



ERGONOMIC WORK ANALYSIS, LEARNING AND DESIGN

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The aim of ergonomics is to ensure that the conditions favourable for the exercise of human work activity are taken into account in the design and layout of technico-organizational work systems. From the viewpoint of participative ergonomics in itself, the design situation is considered as a formative situation and the design is considered as a joint construction process in which the ergonomist plays a specific part; this presents a particular interest from the viewpoint of both the acceptability of new systems and their usability. This model, which is an alternative to that of the expert-ergonomist, poses, in a particularly critical way, the problem of the various possible uses of this analysis of the activity and the very training of professionals in ergonomics.

The aim of ergonomics is to ensure that the conditions favourable for the exercise of human work activity are taken into account in the design and layout of technico-organizational work systems

One way to achieve this aim is through training in work analysis: the academic training of professional ergonomists, of course, (teachers, researchers, practitioners, etc.) but also the training of other actors in work situations, non-ergonomists (designers, works doctors, occupational health and safety staff, security engineers, staff and union representatives, etc.); this is seen as a major relay through which the process of improvement of work situations, affecting the health and security of workers, and the efficiency of the organization, can be initiated and introduced; in this case, work analysis is considered as a "compulsory passage" in order to acquire the capacity to act on work conditions.

Professional training requirements have increased recently due to the rapid transformation of work systems (reconversion, learning and mastery of new knowledge); due to this, work analysis is an efficient tool for the development of professional training programmes concerning new work activities or those in transformation.

Therefore, at present, it is a new, expanding field of research and intervention in the two sectors mentioned due to the importance of the social stakes involved, associated with the development of the technical, social and economic context and the evolution of the scientific disciplines concerned by the work/training articulation (ergonomics, didactics, psychology, linguistics, data

processing, sociology and economics). A collective study was already started by ergonomists at the last IEA congresses (1991-1994); it should be continued and expanded.

1. From the ergonomic viewpoint, every design situation - design of products, design of technical systems or work organization - could be considered as a process of the crystallization of the knowledge of the different actors involved. From this viewpoint, the term design is taken in the widest sense, including the transformation of existing systems and the design of new systems.

In this respect, the "users" are considered as the actors in an on-going process and not simply as users contacted by designers at the end of a trial run in order to verify the usability and/or the acceptability of the product or the system in question.

From the viewpoint of participative ergonomics itself, the design situation itself is a formative situation and the design is a process of joint construction in which the ergonomist plays a specific part due to his knowledge; this presents a particular interest from the viewpoint of both the acceptability of new systems installed and their usability which are then the subject of joint development at the design stage. But this is not obvious and implies special conditions, including training in work analysis.

2. Thanks to various experiments carried out by the authors with different types of public, it is possible to propose the principles of an approach which was gradually developed in an empirical way and could be qualified as "training by and for the action". This is based, in particular, on the idea that learning work analysis develops both "the awareness" of knowledge and the "confidence" which contributes to the engagement in the action.

In this approach, based on ergonomic work analysis, the idea is to reconstitute, in the slightest detail, how an operator performs his task: the information he detects, the reasoning he performs, the decisions he makes, the way he handles doubt and the unexpected, his efforts, his gestures and his movements. This leads to identification of the constraints in which the activity is exercised and the consequences that result, not only for employment but particularly for health. In addition, the operators' verbalizations of their own work practice help ergonomists to clarify the explanatory concepts which are sometimes very complex.

This training is based on the confrontation of two types of knowledge, that of the actors, which is most often concrete and operational, and that of ergonomists which is formed from general scientific data and the practice of research in the field. Both of them have their specific features and their limits. As such, they are complementary and neither of them can exhaust the question of work.

Since this type of training is considered as a mutual learning situation and not as a classical pedagogical situation of the transmission of knowledge, the importance of the ergonomist-instructor/trainee interaction and the temporal dynamics of the process should be underlined.

3. But this model, an alternative to that of the expert-ergonomist, which gives preference to the principle of self-analysis carried out by operators in constant dialogue with the ergonomist, raises the problem of the various possible uses of this activity analysis in a particularly critical way.

Although our targets clearly give preference to the improvement of working conditions, we cannot neglect the ethical problems that are raised by such an exposure of professional experience

- especially when this is done for the benefit of the company. Although the present situation leads to technico-organizational processes being speeded up, at the same time it undoubtedly leads to a considerable shrinking of the employment market which, for the workers involved in our interventions, could, in reality, lead to the loss of their jobs. So it must be clearly realized that ergonomic activity analysis runs the risk of making operators fragile, giving management the opportunity to dispense with them more easily by appropriating their know how.

4. Finally, the type of training required by this analysis and intervention model is rarely the subject of systematic training intended for professionals in the ergonomics field; at present, they face serious problems of professional skills and ethics due to the increased demand. In view of the latent ambiguities of certain interventions, it is increasingly obvious that what could be called the ethical training of ergonomists must be treated urgently and explicitly since intuition and determination are not enough to face up to the complexity of the stakes involved in a field where all the partners don't have the same powers.

5. As such, we shall conclude our communication with debates and interrogations and propose that the following matters in particular be developed through research:

- training practices are based on reference models and theories (learning and/or development).

How can these models be discussed, enriched or relativized through such adult training associated with work activities? In particular, what importance should be attached to crisis phenomena like the destruction of knowledge and prior representations liable result from this type of training?

- how can interaction and confrontation processes be analyzed and managed in the transformation of representations present in a training situation (trainees/trainees and trainees/instructors)?

- what are the specific abilities, the function and the status of the ergonomist-instructor placed in a situation where his own representations are not only put to the test but also transformed by the training action?

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