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DIGITAL EDUCATION | DIGITAL WORK | DIGITAL LIFE

WHEN DO COMPANIES TRAIN LOW SKILLED WORKERS? THE ROLE OF TECHNOLOGICAL CHANGE, HUMAN RESOURCES PRACTICES, AND INSTITUTIONAL ARRANGEMENTS

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ABSTRACT

The article investigates the role of technological change, HR practices, and institutional organizational differences in training participation of low skilled workers in Germany. By building on institutional theories four hypotheses are derived and tested. Regression analysis based on the IAB Establishment Survey (wave 2011 and 2013) show evidence that the training participation of low skilled workers is shaped by organizational characteristics in terms of advanced production technology, investments in EDP, organizational or technological innovation, institutionalized arrangements and HR policies. While the effects of technology and innovations are of short-term nature, institutionalized arrangements in terms of employee representations and formalized HR practices have an enduring effect: They are positively associated with both a higher likelihood of training investments in low skilled workers and higher rates of continuing training participation among low skilled workers in 2011 and 2013.

KEYWORDS

Continuing training; Organizations; Social Inequality; Technological Change, Regulation

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1 INTRODUCTION

In all European societies low skilled workers face particular labor market risks in terms of unemployment, bad working conditions, or low pay (Eurofound 2009). These risks will further increase with ongoing changes in the world of work, often leading to higher skill requirements and a shrinking demand for unskilled work.

According to calculations of the German Institute for Employment Research (IAB) 45% of the tasks that are recently performed by low skilled workers are routine tasks, which could technically be substituted by computers or computer driven machines (Dengler & Matthes 2015). Though the actual effects of the digital transformation on low skilled jobs are still subject of debates and research (Hirsch-Kreinsen 2016) there is at the same time wide consensus that continuing training forms a key measure to respond to these developments by improving digital skills, labor market opportunities, and career prospects for low skilled workers (Martin & Rüber 2016; Mohr et al. 2016: 553). It is the crucial question of the paper how low skilled workers can be better integrated in employer-provided continuing training in Germany.

According to representative establishment data only one out of two companies in Germany has devoted (working) time or money to continuing training in 2017 (IAB 2017). While 40% of the skilled workers took part in continuing training, the share among the low-skilled workers (doing work that does not require a vocational education) was only 20% (IAB 2017; see also Janssen and Leber 2015: 6).

The low training participation of low-skilled workers raises questions for both the underlying obstacles as well as possible pathways to overcome them. While there is a relative broad literature on training participation in general few studies have focused on the particular group of low skilled workers (see Bellmann et al. 2015; Mohr et al. 2016; Martin and Rüber 2016). Moreover, the role of the institutional company context did not receive much attention, so far. Studies addressing the training participation of low skilled workers have been mainly concerned with determinants like labor shortages (Bellmann et al. 2015) or task characteristics (Mohr et al. 2016). The role of institutional differences between organizations, in terms of collective bargaining coverage, employee representation, or HR practices, have neither been explored systematically nor addressed theoretically in previous research on training participation of low skilled workers.

A qualitative study based on firm-level case studies in Germany could identify a number of favorable institutional influences and mechanisms at the sectoral and company level (Wotschack & Solga 2014). Besides the (well-known) factors that increase in-company training in general (such as a labor shortages, technological change, or an existing educational infrastructure) social and institutional embeddedness of the company proved to be an essential prerequisite for the integration of low-skilled workers through training programs. This includes diverse company agreements and collective regulations, long-term employment relations, worker representation, strong norms of solidarity, as well as tight cooperation between the corporate actors. Moreover, the high proportion of low-skilled workers that participate in further training could not be explained by a single characteristic. In fact, several factors worked together in specific constellations. The integration of such social and institutional determinants and constellations remains a gap in the quantitative research on further training.

This article wants to close this gap in existing research by addressing the question, how institutional arrangements and HR strategies at the organizational level shape the training participation of low skilled workers, in addition to technological change, and labor shortages. The data base is the representative German IAB Establishment Survey provided by the German Institute for Employment research (IAB). Theoretically, the study builds on insights from

institutional organizational theory (Beckert 1996; Granovetter 1985; Steinback et al. 2010).

2 THEORY AND HYPOTHESES

Theoretically, differences in training participation are usually explained by processes of selection (by employers) and self-selection (by employees) (Ramos and Harris 2012; Wozny et al. 2016). Barriers at the individual level, such as the missing subjective perception of existing continuing education needs, lack of interest in continuing education, subjective learning barriers or external constraints (such as family demands) can prevent training participation – even when there are good opportunities at the organizational level (Martin and Rüber 2016). Many of these factors most frequently apply to low skilled workers (Mohr et al. 2016). Regarding the side of the employers, the willingness to train workers tends to decrease when time or financial resources are scarce, when the expected returns to training are low, or if no need for training is perceived (Abramovsky et al. 2011).

A common explanation for low training activities at the company level refers to problems of uncertainty (Osterbeek 1998). Transaction cost theory stresses the risk of opportunistic behavior (Neubäumer et al. 2006; Williamson 1985). From the workers perspective, desired returns to training (such as financial benefits, job security or promotion) can be denied by the employer. Employers, in contrast, bear the risk that training investments do not lead to the desired gains in productivity. Moreover, returns to training are jeopardized by career interruptions or employer change ("poaching"). In order to cope with these risks organizations can introduce contractual arrangements (governance structures). Since it is costly to establish such arrangements, transaction costs are increasing and make continuing training more costly.

Alternative theoretical approaches such as filter theory explain the lower training participation of low skilled workers by the (mis)attribution of low and/or uncertain returns to training (Arrow 1973). According to this view, employers tend to ascribe lower returns and greater risk of loss of training investments to low skilled workers. Since they are not able to predict actual gains in productivity (due to training), they focus primarily on groups of people, where returns to training seem high and safe. Certain personal characteristics like the educational degree (measured in certificates), gender, age, or employment relationship serve as an (indirect) indicator signaling lower risk and more gains in productivity. As a consequence, high skilled, young, male, full-time employed workers are more likely to receive continuing training (Asplund 2005).

Given the outlined theories, I expect that low skilled workers are more often included in continuing training when the company faces technological or organizational change (see Bellmann et al. 2015; Hirsch-Kreinsen 2016). Under these conditions, organizations are forced to invest in training of low skilled workers (despite negative attributions). Advanced production technology, the introduction of new technology, digitization, and organizational change will increase the pressure to invest in training also for low skilled workers in order to enable them to adapt to new or advanced technology, work organization, or production processes (hypothesis H1).

When we follow filter theory there is good reason to be pessimistic about the chances and long-term prospects of low skilled workers to participate in continuing training. In the case of labor shortages or technological change, organizations adapt to situational restrictions and do not follow a substantial long-term strategy. So I would expect that the positive effect on training participation of low skilled workers is rather weak and not enduring (hypothesis H2). As long as mechanisms of statistical discrimination are at work, the negative signal of a low or missing qualification (as an indicator of low or uncertain returns to training) will counteract

training participation, in the long run even. So the question arises how mechanisms of statistical discrimination can be canceled out or at least reduced for low skilled workers in the long run.

Institutional theories emphasize the importance of the social context for (solving) problems of uncertainty in economic exchange relations (Abraham 2001; Granovetter 1985; Beckert 1996: 142). When we apply insights from these theories to the question of (overcoming) unequal training participation, we can derive the following hypotheses.

At the organizational level, institutionalized regulations and structures of employee representation can counteract the discrimination of low skilled workers by establishing alternative criteria for the distribution of training investments. I would expect a favorable influence of employee representations (works councils or other types of employee organization) and collective agreements. When training investments are not (solely) driven by the economic criterion of efficient returns but codetermined by employee representations (that are formally obliged to represent the entire work force also regarding issues of continuing training) or collective agreements mechanisms of statistical discrimination should lose their power (hypothesis H3).

Following organizational theory (Steinback et al. 2010) workplace inequalities are also determined by formal organizational practices (like institutionalized regulations or HR policies) that stabilize (or change) status hierarchies within workplaces. Training participation of low skilled workers should vary with the type and shape of HR strategies, ranging from more market and cost driven strategies to institutionalized and employee-oriented practices. I expect that low skilled workers are better off when training investments are governed by formalized, or employee-oriented HR policies (H4). When HR policies are concerned with issues of employability low skilled workers should receive more training due to their poorer employability. When the performance of low skilled workers is evaluated on a regular base by formalized measures, decisions on training participation should be based on (more) actual information on the real productivity of workers, and less on (negative) signals and ascribed attributions by single managers. I expect a similar effect, when long-term employment relationships provide more information on the performance of low skilled workers.

3 RESEARCH DESIGN

The IAB Establishment Panel (Fischer et al. 2009), waves 2011 and 2013, are used in order to test the outlined hypotheses. Data access was provided via on-site use at the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB) and subsequently remote data access. The IAB Establishment Panel provides elaborated information on company characteristics of about 12.000 German companies per year, including a detailed measure of (employer-provided) continuing training participation for different groups of employees. The Panel is based on a random sample selected from all German companies registered at the German Federal Employment Agency's (BA). The data collection was done via oral interviews with employers or employer representatives based on a standardized questionnaire. The following analyses refer to the wave 2011 because of its particular thematic focus on institutionalized HR practices. Information on training participation in 2011 and 2013 is used in order to observe short- und long-term effects of the selected organizational and sectoral characteristics.

Following the definition of the Institute for Employment Research (IAB) the focus is on employer-sponsored continuing training only. Thus, only training activities, which were (at least partly) funded by the employer in terms of investments of time and/or money are taken into account.

All analyses are based on a sample of 6824 establishments from wave 2011 with at least one low skilled worker and on a subsample of 4016 establishments that participated in wave 2011 and 2013. According to the IAB questionnaire low skilled workers are "workers doing jobs that require no professional qualification". This definition is based on the current job and not on the level of qualification of the employees.

Dependent variables: The first dependent (dummy) variables are training investments (yes/ no) in low skilled workers in the first half of 2011 and the first half of 2013. It refers to the question: 'was your establishment active in continuing vocational training in the first half of the year?' When the answer was 'Yes, working hours and/or financial resources were provided for continuing training", and "low skilled workers" (at least one) participated in continuing training (in 2011, respectively 2013) the establishment was considered to support training of low skilled workers. The second dependent (metric) variable is the training participation rate of low skilled workers defined as the share of low skilled workers that received training in 2011, respectively 2013.

Explanatory variables: To capture a possible *demand for innovation-related upskilling*, a dummy variable was created. It is based on the question if the company has improved an existing service or product, developed a new service or new product, or introduced (new) processes for the improvement of production or services in 2010. *Investment in EDP*: A dummy variable indicates whether there were investments in 'computers, information and communication technology' in 2010.

Whether or not the *HR policies* are institutionalized is measured by the question: '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?'. A factor analysis (main components analysis) confirms that one factor explains 62% of the total variance. The dummy variable for formalization of HR policies is encoded with a value of 1 for all companies that exhibit a positive factor charge, otherwise with the value 0.

Differences in the *orientation of HR policies* are measured by the following indicator: 'How important are the following strategies for your establishment to meet future needs for skilled workers?' HR policies are classified as employee oriented (versus cost-cutting and outsourcing strategies) when they conform highly to the following strategies: 'keeping older workers longer in the company', 'long-term personal development of employees', 'improving the reconciliation of family and working life', or 'creating attractive work conditions'. A factor analysis confirms that one factor explained the four items of 47% of the total variance. The dummy variable for an employee-oriented HR policy has a value of 1 for all establishments with a positive factor charge.

Long-term employment relationships: When the company reports that all employees of the company have permanent employment contracts longer employment periods are assumed.

Tow dummy variables were created indicating whether or not there is a *works council or other form of employee representation* in the company and whether or not the company is covered by a *collective agreement*.

4 RESULTS

In a first step, logistic and OLS regression analyses have been carried out in order to study the role of technology, labor shortages, innovation, institutional arrangements, and HR strategies on continuing training participation of low skilled workers (Table 1). Most company characteristics have been observed in 2011. Only for the business situation, labor shortages, investments in EDP, and recent innovations (regarding work organization, products, services, or the production process) retro perspective

information referring to 2010 was used. Dependent variables are investments (yes/no) in continuing training of low skilled workers (in terms of time or money) and training participation rates of low skilled workers in 2011 and 2013.

	Continuing training for low skilled workers (yes/no)	
Model	**M1 (2011)**	**M2 (2013)**
Explanatory variables (wave 2011)		
Investments in EDP (2010)	0.03** (0.01)	0.03* (0.01)
Recent innovation (2010)	0.04** (0.01)	0.02(*) 0.01)
Modern production technology	0.03** (0.01)	0.02(*) (0.01)
Collective agreement	0.02(*) (0.01)	0.01 (0.01)
Formalized HR practices	0.08** (0.01)	0.09** (0.02)
Employee-oriented HR policies	0.04** (0.01)	0.04** (0.01)
Long-term contracts	-0.04**(0.01)	-0.04* (0.02)
Employee representation	0.03* (0.01)	0.05** (0.02)
Pseudo R^2	0.19	0.18
n (establishments)	6824	4016

(*) significant 10% level; * significant 5% level; * significant 1% level;

Control variables: Company size, compound operation, business situation, employment development, work force composition, infrastructure for training, region (East-/West-Germany), sectors (15 dummy variables)

Source: IAB establishment Panel, waves 2011, 2013; own calculations, only companies with low skilled workers

Table 1: Determinants of training investments in low skilled workers: Logistic regression analysis (average marginal effects; standard errors in parentheses)

In line with hypotheses H1 and H2 the analyses confirm (see Table 1, Table 2) that modern production technology and investments in EDP have a significant positive effect on training investments (in 2011 and 2013) but not on training participation rates of low skilled workers. Recent technological or organizational innovations (in 2010) have a positive effect on training investments for low skilled workers in 2011 and 2013, but training participation rates of low skilled workers are only affected in 2011. With other words (and in line with H2), the included technological determinants do not significantly affect training participation rates of low skilled workers. If they do so (in case of recent innovations) their effect is not enduring.

Regarding the role of the institutional organizational context (H3), the analyses confirms the positive impact of employee representations on both the chance of training investments in low skilled workers (Table 1) as well as their training participation rate in the short (2011) and in the long run (2013). In line with the theoretical expectations we find evidence that employee representations contribute significantly and continuously to higher levels of training participation among low skilled workers.

	Training participation rate low skilled workers	
Model	**M3 (2011)**	**M4 (2013)**
Explanatory variables (wave 2011)		
Investments in EDP (2010)	0.02 (0.01)	0.07 (0.05)
Recent innovation (2010)	0.03* (0.01)	-0.07 (0.01)
Modern production technology	0.02 (0.01)	0.00 (0.05)
Collective agreement	0.01 (0.02)	-0.01 (0.05)
Formalized HR practices	0.03* (0.02)	0.11(*) (0.02)
Employee-oriented HR policies	0.04** (0.01)	0.00 (0.04)
Long-term contracts	0.00 (0.02)	-0.05 (0.05)
Employee representation	0.06** (0.02)	0.11(*) (0.06)
Adjusted R^2	0.04	0.01
n (establishments)	6824	4016

(*) significant 10% level; * significant 5% level; * significant 1% level; same control variables as listed in Table 1

Source: IAB establishment Panel, waves 2011, 2013; own calculations, only companies with low skilled workers

Table 2: Determinants of training participation rates of low skilled workers: OLS regression analysis (standardized coefficients; standard errors in parentheses)

Regarding the role of collective bargaining coverage empirical evidence is rather weak. Collective agreements are positively related to the chance that the company has invested in continuing training for low skilled workers in 2011 (though this effect is only significant at the 10%-level), but not in 2013 (presumably due to the smaller number of cases). For both years, there is no significant effect of collective agreements on the training participation rate of low skilled workers.

With regard to the role of HR strategies (H4), the analysis confirms that the likelihood of training investments was significantly higher for low skilled workers (in 2011 and 2013) when the company was characterized by formalized HR practices. Regarding the effects of

employee-oriented HR policies empirical evidence is less clear. In line with hypothesis H4, they are related to a higher likelihood of short (2011) and long-term (2013) investments in training of low skilled workers (see Table 1). Regarding (higher) participation rates of low skilled workers (see Table 2) there is only evidence for a significant effect in 2011 but not in 2013 (presumably caused by changes in the management). The positive impact of long-term employment relationships is not confirmed by the data. We even find evidence for an opposite effect: Companies with (exclusively) permanent employment contracts are less likely to invest in training of low skilled workers.

The explained variance of models M3 and M4 (Table 2) is low (4%) indicating that the overall impact of company characteristics on training participation of low skilled workers is limited. One possible explanation are mechanisms of self-selection: while the decision of employers to invest in training for low skilled workers depends strongly on the company context, the share of workers who take up training opportunities is largely affected by other determinants (Frazis et al. 2000).

Apart from the outlined institutional influences, training participation of low skilled workers varies with a number of control variables. In line with findings from previous studies (Bellmann et al. 2015), labor shortages, infrastructure and staff for training have a positive impact on training participation of low skilled workers in 2011 (but not in 2013). Smaller companies are less likely to invest time or money in continuing training of low skilled workers. In establishments with a large share of low skilled workers training investments and training participation of low skilled workers are significantly higher.

Furthermore, the likelihood of training investments for low skilled workers is positively related to compound operation, work force composition, (higher) turnover rates, regional, and sectoral differences.

5 CONCLUSIONS

This article addressed a major dilemma of low skilled workers in Europe: Though continuing training forms a key measure to improve their labor market position and to cope with fundamental changes in the world of work (like the digitalization), their participation in continuing training remains very low.

Since particularly low and uncertain returns to training are often attributed to low skilled workers this group is included less often in continuing training. Against this background, the article explored the role of technological change, HR strategies, and institutional organizational arrangements to overcome this problem. To my best knowledge, previous research has not addressed this issue so far.

The article derived from the idea that institutional arrangements are able to prevent the discrimination of low skilled workers substantially. By either providing more information on the actual productivity of low skilled workers, or establishing non-economic criteria for training investments they increase the chance that firms continuously integrate (more) low skilled workers in continuing training. The effect of technological change and innovation, in contrast, is rather limited for this group of workers as long as mechanisms of discrimination are at work.

Analyses of data of the IAB establishment Panel (wave 2011, 2013) confirmed this expectation widely. While there is clear evidence that recent innovations, modern production technology, or investments in EDP have a direct positive effect on the likelihood of training investments for low skilled workers, empirical evidence regarding substantial and enduring effects is weak. Institutionalized arrangements in terms of employee representations and formalized HR policies, in contrast, are related to continuously higher levels of training participation among low skilled workers. Additional analysis (not reported here) show evidence that low skilled workers benefit most in organiza-

tional clusters that are characterized by structures of employee representation, formalized HR practices, and employee-oriented HR policies.

The results of this study underline the importance of institutional arrangements and HR practices at the organizational level. A major role is played by structures of employee representation and formalized HR practices, such as written plans for staff development, formally laid down procedures for vacant appointments, job descriptions, written target agreements, or written evaluations of job performance. For the large number of enterprises without employee representations and formalized HR policies substitute regulations and initiatives at the collective bargaining and state level are needed. Collective agreements might play an important role, too. Yet, their overall impact on the training participation of low skilled workers is still weak. This underlines the need to incorporate more binding regulations on continuing training in order to commit companies to take care of their workers' long-term employability.

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