

Nationwide Industrial Cooperation for Long-Life Learning and Apprenticeships

Denis Genon-Catalot
IUT de Valence
LCIS - Université Grenoble Alpes
50 rue Barthelemy de Laffemas
F-26901 VALENCE
Denis.Genon-Catalot@iut-valence.fr

Laure Petrucci
LIPN, CNRS UMR 7030
Institut Galilée
Université Paris 13, Sorbonne Paris Cité
F-93430, Villetaneuse, France
laure.petrucci@univ-paris13.fr

Michel Tabouret
IUT de Saint-Malo
Université Rennes 1
rue de la croix Desilles
F-35400 SAINT-MALO
michel.tabouret@univ-rennes1.fr

Abstract—Long-life learning allows workers' career evolution, and can be achieved either through dedicated adults courses, or via professional experience. Young students are also offered the possibility to study as apprentices, being part-time in the university and part-time working for a company. In this paper, we report on collaborations with Orange-France Telecom (major Telco operator in France) in both areas.

Long-life learning agreement aims at delivering national diplomas on the basis of knowledge and proficiencies acquired through professional experience. The diplomas targeted are networking and telecommunications technician, and bachelor degrees in the same topic. This project was operated for the last three years and after 3 years we could analyse the practice with a sufficiently large population of workers to have return of experience. Hence, we can provide some feedback on these three years of collaboration between Orange-France Telecom and the "Networks and Telecommunications" IUT departments. Such a scheme has been possible since the targeted diplomas benefit from a national programme, which is shared by all universities involved.

Setting up this programme has required an extensive cooperation between universities, both at a pedagogic level and at an administrative level. Although schemes for validating professional experience already existed, practices differed from one university to another: the process is slightly different and the fees as well. Hence, in order to conduct a successful national project, an harmonisation of practices over all universities had to be defined.

Moreover, since several diplomas with a common core area are concerned, a very detailed description of the expected expertise was defined. This process allowed for verifying the candidate experience is in line with the targeted diploma.

We have designed the main lines of the process to guide employees from Orange-France Telecom over a full year, from an information session to a validation jury for their diploma. In the meantime, they participate in collective courses helping them to write a professional overview activity report, describing their acquired expertise during their professional life in line with the aimed diploma. Each participant is also individually tutored by a university's professor. The jury issue is then of three kinds: the diploma is delivered, or not, or only some units are granted. In this latter case, advice is given to achieve a full completion of the curricula.

Now after this first phase of long-life learning by professional experience, Orange-France Telecom proposes to focus the partnership to apprenticeships. This new project meets the new French regulations ("contrats de génération") to anticipate the retirement of employees.

The originality of these generations contracts scheme lies in that some of the retirements will be replaced by anticipation by young apprentices. Thus they will not only pursue their academic technical studies, but will also benefit from a transfer of expertise from the staff member who will retire within the next 3 years.

This project is starting on a national scale and raises many issues, some similar to those of the previous long-life learning by experience, but also new challenges.

I. INTRODUCTION

Schemes for validating professional experience or recruiting young students as apprentices are proposed in the French University system, but practices differ from one university to another: the process is slightly different and the fees as well. Hence, in order to conduct a successful national project, an harmonisation of practices over all universities have been defined.

Moreover, since several diplomas with a common core area are concerned, we defined a very detailed description requirement of the expected expertise for LLL. This process allows for verifying the candidate experience is in line with the targeted diploma. The diplomas targeted are networking and telecommunications technician (graduate+2) and bachelor degrees.

This experience conducted during 3 years with Orange-France Telecom, the major telecommunications operator in France, gave us some feedback and the keys for setting up the new apprenticeship programme for the company to renew their staff. As concerns validation of professional experience, after the initial session's success conducted by only 2 Universities (Rennes 1 and Paris 13), the project was extended nationwide to all "Networks and Telecommunications" departments in French University Institutes of Technology. Such a scheme has been possible since the targeted diplomas benefit from a national programme, which is shared by all universities involved. Setting up this programme has required an extensive cooperation between universities, both at a pedagogic level and at an administrative level. The IUT "Networks and Telecommunications" Departments National board proposed a single window to process LLL for the major telecom operator in France. The initial setup was presented in [1] and this paper, we will draw the feedback of 3 years of experience,

and show how a national scheme can be applied to the new apprenticeship scheme.

II. NETWORKS AND TELECOMMUNICATIONS DEPARTMENTS

A. Administrative and geographic situation

University Institutes of Technology (*Institut Universitaire de Technologie*, IUT) are public schools created in 1966 to offer two years short technical curricula within the French Universities. Now 24 professional specialities are offered in 113 IUT including French overseas territories.

The Networks and Telecommunications (*Réseaux et Télécommunications*, R&T) technician's career emerged from the Electrical Engineering career specialty in 1991 to provide for the growing demand of IT professionals. Now over 2000 students per year follow this curriculum in 29 departments in the French territory, 2 of which are overseas, in French Guiana and Reunion Island (see Fig. 1a and Fig. 1e). It aims at training graduate students in networking technologies (Internet, Voice over IP, Video over IP, ...), fixed and mobile telephony (2G, 3G, 4G, ...).

B. Different levels of studies

Since 2001, within the framework of the Bologna process, the French diplomas are engaged in Bachelor, Master, and Doctorate degrees (BMD) defined at the European level. The DUT (*Diplôme Universitaire de Technologie* — Technology University Diploma) students and other 2-year curricula with 120 ECTS can access the final Bachelor level with an additional year (60 ECTS). This can be achieved by following one of our 4 Networks and Telecommunications professional bachelor (called *Licence Professionnelle* — LPro) specialities:

- ASUR (*Administration et Sécurité des Réseaux*): Networks Administration and Security;
- CART (*Chargé d'Affaires Réseaux et Télécommunications*): Business in Networks and Telecommunications;
- ISVD (*Intégration Systèmes Voix Données*): Voice and Data Systems Convergence;
- RSFS (*Réseaux Sans Fil et Sécurité*): Wireless Networks and Security.

C. Access to studies

DUT and LPro diplomas in the R&T departments can be obtained through 4 different ways:

- the *initial training* is the classical one where students have face-to-face courses delivered by teachers over the semesters, followed by a mandatory internship from 10 to 16 weeks;
- *part-time* training, where each student benefits from an employee's status and alternates periods of courses at the IUT with in-company apprenticeship (only 35 to 45% of the time is located at the training centre);
- *long life learning* (LLL), allowing to resume studies during or after a professional activity period. Training

is offered in evening classes or within part-time training so that people can continue their work (sometimes part-time) during the training period.

- *validation of the assets and professional experience* (VAE, *Validation des Acquis d'Expérience*) allows for validating the professional skills acquired during his/her career and required for a diploma (DUT or LPro) in order to validate these skills during a defence to obtain the diploma.

D. Learning Programme

The National Pedagogic Programme (*Programme Pédagogique National*, PPN) is based on 1 800 hours of face-to-face teaching for any initial training curriculum and provides the nationwide homogeneity of training. The programme is composed of Teaching Units (*Unités d'Enseignement*, UE), each of them being quantified in terms of ECTS (*European Credit Transfer System*). The DUT validates 120 ECTS and LPro degree level, 180 ECTS (i.e. 60 ECTS per study year).

In order to set up a common curriculum, the 29 heads of departments meet in General Assembly several times a year, to work on the development of teaching programmes and common projects. Specific groups of academics dedicated to a particular topic also attend such meetings. Since 2009 a collective LLL scheme has been engaged in the General Assembly of departments' heads so as to provide a coordinated national response to the request of the major Telecom operator in France: Orange-France Telecom.

E. VAE: Stations of the Cross for candidates

While the situation for a student enrolled in the initial education for the R&T curriculum is clear from the PPN, the VAE process directly and solely relies on the University addressed by the applicant. A large scope of differences exist w.r.t. the assessment of acquired skills as well as the associated administrative procedures (duration of the applications' instruction, fees, ...).

For an individual employee, the procedure is a lonely process that can be both long and full of pitfalls. His/her application must carefully be prepared, highlighting the skills acquired during the past professional experiences. The instruction of the application can last several months before actually enrolling in a VAE scheme, which are followed by a 12 months period dedicated to the candidate write a thesis and defending it in front of a jury comprising both academics and professionals in the working domain.

During this period, employees do not benefit from any study leave to prepare or meet the administrative contact and the instructor appointed by the University. Candidates must be strongly motivated and persistent to carry out their work while they are on their own with their application.

In our experience, candidates encounter three major difficulties:

- analysis of the application w.r.t. the diploma, especially as concerns the theoretical parts of the teaching



(a) DUT



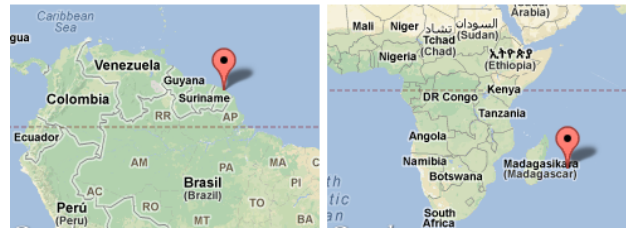
(b) LPro ASUR



(c) LPro ISVD



(d) LPro RSFS



(e) Overseas departments

Fig. 1: Maps of departments delivering the different diplomas

programme that are not directly used for professional activities;

- the difference between knowledge acquired through professional experience within the company, and the individual technical or analysis skills;
- lack of recognition of diplomas obtained by VAE in the company.

As concerns this last point, the increasing demand for technical skills changed the companies human resources policies to find qualified staff. We did collaborate with these services in order to find solutions to the challenges raised by the

applicants. Universities receive many individual applications from employees at Orange-France Telecom, but, as stated above, the process is slow and hard to grasp. Hence the advantages of designing a collaborative answer.

E. Apprenticeship: a first step for students in industry

Now faced with ageing employees, the Orange-France Telecom company is committed to "contracts of generation" proposed by the French Government. Within this framework Orange-France Telecom should hire 5,000 apprentices over the next 5 years. The objective of the "contracts of generation" scheme is to allow personal follow-up to apprenticeship during

their training from technicians / managers who must retire within the next 3 to 5 years.

Those people who are seniors in the company transfer their knowledge and their professional experience to students to better and faster integrate the industry's approach. This approach will have multiple goals:

- Like the VAE qualification, it is a recognition of the technical expertise of Orange-France Telecom technicians, and their expertise will be transferred to a younger population.
- Young post graduates students without any practical experience will engage in a first step in industry with men and women mentors for their first professional experience.

Curricula schedules should provide for spending more than half of the time in the business team. To meet this objective and propose to enhance the business activity, the national curriculum (i.e. PPN) of 4 semesters DUT Networks and Telecommunications has proposed to distribute 750 per year for at least 1500 hours of courses. To meet the initial training volume, we proposed different modules evolutions. Some practical work in Labs and training modules like "Company's Discovery" are directly experienced in the industrial setting. With this face to face teaching time arrangement and the part time alternation of 1 to 2 weeks of courses for 2 to 4 weeks company time, the new programme can be integrated into the University courses' schedule from September to July.

III. STEPS IN THE VAE NATIONAL PROCESS

We now summarise the scheme for the VAE process, and will, in the next section draw conclusions following 3 years of experience.

The overall process comprises several steps:

- Orange-France Telecom identifies the targeted employment category;
- the scheme is presented to the employees;
- the interested employees submit a pre-application;
- pre-applications are evaluated to assess their relevance;
- those selected write a thesis explaining how their professional experience meets the diploma expectations;
- it is defended in front of a jury.

We now describe all these steps in further detail, including the support provided either for groups of candidates or to individuals.

A. Targeted employment category

Orange-France Telecom first selects the employment category concerned with this national programme for the current year. Up to now, several categories have been concerned, but too many would be impossible for us to handle with our usual human resources.

B. Scheme presentation to possible candidates

Once the employment category is defined, the company advertises some jointly held information sessions. This stage is still informative, with no commitment from the employees yet. The supervisors in the company are also informed during a half-day session at the company's headquarters. Their role is incentive, so that they motivate possible applicants to gather information and later to engage in the process.

Each year, approximately 10 information sessions are scheduled over february and march. Additional ones are often programmed as well. The reason for so many sessions taking place is that they often collide with school vacation period, which varies according to the region in France. Thus, people always can attend some sessions scheduled outside their vacation period.

The information sessions are conducted via phone conference and online presentation, using the operator's "coopnet" service. It provides a web interface for slides presentation as well as chatroom facilities.

The presentation comprises:

- an overall presentation of the scheme by the company;
- the experience told by a participant from one of the previous years;
- the targeted diplomas and their national context;
- the different steps of the process itself and its administrative aspects.

Each part is followed by a discussion with all participants so as to answer the attendees' specific questions.

C. Pre-application contents and evaluation

Those employees who want to engage in this professional experience validation programme fill in a pre-application form. They are required to have worked at least 3 years in Orange-France Telecom or other companies. In the pre-application, they state the main activities they performed in their professional life, positions held, etc. They also indicate their curriculum, be it traditional or life-long learning courses. Finally, they provide hints about their technical expertise by filling a self-assessment table where for each technical point related to the diplomas, the applicant must state her/his proficiency: none, can execute, is autonomous, or can transfer knowledge to a colleague.

Based on the information provided by the candidate, the professor responsible for conducting the programme at the local university, assesses the relevance of the application. Either it perfectly fits the diploma, or for a large part, and the candidate is accepted to engage in the programme, or it clearly lacks too many proficiencies, and the application is rejected.

D. Core work and support provided

A candidate engaged in the programme is then expected to present his/her professional experience in regard of the expected proficiencies in a written thesis. In order to help him doing this, some support is provided:

- an academic (or better, a professional also employed part-time in the university) is assigned to each candidate to follow the progress and comment the different stages of advancement ;
- a first collective meeting (i.e. with a group of candidates) occurs very early in the process, which allows for explaining the expected work. Generally, a candidate meets the associated academic for the first time during this collective work session ;
- a second work session happens a few months later, where candidates present a first draft. The draft is commented, both on the structure, the choice of professional experiences to be detailed, and the depth of the description. From then on, personal work takes place, with the academic as support, until the very last stages of the process.

E. Defence and outcome

The last stage of the process consists in defending the thesis in front of a jury composed of academics and professionals. The candidate gives a short presentation of the relevant professional experience followed by a series of questions and answers aiming at an in-depth view of the actual proficiencies. The oral presentation is prepared during a collective working session.

Then the jury states on the adequation of the professional experience with the diploma, and decides either to:

- grant the degree in full;
- grant some units of the degree but not all of them;
- not deliver any unit from the diploma.

It is very seldom that the candidate does completely fail. This is often due to work in the area, and the candidate overstating his/her abilities and proficiencies in the pre-application.

In the second case, where only part of the teaching units are delivered, some recommendations are issued to attain completion. Depending on the extent of the knowledge to acquire, personal work in a specific area is requested, or attending courses and exams. The candidate is expected to complete this within a year.

IV. LESSONS LEARNED OF A 3-YEARS EXPERIENCE

A. Benefits of the national scheme

Setting up such a national programme has been made possible only by providing a national curriculum shared by all 29 Networks and Telecommunications departments in the country. Thus, wherever the employees are in France, they have an academic contact in their region. Note that among the 4 diplomas proposed, only 1 (DUT) is delivered by all departments, whereas the other 3 are available only in some selected places, as shown in Fig. 2. However, the close cooperation between departments allows for finding the closest place for this programme.

Each application is sent to a national committee that distributes it to the nearest participant university. This centralised organisation aims at a better tracking of the different steps in

the process and at regulating the administrative and operational charges of local resources.

The benefits for applicants of having such a wide scheme are manifold:

- they are assigned to a department in their geographic area;
- they can communicate with colleagues that are also part of the process, or have been in the previous years, giving them feedback, sharing experiences, supporting each other;
- as part of this cooperation programme, the employees are given 48 hours by the company as free time for their VAE work instead of the 24 hours they are entitled to by law;
- validation of professional experience gives employees the opportunity to be aware of the spectrum of their abilities, and is often considered as an important step in personal development.

There are also benefits for the company:

- a single programme over the territory;
- a single window academic contact to deal with;
- a unified financial cost per application.

B. Difficulties encountered

It turns out that the population of employees targeted is quite large, and the number of applicants was at first unpredictable. The 3 years of experience showed that approximately 5% engage in the process. Thus, it is possible to tune the population addressed and our capacity to take them in charge. Since the Orange-France Telecom company is present all over the French territory, candidates who were part of this initiative came from anywhere. Networking at the national level has also allowed for bringing together the candidates during collective training actions. Thus some departments were entrusted with candidates from other Universities to as not do training for 1 or 2 persons. We therefore sought to minimise the distances and found tutors in the closest R&T departments. Based on specialities it was always possible to propose a tutor from a close R&T department although the administrative attachment was in another University.

Since we propose 4 very closely related diplomas, it also happens that the candidate is advised to aim for another diploma than the one originally intended. The self-assessment is an essential tool in this respect.

We were very proud to have established a complete table of self-assessment to guide candidates at the stage for identification of their knowledge and skills. In practice we found that terms used are not always the same in the company's usages. On the other hand, some candidates are struggling to clarify the theoretical concepts as they are present in the skills necessary for daily work.

So we are convinced it is essential to have an individualised academic tutor responsible for each candidate so as allow to emerge appropriate skills in line with R&T curricula.

V. A NEW COLLABORATION FOR APPRENTICESHIPS

Apprenticeship training has existed for many years in our R&T Departments, but all departments do not offer this type of training (14/29).

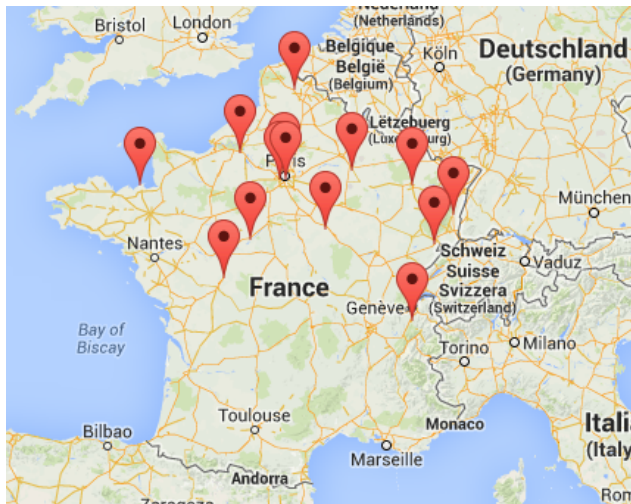


Fig. 2: Map of departments supporting apprenticeship training

As opposed to the VAE, candidates do not have any professional experience. They undergo an eligibility interview in the departments where they are applying and then a second interview in the company prior to signing their employment contract.

With a an employment contract they will received a salary (percentage of SMIC) during the period of training.

It is important to interview the candidates before their first contact in the company to prepare them for their first job interview. This first interview is a stressful human test because for the first time in the candidates' life school records is not the only criterion for recruitment, and they must arrive at position themselves in the context of a professional activity.

Most of the time, the Orange-France Telecom company asked to have a driving license in order to move on site in case of hardware installation.

Sometimes the training does not necessarily take place in the same city where the candidate will be employed, which raises the problem of (double) housing.

We addressed this first year of the process by providing information on "contracts of generation" to all R&T departments interested to be part of the project. At the last general meeting in June 2014, we built a database including the number of seats available w.r.t. departments capabilities and the Orange-France Telecom local base services. An important issue was raised during the meeting : the apprenticeship contracts are managed in France by Regional Councils and they have different modes for funding. We have been trying to write a good practices handbook to support the recruitment teams in our R&T Departments.

VI. CONCLUSION

Setting up such a national programme has been made possible only by providing a national curriculum shared by all 29 Networks and Telecommunications departments throughout the country. Thus, wherever the employees are in France, they have an academic contact in their region.

From the first 2 years experiments where 68 persons were engaged in this validation process: 36 of them succeeded, 11 required further work. The third year, which is currently in its final stage, involves 132 employees handled by 16 university departments out of the existing 29. Now, Orange-France Telecom commits to the "contracts of generations" apprenticeship scheme proposed by the French Government. Within this framework Orange-France Telecom should be hiring 1,000 apprentices for the next year. For the moment, this number is so large that we still do know how to cater for even a tenth of these apprenticeships in our R&T departments. At least all the pedagogic teams engaged in the process of recruiting apprenticeship students wish to have better vision of government fee managed by Regional Councils .

REFERENCES

- [1] D. Genon-Catalot, L. Petrucci, and M. Tabouret. Professional experience validation process at a national level. In *Proc. of the 24th EAEEIE annual International Conference (EAEEIE'13)*. IEEE Computer Society, May 2013.