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ABSTRACT

The nature of basic computer occupations has changed greatly since the early 1980s. The changes reveal a shift in the respective roles of the sectors of industry associated with computer services (manufacturing and industrial computing). The service sector has adopted the procedures of industry in terms of organization, methods, and quality, whereas the manufacturing sector has had to assimilate the culture of services (including taking the totality of customers' needs into account and structuring a service supply). The industrial computing occupations have adopted standard technologies to their particular needs. These trends have affected France's vocational training policy and have necessitated choosing between technology- or occupation-based approaches to preparing learners for basic computer occupations. Currently, training for entry employment in computer occupations in France targets an occupation, an area of application, or a technology. Considering the changes that have occurred in the nature of basic computer occupations and the ways computers are being used, an occupation-based approach would offer the advantage of harmonizing employment qualifications, reducing their number, and avoiding the risk of several qualifications covering the same job targets. It would increase the complementarity of the French educational system's training streams and those of the National Association for Adult Vocational Training. (MN)

Reconfiguring Basic Computer Occupations: Between Technology and Service.

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A FRENCH NEWSLETTER FROM CEREQ AND ITS ASSOCIATED CENTRES

RECONFIGURING BASIC COMPUTER OCCUPATIONS: BETWEEN TECHNOLOGY AND SERVICE

The changing nature of basic computer occupations reveals a shift in the respective roles of the sectors of industry (both manufacturers and industrial computing) and that of computer services. In order to ensure its expansion, the services sector has adopted the procedures of industry in terms of organisation, methods and quality. In order to ensure their survival, the manufacturers have had to assimilate in turn the culture of services, which involves taking the totality of needs into account and structuring a service supply. The industrial computing occupations, meanwhile, have adopted standard technologies (programming languages, systems and networks) to their particular needs. This dynamic, which is reconfiguring the basic computer occupations, is not without impact on vocational training policy, now faced with choices between technology- and occupation-based approaches.

In 1998, an estimated 300,000 people were working in computer occupations in France (excluding sales personnel and keyboard operators). But this breakdown is complicated by the lack of correspondence between the socio-economic classifications applied by INSEE (the French national statistics institute) and the new categories in use within the companies. Thus, the employers' organisation SYNTEC-Informatique, using the employers' categories, provided an estimate of 336,000 jobs in 1997. In any case, labour market observers agree on a sharp increase in these figures in 1999, which may be explained at once by the year 2000 rollover, the transition to the single European currency, the beginning of the economic recovery and the spread of new technologies such as the Internet and *client/server architecture*.[1]

Changes in the qualification structure corresponding to computer occupations reflect a trend that began in the early 1980s. The shift from centralised computer systems to increasingly diffuse ones, which goes back to the arrival of the first PCs, gradually led these occupations to align themselves with the economic players as a whole. Today's computer specialists can no longer rely solely on their technical knowledge; they are required to adapt themselves to a wide variety of interlocutors by absorbing the latter's culture and demands. And this phenomenon is reinforced by a parallel trend that is more recent: that of a general public which is becoming more familiar with standard technologies and environments (office computers, Internet) through the massive distribution of computer goods for both professional and personal use.

FROM DEVELOPMENT TO ASSISTANCE: CONTINUITY AND CHANGE

The main feature of basic computer occupations is the fact of being accessible immediately after the completion of an initial training programme (such as those leading to the higher technician certificate [BTS] or technical diploma [DUT]) or a vocational one (from Level IV to Level III for qualifications acquired through the Association nationale pour la formation professionelle des adultes [National Association for Adult Vocational Training, AFPA]). For this reason, such occupations do not entail the functions and skills that are essentially developped through work experience, notably supervisory posts (project head) or expertise (operations analyst, architect, etc.). In addition, they are always defined by real technical knowledge, which excludes sales personnel.

1. Technical terms which appear in italics are explained in the glossary on p. 4.

PLEASE NOTE: Because of unavoidable production delays, this issue of *Training and Employment* does not contain the usual news briefs and publication announcements. The regular eight-page format will be resumed with issue number 38.

networks. Thus, one large urban transportation company is planning to automate its systems of ticket sales and control with the help of these network technologies and a standard operating system.
The client companies, meanwhile, have largely contributed to the trend towards the standardisation of computer tools and environments in order to guarantee the durability of their investments in this area.
The synergy of computers and telecommunications has also made a major contribution to the reconfiguration of computer occupations. The total digitisation of the telecommunications networks has in fact required massive recourse to computer tools and technologies, while computer networks cannot be set up without recourse to the telecommunications networks. It may also be noted that coupling techniques between telephone and computer technologies have permitted the creation of Help Desk structures within the call centres.

VOCATIONAL TRAINING, BETWEEN TECHNOLOGY- AND OCCUPATION-BASED APPROACHES

This reconfiguration of basic computer occupations constitutes a true cultural revolution in a field of activity where professional identity used to depend essentially on the mastery of technologies. If this technical dimension remains significant, it no longer suffices to define the different computer occupations, which suggests that they have gone beyond their initial phase. Now integrated into every area of society, they are more determined by their respective positions in the chain of services provided to users (development, administration, support).

If we consider the whole of the present training supply preparing for these basic occupations in the light of this situation, it may be observed that this supply targets either an occupation (maintenance and service technician in computer science for the AFPA) or an area of application (BTS in industrial computing for the technical high schools) or a technology (DUT in telecommunications and network engineering for the IUTs or higher technician in computer and telecommunications networks at the AFPA). However, a technological approach to training generally crosses over the different families of occupations. Thus, for the AFPA, which is presently involved in a process of revising its training streams and the corresponding qualifications and accreditations (cf. Box p. 3), the goal is to concentrate primarily on the basic occupations identified. Within such a framework, the areas of application and technological specificities would then define different training paths within a single qualification, through a system of electives. This occupation-based approach has the advantage of harmonising the qualifications, reducing their number and avoiding the risk that several qualifications cover the same job targets. More broadly, it would permit greater complementarity between the educational system's training streams and those of the AFPA.
The parallel study of all the basic computer occupations and the activities they include permits the identification of about twenty coherent skills units for the three families. These units will help to promote a policy of accrediting work experience. Thus, within the Help Desk structures, there is a unit for "call evaluation and foreground processing", the recognition of which would facilitate occupational mobility within the family of maintenance and service occupations. Ultimately, the combination of a training-centred culture and expertise in the analysis of work facilitates the definition of activities upstream from the technologies, so that the latter can serve to place competences in context without overshadowing them.

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GLOSSARY OF TECHNICAL TERMS

- *Client/server architectures*: Computer architectures permitting network users to have access to the data and applications of the server information system.
- *Ethernet*: A standard communications technology used by more than 90 percent of existing local networks.
- *Help Desk*: Remote technical support.
- *"Object-oriented" languages*: Modern programming languages favouring the construction of programmes from reusable software components.
- *OEMs* (original equipment manufacturers): Companies specialised in the subcontracting of after-sales service for different computer manufacturers and in-house computer departments.
- *Rapid development*: A technique permitting the rapid development of a software programme in close collaboration with the user.
- *Simulation*: A technique allowing the appearance of a computer application to be tested rapidly.
- *Software integration*: Modularisation of software through the assembling of reusable software components.
- *Software package*: A standard software programme for one kind of needs that is subsequently parametred in function of the customer's particular characteristics.

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