the displaced worker, simultaneously affected by de-unionization, globalization, and automation. To this day, the salience of this image affects not only the recruitment of new workers but arguably the motivation for incumbents to invest in their careers. Just as new entrants might not perceive manufacturing as an attractive career, so incumbent workers might not believe that theirs is a growing industry. Although advanced manufacturing positions promise higher pay and better working conditions, the share of manufacturing jobs going to college graduates has increased drastically from 21% in 1991 to 40% in 2019 (Hufford, 2019). Thus, less-educated incumbent workers might not consider these jobs to be theirs for the taking and may not see the training investment as worthwhile. Similar beliefs may affect less-educated workers in other industries that are undergoing skill-biased technical change.

Adding to this, training opportunities tend to be biased away from less-educated workers. For reasons that are hard to disentangle from this bias, those who have higher rates of training tend to be more educated, more skilled, younger, and working in white-collar jobs (for US evidence: Leuven and Oosterbeek, 1999; Desjardins et al., 2006; Cronen et al., 2016; Osterman, 2020; for European evidence: Brunello, 2001; Rubenson, 2007; Albert et al., 2010; Fouarge et al., 2013; Gorlitz and Tamm, 2016; Ruhose et al., 2019).

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<sup>2</sup> Kasworm, Carol E. "Emotional Challenges of Adult Learners in Higher Education." *New Directions for Adult and Continuing Education*, 2008. <https://doi.org/10.1002/ace.313>.

And yet, beyond simple explanations such as cost and convenience, we know little about what motivates or dissuades less-educated workers from participating in training when the opportunity arises. As such, this paper asks, *what are the factors that influence the incumbent worker's decision to participate, or not participate, in work-related training?* Developing a coherent theory around the expectations related to training, and how these might vary when it comes to the less-educated worker, would allow employers, policymakers, and workers to optimize the value of the training investment.

## Methodology

To characterize the incumbent worker's decision to train, we reviewed the economics, management, and applied psychology literature from the last 20 years on work-related training. A number of existing literature reviews on training were crucial to these efforts (Colquitt et al., 2000; Johnson et al., 2009; Kyndt et al., 2013; Bell et al., 2017). We focused primarily on the determinants of worker uptake of training, as opposed to the determinants of employers, governments, or educational bodies offering training. We define work-related training as any formal course, targeted to adult workers, that aims to improve an individual's occupational competencies. This includes both on-the-job and off-the-job training. Due to the relative scarcity of research on less-educated workers, we occasionally discuss studies on informal learning, higher education, and learning in general when they are relevant to this population.

The population of interest is incumbent workers across all industries, because the problem of differential participation transcends manufacturing and studies specific to the manufacturing sector are relatively few. Likewise, we focused on studies situated in Western economies and did not limit ourselves to the United States, as much of the training literature comes from Europe and Canada.

Of the 91 studies we included in this review, only 31 focused explicitly on determinants, motivations, or barriers to learning for less-educated or less-skilled adults. Of those, only 17 studies compared determinants, motivations, or barriers across education or skill-level, only 5 were situated in the US, and only 2 looked explicitly at manufacturing workers.

## Categorizing Workers

Studies that group workers by their human capital resources tend to rely on either education level or skill level. However, the difference between these two classifications is not so clear-cut. Skill-level is intrinsically linked to education. In fact, the most common proxy for skill across the papers we reviewed is educational attainment. Under this convention, workers who have at most a high school education are designated as "low-skilled," those with a bachelor's degree and above are "high-skilled," while all others can appear in either group or be separated into a "middle-skilled" category of their own.

While the educational classification is expedient, it suffers from a number of flaws. Jobs have different skill requirements and workers will expand some skills through experience while losing others they do not regularly use (Desjardins et al., 2006; Desjardins and Rubenson, 2011). More generally, skills learned on the job are not captured by measures of formal education, which is particularly problematic for blue-collar work (Desjardins et al., 2006). Finally, there is a paradox at hand: although many advocate for training to upskill workers, training will not figure in the education-based measure of skill. For these reasons and more, a few of the papers we reviewed embraced more complex methods for defining skill-level, including national qualification systems such as the UK's National Vocational Qualification framework, formal assessments such as the IALS (International Adult Literacy Survey), the estimated skill content of a job, or even the vulnerability of a group to marginalization on the labor market (Illeris, 2006).

While educational attainment is imperfect, it has the benefit of being a more precise and less abstract measure than skill-level. It also bypasses issues of value judgement regarding what kinds of tasks are considered skilled as opposed to unskilled. Finally, it largely avoids the problem of definitional variation, although not all studies we reviewed agreed on the cutoff between more- and less-educated, further highlighting the complexity of the issue. For these reasons, this paper focuses primarily on education rather than skill to group workers. We do cite studies that rely on skill as defined by alternate measures, and we include the definitions for these measures in the footnotes.

Like others, we reject the characterization of less-skilled and less-educated adults as “reluctant learners” for whom further education is considered to be a panacea to all life’s problems (see, for example, Cort et al., 2018, which contains an in-depth criticism of this approach, and Ahl, 2006). Nevertheless, we recognize that, particularly in the context of traditional manufacturing, well-paying jobs for these workers are decreasing in the US and upskilling efforts are one approach to ensuring that they can remain dignified participants in the labor market, especially in advanced manufacturing roles. Ultimately, the literature suggests that less-educated workers participate less in training, and are less willing to train (Leuven and Oosterbeek, 1999; Bassanini and Ok, 2004). There must be reasons why some are less convinced of the benefits of training or more aware of its costs. Making sense of these discrepancies is at the core of this paper. Ultimately, the goal is not to change the learner, but rather to generate recommendations on how to adapt the training system to better work for them.

## Conceptual Foundations

The model that emerged from this literature review builds on existing conceptual work. First is Becker’s human capital theory (Becker, 1964), which frames the decision to learn in utility-maximizing terms for both the individual and the firm. From the worker’s perspective, education is an investment bounded by a number constraints and tied to a number of rewards; the decision to participate amounts to a rational comparison of these costs and benefits (Becker, 1964). Vroom’s (1964) model for participation in voluntary activities introduces the concepts of *expectancy* (or the belief that “effort will lead to success in the job”), *instrumentality* (“the belief [...] that success will lead to particular outcomes”), and *valence* (the “value of these outcomes”) (APA Dictionary). Other relevant valence learning models include Rubenson’s expectancy valence model, which proposes that the value of the expected result of learning is weighed against the belief that this result will actually happen (Rubenson, 1979, cited by Kondrup, 2015).

Other models look beyond the individual to the structural impact of policies and environment on the decision to learn. For example, Boeren, Nicaise, and Baert (2010) identify three levels of factors affecting the decision to participate: “the individual; the educational provisions; and the socio-economic context, including the regulating authorities” (Boeren et al., 2010).<sup>3</sup> In particular, Cross’s (1981) chain-response model provides an insightful taxonomy of factors that act as barriers to adult learning, which was incorporated in this model and is discussed in greater detail in the Model Overview section (Cross, 1981). However, rather than framing these factors as barriers, we re-orient them and embed them within a *facilitating conditions* construct adapted from Venkatesh’s (2003) Unified Theory of Acceptance and Use of Technology model (UTAUT). For example, *lack of professional support* becomes *professional support*. We find that the positive orientation of this construct is useful because it allows all of the factors in our model to encourage the decision to learn.

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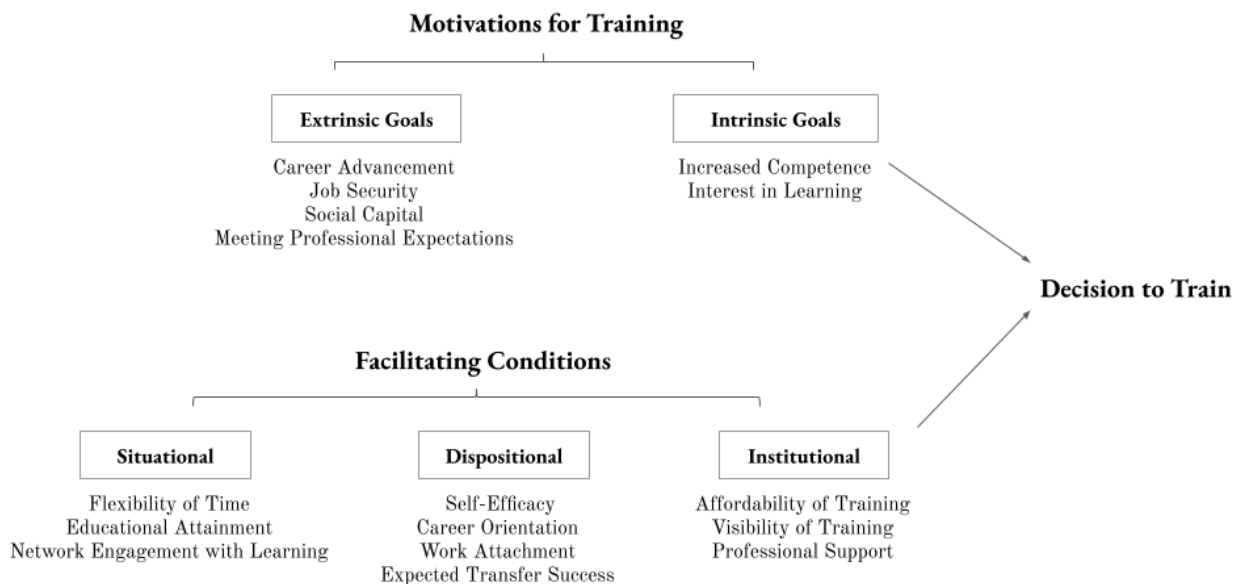
<sup>3</sup> For more details on the conceptual literature, Kondrup (2015) and Silva et al. (1998) provide a useful overview of these models as well as many others.

In drawing from these theories and coupling them with the latest research on drivers of training participation, we hope to identify current and actionable factors that are useful to the policy-maker, particularly in making sense of the manufacturing worker's decision to pursue or turn down training.

## Model Overview

Building on human capital theory, we propose that the adult worker has a complex cost-benefit analysis to conduct when deciding whether or not to train, one which might vary tremendously based on the worker's perception of their own situation. Our model (Figure 1) maps the worker's decision to participate in work-related training along two major dimensions:

- **Motivations for Training:** the adult worker's reasons for participating in training. In general, these motivations relate to the perceived benefits of training.
- **Facilitating Conditions:** the operational factors that affect the perceived costs, risks, and accessibility of training. Unlike the factors in the first construct, these conditions are not reasons for training in and of themselves. However, they can encourage training when present and become barriers to participation when absent.



**Figure 1. Model for Decision to Participate in Work-Related Training**

In effect, we frame the adult worker's choice as a two-part equation: motivations for training will draw the worker to participate because of the associated prospects: a promotion, more responsibilities, or a feeling of increased competency. The feasibility of this path is considered in the context of the facilitating conditions: the perceived costs of investing in learning and the belief that it will pay off. The two dimensions can apply in either order. The worker, sensing an opportunity, could evaluate the costs and risks. Or, a situation that is favorable for learning could make the worker more open to exploring opportunities. Empirical validation can explore the relative importance of each construct in a given context, whether the decision process is sequential, iterative, or a synchronous tradeoff, and to what extent incorrect beliefs distort what appears to be a rational decision.

*Motivations for training* include two constructs, each comprising a number of factors:

- Extrinsic goals push the worker to invest in training in order to reap external rewards, such as promotions or higher wages. In the work-centric world of training, these potential benefits are largely professional.
- Intrinsic goals drive the worker to train for the pure pleasure or learning or to fulfill some internal goal independent of material perks.

These motivations may act independently or in concert. For example, the goal of achieving job security can motivate a worker to pursue training in order to obtain a new career, such that the worker is motivated to train by two interacting goals: a new career and job security.

*Facilitating conditions* characterize the accessibility of training. These conditions can affect both the perceived cost of investing in training and the perceived likelihood of success in completing (and leveraging) this training. They follow Cross's (1981) taxonomy of barriers to adult learning:

- Situational factors originate in personal circumstance, such as the individual's baseline educational level and ability to spend time or money on training.
- Dispositional factors originate in the individual worker's beliefs and attitudes. These attitudes might influence how open an individual is to the experience of learning.
- Institutional factors originate in the work and government policy environment. They reflect perceived access to, and support for, training.

While all of these factors describe the worker's general relationship to training, they can also help understand how the worker relates to a specific course. For example, an employee may wish to feel more competent at work, and this will make them more amenable to training in general while also guiding their selection of courses to address their perceived shortcomings.

## 1. Motivations for Training

### 1.1. Extrinsic Goals

It is hard to disentangle the value of training from the career prospects it offers, whether tangible such as a raise or promotion or less tangible such as an expectation of job security. In fact, most adults who seek out learning even beyond training do so for job-related reasons (Desjardins et al., 2006, p.41). This section will explore the extrinsic goals that have been shown to motivate training.

#### 1.1.1. Career Advancement

Workers who wish to grow professionally may perceive training as a way to unlock higher wages, a promotion, or even a career change. In fact, career advancement may seem like an obvious reason for participating in training. However, only 18% of employed US adults who enrolled in work-related courses reported doing so in order to get a raise or promotion (NCES, 2005). The prevalence of these motivations generally increases as educational attainment decreases, but they remain relatively low, at 21% for those with some college or a vocational or associate's degree, and 27% for those with a high school diploma or its equivalent.

The importance of these motivations may depend on the extent to which the relationship between performance and career advancement is formalized. Indeed, performance reward systems,

progressive employment policies,<sup>4</sup> and formalized HR policies<sup>5</sup> have all been linked to a higher incidence of training at work (O’Connell and Byrne, 2012; Wotschack, 2020). Formal structures may be particularly important to motivate less-skilled<sup>6</sup> employees in sectors like manufacturing, where skill requirements are not governed by license and certification requirements, and incentives are less clear (Wotschack, 2020). Finally, long-term wage growth, as opposed to an immediate wage bump, may be particularly influential in driving the decision to train, at least in a recessionary period (Watanabe, 2010).

Training can also be seen as a way to improve employment prospects outside the firm. In fact, 19% of US adults reported participating in work-related courses in order to change jobs or careers (NCES, 2005). The relationship between training and turnover is an important reason that companies are reluctant to provide on-the-job training to their employees, particularly if the subject matter is relevant outside the firm (see, for example, Acemoglu 1997). In fact, one study suggests that the perception of organizational support for employee development may actually increase turnover if “employees perceive few career opportunities that match their career goals and interests within the organization” (Kraimer et al., 2011). Still, training to change jobs or careers is the least reported motivation across all educational tiers<sup>7</sup>, save for those with less than a high school diploma or its equivalent (NCES, 2005).

Less-skilled<sup>8 9</sup> workers in particular have been shown to pursue training to increase job satisfaction broadly defined (as well as perhaps earn qualifications and perform their jobs better), but there is less evidence that they expect it will lead to another job, higher earnings, or a promotion (McQuaid et al., 2012). This does not mean tangible outcomes are not desired. In interviews with less-educated adults (Brown and Bimrose, 2018), nearly a third cited a goal of achieving job-related rewards such as wanting “to gain financial stability and achieve a better salary” (12 of 105 interviewees). A crucial difference may be the extent to which workers perceive their job to have growth potential, a factor that has been shown to predict self-directed learning<sup>10</sup> in less-educated employees (Raemdonck et al., 2012).

### 1.1.2. Job Security

Rather than wanting to grow their career, some workers are drawn to training in the hope that it will help them keep their current job or their position in the labor market. In fact, workers who anticipate job loss are about 40% more likely to participate in long-term<sup>11</sup> work-related education, and “labor market factors (perceived insecurity, job displacement, union contracts, and some benefits) strongly influence participation” (Elman and O’Rand, 2002).<sup>12</sup> One possibility is that job insecurity motivates

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<sup>4</sup> Progressive employment policies was defined as “a binary variable scored 1 if the respondent is employed in a workplace that has either a formal explicit policy on respect and dignity at work and/or if there is a formal explicit policy on equal opportunities in the workplace” (O’Connell and Byrne, 2012)

<sup>5</sup> In this study, the presence of Institutionalized HR policies was measured using factor analysis of responses to the following questions: “Does your establishment work with: (a) written plans for staff development?, (b) formally laid down procedures for appointments?, (c) job descriptions for the majority of jobs?, (d) written target agreements with employees?, (e) written evaluations of job performance?” (Wotschack, 2020).

<sup>6</sup> As determined by having a job “that requires no professional qualification.”

<sup>7</sup> Among all adult participants, not all employed adult participants.

<sup>8</sup> As determined by the UK’s National Vocational Qualification and the Scottish Vocational Qualification frameworks

<sup>9</sup> Note- Workers were in the UK care and hotel sectors.

<sup>10</sup> Defined as “a tendency to take an active and self-starting approach to work-related learning activities and situations and to persist in overcoming barriers and setbacks to learning” (Raemdonck et al., 2008, cited in Seibert et al., 2001).” (Raemdonck et al., 2012).

<sup>11</sup> Education that is longer than one semester.

<sup>12</sup> In models that do not control for potentially confounding factors, “persons with less education or nonprofessional skills are more likely to perceive insecurity. In contrast, persons with college degrees or more skilled workers

training through the goal of becoming a more attractive candidate outside one's company, and in fact, the relationship between job insecurity and training decreases the more competitive a worker perceives themselves to be (Van Hootegeem et al., 2018). Another possibility is that workers in vulnerable positions are training to sustain their current employment. For example, in the case of older workers, there is evidence that those who participate in training stay in the labor market longer than those who do not, although this could be a result of self-selection (Fouarge and Schils, 2009).

Organizational and technological disruption can also motivate training by threatening to change the nature of the job. In fact, various measures of technological changes, organizational changes, and "changes in market competition"<sup>13</sup> have been linked to greater on-the-job training incidence as well as greater participation in employer-provided training (Gorlitz and Tamm, 2016; Xu and Lin, 2011). Still, it is possible that these results are at least partly attributable to firms providing more transitional training.

The evidence with regard to less-educated workers complicates this picture, as job insecurity appears to either have no impact or to hamper their participation. One study finds no relationship between job insecurity and less-educated workers' intention to participate in training (Sanders et al., 2011). Another finds a decrease in training participation rates of less-skilled<sup>14</sup> workers following the introduction of a new technology (Mohr, 2016). The authors propose that this lack of relationship can be explained by substitution effects, as technology simply automates away the tasks of select workers, rather than supplementing their work. In fact, a study of unionized pulp mill workers suggests that training can be seen as a challenge to job security for this very reason: "the more [workers] learn, the more flexible they become and the fewer workers required to maintain the mill" (Bratton, 2001). It is possible that when the worker does not already suspect their job to be under threat, the offer to train can be perceived as a signal of changes to come<sup>15</sup> (Bratton, 2001). Data from the USA presents another twist: increased foreign competition<sup>16</sup> decreases the probability that workers participate in training associated with career advancement, particularly in the case of less-educated workers (Kosteas, 2017). Overall, the evidence suggests that job insecurity compels some workers to seek out training as a form of insurance, but obscures other benefits associated with learning such as career growth. Finally, training itself may sow feelings of job insecurity, engendering a mixed response to the opportunity.

### 1.1.3. Social Capital

Work-related learning may also be motivated by the desire for increased social standing and a larger network. In one European survey, 9% of employed adults and 13% of self-employed adults were found to participate in education and training for the purposes of meeting new people (Eurobarometer 2003, cited by Desjardins et al., 2006). In fact, one study shows that training participation results in higher levels of participation in other forms of engagement: "civic, political, and cultural activities while not crowding out social participation"<sup>17</sup> (Ruhose et al., 2019). Still, social goals are likely more prevalent in general adult education than in training. Indeed, adults report seeking out education to earn more respect from their peers, and pursuing high school equivalency credentials in order to be a positive role model (Kimmel et al., 2016; O'Neill and Thomson, 2013). Likewise, in interviews with

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(managers and technical personnel as derived from two-digit occupational codes) have the lowest levels of perceived job insecurity" (Elman and O'Rand, 2002).

<sup>13</sup> Defined as "firms competing with firms beyond local markets or with internationally owned firms have more workplace training" (422, Xu and Lin, 2011).

<sup>14</sup> As determined by the skill requirement of the job, estimated by the employees

<sup>15</sup> Belonging to a union may exacerbate this relationship by highlighting the tension between management and worker interests.

<sup>16</sup> As measured by rising imports

<sup>17</sup> For blue-collar workers, only participation in cultural activities significantly increased.



less-educated adults, nearly ten percent of respondents spoke of perceiving “learning as a means to improve their social status” (Brown and Bimrose, 2018).

It is possible that social capital - defined as the resources made available through one’s network - is both a goal and a facilitating condition for learning, particularly for less-educated workers. In fact, social capital<sup>18</sup> has been shown to be beneficial for adults without higher-education degrees when it comes to participating in job-related learning (Knipprath and De Rickl, 2015). However, this finding does not seem to extend to more-educated workers: Støren (2013) found that proxies for social capital<sup>19</sup> have little to no effect on participating in work-related training for this population.

#### 1.1.4. Meeting Professional Expectations

The expectations of peers, managers, and one’s professional network can also create the perception that training is an implicit job requirement. This may be particularly true in the U.S., which has the highest proportion of employers suggesting training to their employees (and thus the lowest proportion of employees initiating training themselves), as compared to the Netherlands, Switzerland, and Canada (Leuven and Oosterbek, 1999). In fact, 76% of employed US adults who enrolled in work-related courses reported doing so because their “employer required or recommended it” (NCES, 2005).

More subtly, subjective norms towards training—or the “employees’ beliefs about the extent to which individuals important to them feel they should participate”—have been found to significantly influence attitudes towards participating in development activities that include training (Hurtz and Williams, 2009). There is evidence that they affect the training intentions of less-educated workers as well (Sanders et al., 2011). This pressure may not be felt equally, however. Whereas employees in knowledge-intensive organizations see workplace learning as an organic part of their jobs, driven by “both employer and employee expectations,” there is some evidence that employers in traditional manufacturing settings only encourage employees to take courses directly related to their job duties, offering few prospects for growth (Riddell et al., 2009).

In general, there is a lot of literature substantiating the connection between employer support and training participation rates, particularly as it relates to white-collar workers, knowledge workers, and managerial workers. We will explore this branch of research in greater detail in the *facilitating conditions* section, but it is worth highlighting the difference between employer support and the perception of training as a required part of working life that rarely leads to growth, and how this distinction might affect blue and white-collar workers differently. Depending on the culture of the firm, an emphasis on lifelong learning may seem like a desirable workplace attribute, or it could represent yet another expression of employer control.<sup>20</sup>

### 1.2. Intrinsic Goals

Work-related education is a largely functional activity, and it follows that workers expect tangible outcomes to follow. Yet, intrinsic goals still serve as primary or secondary motivators for many workers (Eurobarometer 2003, as cited in Desjardins et al., 2006, p.45).

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<sup>18</sup> This concept is measured through participation in communal activities (Knipprath and De Rickl, 2015).

<sup>19</sup> These are based on “whether the graduate held a position in a student or other voluntary organization during his/her time in higher education, whether the graduate consider his/her social network as very useful (concerning information on job opportunities, directly obtaining work, or setting up own business), and whether the parents of the graduate have higher education” (Støren 2013).

<sup>20</sup> For more on how the insistence on lifelong learning may reveal problematic power dynamics, see Ahl, 2006.

### 1.2.1. Increased Competence

The desire to feel more competent at work can also motivate the decision to train. In fact, wanting to “maintain or improve current skills” was by far the most cited reason (at 92%) for participating in a work-related course in a survey of US adults (NCES, 2005). Arguably, the goal of competence straddles the divide between intrinsic and extrinsic motivations, touching on both an internal desire for mastery, perceptible improvements in performance, and additional job security. The extent to which this goal is purely internal may depend on the extent to which workers expect rewards for their training.

The difficulty of a job may inform the motivation to train in order to feel competent. The complexity and skill content of jobs are in fact significant determinants of participation in training, even after controlling for educational achievement or literacy proficiency (Görlitz and Tamm, 2016; Xu and Lin,<sup>21</sup> 2011; Desjardins and Rubenson, 2011). The range of tasks required by a job may be even more important than the overall complexity of the job in pushing a worker to train. Indeed, one study of less-educated workers found that task variety was a significant predictor of self-directed learning but job complexity was not (Raemdonck et al., 2012).

While job difficulty is a likely driver of the differences in training participation between less and more-educated/skilled workers, there are some complicating considerations. For example, there is evidence that more-skilled<sup>22</sup> blue collar workers are less likely to participate in education and training than less-skilled white collar workers, which may be explained by the fact that some white-collar job requirements, such as those depending on literacy skills, are better suited to development in a formal educational setting, while blue-collar job requirements may be better learned on-the-job (Desjardins et al., 2006). In fact, the frequency of reading engagements and computer use at work are both correlated with participation in education in training, perhaps because these measures are good proxies for skill requirements that are suited to classroom learning (ALL Survey 2003, cited by Desjardins et al., 2006).

Ultimately, the relationship between training and wanting to feel more competent will not always encourage workers to train, particularly if they already feel competent: one study finds that if job tasks are not expected to change, investing in training can feel “meaningless” (Tamkin and Hillage, 1997, cited by Johnson et al., 2009).

### 1.2.2. Interest in Learning

A general interest in learning, or curiosity for a specific topic, independent of any reward other than satisfying these desires, has been shown to motivate participation in various educational activities in the higher education literature. Older adult students in particular are significantly more likely to report enrolling in undergraduate studies for the sake of learning relative to traditional undergraduates (Wolfgang and Dowling, 1981). One possible explanation for this factor is that education offers adult learners a way to self-actualize, allowing them to “[improve] one’s status and self-worth” (Valentine 1990, as cited in Rothes et al 2014).

There is less evidence of the inclination to learn for the sake of learning in the world of professional education, which by definition is much more practical. Still, up to a quarter of employed European adults report that one of their reasons for engaging in education and training is to increase their general knowledge; this tendency is significantly higher among adults whose educational attainment

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<sup>21</sup> This study looks specifically at the firm-level technological complexity.

<sup>22</sup> As determined by the “skill level required for completing job tasks associated with particular occupations” (p. 72).

is higher than upper secondary (Eurobarometer 2003, cited by Desjardins et al., 2006). Further, a study of more-educated adults shows that enthusiasm for the “opportunity to learn new things” is associated with a greater probability of participating in work-related training (Støren, 2013).

Learning for the sake of learning may be differentially prioritized. There is evidence that while adults across educational levels have some intrinsic motivations for enrolling in educational courses, less-educated adult learners (including unemployed learners) are more likely to report extrinsic incentives<sup>23</sup> as well (Rothes et al., 2014; Daehlen & Ure, 2009). Indeed, nearly a third of less-educated adults interviewed on learning brought up the importance of the “practical nature” of the experience; some emphasized appreciating the fact that vocational courses tended to be less “theoretical or disconnected” than their schooling (Brown and Bimrose, 2018). Much of this literature does not differentiate between work-related and non-work-related learning however, so the relationship between education and a pure interest in training remains unclear.

### 1.3. Less-Educated Workers and Motivations for Training

Only a small subset of the studies we reviewed focused on the motivations of less-educated workers, and an even smaller share explicitly compared these workers to more-educated workers. However, the research so far suggests that less-educated workers may have limited expectations for training and that few believe that they can fundamentally change their careers through training. To what extent this differentiates them from more-educated workers is unclear. Still, researchers have suggested that workers “in simple manual jobs” doubt that learning could advance their career or be applied in their work-setting (Iller, 2005, cited by Cedefop, 2010). Likewise, Sanders and de Grip (2004) find that participating in training had no effect on less-educated workers’ “perceptions of their employability” inside and outside the firm. It is hard to trace where these expectations might originate, but a likely explanation can be found in their previous educational and training experiences.

It may simply be the case that training has not led to career growth in the past, such that these workers have no reason to expect that it will in the future. Worse, training may have been a precursor to job insecurity, such that the experience now brings to mind anxiety-laden circumstances. This issue may be particularly pertinent for manufacturing workers, who saw globalization and technology transform their industry, and for whom down-sizing was more than a looming statistic. Those who lost their job or were driven to re-train as a consequence may retain an unpleasant memory of the experience.

While this population of workers may have strained ties to training, the research suggests a number of constructive approaches to motivate them to train of their own accord. Communicating the growth potential of a job or instituting performance rewards systems may be necessary to ensure that the learning investment seems worthwhile. Furthermore, the fact that task complexity drives differences in participation rates among less-educated workers suggests that tying training to the possibility of new, more advanced responsibilities could motivate manufacturing workers. We’ll explore concrete ways to act on these findings in the recommendation section.

## 2. Facilitating Conditions

Assuming that a worker wants to train, they must also answer, “can I do it?” Their answer will be influenced by their individual circumstances (*situational* factors), individual beliefs (*dispositional* factors), and the structural environment (*institutional* factors) (Cross, 1981). The ensemble of these factors are the *facilitating conditions* which may not motivate training directly, but can make the

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<sup>23</sup> such as “to get a job” or “to meet new people”

tradeoff between the benefits and costs of learning appear more attractive. When absent, these factors can become barriers to participation.

## 2.1. Situational

Situational factors originate in personal circumstance, such as the individual's baseline educational level and ability to spend time or money on training.

### 2.1.1. Flexibility of Time

Flexibility and general availability of time are particularly important when it comes to work-related training. Lack of time and being generally busy have been shown repeatedly to be some of the most important barriers to training participation (Leuven and Oosterbeek, 1999; Sussman, 2002). Being too busy at work or having childcare or family responsibilities beyond work were the first and third most common reasons given for not participating in education, by 28% of 17% US adults, respectively (OECD, 2012). This relationship is also validated in less-skilled<sup>24</sup> workers (McQuaid et al., 2012). The timing of training may also be incompatible with the work schedule (Peters, 2004). Related to these challenges, 11% of US adults reported that the time or location of a course was a barrier to participation (OECD, 2012).

Still, one study finds that family responsibilities do not significantly predict participation in training, although this study was not able to differentiate between the number and age of children (Renaud et al., 2004). Furthermore, in the US, there is evidence that having young children has a positive effect on training participation, possibly because children provide impetus for parents, particularly fathers, to invest in their careers for the sake of security (Massing and Gauly, 2017; Elman and O'Rand, 2002). The presence of an older person at home, however, seems to facilitate participation in long-term<sup>25</sup> work-related education considerably (Elman and O'Rand, 2002). Finally, some researchers have suggested that time management activities can help mitigate the impact of lack of time on less-educated workers' participation in training and development (Kyndt et al 2013).

### 2.1.2. Educational Attainment

Worker literacy, numeracy, and educational attainment may influence participation directly, by affecting how accessible a course appears, or indirectly, through their relationship with access and opportunity. Whatever the cause may be, the idea that "learning begets learning" is probably the most substantiated<sup>26,27</sup> in the training literature. Interestingly however, educational concerns are not high on the list of reported reasons for non-participation: only 2% of US adults said they did not participate in a training or course because they felt they did not have the prerequisites (OECD, 2012). This suggests that the impact of education is at least partially through indirect pathways.

Some studies identify potential confounding variables in the relationship between training and education, some of which point to our other factors. Educational attainment has been found to be

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<sup>24</sup> As determined by the UK's National Vocational Qualification and the Scottish Vocational Qualification frameworks.

<sup>25</sup> Education lasting longer than a semester.

<sup>26</sup> "Ever since Johnstone and Rivera's classical study on participation in the early 1960s (Johnstone and Rivera, 1965), survey after survey has consistently found substantial correlations between measures of initial education and participation in adult education and training (Boudard, 2001; Tuckett and Sargent, 1996; Sargent, 1997; Field, 1999; Keep, 1999; Williamson, 2000; Berube et al., 2001; Desjardins, 2004)." (Rubenson, 2007)

<sup>27</sup> For more evidence on the relationship between education and training, see the studies in the introductory section: Leuven and Oosterbeek, 1999; Brunello, 2001; Desjardins et al., 2006; Rubenson, 2007; Albert et al., 2010; Fouarge et al., 2013; Nilsson and Rubenson, 2014; Gorlitz and Tamm, 2016; Ruhose et al., 2019; Osterman, 2020.

both a stronger and weaker predictor of training participation than literacy skills (Boudard and Rubenson, 2003; Gauly and Lechner, 2019). Controlling for job characteristics such as part-time status, tenure, firm size, job content, and skill profile has been found to eliminate the relationship between education and training participation (Gauly and Lechner, 2019). Similarly, controlling for job tasks reduces much of the difference in training participation between educational groups, though statistically significant differences remain (Görlitz and Tamm, 2016). In fact, a few studies have even found a negative relationship between education level and training participation after controlling for job and individual characteristics (Renaud et al., 2004; Xu and Lin, 2011). Interestingly, being over- or under-educated for a job has no effect on participation in training, at least for workers with higher-education degrees (Støren, 2013).

A number of theories have been floated to explain the link between education and training. For one, more-educated workers tend to be hired into higher-skilled positions which in turn require more training (Brunello, 2001, cited by Albert et al., 2010). It is also possible that initial educational investments require more education in order to pay off, and that the returns on these investments increase based on educational attainment (Kramer and Tamm, 2018). Others suggest that educational attainment and its proxies may simply be indicative of a greater motivation to learn (Gauly and Lechner, 2019).<sup>28</sup> However, the abundance of confounding factors suggest that there are a number of structural mechanisms related to opportunity and access at work, and in fact uncovering them is a core part of this paper.

A particularly promising finding is that the self-reinforcing character of learning is not limited to formal, baseline education: quality training experiences can also stimulate further learning. Indeed, there is evidence that prior training participation is a determinant of participation in training on par with formal educational qualifications (Sousounis and Bladen-Hovell, 2010). Looking specifically at less-educated workers, prior participation in work-related learning has been found to predict future participation in work-related learning as well as learning intention (Maurer et al., 2003; Kyndt et al., 2013). Importantly, the influence of past experiences on participation highlights the importance of offering relevant and quality development activities to one's employees, as "shoddily selected and executed" training experiences may well result in negative attitudes to training in the future (Hurtz and Williams, 2009).

Finally, although the relationship between education and training is generally observed in the US, there may be an important caveat when it comes to longer-term<sup>29</sup> work-related education, or "educational reentry" (Elman and O'Rand, 2002). Specifically, Elman and O'Rand (2002) find that, after controlling for individual and labor market characteristics, "only those without degrees but some college are more likely to return to school," suggesting a strong "credentialing motive" that is informed by the college degree wage premium. Employers may even be supporting this motive, as data shows that this group of workers has also been found to receive longer employer-provided training than others (Lerman et al., 2004).

### 2.1.3. Network Engagement with Learning

People around the worker who engage in learning can influence the decision to train by normalizing the exercise, validating its worth, and providing examples that it can be done. Indeed, the favorableness of social cues<sup>30</sup> from coworkers and supervisors towards training has been shown to

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<sup>28</sup> This study finds that the "association between training and literacy does not reflect a causal effect of training."

<sup>29</sup> Education that takes longer than a semester.

<sup>30</sup> "Social cues are information from the social environment (e.g., from coworkers and managers) that support and thereby encourage certain attitudes and behavior (Zalesny & Ford, 1990). [...] To measure social cues regarding training, a four-item scale was developed to assess the value for training expressed by participants' coworkers and supervisors. The items were, "My co-workers view the training that is offered on campus as useful to our jobs," "My

be significantly related to training participation (Morrell and Kosgaard, 2011). In a study of less-educated adults, Goto and Martin (2009) find that psychological factors related to enrollment can be affected by the adult's social network in the form of mentors and role models. Similarly, belonging to a progressive trade union (defined in part by commitment to member education) has been linked to the creation of learning communities which can increase participation in both formal and informal professional education (Sawchuck, 2003).

## 2.2. Dispositional

Dispositional factors reflect the individual worker's mindset. They are the collection of personal attitudes and beliefs that can influence a person's relationship with learning.

### 2.2.1. Self-Efficacy

Similar to educational attainment, self-efficacy may affect training participation by influencing the worker's confidence that they will be able to complete training. Self-efficacy is the personal estimation of "how well one can execute courses of action required to deal with prospective situations" (Bandura, 1982). Two types of self-efficacy for development relative<sup>31</sup> and absolute - have been linked to participation in and attitudes toward work-related learning (Maurer et al., 2003; Maurer et al., 2008).

Self-efficacy stands to be particularly relevant for less-educated workers, some of whom may have negative associations with prior classroom-based learning (Illeris, 2006). In fact, Goto and Martin (2009) find that self-efficacy strongly influences less-educated adults' decision to enroll in a technical college. Specifically, exam anxiety has been linked to lower motivation to train in less-educated workers (Fouarge et al., 2013). Country-level evidence linking "external differentiation" policies in schools, such as tracking and grade retention, to "less positive attitudes towards learning among adults" may be particularly relevant here (Lavrijsen and Nicaise, 2017).

The impact of low self-efficacy may also affect older manufacturing workers, who may be far removed from their last schooling experience (Smith et al., 2010). In particular, fear of failure was reported to be at its worst during assessments, when workers have to showcase their aptitude (Smith et al., 2010). Still, one study of manufacturing workers finds that self-esteem, or the "evaluation of self in terms of affect (i.e. liking)," predicts attitude toward training while training self-efficacy does not (Carlson et al., 2000).<sup>32</sup> Another finds no relationship between self-efficacy and learning intention in less-educated workers (Kyndt et al., 2013).

Overall, it is not hard to understand how self-efficacy can play a role in participation. There may even be a feedback loop at work; indeed, there is evidence that training participation and positive learning experiences can improve self-efficacy in less-educated adults (Brown and Bimrose, 2018; Sanders et al., 2015).

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supervisor views the training that is offered on campus as useful to my job," "My co-workers view the training that is offered on campus as a waste of time," (reverse-scored) and "My supervisor views the training that is offered on campus as unnecessary to my job" (reverse-scored)" (Morrell and Kosgaard, 2011).

<sup>31</sup> "The relative self-efficacy measure examined in the current study incorporates relative judgments of ability as the central focus, which comes directly out of the self-concept tradition (Bong & Clark, 1999)" (Maurer et al. 2003).

<sup>32</sup> However, this study finds no relationship between training self-efficacy and attitude towards training. The authors speculate "individuals did not view the training they were about to receive as a means of satisfying their personal needs and goals. Instead, the training may have been viewed as means of survival in the ever changing environment in which they worked."

### 2.2.2. Career Orientation

The tendency to reflect on one's career has been linked to higher training participation, presumably by making a person more receptive to the potential rewards of training. The literature suggests several concepts related to career orientation. Self-directedness is the tendency to take ownership of one's professional trajectory by taking actions to achieve career goals. A self-directed learning orientation<sup>33</sup> has been found to predict professional learning behavior (Gijbels et al., 2012). The link between self-directedness and learning intention has also been reported in less-educated employees (Kyndt et al., 2013). Career planning, or the "extent to which employees create and update clear, specific, plans for achieving career goals", has also been linked to training motivation (Colquitt, LePine, Noe, 2000 point to a selection of studies supporting this relationship). Likewise, career insight, or the "the extent to which a person has knowledge concerning his or her career-related strengths and weaknesses, specific career goals, career plans, and current work situations," has been linked to intention to participate in and attitude to work-related learning (Maurer et al., 2003). Finally, the degree to which an individual is working toward career goals has been suggested to indirectly promote the training intention of less-educated workers (Sanders et al., 2011). In general, it appears that the way people think and act on their professional future, which may be influenced by the culture of their company, affects their relationship to training.

### 2.2.3. Work Attachment

Factors that describe the worker's attachment to their job or firm also affect participation. Job involvement, or the importance of one's job to their identity, has been linked to participation in and attitudes towards work-related learning (Rowold and Schilling, 2006; Maurer et al., 2003), possibly because it motivates employees to want to apply their learnings at work (Battistelli, 2008). Likewise, organizational citizenship behavior - voluntary behavior that benefits the firm but is not formally rewarded<sup>34</sup> - is related to participation in work-related learning (Pierce and Maurer, 2009).

These factors have been proposed in the literature as an explanation for Jacob Mincer's seminal finding that the rate of training increases with experience on the job, "as workers demonstrate their aptitude and commitment to a career or to an employer" (Rubenson 2007 on Mincer, 1988). There may also be a feedback loop where training can encourage organizational commitment (defined as the worker's attachment to their workplace) in manufacturing workers (Schneider and Flore, 2017).<sup>35</sup> This finding is particularly important because it provides an alternative narrative to that of workers training in order to leave their firm.

### 2.2.4. Expected Transfer Success

The degree to which workers believe that they will be able to use what they learn on the job will also influence participation. Less-educated workers in particular have been found to place greater value

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<sup>33</sup> "Self-directed learning orientation is defined as a relatively stable tendency to take an active and self-initiative approach to work-related learning activities and situations and to persist in overcoming barriers and setbacks ([41] Seibert et al., 2001). Employees with a self-directed learning orientation identify learning opportunities, show learning initiative, undertake learning activities, and persevere in overcoming barriers to learn. In contrast, people who are less oriented towards self-directed learning exhibit the opposite behavior: they fail to identify learning opportunities, let alone seize opportunities to learn (Seibert et al., 2001)." (Gijbels et al., 2012)

<sup>34</sup> Examples include: "helping coworkers with a job-related problem, accepting orders without a fuss, helping keep the work area clean and promoting a positive work climate" (Pierce and Maurer, 2009).

<sup>35</sup> The study finds that training conducive to building "specific" skills and "private" skills (relevant outside of work) was associated with organizational commitment, but training conducive to "general" skills was not. The authors hypothesize that "in a setting in which workers are employed on a long-term basis, general training may signal to workers that their job could disappear and may thereby generate more insecurity and less normative commitment." (Schneider and Flore, 2017)

on training that is closely related to their jobs (Kyndt et al., 2013). In fact, encouraging the perception that new skills will be useful on the job has been shown to increase less-skilled workers' participation in training (Johnson et al., 2012). The way training is portrayed by the organization, for example if it is explicitly linked to applications at work, can increase motivation to train in less-skilled<sup>36</sup> workers by improving both self-efficacy and the perception that training will lead to work-related rewards (Guerrero and Sire, 2001). The experience of previous transfer success may be equally important. Indeed, previous transfer success has been found to predict intention to train in highway construction workers and their supervisors (Bates, 2002).

While expected transfer success may seem like a self-evident factor, employers and employees can lose sight of it amid a large number of mandatory or compliance-related courses. More importantly, it can be a useful lever to help workers engage with training.

## 2.3. Institutional

Institutional factors relate to the organizations that the worker interacts with and the policies, people, and processes that define those interactions. These factors are often within the employer or policymaker's direct control. In fact, an alternative name for this construct might be *Institutional Climate for Learning*, as it designates the ensemble of employer contexts and behaviors that make training more appealing and easier to undertake. For example, working in a company with a continuous learning culture has been shown to predict training participation rates when considered in conjunction with staffing strategy (the tendency to promote and develop from within), previous transfer success (historical employee ability to apply learning at work), and job-related reading and math proficiency (Bates, 2002). As Maurer et al (2003) put it: "perhaps it is not just the employee who initiates learning but the entire social system in which he or she is embedded."

### 2.3.1. Affordability of Training

The negative relationship between cost and participation bears out in both the higher education and training literature. In general, a course or training being too expensive is the second most frequently listed reason for not participating in education, given by about a quarter of US adults (OECD Stat, 2012). Cost is also listed as a top obstacle by workers across four countries (the US, Canada, Netherlands, and Switzerland) who were unable to take a training or educational course they were interested in (Leuven and Oosterbeek, 1999).<sup>37</sup> Unsurprisingly, cost has been shown to hinder up to 54% of less-skilled<sup>38</sup> workers in the UK hotel and care sectors (McQuaid et al., 2012). Cost can even be prohibitive when the employee considers firm-level expenses: there is evidence that in smaller companies, employees may refrain from initiating training and development requests due to their perception that these would be declined due to "strong resource allocation norms" (Susomrith and Coetzer, 2015).

Addressing affordability challenges is a useful lever to improve training participation. For example, one experiment with less-skilled<sup>39</sup> workers found that issuing training vouchers worth €1000 increased training participation by nearly 20 percentage points in two years, and that this increase was disproportionately in favor of more general training (Hidalgo et al., 2014). Although there was

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<sup>36</sup> As determined by French nomenclature.

<sup>37</sup> Interestingly, highly educated workers are more likely to report feeling constrained in their training choices than less-educated workers, in spite of having more training experience, perhaps because they are more exigent when it comes to training (Leuven and Oosterbek, 1997).

<sup>38</sup> As determined by the UK's National Vocational Qualification and the Scottish Vocational Qualification frameworks.

<sup>39</sup> As determined by workers in "sectors in the economy where a vast majority of the workers perform low-skilled work": only 6.6% of the sample had higher education degrees.



substantial deadweight loss,<sup>40</sup> participants who were moved by the program were more likely to have never participated in training relative to those who were not, and they were more likely to intend to enroll in a course in the future. However, employers and policymakers should consider cost in conjunction with other levers, since the affordability factor does not help us understand why some employees would turn down employee-sponsored training, for which the worker would not pay.

### 2.3.2. Visibility of Training

It shouldn't need to be said, but people cannot take classes they do not know about. In other words, increasing visibility of training impacts training participation. In one study, "recognized availability" of training had the largest impact on participation (Hurtz and Williams, 2009). This can be achieved, for example, by making sure that the training is relevant and supported by the workplace community so that it can grow a "positive reputation" (Hurtz and Williams, 2009). Related to visibility is the simple availability of courses, and some studies get directly at this aspect. Kyndt and Baert (2013) find that the presence of learning opportunities at the workplace increases participation. Xu and Lin (2011) confirm these results.

Unfortunately, employers may not spread information to their employees equally such that differential awareness can impede training. In particular, some demographic groups such as employees of color and older female employees may be overlooked when it comes to opportunities and are more likely to pay for training themselves (Shields and Price, 2003; Lössbroek and Radl, 2019). In the case of less-skilled workers, "a lack of consistent information about opportunities and in some cases the sense that managers had 'rationed' information about opportunities to favoured staff" have been suggested to negatively affect participation (McBride et al., 2006, cited by Johnson et al., 2009).

### 2.3.3. Professional Support

Highly related to the above is the extent to which the worker feels supported by their professional network, particularly by supervisors. Professional support is the ensemble of employer behaviors that signal to the worker that they are valued and that professional development would be appreciated. In general, managerial support has been found to be a significant predictor of participation in work-related learning (Kyndt and Baert, 2013). In less-skilled<sup>41</sup> workers, support from one's supervisor may increase the perception that training will lead to work-related rewards and thus motivation to train (Guerrero and Sire, 2001). Similarly, organisational support has been shown to predict learning intention in less-educated workers (Kyndt et al., 2013). Support can go beyond verbal approval. At the organizational level, providing career mentoring services is one proven method to demonstrate support for development (Kraimer et al., 2011). Ultimately, the fact that only 4% of adults listed lack of employer support as their main reason for not participating in further education suggests that the presence of support is more of an encouragement to training, or aid for training success, rather than lack of support acting as a barrier to training (OECD, 2012).

Beyond the supervisor, survey data reveals that employees would feel more inclined to participate in learning "if they received advice or encouragement from someone at work" (Findlay et al., 2012). Coworker support may also indirectly promote the training intention of less-educated workers (Sanders et al., 2011). In fact, even social support coming from friends or family has been shown to have a positive influence on the perceived benefits of partaking in work-related learning (Maurer et al., 2003). In interviews with less-educated workers, nearly a quarter of respondents mentioned the importance of "significant others," from parents to teachers to colleagues, in shaping their learning experience by providing support or inspiration (Brown and Bimrose, 2018). Although at least one

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<sup>40</sup> Defined as "how many vouchers are used for training that otherwise also would have taken place" (Hidalgo et al., 2014).

<sup>41</sup> According to French Nomenclature

study (Gijbels et al., 2012) finds no link between social support and professional learning behavior, the overall effect of receiving support from peers seems to be similar to that of witnessing peers engage in learning (the network engagement factor discussed previously): it both validates learning and makes it seem more accessible.

## **2.4. Less-Educated Workers and Facilitating Conditions**

Although the facilitating conditions apply to all workers, less-educated workers may be systematically lower on them, such that many can actually become barriers to training. On the flip side, the associated policy levers associated with these facilitating conditions are generally straightforward to understand.

In terms of situational factors, the research on affordability and time is clear-cut: less-educated workers are likely to be deterred by the cost of training and scarcity of time. Although there is no research showing that they are differentially affected by these costs, it is not hard to imagine that since they tend to have lower wages they are more broadly liquidity- and flexibility-constrained.

Some dispositional factors may also act as barriers to training for less-educated workers. For example, we saw that lower self-efficacy can influence education decisions. Still, there is evidence of the positive impact that role models can have on self-efficacy. The research offers other leverage points: less-educated workers may be more motivated to train if they are more attached to their work. Likewise, the importance that these workers place on transfer success supports the idea that training with immediate job applications should be prioritized, if only for the sake of creating a positive experience for the employee that could entice them for future training.

With respect to institutional factors, the findings are again both unfavorable and promising. While employer bias may mean that less-educated workers are less exposed to opportunities, the positive impacts of managerial support can encourage participation. In particular, the way training is portrayed by the organization, as a collaborative experience in line with job requirements, can do a lot for employee motivation by affecting self-efficacy and the perceived usefulness of training.

Ultimately, many of these barriers are within the reach of policy makers, training providers, and employers, particularly when it comes to factors such as lack of time and professional support. It is worth noting that older workers perceive many of the same barriers as less-educated workers, such as lower self-efficacy, employer bias, and being less convinced of the returns to training (Maurer, 2001; Maurer et al., 2003; Desjardins et al., 2006). As such, the research that has been conducted on how to promote training among older workers may be helpful, particularly since a substantial share of manufacturing workers tend to be older.

### **Implications for research, practice, and policy**

The situation facing incumbent workers is more complex than many policy-makers or academics may realize. The very American concept of pulling yourself up by your own bootstraps can color the way we look at the situations and choices that others make. Our research suggests that simply creating upskilling opportunities may not be enough to help less-educated incumbent workers advance their careers. Expecting them to do so, without understanding the complexities of how they perceive training or the challenges they face, can distract from making the workforce learning system work better for the people who need it most. Existing training programs will need to be complemented by proactive demand-side policies as well as innovative approaches that make the training delivery process work better for this segment.

Building on our research model, as well as conversations with workforce experts, HR leaders, and incumbent workers, this section provides policy suggestions to help improve workforce upskilling approaches for less-educated workers.<sup>42</sup> Just as companies are beginning to transform their learning and development approaches for professionals (Lundberg and Westerman 2020), stakeholders must systematically rethink the training systems for less-educated workers to reflect changing occupational skill requirements and new technological capabilities.

Many stakeholders have roles to play in upskilling. Training providers are institutions that deliver workforce training, including employers, community colleges and other educational institutions, non-profit community groups, and private providers. Job centers, which are operated through the Department of Labor's Employment and Training Administration, provide "training referrals, career counseling, job listings, and similar employment-related services."<sup>43</sup> Workforce Boards comprise members of the local government, employers, and labor and community-based organization representatives who, together, govern the selection of appropriate courses and training providers, and are responsible for monitoring the efficiency and relevancy of these services.<sup>44</sup> Beyond acting as training providers, non-governmental organizations (NGOs) can provide services such as research and policy, career advice and complementary supports. Note that fewer of our recommendations concern policymakers such as workforce boards or legislators, because the focus of our analysis is the employee and their immediate environment. Further recommendations at the level of broader institutional training systems can be found in Bonvillian et al (2020).

The recommendations in this section cover four major categories. **Supporting a career mindset** for workers can help to improve the demand side of the system, helping workers to see opportunities as relevant and attainable. **Optimizing offers** addresses the supply side, helping to align the portfolio of training opportunities better with the needs of workers. **Building instructional scaffolding** can improve the effectiveness of the learning experience by providing supports that help less-educated workers succeed. Finally, we suggest a few **innovative approaches** that can work across and within the other categories to make the training system function better for incumbent adult workers.

### Support a Career Mindset

1. Actively encourage employees to think about their professional development
2. Create a role within the organization for providing career advice and linking career pathways to training opportunities.
3. Advertise career pathways and training opportunities that align with each pathway.
4. Consider tying rewards to performance rather than using uniform or seniority-related approaches.
5. Create opportunities for dialogue across different types of employees to facilitate career exploration.
6. Help workers to see training opportunities as an additional employee benefit, not just another

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<sup>42</sup> Special thanks to Meghan Abella-Bowen, Senior Program Manager of the Center for Advanced Manufacturing at the Massachusetts High Technology Collaborative, Paula Martel, HR Manager at North Easton Machine, and Brian Norris, Director, Northeast Advanced Manufacturing Consortium who were very generous in sharing their expertise in discussion of the recommendations.

<sup>43</sup> Department of Labor. "American Job Centers." Accessed 10/05/2020. [www.dol.gov/general/topic/training/onestop](http://www.dol.gov/general/topic/training/onestop).

<sup>44</sup> National Skills Coalition. "Side-by-side Comparison Of Occupational Training And Adult Education & Family Literacy Provisions In The Workforce Investment Act (WIA) And The Workforce Innovation And Opportunity ACT (WIOA). October 2014." [nationalskillscoalition.org/resources/publications/file/2014-10\\_WIOA-Side-by-Side.pdf](http://nationalskillscoalition.org/resources/publications/file/2014-10_WIOA-Side-by-Side.pdf)

corporate function.

7. Give special attention to high-performing workers and encourage their career growth.

The motivational section of this paper suggests that many workers are not as convinced of the personal returns to training as they could be. Less than 20% of workers engaged in training to receive a promotion or a pay raise (NCES, 2005). As such, this first set of policy recommendations aims to improve the demand side of the upskilling challenge by explicitly connecting training with career growth. They aim to encourage employees to develop longer-term career aspirations and help them understand how they can achieve these goals through training. Beyond the employee career mindset, these mechanisms can also signal an organizational climate for learning.

Encouraging the process of career planning can take many forms. When the company is unable to reward employee development with wage increases or a promotion, they can turn to training that is tied to externally-recognizable certifications and make clear how a given course pathway corresponds to a career pathway. Learning experiences involving members at all levels of the company have also been rewarding because they represent an opportunity for employees to interact with people from whom they are generally removed. These low-cost interventions can act as a platform for employees to get to know their peers and start to envision themselves in other roles within the company.

The positive impact of targeted managerial support in this process should not be underestimated. Beyond activities aimed at all workers, managers should be encouraged to identify the highest-potential workers and give them extra encouragement and support for career growth. These might be the employees who have shown up on time, done their jobs well, displayed loyalty to the company, and could move up in the ranks and flourish in a different role with the right set of skills.

### **Optimize Course Offerings**

1. Engage workers, as a group, to make training courses more relevant to their needs.
2. Generate personalized portfolios of training opportunities based on each employee's existing knowledge, role, and desired career pathway.
3. Review course requirements with learners to determine whether the training fits their goals and background.
4. Distinguish mandatory training from voluntary training and make mandatory training as interesting and relevant as possible.

Once career growth and training have been persuasively linked for the employee, employers and other training providers will also need to improve the supply side of the training challenge. From the standpoint of the training portfolio, companies should work to ensure they have the types of training experiences that workers need, and that the quality is high. They can engage employees through workshops or surveys or other methods to understand gaps in the portfolio, gather feedback on employee impressions of courses, and seek to understand whether courses lead to higher performance. They should then use that information to add, delete, or improve courses as needed.

Another approach to the supply challenge is to help employees make sense of the many options available. Rather than ask an employee to choose opportunities from a single inventory of courses, consider finding ways to personalize the catalog for each employee. This does not mean creating new offerings, but rather curating a set of existing options that are most relevant for the employee's needs. This may be better done by an individual who can play the role of guidance counselor, mentor, and advocate as needed, but software is also an option.

Discussing perceived skills gaps with employees and orienting courses around these gaps is one way to help achieve relevance. In particular, recently-promoted or recently-hired employees should be asked where they feel they are still lacking and which skills they think helped push them ahead. These conversations could verify or challenge the relevance of existing offerings. Similarly, training providers should take care to include material on how to transfer knowledge to the workplace in their courses.

Great care should be taken to ensure that a negative training experience does not dissuade employees from further training. This means that a course should neither be too advanced nor too basic for the student. Indeed, it can be easy for a student to hide “knowledge gaps” early and progressively fall behind in a course when it feels too late to speak up.<sup>45</sup> To avoid these situations, training providers should create a list of course pre-requirements, check competencies prior to enrollment, and potentially suggest pre-training.

Finally, employers and training providers should actively distinguish between mandatory training and voluntary training. They should acknowledge when mandatory training accomplishes a strict set of goals that may not be oriented specifically to job-specific skills while helping employees understand the value of more developmental training. In general, organizations should resist the urge to make non-essential training mandatory because it may hinder the perception that training is a valuable opportunity for growth. Instead, they should focus on encouraging employees to participate of their own accord by highlighting the short and long-term benefits of training, and by helping them make good training choices as part of instructional scaffolding.

### **Build Instructional Scaffolding**

1. Include training alumni with whom workers can identify in the recruitment process.
2. Institute a peer-learning structure to make training a collective experience.
3. Designate an employee advocate or mentor who can help workers manage difficulties throughout the learning process.
4. Help employees build up to longer training experiences by starting with shorter courses and capitalizing on positive training experiences.

Given the negative impact of low self-efficacy or poor experiences with prior learning, it will be important to build a support system that students can rely on throughout their learning journey, from recruitment to completion. This scaffolding can help them take their first steps effectively and give them confidence and support for longer learning journeys.

The effect of seeing peers participate in learning, which has been shown to be particularly powerful for less-educated workers, should be leveraged from the start. If employees are skeptical about the benefits of training, speaking with peers who previously enrolled might lend credence to a program. In fact, training alumni should be actively encouraged to share their training experiences widely considered when choosing instructors.

Peer-learning arrangements represent another way to take advantage of this effect. Employees could be assigned a partner for the duration of a training to make it a collective experience. Partners would have a shared responsibility to help each other by talking through issues that come up along the way. This setup could help participation seem less lonely, help to surface and resolve concerns early, and

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<sup>45</sup> Based on conversation with Paula Martel

provide additional encouragement to finish. Similarly, employees could be assigned a peer mentor, who has already mastered the material covered in training.

In general, the organization should make itself a partner during the training process to alleviate any feeling that one is returning to the classroom totally on their own. Particularly for employees whose last classroom experience was not positive or dates back to a long time ago, it may be important to begin with shorter courses and then capitalize on the experience to build up to more intensive courses.<sup>46</sup>

Furthermore, employees should have a point person they can turn to for help in deciding what training to take, or discussing any concerns they have throughout the training. This person should be equipped to assist employees by interfacing with the training provider, providing additional literature, or re-orienting them to a more appropriate training. It may be worth creating formal organizational roles to help reinforce this point.

### **Engage in Innovative Approaches to Training**

1. Accommodate students' schedules with convenient timing and digital or blended courses, and provide the infrastructure to support these options.
2. Offer alternatives to classroom instruction such as job exchange programs, job rotations, or other on-the-job learning schemes (as well as the peer-learning / mentorship programs mentioned above).<sup>47</sup>
3. Prioritize alternatives to written exams to make some training experiences feel like a safer space for learning.
4. Familiarize employees with the rest of the production line or company, beyond their specific roles.
5. Create stackable training programs that provide market-relevant indicators of achievement.
6. Consider creating a "high potentials" program for low-wage workers.

Stakeholders should also rethink their traditional approaches to training. From a delivery standpoint, new technologies can be particularly advantageous as they are cheaper, more flexible, and provide access to many useful resources. Digital or blended programs can also reduce challenges related to timing and schedules. However, employers and training providers should be sure to address any digital divide and offer access to relevant equipment as needed.

Providers should also be mindful of the variety of work schedules that exist and plan accordingly. In particular, training that immediately follows work hours has been found to be popular, while scheduling so that workers go home between work and training can reduce attendance. Employers should also adjust workload as a function of the time dedicated to training.

Employers could also leverage employees who have already trained by asking them to replicate the training at work, effectively acting as a teacher for their peers. Although this scheme might not lead to external recognition of training outside of the company, it has many advantages. It allows training to occur on location and on a flexible schedule, it validates the peer trainer, and it capitalizes on the

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<sup>46</sup> Based on conversation with Paula Martel

<sup>47</sup> For more on this: Illeris, K. (2004), "A model for learning in working life", *Journal of Workplace Learning*, Vol. 16 No. 8, pp. 431-441. <https://doi.org/10.1108/13665620410566405>

effect of seeing peers engage in learning. To encourage these alternative approaches, employers could award badges to recognize experiential expertise.

Alternatives to classroom instruction such as on-the-job training could also be beneficial from a pedagogical standpoint. Not only are some topics better suited to the working environment, but this format may appeal to those who are reluctant to return to a more traditional style of instruction, as well as those interested in a variety of learning delivery methods.

Finally, encouraging employees to understand the whole production process, or a whole area of the company, can have benefits for the employee and company. Employees gain better understanding of their role and how it fits with others. Shared understanding can build camaraderie and surface potential process improvements. And, seeing themselves within the broader context may help workers to understand other roles they may wish to play in the company.

Table 1 connects each recommendation to relevant stakeholders. While stakeholders can certainly engage in other areas, these represent the recommendations where each can be most effective.

**Table 1. Policy Recommendations by Relevant Stakeholder**

	Employer	Training Providers	Job Centers	NGOs
<b>Support a Career Mindset</b>				
Actively encourage employees to think about their professional development	X	X	X	X
Create a role within the organization for providing career advice and linking career pathways to training opportunities.	X			
Advertise career pathways and training opportunities that align with each pathway.	X	X	X	X
Consider tying rewards to performance rather than using uniform or seniority-related approaches.	X			
Create opportunities for dialogue across different types of employees to facilitate career exploration.	X	X	X	
Help workers to see training opportunities as an additional employee benefit, not just another corporate function.	X			
Give special attention to high-performing workers and encourage their career growth.	X			
<b>Optimize Course Offerings</b>				
Engage workers, as a group, to make training courses more relevant to their needs.	X	X	X	
Generate personalized portfolios of training opportunities based on each employee's existing knowledge, role, and desired career pathway.	X	X	X	X
Review course requirements with learners to determine whether the training fits their goals and background.	X	X	X	
Distinguish mandatory training from voluntary training and make mandatory training as interesting and relevant as possible.	X			

<b>Build Instructional Scaffolding</b>				
Include training alumni with whom workers can identify in the recruitment process.	X	X	X	X
Institute a peer-learning structure to make training a collective experience.	X	X	X	X
Designate an employee advocate or mentor throughout the learning process who can help workers manage difficulties throughout the learning process.	X	X	X	X
Help employees build up to longer training experiences by starting with shorter courses and capitalizing on positive training experiences.	X	X	X	X
<b>Engage in Innovative Approaches to Training</b>				
Accommodate students' schedules with convenient timing and digital hybrids, and provide the infrastructure to support these options.	X	X	X	
Offer alternatives to classroom instruction such as job exchange programs, job rotations, or other on-the-job learning schemes (as well as the peer-learning/mentorship programs mentioned above).	X	X	X	X
Prioritize alternatives to written exams to make some training experiences feel like a safer space for learning.	X	X	X	
Familiarize employees with the rest of the production line or company, beyond their specific roles.	X	X	X	X
Create stackable training programs that provide market-relevant indicators of achievement.	X	X	X	X
Consider creating a "high potentials" program for low-wage workers.	X			X

## Conclusion

This literature review makes clear that employees are not a homogenous set when it comes to workforce learning. In particular, less-educated workers face a unique set of considerations that make their training choices very different from those of more highly-educated workers. Yet, only a fraction of the literature we reviewed focuses specifically on the less-educated worker population, and an even smaller fraction is specific to the US. Much more research is needed to understand the different ways that less- and more-educated workers perceive upskilling, and why.

Our model seeks to address some of this gap by identifying characteristics that can motivate worker interest in pursuing training, and facilitators that help them succeed. The research suggests that less-educated workers face a number of costs and may not believe that training will lead to professional growth. Thus, beyond training supply, additional supports are needed on the demand side to make a convincing case that these employees can reap the rewards of training, and in delivery through supportive scaffolding and innovative approaches that can help them succeed.

Further research would take this model onto the production floor and test the concepts among the people who may want to retrain to fill the estimated 2 million jobs created by the growth of advanced manufacturing. It could also examine differences between young students studying for careers in manufacturing and incumbent workers who have been away from school for years, as well as explore the special considerations of other groups, such as English Language Learners.



This research raises a number of other interesting questions to explore in further work. For example, could we identify the trigger events for contemplating a change in career path? Are there types of training that are particularly successful at making people more interested in the experience (or training that deters people from more learning)? How do we gauge the adult worker's perceptions of their environmental pressures, and what happens if they are operating on poor information? Can we affect the choices and outcomes through specific informational or other interventions?

Ultimately, the real value of this model, and the research it motivates, will be in the levers it provides to help incumbent workers engage in effective upskilling. We hope that it will spur stakeholders to improve the training system for less-educated workers so that the workers, and the communities they live in, can thrive through future waves of advanced manufacturing and technological innovation.

## References

- Acemoglu, D. (1997). Training and Innovation in an Imperfect Labour Market. *The Review of Economic Studies*, 64(3), 445–464. <https://doi.org/10.2307/2971723>
- Ahl, H. (2006). Motivation in adult education: A problem solver or a euphemism for direction and control? *International Journal of Lifelong Education*, 25(4), 385–405. <https://doi.org/10.1080/02601370600772384>
- Albert, C., Garcia-Serrano, C., & Hernanz, V. (2010). On-the-job training in Europe: Determinants and wage returns. *International Labour Review*, 149(3), 315–341.
- APA Dictionary. Valence–instrumentality–expectancy theory. (n.d.). In *APA Dictionary of Psychology*. Retrieved Dec. 5, 2020, from <https://dictionary.apa.org/valence-instrumentality-expectancy-theory>
- Autor, D., Mindell, D., & Reynolds E. (2019). “The Work of the Future: Shaping Technology and Institutions.” MIT Work of the Future, November 1, 2019. <https://workofthefuture.mit.edu/research-post/the-work-of-the-future-shaping-technology-and-institutions/>.
- Autor, D., Mindell, D., & Reynolds E. (2020). “The Work of the Future: Building Better Jobs in an Age of Intelligent Machines.” MIT Work of the Future. Accessed December 6, 2020. <https://workofthefuture.mit.edu/research-post/the-work-of-the-future-building-better-jobs-in-an-age-of-intelligent-machines/>.
- Baldwin, T. T., Magjuka, R. J., & Loher, B. T. (1991). The perils of participation: Effects of choice of training on trainee motivation and learning. *Personnel Psychology*, 44(1), 51–65. <https://doi.org/10.1111/j.1744-6570.1991.tb00690.x>
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122–147. <https://doi.org/10.1037/0003-066X.37.2.122>
- Bassanini, A. & Ok, W. (2004). How do firms' and individuals' incentives to invest in human capital vary across groups?. 2004. halshs-00194344
- Bates, R. A. (2001). Public sector training participation: An empirical investigation. *International Journal of Training and Development*, 5(2), 136–152. <https://doi.org/10.1111/1468-2419.00128>

- Battistelli, A. (2009). The influence of the organisational context on training motivation. *Journal of E-Learning and Knowledge Society*, 4(1), Article 1. <https://doi.org/10.20368/1971-8829/263>
- Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education, First Edition*. National Bureau of Economic Research. <https://www.nber.org/books-and-chapters/human-capital-theoretical-and-empirical-analysis-special-reference-education-first-edition>
- Bell, B. S., Tannenbaum, S. I., Ford, J. K., Noe, R. A., & Kraiger, K. (2017). 100 years of training and development research: What we know and where we should go. *Journal of Applied Psychology*, 102(3), 305–323. <https://doi.org/10.1037/apl0000142>
- Boeren, E., Nicaise, I., & Baert, H. (2010). Theoretical models of participation in adult education: The need for an integrated model. *International Journal of Lifelong Education*, 29(1), 45–61. <https://doi.org/10.1080/02601370903471270>
- Bonvillian, W. B, Sarma, S., Perdue, M., & Myers, J. (2020). "Preliminary Report - The Workforce Education Project." MIT Open Learning, April 2020.
- Boudard, E., & Rubenson, K. (2003). Revisiting major determinants of participation in adult education with a direct measure of literacy skills. *International Journal of Educational Research*, 39, 265–281. <https://doi.org/10.1016/j.ijer.2004.04.007>
- Bratton, J. A. (2001). Why workers are reluctant learners: The case of the Canadian pulp and paper industry. *Journal of Workplace Learning*, 13(7/8), 333–344. <https://doi.org/10.1108/13665620110411120>
- Brown, A., & Bimrose, J. (2018a). Drivers of learning for the low skilled. *International Journal of Lifelong Education*, 37(2), 151–167. <https://doi.org/10.1080/02601370.2017.1378934>
- Brown, A., & Bimrose, J. (2018b). Drivers of learning for the low skilled. *International Journal of Lifelong Education*, 37(2), 151–167. <https://doi.org/10.1080/02601370.2017.1378934>
- Brunello, G. (2001). *On the Complementarity between Education and Training in Europe* (SSRN Scholarly Paper ID 273040). Social Science Research Network. <https://doi.org/10.2139/ssrn.273040>
- Caliendo, M., Cobb-Clark, D. A., Seitz, H., & Uhlendorff, A. (2016). *Locus of Control and Investment in Training* (SOEPpaper No. 890, IZA Discussion Paper No. 10406 ID 2886777). <https://papers.ssrn.com/abstract=2886777>
- Carlson, D. S., Bozeman, D. P., Kacmar, K. M., Wright, P. M., & McMahan, G. C. (2000). Training Motivation In Organizations: An Analysis Of Individual-Level Antecedents. *Journal of Managerial Issues*, 12(3), 271–287.
- Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. - PsycNET. *Journal of Applied Psychology*, 85(5), 678–707. <https://doi.org/10.1037/0021-9010.85.5.678>
- Cort, P., Mariager-Anderson, K., & Thomsen, R. (2018). Busting the myth of low-skilled workers – destabilizing EU LLL policies through the life stories of Danes in low-skilled jobs. *International Journal of Lifelong Education*, 37(2), 199–215. <https://doi.org/10.1080/02601370.2017.1404501>
- Cronen, S., McQuiggan, M., & Isenberg, E. (2016). "Adult Training and Education: Results from the

- National Household Education Surveys Program of 2016." NCES (National Center for Education Statistic), September 14, 2017. <https://nces.ed.gov/pubSearch/pubsinfo.asp?pubid=2017103rev>.
- Cross, K. P. (1981). *Adults as Learners. Increasing Participation and Facilitating Learning*.
- Dæhlen, M., & Ure, O. B. (2009). Low-skilled adults in formal continuing education: Does their motivation differ from other learners? *International Journal of Lifelong Education*, 28(5), 661–674. <https://doi.org/10.1080/02601370903189948>
- Desjardins, R., & Rubenson, K. (2011). An Analysis of Skill Mismatch Using Direct Measures of Skills. <https://doi.org/10.1787/5kg3nh9h52g5-en>
- Desjardins, R., Rubenson, K., & Milana, M. (2019). Unequal chances to participate in adult learning: International perspectives. IIEP UNESCO. <http://www.iiep.unesco.org/en/publication/unequal-chances-participate-adult-learning-international-perspectives>
- Elman, C., & O’Rand, A. M. (2002). Perceived Job Insecurity and Entry into Work-Related Education and Training among Adult Workers. *Social Science Research*, 31(1), 49–76. <https://doi.org/10.1006/ssre.2001.0718>
- European Centre for the Development of Vocational Training (Ed.). (2010). *Working and ageing: Emerging theories and empirical perspectives*. Publications Office of the European Union.
- Findlay, J., Findlay, P., & Warhurst, C. (2012). What Every Worker Wants? Evidence about Employee Demand for Learning. *British Educational Research Journal*, 38(3), 515–532. <https://doi.org/10.1080/01411926.2011.557421>
- Fouarge, D., & Schils, T. (2009). The Effect of Early Retirement Incentives on the Training Participation of Older Workers. *LABOUR*, 23(s1), 85–109. <https://doi.org/10.1111/j.1467-9914.2008.00441.x>
- Fouarge, D., Schils, T., & de Grip, A. (2013). Why do low-educated workers invest less in further training? *Applied Economics*, 45(18), 2587–2601.
- Gauly, B., & Lechner, C. M. (2019). Self-perfection or self-selection? Unraveling the relationship between job-related training and adults’ literacy skills. *PLOS ONE*, 14(5), e0215971. <https://doi.org/10.1371/journal.pone.0215971>
- Giffi, C. A., Wellener, P., Dollar, B., Manolian, H. A., Monck, L., & Moutray, C. (2018). *2018 Deloitte and The Manufacturing Institute skills gap and future of work study*. Deloitte Insights, Manufacturing Institute. <https://www2.deloitte.com/us/en/pages/manufacturing/articles/future-of-manufacturing-skills-gap-study.html>
- Gijbels, D., Raemdonck, I., Vervecken, D., & Van Herck, J. (2012). Understanding work-related learning: The case of ICT workers. *Journal of Workplace Learning*, 24(6), 416–429. <https://doi.org/10.1108/13665621211250315>
- Görlitz, K., & Tamm, M. (2016). Revisiting the complementarity between education and training – the role of job tasks and firm effects. *Education Economics*, 24(3), 261–279. <https://doi.org/10.1080/09645292.2015.1006182>
- Goto, S. T., & Martin, C. (2009). Psychology of Success: Overcoming Barriers to Pursuing Further Education. *The Journal of Continuing Higher Education*, 57(1), 10–21.

<https://doi.org/10.1080/07377360902810744>

- Guerrero, S., & Sire, B. (2001). Motivation to train from the workers' perspective: Example of French companies. *The International Journal of Human Resource Management*, 12(6), 988–1004. <https://doi.org/10.1080/713769684>
- Hidalgo, D., Oosterbeek, H., & Webbink, D. (2014). The impact of training vouchers on low-skilled workers. *Labour Economics*, 31, 117–128. <https://doi.org/10.1016/j.labeco.2014.09.002>
- Hootegem, A. V., Witte, H. D., Cuyper, N. D., & Elst, T. V. (2018). Job Insecurity and the Willingness to Undertake Training: The Moderating Role of Perceived Employability: *Journal of Career Development*. <https://doi.org/10.1177/0894845318763893>
- Hui, T. S., & Smith, J. A. (2002, November 15). *The Determinants of Participation in Adult Education and Training in Canada* [MPRA Paper]. <https://mpra.ub.uni-muenchen.de/17998/>
- Hurtz, G. M., & Williams, K. J. (2009). Attitudinal and motivational antecedents of participation in voluntary employee development activities. *The Journal of Applied Psychology*, 94(3), 635–653. <https://doi.org/10.1037/a0014580>
- Illeris, K. (2006). Lifelong learning and the low-skilled. *International Journal of Lifelong Education*, 25(1), 15–28. <https://doi.org/10.1080/02601370500309451>
- Johnson, S., Sawicki, S., Pearson, C., Lindsay, C., McQuaid, R., & Dutton, M. (2009). *Employee Demand for Skills: A Review of Evidence & Policy* [Evidence Report 3]. UK Commission for Employment and Skills. [https://dera.ioe.ac.uk/9116/2/Evidence\\_Report\\_3\\_3.pdf](https://dera.ioe.ac.uk/9116/2/Evidence_Report_3_3.pdf)
- Hufford, A. (2019, December 9). American Factories Demand White-Collar Education for Blue-Collar Work. *Wall Street Journal*. <https://www.wsj.com/articles/american-factories-demand-white-collar-education-for-blue-collar-work-11575907185>
- Kimmel, S., Gaylor, K., & Hayes, J. (2016). Age Differences among Adult Learners: Motivations and Barriers to Higher Education. *Academy of Business Research Journal*, IV, 32–58.
- Knipprath, H., & De Rick, K. (2015). How Social and Human Capital Predict Participation in Lifelong Learning: A Longitudinal Data Analysis. *Adult Education Quarterly*, 65(1), 50–66. <https://doi.org/10.1177/0741713614561855>
- Kondrup, S. (2015). Understanding unskilled work as a condition for participation in adult education and training. *European Journal for Research on the Education and Learning of Adults*, 6(2), 159–173. <https://doi.org/10.3384/rela.2000-7426.rela9064>
- Kosteas, V. D. (2017). Workers' Participation in Training and Import Competition: Evidence from the USA. *The World Economy*, 40(6), 1089–1104. <https://doi.org/10.1111/twec.12403>
- Kraimer, M. L., Seibert, S. E., Wayne, S. J., Liden, R. C., & Bravo, J. (2011). Antecedents and outcomes of organizational support for development: The critical role of career opportunities. *The Journal of Applied Psychology*, 96(3), 485–500. <https://doi.org/10.1037/a0021452>
- Kramer, A., & Tamm, M. (2018). Does learning trigger learning throughout adulthood? Evidence from training participation of the employed population. *Economics of Education Review*, 62, 82–90. <https://doi.org/10.1016/j.econedurev.2017.11.004>

- Kyndt, E., & Baert, H. (2013). Antecedents of Employees' Involvement in Work-Related Learning: A Systematic Review. *Review of Educational Research*. <https://doi.org/10.3102/0034654313478021>
- Kyndt, E., Govaerts, N., Claes, T., Marche, J. D. L., & Dochy, F. (2013). What motivates low-qualified employees to participate in training and development? A mixed-method study on their learning intentions. *Studies in Continuing Education*, 35(3), 315–336. <https://doi.org/10.1080/0158037X.2013.764282>
- Lavrijsen, J., & Nicaise, I. (2017). Systemic obstacles to lifelong learning: The influence of the educational system design on learning attitudes. *Studies in Continuing Education*, 39(2), 176–196. <https://doi.org/10.1080/0158037X.2016.1275540>
- Lerman, Robert, Signe-Mary McKernan, and Stephanie Riegg. "The Scope of Employer-Provided Training in the United States: Who, What, Where, and How Much?," October 26, 2004. <https://doi.org/10.17848/9781417549993.Ch7>.
- Leuven, E., & Oosterbeek, H. (1999). The demand and supply of work-related training: Evidence from four countries. In *Research in Labor Economics* (Vol. 18, pp. 303–330). Emerald (MCB UP ). [https://doi.org/10.1016/S0147-9121\(99\)18026-9](https://doi.org/10.1016/S0147-9121(99)18026-9)
- Lössbroek, J., & Radl, J. (2019). Teaching older workers new tricks: Workplace practices and gender training differences in nine European countries. *Ageing & Society*, 39(10), 2170–2193. <https://doi.org/10.1017/S0144686X1800079X>
- Lundberg, A. & G. Westerman. "The Transformer CLO." *Harvard Business Review*, January 2020. <https://hbr.org/2020/01/the-transformer-clo>.
- Massachusetts Executive Office of Housing and Economic Development (EOHED). (2019, January 15). *Baker-Polito Administration Announces \$2.5 Million for Advanced Manufacturing Training | Mass.gov*. Mass.Gov. <https://www.mass.gov/news/baker-polito-administration-announces-25-million-for-advanced-manufacturing-training>
- Massing, N., & Gauly, B. (2017). Training Participation and Gender: Analyzing Individual Barriers Across Different Welfare State Regimes. *Adult Education Quarterly*, 67(4), 266–285. <https://doi.org/10.1177/0741713617715706>
- Maurer, T. J. (2016). Career-relevant learning and development, worker age, and beliefs about self-efficacy for development: *Journal of Management*. <https://doi.org/10.1177/014920630102700201>
- Maurer, T. J., Lippstreu, M., & Judge, T. A. (2008). Structural model of employee involvement in skill development activity: The role of individual differences. *Journal of Vocational Behavior*, 72(3), 336–350. <https://doi.org/10.1016/j.jvb.2007.10.010>
- Maurer, T. J., Weiss, E. M., & Barbeite, F. G. (2003). A model of involvement in work-related learning and development activity: The effects of individual, situational, motivational, and age variables. *The Journal of Applied Psychology*, 88(4), 707–724. <https://doi.org/10.1037/0021-9010.88.4.707>
- McBride, A., Cox, A., Mustchin, S., Carroll, M., Hyde, P., Antonacopoulou, E., Walshe, K., & Woolnough, H. (2006). *Developing skills in the NHS* [Department of Health Policy Research Programme]. University of Manchester.
- McQuaid, R. W., Raeside, R., Canduela, J., Egdell, V., Lindsay, C., & Berry, C. (2012). *Engaging low*

- skilled employees in workplace learning* [Evidence Report 43]. UK Commission for Employment and Skills. <http://hdl.voced.edu.au/10707/206400>
- Mohr, S., Troltsch, K., & Gerhards, C. (2016). Job tasks and the participation of low-skilled employees in employer-provided continuing training in Germany. *Journal of Education and Work*, 29(5), 562–583. <https://doi.org/10.1080/13639080.2015.1024640>
- Morrell, D. L., & Korsgaard, M. A. (2011). Training in context: Toward a person-by-situation view of voluntary training. *Human Resource Development Quarterly*, 22(3), 323–342. <https://doi.org/10.1002/hrdq.20083>
- NCES (2005). *Reasons for Adults' Participation in Work-Related Courses, 2002-03*. (2005). National Center for Education Statistics. <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2005088>
- Nilsson, S., & Rubenson, K. (2014). On the determinants of employment-related organised education and informal learning. *Studies in Continuing Education*, 36(3), 304–321. <https://doi.org/10.1080/0158037X.2014.904785>
- O'Connell, P. J., & Byrne, D. (2012). The Determinants and Effects of Training at Work: Bringing the Workplace Back in. *European Sociological Review*, 28(3), 283–300. <https://doi.org/10.1093/esr/jcq063>
- O'Donnell, K. "Adult Education Participation in 2004-05." National Household Education Survey (NHES). NCES, May 31, 2006. <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2006077>.
- OECD Stat, 2012. (n.d.). *Adult education and learning: Barriers to participation*. Retrieved November 12, 2020, from <https://stats.oecd.org/index.aspx?queryid=79325#>
- O'Neill, S., & Thomson, M. M. (2013). Supporting academic persistence in low-skilled adult learners. *Support for Learning*, 28(4), 162–172. <https://doi.org/10.1111/1467-9604.12038>
- Osterman, P. (2020). "Skill Training for Adults." MIT Work of the Future, October 14, 2020. <https://workofthefuture.mit.edu/research-post/skill-training-for-adults/>.
- Pierce, H. & Maurer, T. (2009). Linking Employee Development Activity, Social Exchange and Organizational Citizenship Behavior. *International Journal of Training & Development*, 13(3), 139–147.
- Peters, V. (2004). "Working and Training: First Results of the 2003 Adult Education and Training Survey." Education, Skills and Learning Research Papers. Statistics Canada, April 2004. [https://epe.lac-bac.gc.ca/100/200/301/statcan/education\\_skills\\_learning\\_research\\_81-595-e/2004/015/81-595-MIE2004015.pdf](https://epe.lac-bac.gc.ca/100/200/301/statcan/education_skills_learning_research_81-595-e/2004/015/81-595-MIE2004015.pdf).
- PricewaterhouseCoopers (PWC), & Manufacturing Institute. (2016). *Upskilling manufacturing: How technology is disrupting America's industrial labor force*. <https://www.pwc.com/us/en/industrial-products/assets/pwc-upskilling-manufacturing.pdf>
- Raemdonck, I., Leeden, R., Valcke, M., R.Segers, M., & Thijssen, J. (2012). Predictors of self-directed learning for low-qualified employees: A multi-level analysis. *European Journal of Training and Development*, 36, 572–591. <https://doi.org/10.1108/03090591211245495>
- Renaud, S., Lakhdari, M., & Morin, L. (2004). The Determinants of Participation in Non-Mandatory Training. *Relations Industrielles / Industrial Relations*, 59(4), 724–743.

<https://doi.org/10.7202/011336ar>

- Riddell, S., Ahlgren, L., & Weedon, E. (2009). Equity and lifelong learning: Lessons from workplace learning in Scottish SMEs. *International Journal of Lifelong Education*, 28(6), 777–795.  
<https://doi.org/10.1080/02601370903293252>
- Rothes, A., Lemos, M. S., & Gonçalves, T. (2014). Motives and Beliefs of Learners Enrolled in Adult Education. *Procedia - Social and Behavioral Sciences*, 112, 939–948.  
<https://doi.org/10.1016/j.sbspro.2014.01.1252>
- Rowold, J., & Schilling, J. (2006). Career-related continuous learning: Longitudinal predictive power of employees' job and career attitudes. *Career Development International*, 11.  
<https://doi.org/10.1108/13620430610692917>
- Rubenson, K. (1979). *Recruitment to Adult Education in the Nordic Countries—Research and Outreaching Activities*.
- Rubenson, K. (2007). *Determinants of Formal and Informal Canadian Adult Learning: Insights from the Adult Education and Training Surveys* (p. 132) [Learning Research Series]. Learning Policy Directorate - Strategic Policy and Research.  
<http://en.copian.ca/library/research/hrsdc/determinants/determinants.pdf>
- Ruhose, J., Thomsen, S. L., & Weilage, I. (2019). The benefits of adult learning: Work-related training, social capital, and earnings. *Economics of Education Review*, 72, 166–186.  
<https://doi.org/10.1016/j.econedurev.2019.05.010>
- Sanders, J., & Grip, A. (2004). Training, task flexibility and the employability of low-skilled workers. *International Journal of Manpower*, 25(1), 73–89. <https://doi.org/10.1108/01437720410525009>
- Sanders, J. M. A. F., Damen, M. A. W., & Van Dam, K. (2015). Are positive learning experiences levers for lifelong learning among low educated workers? *Evidence-Based HRM: A Global Forum for Empirical Scholarship*, 3(3), 244–257. <https://doi.org/10.1108/EBHRM-01-2014-0002>
- Sanders, Jos, Oomens, S., Blonk, R. W. B., & Hazelzet, A. (2011). Explaining lower educated workers' training intentions. *Journal of Workplace Learning*, 23(6), 402–416.  
<https://doi.org/10.1108/13665621111154412>
- Sawchuck, P. H. (2003). The 'Unionization Effect' among Adult Computer Learners. *British Journal of Sociology of Education*, 24(5), 637–648. <https://doi.org/10.1080/0142569032000127189>
- Schneider, M. R., & Flore, J. (2019). Training and commitment in a German manufacturing company during the post-2008 crisis: A case of internal flexicurity. *The International Journal of Human Resource Management*, 30(10), 1666–1682. <https://doi.org/10.1080/09585192.2017.1308413>
- Shah, C. (2017). *Employer-Supported Training in Australia: Participation, Demand and Supply*. NCVET Technical Report. National Centre for Vocational Education Research.  
<https://files.eric.ed.gov/fulltext/ED577689.pdf>
- Shields, M. A., & Price, S. W. (1999). Ethnic differences in the incidence and determinants of employer-funded training in Britain. *Scottish Journal of Political Economy*, 46(5), 523.  
<https://doi.org/10.1111/1467-9485.00146>

- Silva, T., Cahalan, M., & Lacireno-Paquet, N. (1998). Adult Education Participation Decisions and Barriers: Review of Conceptual Frameworks and Empirical Studies. Working Paper Series. NCES 9810. [/paper/Adult-Education-Participation-Decisions-and-Review-Silva-Cahalan/b1f214e1a66dbf38e5de1322e067480419521a89](https://doi.org/10.1108/13665621011053190)
- Smith, E., Smith, A., & Selby Smith, C. (2010). Old dogs, new tricks: Training mature-aged manufacturing workers. *Journal of Workplace Learning*, 22(5), 277–291. <https://doi.org/10.1108/13665621011053190>
- Sousounis, P., & Bladen-Hovell, R. (2010). Persistence in the determination of work-related training participation: Evidence from the BHPS, 1991–1997. *Economics of Education Review*, 29(6), 1005–1015. <https://doi.org/10.1016/j.econedurev.2010.04.009>
- Støren, L. A. (2013). Who attends work-related training five years after graduation? A comparison across European countries. *International Journal of Lifelong Education*, 32(2), 165–189. <https://doi.org/10.1080/02601370.2012.733972>
- Susomrith, P., & Coetzer, A. (2015). Employees' perceptions of barriers to participation in training and development in small engineering businesses. *Journal of Workplace Learning*, 27(7), 561–578. <https://doi.org/10.1108/JWL-10-2014-0074>
- Sussman, D. (2002). *Statistics Canada: Barriers to job-related training* (Perspectives on Labour and Income Vol. 3, no. 3). Statistics Canada. <https://www150.statcan.gc.ca/n1/pub/75-001-x/00302/6210-eng.html>
- Tam, M. E.-M. (2013). It is not just a matter of having the time: Job-related training participation of Hong Kong employees. *Journal of Education and Work*, 27(5), 524–543. <https://doi.org/10.1080/13639080.2013.780123>
- Tharenou, P. (2001). The relationship of training motivation to participation in training and development. *Journal of Occupational and Organizational Psychology*, 74(5), 599–621. <https://doi.org/10.1348/096317901167541>
- Watanabe, S. P. (2010). Determinants of Employer-sponsored Training Participation for Young Workers during Economic Downturns: Evidence from the Past. *Journal of Industrial Relations*, 52(4), 491–505. <https://doi.org/10.1177/0022185610375511>
- Wolfgang, M. E., & Dowling, W. D. (1981). Differences in Motivation of Adult and Younger Undergraduates. *The Journal of Higher Education*, 52(6), 640–648. <https://doi.org/10.1080/00221546.1981.11778136>
- Wotschack, P. (2020). When Do Companies Train Low-Skilled Workers? The Role of Institutional Arrangements at the Company and Sectoral Level. *British Journal of Industrial Relations*, 58(3), 587–616. <https://doi.org/10.1111/bjir.12503>
- Xu, K., & Lin, Z. (2011). Participation In Workplace Employer-sponsored Training In Canada: Role Of Firm Characteristics And Worker Attributes. *Contemporary Economic Policy*, 29(3), 416–430. <https://doi.org/10.1111/j.1465-7287.2010.00204.x>