

Informal Learning and Development of Key Competencies in Workplaces*

Riccardo Leoni[†]

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Abstract

The objective of the study is to test the hypothesis that a number of educational, training and workplace features affect the growth of a worker's key competence level. The focus is on expressed competencies. Our findings confirm Green et al.'s. (2001) model, precisely they demonstrate the strong statistical significance of five variables concerning the organizational nature of the workplace where employees: (i) have participated in improvement groups; (ii) have submitted improvement suggestions; (iii) were interviewed for performance evaluation purposes; (iv) receive constant information flows; and (v) are involved and consulted by the organization.

The cross-sectional nature of the estimates raises typical questions of causality nexuses and endogeneity, which are discussed and addressed in an analogous paper (Leoni and Gaj, 2009) by the most modern econometric techniques, and the set of tests applied do not alter the main results.

The policy recommendations that can be derived include the implementation of: (a) employee-management agreements to redesign workplaces in accordance with the findings of the study; (b) public policies designed to encourage the re-engineering of workplaces in line with the processes under way in the main countries of Central and Northern Europe.

Key words: *training, learning, job design, organizational behaviours.*

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[†] Department of Economics 'H. P. Minsky', University of Bergamo, Italy (email: leoni@unibg.it). The authors wish to thank Davide Antonioli, Massimo Colombo, Annalisa Cristini, Federica Origo and Francesca Sgobbi for the fruitful discussions on certain aspects of the study, and Francis Green for his comments on some preliminary results. Particular acknowledgement goes to Alessandro Gaj for his help in carrying out the econometric estimates. The usual caveat applies and the author take full responsibility for any errors in the paper. The study benefited from a grant made available by University of Bergamo.

1 Introduction

J. J. Heckman has tackled repeatedly the economics of learning and training over the past few years (Heckman, 2000; Heckman, Lochner and Taber, 1998; Heckman, Lochner and Todd, 2003). In reviewing the international literature, both theoretical and empirical, he came to the conclusion that: i) training is a dynamic process; ii) skill begets skill, which is tantamount to recognizing a form of path dependence in the construction of competencies, and most of all, iii) that ‘much learning takes places outside of schools: post-school learning is an important source of skill formation that accounts for as much as one third to one half of all skill formation in a modern economy (this estimate is made in Heckman, Lochner e Taber, 1998)’ (Heckman, 2000, p. 5).

It is well known in the economic literature that work activities (in general) constitute a significant albeit indirect source of learning, such as learning-by-doing (Arrow, 1962), learning-by-using (Rosenberg 1982), learning-by-interacting (Lundvall, 1988) and learning-by-searching (Cohen-Levinthal, 1990). But it is not straightforward to understand which kind of competencies can be learned more easily outside schools (technical or transversal competencies?), nor which specific workplace characteristics might play a role in shaping an individual’s capabilities, abilities and skills.

At this regard, for what we know two research lines have been pursued. One is that of workplace attitudes, or habits developed within the organization that are independent of personal dispositions: workplace attitudes may be the result of a management style and/or the approach of the single manager, or of the sharing of common experiences by workers, which set the standards to which new recruits adhere progressively (due to the effect of informal learning) (Schneider *et al.*, 1995). Bartel *et al.* (2004) show the existence and persistence of a genuine workplace effect on the individual worker’s perception of her role and organization, adding to the findings of previous research the notion that workers’ attitudes are strongly correlated also to the firm’s performance.

The second line of research about the origin of informal (or outside school) learning is related to organizational design, as source of the stable and socially recognized *work practices* that employees are required to perform daily. Green *et al.* (2001) give evidence of a strong relationship between level of a subset of competencies and some specific work practices. As far as the dependent variables are concerned, competencies identified are the ones the debate on life-long

learning considers as «key» or meta-competencies¹, as: i) they are of higher superior class, ascribable to the epistemological concept of meta-competencies, which involve cognitive processes of a higher order; ii) they are responsible, to large extent, of the subsequent and continuing learning of other specific competencies, of various nature (technical and non-technical knowledge), as they are assimilable to Bateson's deuterio-learning (1972); iii) they are applicable to all workplaces, regardless of industry and company size. Their relevance for a firm is due to the fact that its most valuable assets is not just, or largely, technical knowledge (as this can be more easily duplicated or transferred by schooling and by mobility of workers), but rather soft competencies like problem solving, ability to interact and cooperate (teamwork) and capabilities to build and keep good relations (with clients and/or with collaborators). On the front of the explanatory variables, the authors reveal the forging role of key competencies by a set of work practices which are typical of *High Performance Work Organizations* (HPWO) (Appelbaum *et al.*, 1994, 2000; Ichniowski *et al.*, 2000), such as improvement groups (or quality circles), information sharing and wide consultations of employees, suggestion systems and appraisal. This stress the point that learning of key competencies *too* is connected to reflexive work practices temporally and locally situated. There is a broad consensus that reflexivity is a mental prerequisite to develop key competencies (Rychen, 2003, p. 120).

Since we dispose for Italy of a dataset very similar that used by Green *et al.* (2001) for U.K., the aim of this paper is to investigate the role played by the organizational design of workplaces in the competencies formation process, by testing the validity of Green *et al.*'s model in a different context and in different time (year 1997 for UK, year 2003 for Italy). The analysis will review both the concept of firm as a HPWO and the theories of job design (§ 2). It then will move on to build an econometric model (§ 3), which will be tested using a recent database constructed by ISFOL² (§ 4), based on a national survey on a significant sample of workers on the organizational conditions of their workplaces and the learning sources of the competencies expressed. The relevant findings will be discussed in § 5, while the econometric problems of endogeneity, selection bias and heterogeneity implied in the estimates will be avoided, for the sake of space; however we can assure that these problems do not undermine the results acquired.³ Our closing remarks will be presented in § 6.

¹ See the DeSeCo project (Definition and Selection of Competencies: theoretical and conceptual foundations), undertook in 1997 under the auspices of the OECD. For a comprehensive reference see Rycken and Salganik (2003).

² ISFOL is an Italian public Institute for the development of vocational training of workers. The database is labelled under the acronym OAC (Organizzazione, Apprendimento e Competenze, that it *Organization, Learning and Competencies*).

³ All these aspects are discussed and faced in details in Leoni and Gaj (2009).

2 The background

The debate on organizational theories has widely recognized the better performance of the lean production (Womack, 1990) and HPWO models (Appelbaum *et al.*, 1994, 2000; Ichniowski *et al.*, 2000) than the Taylor-fordist ones. The deep reason lies in the fact that the former models spur organizational learning to both worker and firm. The key features of the new organizational designs are the implementation of interfunctional activity systems focusing on processes (rather than on functions) and customer (Womack *et al.*, 1990; Coriat, 1991; Davenport, 1993; Hammer and Champy, 1993; Kenney and Florida, 1994). In order to be more successful, the new system has to be internally complemented by bundles of new work practices, which include team working, job rotation, delayering, information sharing and wide consultations of employees, suggestion systems, appraisal and incentives to learn. The new organizational design and the mentioned complementarities constitute a prerequisite also for a performing implementation of ICT, specially of Enterprise Resources Planning (ERP) systems (Ichniowski *et al.*, 1997; Black and Lynch 2001, 2004; Brynjolfsson and Hitt, 2000; Caroli and Van Reenen, 2001; Brynjolfsson *et al.*, 2002; Brynjolfsson and Hitt, 2003; Bauer, 2003; Cristini *et al.*, 2003, 2008; Zwick, 2004; Colombo *et al.*, 2008). These organizational traits of workplaces enable individuals to develop the creation of organizational knowledge, and firm to control resources that cannot be easily reproduced (Prahalad e Hamel, 1990; Teece, Pisano e Shuen, 1997), building in this manner a competitive advantage.

A microfounded integration of these organizational features, specifically connected to the development of problem solving competence, is the job design theory put forward by Koike (1994). According to this author there are two possible strategies for the division and organization of labour, each defined as separate system and integrated system. The former breaks down operations into two groups: usual operations, for line workers, and unusual operations, involving problem solving, for more experienced workers. Under this organizational design, jobs in the first group require execution capabilities, while those in the second one call for control (for problem solving activities), command and coordination.⁴

In an integrated system, line operators are required (from the start of their employment, with the temporary help of an expert) to deal with flawed products and the causes of the flaws, as well as to manage changes arising from variations in quantities demanded, modifications of production

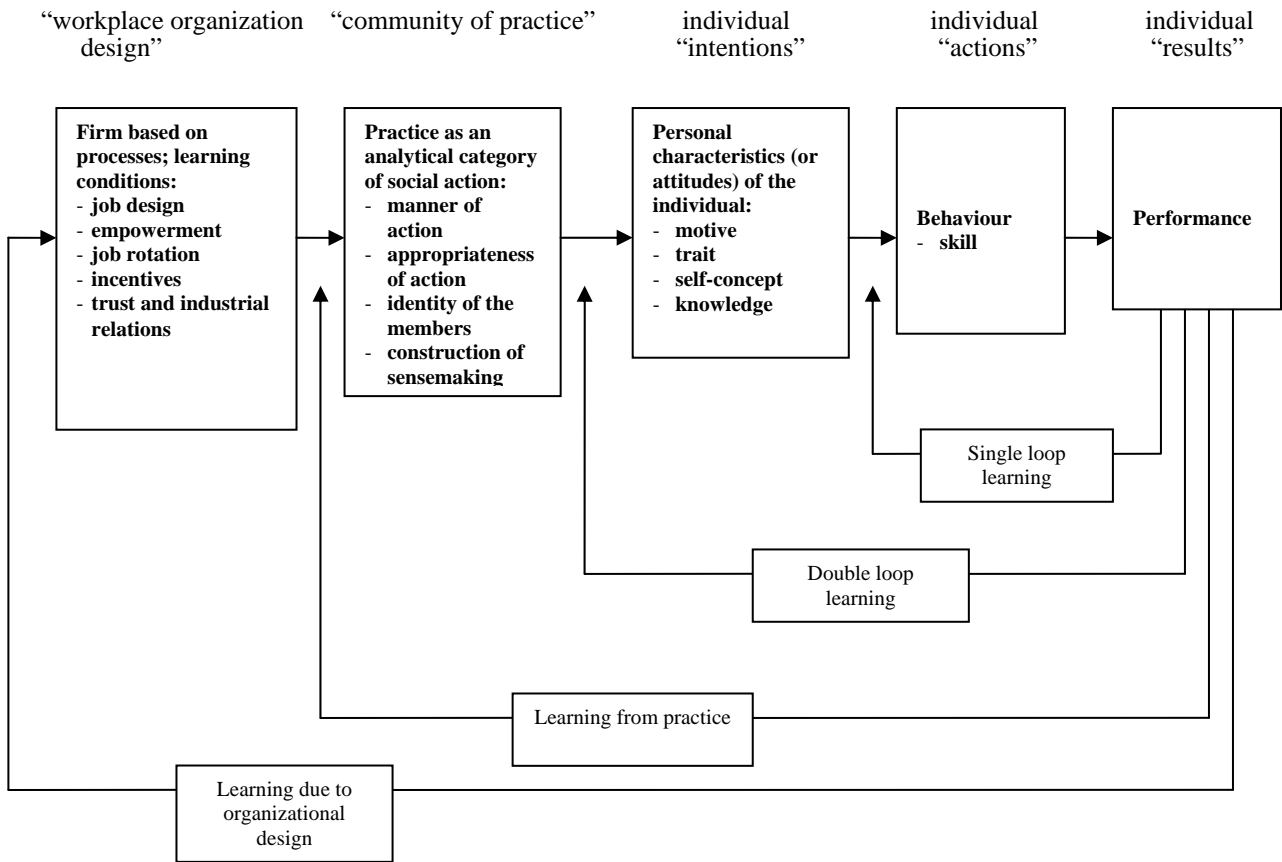
⁴ Under this approach, organizational analysis is called upon to set out the procedures (to eliminate useless steps) and to assign to each job the execution of a specific (and limited) number of procedures. In this way the task is highly specialized and has no relation with its purpose. The transition from tools to machine tools (numerical control machines) and, lastly, to automated machine tools (computerized numerical control machines) brought with it the need to enlarge the tasks of the individual operators, giving rise to the concept and practice of multiple skills (multiskills).

methods and, finally, the innovation of products. The consequence of repeated problem solving on a daily basis is the development of intellectual (or cognitive) abilities, which are further bolstered by the strategic use of job rotation by a worker,⁵ precisely because usual and unusual operations tend to differ from one position to another, determining actual learning and mobility clusters (Dybowski, 1998). Participation in interfunctional improvement groups (quality circles), suggestion systems and consultation on problems that arise are additional organizational/management techniques that contribute to raise the worker's cognitive and relational abilities, as well as the quality of products and processes, thanks to constant problem solving. A direct consequence of this informal learning process is that classroom training should concern mainly short courses, with the goal to systematize knowledge acquired on the field, that is to provide the *know-why* of knowledge (Lundvall e Johnson, 1994).

In the debate on the mechanisms and determinants of competencies formation, the hypothesis of learning springing out of organizational design lies at the root of the sequences depicted in figure 1. This figure reflects learning as theorized by Argyris and Schön (1996), and Le Boterf (2000), which concerns the first two types of learning (right-hand side). The first type is called single loop learning, as individuals learn by modifying their action on the basis of their own and their organization's objectives. However, there is no substantial change in the objectives or in the values or 'action theories' that guide this action: the concept and practice of training are part of this cycle. In double loop learning – the second type – individuals question their objectives and assumptions. They are encouraged to take their operational schemes and concepts to higher levels, that is to revise their 'action theory'. Training for 'open' roles takes place against this background. The third type of learning is related to Wenger's community-of-practice (1998) and to practice as a learning process. Learning is not a separate activity but a result that affects practice; it drives practice. Finally, the fourth type relates to the organizational theory whereby organization and job designs as well as the methods adopted to motivate workers *translate* into *practices* that shape and develop, in an autopoietic manner, ways to learn competencies that result in better performance.

⁵ The term strategic has to be placed on the backdrop of an organizational design that favours team work, i.e. production islands where workers rotate between upstream and downstream (thus contributing to correct any mistakes made by upstream co-workers thanks to the experience previously gained) and of the fact that, ideally, permanence in a given job is related to the time necessary to learn the relevant competencies.

Figure 1 – The learning chain



3 Empirical model

The empirical model to be tested is that by Green *et al.* (2001). It is inspired by the framework of a production function where an individual’s competence level is a function of a series of inputs:

$$ICE_{it} = \alpha_1 SCH_{it} + \alpha_2 WBL_{it} + \varepsilon_i + u_{it} \quad \text{for } t = 1, \dots, n \quad [1]$$

where ICE is an index of the competencies expressed (or acted out) by the individual in job *i*, at time *t*; SCH is an input vector of an educational nature (schooling); WBL is a vector of work-based learning indices; ε_i is a fixed level of skills acquired independently of education or work, while u_{it} is a stochastic term with $E(u_{i1} = u_{i2} = \dots = u_{in} = 0)$.

For education the usual indicator is adopted, that is educational attainment as reflected by the number of school years necessary to obtain the diploma held (SCH: *schooling*), together with the

square of such indicator to control for the existence of any decreasing returns, in accordance with the human capital theory.

For work-based learning, the candidate variables are those related to the years of experience in the labour market (WEXP: *work experience*) (these, too, supplemented with the square term); to an interactive term combining educational attainment and work experience (SCH*WEXP); to an index reflecting the learning time required to perform current job duties, as split between two dummies, one active for periods longer than 24 months (HLT: *high learning time*), and the other for periods shorter than 6 months (LLT: *low learning time*); to two dummy indicators to capture whether the individual has been trained by the current employer (TR_CE: *training with current employer*) or by the previous employer (TR_PE: *training with previous employer*); finally, the employee's seniority with the company (TE: *tenure*). In addition to these standard variables, control indicators are used as: gender (G: *gender*), in order to test the idea (common in the literature) that women develop competencies more easily, especially in the cognitive dimension; the size of the business (ES: *establishment size*), the growth of which might result in skill improvement thanks to the greater incentives and competition that come with a larger size and/or a more complex organizational design, even though the informality of the roles played in smaller organizations might offset this condition; and, lastly, to two types of non-standard employment contract, i.e. a dummy for fixed-term employment (TC: *temporary contract*), and a dummy for part-time employment (PT: *part-time contracts*), to check whether these types of contract undermine the learning effort of workers and the incentive of companies to train workers.

The variable ε_i might reflect such organizational aspects characterizing the individual's job (Z_i) as are deemed to have – according to the literature references in the preceding section – a learning effect, as they prompt the worker to engage in specific work practices. The candidate variables include: participation in an improvement group (QC: *quality circle*); the submission of suggestions (in the twelve months preceding the interview) to improve efficiency in the individual's work (SS: *suggestion system*); a formal performance evaluation by the immediate supervisor on a systematic basis (APP: *appraisal*); participation in meetings (at least every four months) where supervisors/management provided information on company operations to check and fine-tune technical and work-definition problems (INF: *information*); and finally participation in meetings (at least once every four months) where, upon request, the individual expressed his or her point of view (CON: *consultation*).

Specifically:

$$\begin{aligned}
ICE_{it} = & \alpha_0 + \alpha_1 G_{it} + \alpha_2 ES_{it} + \alpha_3 TC_{it} + \alpha_4 PT_{it} \\
& + \alpha_5 SCH_{it} + \alpha_6 SCH_{it}^2 + \alpha_7 WEXP_{it} + \alpha_8 WEXP_{it}^2 + \alpha_9 SCH_{it} * WEXP_{it} \\
& + \alpha_{10} HLT_{it} + \alpha_{11} LLT_{it} + \alpha_{12} TR_CE_{it} + \alpha_{13} TR_PE_{it} + \alpha_{14} TE \\
& + \alpha_{15} QC_{it} + \alpha_{16} SS_{it} + \alpha_{17} APP_{it} + \alpha_{18} INF_{it} + \alpha_{19} CONS_{it}
\end{aligned} \tag{2}$$

The above hypotheses are expected to result in the following signs:

$$\begin{aligned}
\alpha_{1,F} &> 0, \alpha_2 \geq \leq 0, \alpha_3 < 0, \alpha_4 < 0, \\
\alpha_5 &> 0, \alpha_6 < 0, \alpha_7 > 0, \alpha_8 < 0, \alpha_9 > 0 \\
\alpha_{10} &> 0, \alpha_{11} < 0, \alpha_{12} > 0, \alpha_{13} = 0, +\alpha_{14} > 0 \\
\alpha_{15} &> 0, \alpha_{16} > 0, \alpha_{17} > 0, \alpha_{18} > 0, \alpha_{19} > 0
\end{aligned}$$

4. The database and estimate problems

The database⁶ utilized to test the above model was constructed by ISFOL, following a survey carried out through a questionnaire administered via CAPI to a stratified sample of approximately 3605 salaried workers, representing 9.2 million private sector workers (excluding workers in the construction and agricultural sectors).⁷ The questionnaire contains a section intended to determine the frequency of organizational attitudes successfully practiced by the respondents, with detailed references to the ‘organized context’ where the individual operates, and distinctions among: (i) skills required by the role, (ii) expertise held (i.e. mastery in performing, in given contexts, specific activities), and (iii) organizational behaviours really activated.

4.1 Dependent variable

There are 44 listed activities. They are surveyed through a Likert scale from 1 to 7, with frequencies rising from ‘rarely’ to ‘practically nearly always’, to determine whether the attitudes required by the position filled are activated effectively. The items represent organizational attitudes that combine to constitute various skill dimensions. Following the line of thinking of “Skills in Britain” (Ashton *et. al.*, 1999), these dimensions consist of components expressed in such realms as: (i) cognitive/intellectual (writing, reading, calculation, problem solving, control, planning); (ii)

⁶ The database and the relevant questionnaire can be obtained from www.insfol.it/Banche_Dati/Organizzazione-apprendimento-competenze.

⁷ For the methodological approach of the survey and for an initial assessment of the results, see Tomassini, 2006.

interpersonal (communication, teamwork, supervision); (iii) physical (effort, endurance, manual ability); (iv) knowledge (technical, specialized, IT); (v) motivation/self-startedness (reliability, motivation, ability to take independent action); (vi) attitudes/work conditions (organizational effort, autonomy, discretionality, responsibility, variety).

This approach is founded on the idea (as argued by Green *et al.*, 2001) that workers know much more than what it appears from what they actually do and are required to do on the job. As a result, they are capable of providing a truthful assessment of the activities performed and how they perform them. In a similar vein, workers are capable of self-assessing their own skills. If there is a self-appraisal error (either overestimation or underestimation), this is simply assumed to be unrelated to the other variables.

The value of a worker's self-appraisal of the activities required and performed, as opposed to the traditional job descriptions by organizational analysis experts, was supported by the international literature (Kulik *et al.*, 1987; Fried e Ferris, 1987; Spenner, 1990), documenting instances where it was found that workers' assessments were substantially similar to those made by external observers/specialists. This literature suggests also that the (not easily identifiable and measurable) distortion risk arising from 'social desirability'- which may lead individuals to overestimate their self-assessed skills - can be curbed to a significant extent by paying attention to the language used in questionnaires, by asking *respondents not for an assessment of the skills possessed but the degree of role coverage. This can be measured by the frequency with which the required duties are fulfilled effectively by respondents. The result is a survey of the skills actually employed (because they are required by the position), which reflect in the respondent's attitudes and performance.*

Factor analysis, as applied to respondent data, made it possible to highlight as common factors a number of skills, as well as an index of total skills (Leoni, 2006b, and methodological appendix obtainable from the web site indicated in footnote 7). Subsequently, based on contributions coming from economics, sociology and psychology, a series of «key competencies», called also transversal competencies or skills (reference to which is made in this paper), was identified as the expression of such activities as: (i) problem solving (carried out through the in-depth analysis of complex problems, the solution of problems, the identification of errors, and thinking about solving problems); (ii) communication/social interaction with two different groups of counterparties: (ii.a) customers (for instance, providing advice and customer care, or by selling a product or service), (ii.b) subordinates (for instance managing effectively subordinates, or giving instructions or training subordinates); and finally (iii) teamwork (joining in a team effort, helping other team members, listening carefully to colleagues). Moreover, an overall skill index was compiled, by weighing the individual indices, through the variances explained by the individual factors extracted with the factor analysis.

These competencies can be defined as «transversal skills», as theorized the OECD in the DeSeCo (*Definition and Selection of Competencies*) project of 1997 (OECD, 2002; cfr. also Ryken e Salganik, 2003, pp. 66-67). These skills transcend and cross the borders of the various disciplines (which are the subject of specialized activities). They can be activated in different positions and supplement specialist skills. Transversal skills, which can be defined also by using the adjective strategic, are associated with the epistemological concept of metacompetencies (Montedoro, 2004, p. 49), constituting a ‘class’ of a higher logic order vis-à-vis specialist competencies. According to Alberici (2004, p. 106), metacompetencies are related to that dimension of human action related to the *reflectiveness* of thought and the autopoietic nature of competency. These metacompetencies unfold in such dimensions as personal psychological and social resources, social skills and, finally, organizational skills, which include the constructs underlying the factors extracted with the factor analysis.

In this paper we limit ourself applying equation [2] only to the overall index to the dimension of the competencies expressed.⁸ The overall index is no more that the total variance explained by weighting the variance of each factor.

4.2 Independent variables

Every respondent was asked several questions, many of which cover quite accurately the specifications of the explanatory variables described in § 3. The only specification to be added concerns the length of time necessary to learn the skills expressed by the worker. In this paper, we select arbitrarily (though in accordance with Green *et al.*, 2001) three intervals, that is less than 6 months (*low learning time*), between 6 months and 24 months (default variable) and over 24 months (*high learning time*).

But respondents were asked also retrospective questions, concerning the organizational condition of their job 5 years earlier, i.e. participation in quality circles and formal and periodic evaluation of their performance. Moreover, respondents were asked to indicate whether their discretionary power on the job had increased or decreased, compared with the previous condition.

The statistical characteristics of the variables utilized in the estimation processes are avoided for the sake of space.⁹

Skills are expressed by the absolute scores obtained from the factor analysis, while education, work experience and tenure are measured in terms of years. The dichotomic variables reflect the condition measured in percentage terms: for instance, the percentage of workers reporting a period longer than 24 months to learn their skills was 17 percent, compared with 59 percent for those reporting a period of less than 6 months (with the percentage necessary to reach 100 percent being captured by default by the equation constant).

⁸ For an application to each of the three competencies identified, see Leoni and Gaj (2009).

⁹ See Leoni and Gaj (2009) for details.

The sample utilized (for the target universe) consisted of 3578 individuals. This number fell to 3224 due to lack of replies to the question on participation in quality circles five years prior to the interview. It is natural that the average values of some of the variables in both samples differ, as the second sample does not include workers (especially younger workers and women who just re-entered the workforce) that at time t-5 were not employed. Compared to the second, the first sample is relatively ‘younger’ and, accordingly, variables that reflect seniority (such as: work experience, tenure, but also cumulative skills or temporary employment contracts, which are more typical at the beginning of a career and, as such, concern younger people) have a higher or lower average value, depending on the case.

The t-test performed on the single variables confirmed substantially that the second sample was ‘randomly extracted’ from the first, except for those variables discussed above.

4 Findings

Table 1 shows the estimates of model [2], which is related to the overall key competencies expressed by the worker. In column 1 (mod_1), the model is restricted to some control variables and schooling, in keeping with the suggestions of the theory of human capital. The estimates provide an indication in line with this theory, that is the marginal return on education for the skill level appears to be positively decreasing. Among control variables, the negative condition for women as well as for fixed-term and part-time employees is strongly emphasized. But the result is not robust, and the return on education appears to rise steadily following the inclusion of the years of experience in the labour market (mod_2), a variable which is not statistically significant.

< table 1 approximately here >

The introduction of the variables related to *work-based learning* (mod_3) brings into sharp relief their explanatory power. The longer (the shorter) the time required to learn them, the higher (the lower) the level of skills acquired and expressed by individuals throughout their career. Training and company seniority are two significant factors for the individual’s skill development.

However, the key variables in the model (mod_4) are those that reflect the organizational characteristics of the jobs, which are strictly in line with the theory set out in § 2 on HPWOs, as well as with the results of Green *et al.* (2001). The peculiarity of these variables is that they are complementary with those related to work-based learning, simultaneously reducing the role of schooling (whose p-value rises to the limit of acceptability: 9%) and training received from the previous employer. The non-significance of the coefficient of this last variable upholds the idea that companies tend to provide firm-specific training, which the worker cannot utilize in a different context.

Basically, results expressed by mod_4 constitute a sort of replication of Green *et. al.*'s (2001) model, confirmed in a different space (Italy) and time (period 2003).

< table 2 approximately here >

As already noted, our the database provides two retrospective bits of information concerning the respondent's organizational condition five years earlier – i.e. participation, or absence thereof, in quality circles or improvement groups, and periodic evaluation, or absence thereof, of work performance. Moreover, compared to the work conditions prevailing five years earlier, it could be determined whether the worker's discretionary power had increased or diminished and whether employment had become permanent, on a full-time basis. In this case the sample shrank to 3224. Before proceeding with the evaluation of the role of the new variables, mod_4 (in table 1) was re-estimated to check whether the difference in the sample number had entailed changes in the results obtained. Basically, mod_5 (table 2) confirmed the previous results, except for the significance of the schooling and information coefficients, which fell to values that were no longer statistically acceptable.

When the 5-year lag variables are introduced in the model (mod_5, tables 2), the results are substantially similar to the previous ones, with two significant qualifications.

The first concerns the condition of participation in quality circles, where importance is attributed not to continued permanence but to variety. The mission of these circles is short-lived. These groups, which are also called improvement groups, are generally intended to address and solve one or more common problems, to develop new ideas/products, or simply to brainstorm. Long and engaging personal interactions create new knowledge and skills, according to what Nonaka e Takeuchi (1995, p.170) call “socialization” (transmission of knowledge from tacit to tacit among members) and “exteriorization” (transmission of knowledge from tacit to explicit or codified) mechanisms.

The second qualification concerns the condition of performance evaluation, confirming the role as a skill development mechanism of a systematic, non-occasional process in this area. These assessments (which may have been structured differently, though no investigation was conducted in this respect by the survey) generally address both competencies, with a review of the weaknesses that the individual should try to correct,¹⁰ and incentives. The assessment mechanism, and its continuity over time, helps individuals to direct their efforts toward the attainment of the skills required by the organization.

The positive effect of performance assessment for skill development purposes was found also by Diaye *et al.* (2007) in French manufacturing companies with over 50 employees.

¹⁰ This effort is aided by the evaluator (who generally is the employee's supervisor) as well as by the company's “training” department.

The cross-section nature of the estimates raises typical questions concerning the endogeneity of some variables, the selection bias associated with the individuals sampled and heterogeneity (heteroskedasticity). All these questions have been faced in Leoni and Gay (2009), without obtaining any undermining of the acquired results here documented.

5 Policy implications

The findings of this research, together with the results shown in Leoni and Gaj (2009) and Green *et al.* (2001), highlight the role of organizational design in shaping and developing the individual worker's skills. Considering also the results of other analyses – especially those whereby lean organizations: (a) deliver better performance,¹¹ (b) spur greater radical and incremental product innovation,¹² and (c) are conducive to greater worker satisfaction and commitment¹³ - it is our opinion that a much closer look should be taken at the notion of the *inevitability* of the alienating fragmentation of work. A theory whereby individuals are strongly defined by what they do (i.e. work) for their living should pay attention to workplaces characteristics, discriminating between the traditional one and those identified by the strand of research on HPWOs, to which our, Green *et al.* (2001) and Bartel *et al.* (2004) findings refer. Incidentally the two contexts trace back very well to the distinction between labour and work formulated by Arendt (1958).

These findings are important also in connection with two significant policy questions:

1. the positive identification of the key characteristics of workplaces that foster skill development should prompt the employees and employers to introduce – through company agreements – policies designed to develop and redesign workplaces, to achieve objectives in keeping with the findings of this, Green *et al.* (2001) and Bartel *et al.* (2004) research;
2. the adoption by firms of the workplace reorganization processes necessary to achieve objectives in line with the above findings should be encouraged by national policies intended to create the conditions for an effective development and redesign of the workplaces, in accordance with the models of the companies investigated for this paper. Besides, these policies have already been implemented in many countries of Northern Europe, following publication of the green book by the EU in 1997 on “Partnership for a new organisation of work.”¹⁴

An economic and industrial policy designed to encourage the organizational development of workplaces, in keeping with the above characteristics, would make it possible also to generate dynamic capabilities (Teece, Pisano e Shuen, 1997; Cristini *et al.*, 2005) thanks to the virtuous circle that sets in, despite the contrasting effects of the constant changes in the demand for products

¹¹ For further information reference should be made to the growing literature on this aspect: Ichniowski *et al.*, 1997; Black and Lynch (2001, 2004), Brynjolfsson and Hitt, 2000; Caroli and Van Reenen, 2001; Brynjolfsson *et al.*, 2002; Brynjolfsson and Hitt, 2003; Bauer, 2003; Cristini *et al.*, 2003; Zwick, 2004.

¹² See Michie and Sheehan, 1999, 2003; Pini and Santangelo (2005a, 2005b).

¹³ See Freeman and Kleiner, 2000; Helliwell and Huang, 2005; Origo and Pagani, 2006; Cristini, 2007.

¹⁴ For a review of these policies, see: Business Decisions Limited, 2000; Alasoini *et al.*, 2005.

and services. In other words, such a policy would encourage recurrence in the creation of capabilities along a circular flow from organizational design/human resources management, to informal learning processes, to skill development and back again to organizational design/human resources management, and so on. Since it is self-sustaining, this process makes learning genuinely “organizational” more than “individual”. If this circularity were to be further confirmed, it would follow that companies are limited in and by their capabilities to change their growth path. From a theoretical point of view, these path-dependency effects can, on the one hand, help to understand the persistent heterogeneity of firms and, on the other, act as predictors of future capability accumulation processes. However, in the meantime, these effects make available to policymakers information on possible starting points for action against lock-in factors and/or the slowdown of growth in organizational learning and the performance of firms.

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Table 1 - Dependent variable: index of total key competences

Weighted OLS estimates, with heteroskedasticity-robust standard error. Levels of confidence: *** = 1%, ** = 5%, * = 10%

Indip: variables	Mod-1		Mod-2		Mod-3		Mod-4	
	Coeff. (s.e.)	I.o.c.	Coeff. (s.e.)	I.o.c.	Coeff. (s.e.)	I.o.c.	Coeff. (s.e.)	I.o.c.
Gender: 1-M (2-F)	-2.220 (.582)	***	-1.905 (.581)	***	-1.211 (.536)	**	-0.601 (.515)	
Establishment size	0.00003 (.0002)		-0.0004 (.0002)		-0.00006 (.0003)		-0.0002 (.0003)	
Temporary contract	-1.968 (.920)	**	-1.059 (.890)		-0.461 (.882)		0.058 (.851)	
Part time contract	-1.642 (.777)	**	-1.608 (.772)	**	-0.905 (.732)		-1.227 (.690)	*
Schooling	1.673 (.409)	***	1.327 (.476)	***	1.022 (.463)	**	0.769 (.450)	*
Schooling ²	-0.029 (.016)	*	-0.018 (.017)		-0.013 (.017)		-0.011 (.016)	
Work experience (WEXP)			0.084 (.114)		-0.057 (.108)		-0.129 (.109)	
WEXP ²			-0.002 (.002)		0.001 (.002)		0.001 (.002)	
Schooling*WEXP			0.014 (.010)		0.007 (.010)		0.011 (.009)	
High learning time (> 24 months)					2.121 (.978)	**	1.558 (.953)	*
Low learning time (< 6 months)					-2.693 (.602)	***	-1.629 (.601)	***
Training with current employer					4.222 (.678)	***	1.965 (.703)	***
Training with previous employer					2.547 (.865)	***	1.253 (.852)	
Tenure					0.073 (.038)	*	0.090 (.037)	***
Quality circle							2.690 (.933)	***
Suggestion system							4.275 (.548)	***
Appraisal							2.109 (.680)	***
Information							2.171 (1.119)	**
Consultation							2.352 (3.116)	***
Constant	7.691 (2.588)	***	7.519 (3.166)	**	10.239 (3.182)	***	8.160 (3.116)	***
Number of obs	3578		3578		3578		3578	
F(19, 3558)	32.02		31.09		30.78		38.18	
Prob > F	0.0000		0.0000		0.0000		0.0000	
R-squared	0.1237		0.1380		0.2203		0.3094	
Root MSE	9.1781		9,1069		8.6676		8.1629	

Table 2 - Dependent variable: index of competence ‘TOTAL KEY COMPETENCES’

Weighted OLS estimates, with heteroskedasticity-robust standard error. Levels of confidence: *** = 1%, ** = 5%, * = 10%

	Model_5		Model_6	
Indip. variables	Coefficients (s.e.)	l.o.c.	Coefficients (s.e.)	l.o.c.
Gender: 1-M (2-F)	-0.558 (.563)		-0.525 (.563)	
Establishment size	-0.0002 (.0003)		-0.0003 (.0003)	
Temporary contract (time t)	0.753 (.964)		0.857 (.994)	
<i>Change contract: from temporary (t-5) to permanent (t)</i>			0.446 (.924)	
Part time contract (time t)	-1.806 (.755)	**	-1.785 (.766)	**
<i>Change contract: from part-time (t-5) to full-time (t)</i>			0.318 (1.154)	
Schooling	0.638 (.527)		0.669 (.543)	
Schooling ²	-0.003 (.018)		-0.005 (.019)	
Work experience (WEXP)	-0.124 (.134)		-0.106 (.135)	
WEXP ²	0.001 (.003)		0.001 (.003)	
Schooling*WEXP	0.001 (.010)		0.010 (.011)	
High learning time (> 24 months)	1.654 (.983)	*	1.520 (.960)	
Low learning time (< 6 months)	-1.587 (.637)	***	-1.592 (.635)	***
Training with current employer	1.946 (.746)	***	1.919 (.775)	***
Training with previous employer	0.864 (.921)		0.816 (.914)	
Tenure	0.090 (.037)	**	0.092 (.038)	***
Quality circle (time t)	2.495 (.993)	***		
<i>Quality circle (yes, time t & t-5)</i>			0.946 (1.482)	
<i>Quality circle (yes time t; no t-5)</i>			3.916 (1.082)	***
Suggestion system	4.612 (.588)	***	4.480 (.587)	***
Appraisal (time t)	1.991 (.730)	***		
<i>Appraisal (yes, time t & t-5)</i>			2.125 (.890)	**
<i>Appraisal (yes time t; no t-5)</i>			1.508 (1.131)	

Information	1.441 (1.177)		1.243 (1.186)	
Consultation	2.372 (.697)	***	2.326 (.710)	***
<i>Increase in discretionary power (between t-5 and t)</i>			1.263 (.728)	*
constant	8.346 (3.686)	**	7.824 (.3773)	**
Number of obs.	3224		3224	
F (19, 3204)	38.33		32.35	
Prob > F	0.0000		0.0000	
R-squared	0.3211		0.3262	
Root MSE	8.1632		8.1389	