



Ação Ergonômica
Revista Brasileira de Ergonomia

ação ergonômica volume 12, número 2

ERGONOMICS AND TRAINING IN WORKPLACES: A MEETING POSSIBLE?

Vicente Nepomuceno

Email: vicente.nepomuceno@gmail.com

Professor de Eng. de Produção na Universidade Federal do Estado do Rio de Janeiro - UNIRIO; Doutorando no Programa de Pós Graduação em Eng. de Produção da Universidade Federal Fluminense - UFF

Denise Alvarez

Email: alvarez.dena@gmail.com

Professora do Depto e do Programa de Eng. de Produção da Universidade Federal Fluminense - UFF

Fernanda Araujo

Email: fernanda.s.araujo@gmail.com

Professora de Eng. de Produção no Centro Federal de Educação Tecnológica Celso Suco da Fonseca – CEFET/RJ, UnED Nova Iguaçu; Doutoranda no Programa de Pós Graduação em Eng. de Produção da UFF

Marcelo Figueiredo

Email: marceloparada@uol.com.br

Professor do Depto de Eng. de Produção da Universidade Federal Fluminense – UFF

Abstract: In this article we present a literature review on recent academic productions in the field of ergonomics and training. The objective is to identify, from the accumulated theoretical-methodological framework, some possibilities of action within this field, in addition to pointing to some topics of interest for future research and interventions. Firstly, some of the possible domains of the meeting between ergonomics and training will be presented. Next, we will make a brief historical retrospective of this field, so that, in the third topic of the article, identify those that we consider as main theoretical-methodological references. At the end, the most recurrent research and intervention themes found in the different experiences analyzed will be presented.

Keywords: Ergonomics, Academic productions theoretical - methodological.

1. INTRODUCTION

1.1 Some possible areas of encounter between Ergonomics and Training.

A recurring synthesis about the main objective of ergonomics is to say that it aims to adapt work to man and not man to work. It is work that must change to adapt to human limits. Humans must not adapt to the conditions imposed by work conditions and organizations. The opposite is expected: that its limits and characteristics are respected by the conditions and organization of work.

Ergonomics proposes changes in the conditions offered for carrying out work, so that workers are no longer the only ones to guarantee their own health through the use of themselves. It does not address the needs of workers to change their behavior (LACOMBLEZ & VASCONCELOS, 2009).

Training, on the other hand, aims to adapt people to work, seeking to influence workers' behavior. For this reason, at first glance, it may be difficult to imagine the dialogue between ergonomics and training. “*Todavia, alguns ergônomos mantiveram um certo interesse pelas potencialidades da intervenção formativa, considerando-a uma alavanca para a ação, uma passagem útil para uma difusão mais alargada do projeto da ergonomia.*” (LACOMBLEZ & VASCONCELOS, 2009, p.54)

Changing conditions does not depend solely on scientific knowledge. It also presupposes the engagement and determinations of the actors involved. For Falzon and Teiger (2001), ergonomics and training are two poles for understanding man and work, which seem to have difficulty going together. However, even with some resistance, it is possible to identify spaces and moments of encounter between these poles.

Lacomblez and Teiger (2007) identify three meeting domains:

- the training of workers justified and defined thanks to the analysis of the work;
- the training of design and/or health actors in work

analysis;

- work analysis for the development of professional experience, integrated into the transformation of work.

The first and second domains differ in that the first performs work analysis and then, based on it, proposes and carries out training, while the second domain aims to train in work analysis. The first aims to develop the professional knowledge of the workers “object” of the analysis, while the second aims to teach work analysis techniques for these or other workers to intervene in the work situation. One proposes, ultimately, the change of the subject and his way of acting at work, and the other the development of an analysis of work that will lead to the transformation of working conditions, but which, in turn, will allow other forms of work. to act.

The analysis of work prior to training is related to professional training spaces. It can be applied in various situations, ultimately, in all training spaces focused on the exercise of a profession, we could analyze the work previously to avoid the “knowledge economy”. These two elements (training in work analysis and prior work analysis to support professional training) can coexist within a third type of intervention.

The third domain seeks to reconcile the objectives of the first two, associating them with the dimensions of research, training and action. In this third type, we move towards resolving the dilemma “adaptation of work to man or man to work”. Lacomblez and Teiger (2007) state that between acting on the conditions of execution or on individuals, experience has shown that it is not possible to achieve one without the other. Therefore, it is about analyzing the work to develop professional knowledge, and at the same time, to intervene in the conditions of execution. Below we seek to briefly reconstruct the history of the construction of this domain.

1.2. Brief history of “Training in/through work analysis for/through action”

The 1970s is a milestone in the establishment of this field, and its references are the emblematic dialogue initiatives with trade union movements, as in the case of Italy, with

Ivar Oddone, and in France, with the CNAM work physiology laboratory.

The experience of training workers at CNAM originated from the need to carry out training and intervention remotely from work. It was believed that AET training would provide workers with a tool for action. A space for dialogue was created between researchers and trade unionists who presented a social demand and who had workers' knowledge that should be taken into account in the analysis of work. The meeting between both knowledge - scientific and workers' - made it possible to construct a shared description of work between researchers and workers.

The knowledge produced in these spaces fed the trade union environment and the world of ergonomics. In such a way that, according to Lacomblez, Teiger and Vasconcelos (2014), it was possible to frame these co-learning experiences within the scope of a common object of study in the field of action research. The shared training space proved to be a stimulating intervention model and other methods spread from there, in France and other countries (LACOMBLEZ & VASCONCELOS, 2009).

In line with these principles, the methodology proposed by Teiger and Laville in the dialogue with the unions was guided by the self-analysis of work. The ergonomic analysis would be carried out by the operator involved in the work situation. The authors called this experience an actor training paradigm and defined a set of principles that guided it (LACOMBLEZ & VASCONCELOS, 2009):

- The initial knowledge of trainees is integrated into detailed descriptions of their work activity and its effects on health. This is followed by maieutic questioning to encourage the trainee to translate into words what he does not know he knows.
- Knowledge emerges in a timely manner, rather than within a pre-established program. There is a back and forth between the observation of the trainees and the analysis of the ergonomists who evoke three types of knowledge:

(1) ergonomic knowledge of the activity model;

(2) methodological knowledge in work analysis; and (3) strategic knowledge, responsible for ensuring the implementation of transformations.

- Language must be thought out carefully special to allow this meeting of knowledge. From the point of view of this way of doing ergonomics, teaching AET to trainees must be an instrument for action. Not learning AET to reproduce these teachings, but learning to act (LACOMBLEZ & VASCONCELOS, 2009).

“This dynamic of the relationship between trainees and trainers is generated by the potential of the ergonomic analysis of work, when defined as the object of the training intervention.” (LACOMBLEZ & VASCONCELOS, 2009)

This training experience with unions was enriched by debates and experiences developed in other countries, such as Canada and Brazil (FERREIRA, 2015; BRITO et al., 2011), as well as other experiences in France (GAUDART et al., 2012). Furthermore, it expanded from initiatives to appropriate the methodology to work directly with actors in a company, without the intermediation of unions. This aspect brings new challenges to the field of encounter between ergonomics and training.

Interventions of this type within companies became more frequent in the 80s and 90s. Several studies have been carried out with company actors in Portugal (LACOMBLEZ & VASCONCELOS, 2009; COSTA, SILVA, 2010) and in Canada (ST. VINCENT et al., 1998; BELLEMARE et al., 2000), aiming to reduce professional risks.

In these experiences, it is important to note that the necessary investments for professional training are not always available. In Portugal, for example, the authors observed low company availability to release workers for training activities. This type of problem can make action impossible, or have the perverse effect of making the worker believe that he is able to carry out his work safely and efficiently, when conditions do not allow this to happen.

“Unlike the aforementioned actions within trade union organizations, these are effectively part of the business context, which limits the time availability of participants, who are unlikely to be exempt from their productive activity to participate during working time in training sessions. .” (LACOMBLEZ, TEIGER, 2007, p.597)

2. METHODOLOGY

2.1 *Theoretical-methodological corpus*

From the initial experiences to the present day, some principles that guided practices in this field were formalized, constituting a fundamental theoretical-methodological corpus called by Lacomblez, Teiger and Vasconcelos (2014) as training of actors in and through the analysis of work for and by action. We highlight four principles from this corpus below: the philosophy of action, constructivist pedagogy, mutual learning and the need for clinical and strategic knowledge on the part of the trainer.

Philosophy of action

The specificity of this training for and through action lies in the conception of ergonomics as a science of action. This point of view makes reference to the thought/action relationship and belongs to a double tradition: the philosophy of action and constructivist pedagogy (TEIGER, MONTREUIL, 1996).

The question of action is at the origin of ergonomics, which aims to be a practice of change. The process of understanding the work aims to transform it, therefore aiming at action. According to the philosophy of action, a change of point of view is an opening to the design and conception of other possibilities, which begins the day we become capable of conceiving another state of things and decide that this situation is intolerable.

Caoutarel et al. (2009) and Petit (2008), as well as other ergonomics authors, look to Sartre for a reference

for this debate. In the philosopher's words, the action does not result from a process of deep suffering that would make a situation unsustainable but, on the contrary, the action results from the perception that another state of things is possible and, then, one can realize that the situation is painful and unsustainable. You need to open yourself up to another state of things.

For Teiger and Montreuil (1996), this particular interest of ergonomics in changing the work situation means that the conception of another state of things is the type of training under discussion. The object of research is the type of process that brings about this new way of conceiving things. Or, put another way, it is “the dynamic aspect of the transformation of representations of a situation that provides the impulse to change points of view, thus allowing actions that transform situations” (TEIGER, MONTREUIL, 1996, p.87).

Lacomblez and Teiger (2007) will affirm the understanding of action in its broadest sense, that is, they state that the essential thing is to debate the initial representations about work and prevention, which are often reductive, and transform them into representations for action, providing bases analyzing situations and enriching the arguments for the intended changes.

Tradition of constructivist psychology

Job analysis training does not teach you how to memorize the AET steps. Knowing is not copying what is real, but acting on it, transforming it, in fact or in appearance, as a way of understanding. This arises in the workspace under the issue of representation (LACOMBLEZ, TEIGER AND VASCONCELOS, 2014; TEIGER, MONTREUIL, 1996).

Representation is understood as a mediating element between cognition and action and plays an important role in the learning process. Changing the representation is changing the appearance of reality, it is already transforming it (TEIGER, MONTREUIL, 1996; LACOMBLEZ, TEIGER E VASCONCELOS, 2014). To facilitate this process, the basic concepts of ergonomic analysis are mobilized. Learning the concepts and methods of ergonomic work analysis can be considered a cognitive tool for transforming representations (TEIGER, MONTREUIL, 1996).

“The approach is based on the idea that learning how to analyze work allows the worker to become more ‘aware’ of the reality of their activity and more confident about their involvement in an action.” (TEIGER, MONTREUIL, 1996)

To meet this challenge of changing representation, it is necessary to think about the moments and phases of training. As already said, it must occur according to the opportunity that emerges in the research-action-training space. Each experience tends to organize its phases in its own way, even so, four main phases of training can be identified (LACOMBLEZ, TEIGER AND VASCONCELOS, 2014):

1. Spontaneous expression: in the first dialogues, workers express their representation without being provoked.
2. Provoked expression: from this emerges “what you don’t always know you know”, the “complexity and variability of work”, the “skills unknown”, “the commitments made between production and safety”.
The causes of the work begin to appear and, in the next phase, ergonomic contributions are prioritized: base model and explanatory knowledge about activity analysis.
3. A process of objectification-distancing allows for de-individualizing the interpretation of the consequences of work and opening paths for collective action.
4. Participants take a leading role in the collective exercise.

Training as mutual learning

Training is considered a process of mutual learning (TEIGER, MONTREUIL, 1996; LACOMBEZ, TEIGER, 2007; LACOMBLEZ, TEIGER AND VASCONCELOS, 2014).

Teiger and Montreuil (1996) state that this training is based on the comparison and debate of two types of knowledge: that of actors, which is often concrete and

operational, and that of ergonomists, which is based on general scientific data in field research. Both have specific characteristics and limitations and, consequently, are complementary, since neither can answer all the questions involved in the work.

For the tradition of training with workers in Brazil, this is an old and important issue. The dialogue between popular and technical knowledge has always been understood as a two-way street. The teaching-learning process is a back-and-forth where different knowledge complements and adds to each other, as master Paulo Freire taught us.

The skills of a trainer – clinical and strategic

The trainer in this situation needs experience in ergonomic analysis, as well as qualities relevant to clinical and strategic posture. The clinical stance concerns attention “to the evolution of the words of the work actors” and the strategic stance “considers the congregation of all actors in this social experience

which is the intervention” (LACOMBLEZ, TEIGER, 2007, p.598).

The clinical stance is fundamental, because to get out of spontaneous expression, to bring to light “what you don’t know that you know”, you need to pay attention to the evolution of words. It is through the verbalization of these operators in relation to their work that some complex concepts to describe the activity are clarified and developed during ergonomics training programs (TEIGER, MONTREUIL, 1996). Care with language is essential.

The progressive construction of this field led to the understanding of training “as having a clinical character, as long as it is considered that it is not the worker who is the object of attention, but rather the work” (LACOMBLEZ, TEIGER AND VASCONCELOS, 2014).

In addition to the clinical stance, a strategic stance is necessary. Working within organizations will require distinct qualities from the trainer, precisely to guarantee a space for intervention for the trainees throughout the training, so as not to abandon them after the intervention without room for maneuver to transform the situations that they identified as harmful and harmful. Knowing how to interpret spaces of power and expand the power of action within the organization will be considered strategic knowledge.

To cope with this new paradigm, it is essential to expand the scope of training beyond the operators directly involved. Other actors must be integrated in the analysis of the activity, allowing the discovery of contradictions to circulate and facilitating access to different levels of the hierarchy. This aims to create conditions for effective transformation (LACOMBLEZ & VASCONCELOS, 2009).

“Sectoral assessments (with those responsible for safety, engineering, production) promoted hand in hand with the evolution of work with the group of 'trainees' complete the device and seek to ensure, simultaneously, a broadly shared vision of emerging problems and dilemmas that characterize work activities in general, (...), and the necessary involvement of the essential hierarchy when triggering concrete actions to transform the conditions of execution.”(LACOMBLEZ & VASCONCELOS, 2009, p.57)

Thus, this double stance is reflected in two perspectives of transformation: the change in the agents' work representations, as well as the transformation of the conditions and modes of carrying out work activity (COSTA, SILVA, 2010), which occurs through the involvement of the trainer with other actors in the company.

2.2 The most common themes in the field of Ergonomics and Training

The study of different experiences within this field and in different possible domains led us to understand the evolution of themes present in the field of Ergonomics and Training and to classify them as follows:

a) *Participatory ergonomics and training in work analysis as a tool for action: training evolved in an integrated manner with the transformations in the uses of AET, implying renewals of both the theoretical framework, the objectives of the intervention and the critical situations focused on .*

Job analysis changed its status from “tool used to detect work demands” to “object of training for action” (LACOMBLEZ et al., 2007). The training became part of an intervention in ergonomics, mainly in participatory approaches (TEIGER & MONTREUIL, 1996), and took the place of a fundamental piece to prolong the effects of the intervention, allowing the transformation of the representation of the work of different actors that will last in the organization (MONTREUIL, BELLEMARE, 2001).

b) *Training as a space for developing professional knowledge: training itself has become the object of study of ergonomics. From training in work tools and their uses (TEIGER & MONTREUIL, 1996), to training aimed at developing professional knowledge. The ways of achieving this development went from an operator as a tabula rasa, who should acquire “ready-made” knowledge, to a space for joint construction between ergonomists and workers. One of the objectives of training is to bring to light and conceptualize workers' knowledge that comes from experience (TEIGER & MONTREUIL, 1996). In this process, advances in training practices, models and theories emerged, enriched or relativized by the training experiences of adults associated with work activities (ABRAHÃO et al., 1995).*

c) *Adapt learning conditions at work to human limits and characteristics - thinking about the issue of learning: the initial interest was in taking action or creating a professional training program. For this, a diagnosis was needed to identify the problems in the design of the work situation that would need to be resolved to adapt the situation allowing learning (TEIGER & MONTREUIL, 1996). Therefore, the issue of learning at work has become of interest beyond the classrooms, or the training spaces organized by ergonomists. Taking into account knowledge from experience in development places emphasis on the*

collective dimension of learning. The learner is no longer alone, without a reference for learning new knowledge. On the contrary, he must deal with his internal resources in relation to external resources (human, organizational and material) that can hinder or facilitate collective and individual learning and the time it takes for it to occur (LACOMBLEZ et al., 2007).

d) Strategic knowledge in training action: the integrated action to develop professional knowledge and material conditions has brought a series of contributions that allow enriching knowledge about the work situation, facilitating the process of organizational change (MONTREUIL, BELLEMARE, 2001) and give greater perpetuity to the transformations carried out during the intervention, as the intervention does not always result in real transformations in work spaces. It is necessary to question the real political desires of the organization and evaluate the conditions that the graduating workers will have to implement changes in work situations after the ergonomists are no longer at the company (LACOMBLEZ et al., 2007).

The evaluation of training action: what are the evaluation criteria in these spaces (TEIGER & MONTREUIL, 1996)? How to evaluate the knowledge acquired in training (DELGOULET et al., 2012)? It is clear that many researchers do not explain the methodology used in training programs and assessment programs. To advance experiences in this field, it is essential to think about training evaluation. It is very common to find incongruity between what was planned and what was implemented. It is necessary to go beyond the apparent success or apparent failure of the intervention and consider the objectives of the intervention and the context in which the interventions occurred. It is necessary to think about evaluation in an integrated way from the beginning of the project (LACOMBLEZ et al., 2007; COUTAREL et al., 2009).

3. CONCLUSION

To identify the areas of action in the encounters between ergonomics and training, and topics of interest for understanding work and transforming it, we carried out a bibliographic review on the field, relying largely on the work of Teiger and Lacomblez, who have been working for some years systematizing the accumulated advances on the topic (TEIGER & LACOMBLEZ, 2013). Obviously this review is not exhaustive and it seems to us that the subject still has a lot of room to prosper. Numerous possibilities for encounters and advancements seem to be present. Many experiences in Brazil and other countries have not yet been recorded, and can make significant contributions to this debate. A first clue has been given and the five areas of interest found reinforce that there is a fruitful and relevant path for this field of research.

6. BIBLIOGRAPHIC REFERENCES

ABRAHÃO, J., FERREIRA, L., LACOMBLEZ, M., TEIGER, C. Ergonomic Work Analysis Learning and Design. IEA World Conference 1995, 3º Congresso Latino Americano de Ergonomia, e 7º Congresso Brasileiro de Ergonomia, Rio de Janeiro, Brasil, 1995.

BELLEMARE, M. MARIER, M. PREVOST, J., MONTREUIL, S. PERRON, N. from diagnosis to transformation: how projects are implemented in a participatory framework. Proceedings of the IEA 2000\IHVES 2000 Congress. Vol.2. pp724-727. 2000

BRITO, J. ATHAIDE, M., NEVES, M.Y., SILVA, E.F. MUNIZ, H.P. Caderno de método e procedimentos: programa de formação em saúde, gênero e trabalho nas escolas. Rio de Janeiro: ENSP/FIOCRUZ, 2011. Livro eletrônico Acesso: www.ensp.fiocruz.br/trabalhoescolavida

COSTA, C., SILVA, C. Análise do trabalho, formação contextualizada e acção de transformação das condições de trabalho no sector de saneamento de um serviço municipal. *Laboreal*, 6, (2), 27-46. 2010. <http://laboreal.up.pt/revista/artigo.php?id=48u56oTV6582234;5252:7252;2>

COUTAREL, F., VÉZINA, N., BERTHELLETTE, D., AUBLET-CUVELIER, A., DESCATHA, A., CHASSAING, K., ROQUELAURE, Y. & HÁ, C. Orientações

para a avaliação das intervenções visando a prevenção dos Problemas Músculo-Esqueléticos ligados ao trabalho. *Laboreal*, 5, (2), 95-108. 2009.

<http://laboreal.up.pt/revista/artigo.php?id=48u56oTV6582234833782384972>

DELGOULET, C., CAU-BAREILLE, D., CHATIGNY, C., GAUDART, C., SANTOS, M., VIDAL-GOMEL, C.

Ergonomic Analysis on Work Activity and Training.

Work, vol. 41, pp. 111–114, 2012. DOI

10.3233/WOR-

2012-1286

FALZON, P. TEIGER, C. Ergonomia e Formação. In: CARRÉ, P., CASPAR, P. (Orgs) *Tratado das Ciências e das Técnicas da Formação*. Lisboa: Editora Piaget, 2001.

FERREIRA, L. L. Análise coletiva do trabalho: quer ver, escuta. *Revista Ciências do Trabalho - Nº 4*, DIEESE, JUNHO de 2015

GAUDART, C., PETIT, J., DUGUE, B., DANIELLOU, F.

DAVEZIES, P., THERY, L. Impacting working conditions through trade union training. *WORK*, IOS Press, 41, pp.165-175, 2012. <10.3233/WOR-2012-

1281>. <hal-00674119>

LACOMBLEZ, M., BELLEMARE, M., CHATIGNY, C., DELGOULET, C., RE, A., TRUDEL, L.,

VASCONCELOS, R. Ergonomic Analysis of Work Activity and Training: Basic Paradigm, Evolutions and Challenges. IN: PIKAAR, R.N., KONINGSVELD,

E.A.P., SETTELS, P.J.M. (Eds). *Meeting Diversity in Ergonomics*. Amsterdam: Elsevier, 2007.

LACOMBLEZ, M. TEIGER, C. Ergonomia, formações e transformações. In: FALZON, P. *Ergonomia*. São Paulo, Editora Blucher, 2007.

LACOMBLEZ, M., TEIGER, C., VASCONCELOS, R. A. A ergonomia e o “paradigma da formação dos atores”: uma parceria formadora com os protagonistas do trabalho. In:

BENDASSOLLI, P.F. SOBOLL, L. A. P. Métodos de pesquisa e intervenção em psicologia do trabalho: clínicas do trabalho. São Paulo: Editora Atlas, 2014.

LACOMBLEZ, M. & VASCONCELOS, R. (2009). Análise ergonómica da actividade, formação e transformação do trabalho: opções para um desenvolvimento durável. *Laboreal*, 5, (1), 53-60.
<http://laboreal.up.pt/revista/artigo.php?id=37t45nSU5471123592231593411>

MONTREUIL, S., BELLEMARE, M. *Ergonomics, Training and Workplace Change: Introduction. Relations industrielles / Industrial Relations*, vol. 56, n° 3, p. 465-469, 2001.

PETIT, J. A intervenção ergonômica como dinâmica de aprendizagem: estudo de caso. *Laboreal*, Vol.4 (2),pp. 37-46, 2008.
<http://laboreal.up.pt/revista/artigo.php?id=37t45nSU5471123417879792:41>

ST-VINCENT, M. CHICOINE, D., BEAUGRAND, S.. Validation of a participatory ergonomic process in two plants in the electrical sector. *International Journal of Industrial Ergonomics*. Vol. 21, pp. 11 – 21, 1998

TEIGER, C. MONTREUIL, S The foundations and contributions of ergonomic work analysis in training programmes. *Safety Science*, Vol. 23, No. 213, PP. 81-95, 1996.

TEIGER, C, LACOMBLEZ, M. (Se) Former pour transformer le travail. *Dynamique de constructions d'une analyse critique du travail*. Quebec: Presses de l'universite laval, Etui, 2013.