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Sylvie Montreuil et Marie Bellemare

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Ergonomics, Training and Workplace Change: Introduction

SYLVIE MONTREUIL
MARIE BELLEMARE

In recent years, organizational changes and the importance of employee skill development have become major challenges facing specialists of industrial relations, management and work. Managers, particularly human resource managers, often become facilitators (Demers 1999), who are responsible for the promotion of an organizational environment conditions that enable members of their organization to make anticipated changes. Moreover, as suggested by Keller (1995), too little emphasis is placed on the reasons and conditions, other than economic motives, for recently emerging forms of employee participation.

This special issue of *Relations industrielles/Industrial Relations (RI/IR)* explores this trend. It presents approaches and empirical research on two areas of intervention, both of considerable interest to ergonomists, but also likely to offer new perspectives for other specialists of work. The first involves training actors in work environments to use a participatory approach to the transformation of work situations. The second examines the contribution of an ergonomic-oriented occupational analysis of the design of high quality occupational training.

Training is a field of practice and research involving various experts on work, particularly ergonomists (Teiger and Montreuil 1996). Since the early 1990s, an international network of researchers and ergonomists has explored the theme of ergonomics and training, presenting their findings at the triennial International Ergonomics Association conference (2000, 1997, 1994, Quéinnec and Daniellou 1991).¹ This is a testimony to the

– MONTREUIL, S., Département des relations industrielles, Université Laval, Québec.
BELLEMARE, M., Département des relations industrielles, Université Laval, Québec, and
Institut de recherche Robert-Sauvé en santé et en sécurité du travail, Montréal, Québec.

1. These symposia have resulted in thematic issues of the following scientific journals: *Éducation Permanente* (1995, No. 124), *Performances Humaines et Techniques* (1998, December) and *Safety Science* (1996, No. 2/3).

importance and persistence of the topic. This work is the basis of this special issue. Readers who are less familiar with ergonomics may wish to consult a previous special issue of *RI/IR* (Vol. 50, No. 4) entitled "Ergonomics and Industrial Relations." In particular, it contains an article written by Lamonde and Montreuil (1995), in which they explain the basics of ergonomics and its relationship to industrial relations.

ERGONOMIC TRAINING OF WORKPLACE ACTORS

Ergonomic training of workplace actors generally refers to a context in which ergonomists deliver training to individuals representing various services (e.g., production, engineering, maintenance) and levels (e.g., workers, production supervisors, project leaders) in response to a request made on behalf of an organization or a group of workers. This training is often given as a response to a request to address occupational health and safety problems, but sooner or later it encompasses both quantity and quality aspects of productivity. The goal of such training is to provide workplace actors with the necessary tools to characterize all parameters that define the work situation, recognize their effects on both individual work activity and production outcomes, as well as to identify changes that will improve the situation. Once training is complete, these individuals can apply this know-how and experience to other transformation projects or existing representation structures.

This training can generally be characterized in the following way:

- It concerns adults whose diverse and complementary professional experience, as well as individual know-how, is taken into consideration in the training. The training content is based on this know-how.
- It is geared towards transformation of work situations by focusing on the dynamics that emerge during the training activity and on the participants' functional knowledge of the organization's operations.
- Emphasis is placed on learning through action: each actor may put forward his or her point of view regarding the parameters of the situation to be transformed.

Such an approach falls within the general context of participatory ergonomics (Noro and Imada 1991) and two research interventions of this nature are presented in this issue (Bellemare et al. and St-Vincent et al.).

Bellemare, Montreuil, Marier, Prévost and Allard present a participatory ergonomics intervention that depicts the necessary context for action-oriented training: the plant mobilization phases, actor training and the

transformation of work situations are clearly identified. On the basis of qualitative analysis of data gathered over an 18-month period, the authors present their assessment of the process and outcome of ergonomics training delivered to actors in the hot metal production industry. The actors developed the ability to identify factors that facilitate change or transformation.

This training was intended for the transformation of work situations involving individual acquisition of a number of analytical tools and it proposed changes based on the participants' knowledge. An article by St-Vincent, Lortie and Chicoine provides an overview of the methods and tools they employed in two Québec manufacturing plants with very different settings. The participatory approach requires developing tools that will promote the emergence and expression of participants' knowledge. Furthermore, this research led to the creation of various tools adapted to the analysis of both repetitive and varied task stations. Hence, this study covers entire spectrum, beginning with occupational analysis, highlighting the difficulties encountered when performing the work and extending to the search for solutions by ergonomically trained participants.

Berthelette, Desnoyers and Bédard present on a quantitative approach for the assessment of a union-sponsored occupational health and safety training program. The authors compare the final outcome against expected results, in terms of attribution of several causes of occupational accidents, identification of these causes, preventative measures and broadening the scope of the accident analysis to include environmental risk factors. Their work is a striking illustration of how evaluative research can be used to successfully determine the participants' representations of occupational accidents before and after training. Assessing the outcome of occupational training is a topic that is far too seldom examined and we believe that these research findings provide fresh insights on this subject.

THE ROLE OF ERGONOMICS IN OCCUPATIONAL TRAINING

Knowledge construction is certainly germane to the question of qualification. Ergonomic analysis of work activities can make an important and original contribution to this issue by providing answers to two questions. How does professional experience enable acquisition of knowledge? How can the various know-how acquired through professional experience be identified and integrated into occupational training programs? The history-based approach described by Lacomblez provides a better understanding of the options and issues where selected links are established between work analysis and occupational training. This article presents a four-step account of the history of occupational training by looking at the social and scientific

practices associated with the successive phases of wage relationships and their link to occupational analysis.

The interweaving of occupational training with socio-economic context highlights the technical and organizational determinants of conditions for work achievement from an ergonomic perspective. Leppänen describes a research-action project carried out in two paper production plants in Finland. This industry has undergone considerable changes over the last fifteen years, moving towards an increasingly automated production process. As a result, all machine operators and process supervisors must now be able to recognize malfunctions indicated by a computer system, formulate hypotheses regarding the status of the process and take appropriate actions. They must also report their observations and decisions to those group members who ensure smooth, continuous production. This research highlights an analysis of the operators' activity that clearly illustrates the various skill levels involved: individual, team and organizational. The study shows that a training program based on systematic analyses of subjective and objective aspects in the work process, as perceived by workers and production supervisors, facilitates operational knowledge acquisition of the process. The training program provided an opportunity to pool knowledge and resulted in dozens of suggestions being put forward for production improvements, both technical and relational, for the various trades.

The articles in this special issue are to be commended for both their quality and relevance. Several notable conclusions emerge:

- The anchoring of ergonomics in activities actually integrated into task performance and the possibility of unveiling previously unidentified facets permits actors in work environments to enrich each other's knowledge and thus more easily accommodate organizational change, anticipate occupational training needs and improve work situations.
- In the participatory approach, training is a means of ensuring results at the time of the ergonomic intervention. It also helps to prolong the effects, as the various actors are confronted with different representations of the work performed and thereby often develop a new outlook of the work, which takes into account malfunctions, variations, the work collective, etc.
- Ergonomic occupational analysis appears to be a powerful tool for fostering skill acquisition and development in the workplace. It has the advantage of highlighting optimal performance conditions that will promote the development of new skills and the physical security of workers.

Lastly, we should point out that these articles reveal the possibility and necessity of drawing from various disciplines in order to gain a better understanding of the work process and the changes affecting it. Combining the contributions of evaluative research, psycho-sociology, professional didactics and sociology, with those of ergonomics and occupational sciences is a key determinant for understanding work, and the optimization of its transformation.

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