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### **What Criteria do Teachers use for the Implementation of Work Placements? The Case of French Teachers in Industrial Fields. (1418)**

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**Abstract :** We aim to explore the criteria used by teachers of industrial technology contents for implementing work placements (internships). What is a "good" environment for work placements? What is a "good" subject for their internship report? The method is a qualitative survey by semi-directive interviews of teachers in two technological schools ("lycées technologiques") in the suburbs of Paris. One team consists of 5 teachers of mechanics and production engineering for the vocational education of high-level technicians who would design and build automation devices for the manufacturing industry. The other one is composed of 6 teachers of Civil Engineering for the vocational education of high-level technicians who would take part of supervisory staff for construction industry. Results do highlight five dimensions of an "ideal" internship from teachers point of view : (1) It is a technical environment appropriate for the curriculum (2) It is complementary to technology courses; (3) It obeys the institutional instructions so that students achieve their diploma; (4) It is a pedagogical environment ; (5) It makes student realize work process in its globality.

**Key words :** Work placement, internship, implementation, teacher perceptions, ideal

#### **1. Why Studying Teachers' Ideas and Practice about Implementation of Work Placements?**

Work placements is a topical politic issue in France, and more largely the issue of work experience in education curricula for the young. The political discourse promotes the formula of the apprenticeship (in contract with an employer), and the government declares the objective to pass from 600000 apprentices in 2010 to 800000 in 2015, taking the German dual system as example (Ministère du travail, de l'emploi et de la santé, 2010). The reform of secondary vocational education (les baccalauréats professionnels), applied since September 2009, give more importance to work experience. While passing from a total curriculum duration of 4 years to a 3 years one, in-company periods are expanded from 6 weeks per annum on average to more than 7 weeks per annum.

Another topicality is the French reform of the teacher's education system including technological and vocational disciplines teachers. This reform is implemented since September 2010, consequent with the reform of teachers' recruitment for public education. The creation of masters specific for educating teachers make it relevant to characterize teachers knowledge, and in particular with regard to their responsibility about implementation of in-company periods in vocational curricula.

However, research about the implementation of internships and apprenticeship are not very interested in the practices and knowledge of the technological and vocational disciplines teachers, who are in charge to implement internships, in France.

Lastly, subscribing the idea of "bound to life" and "opened on the city" school, (Schwarz, 1979, p.74), we wonder about the possibilities and limits of the integration of work periods in the productive system into curricula, and of the didactic conditions of its implementation.

These various reasons led us to interest us in teachers' practice and motivations, in order to understand how they pose the problem of the implementation of internships and the resources they mobilize. We don't talk here about of the tutors or trainers in company whose practices were studied for example by Fuller & Unwin (2003), and Kunegel (2008), but we talk about teachers in charge of the courses of the technological and vocational contents, employed by schools, also in charge of the preparation of the work placements and their debriefing, of the follow-up of the students during this in-company period and who are in relation with the companies.

## **2. Issues**

Our intension is not to characterize teachers' knowledge about what they have to do. Instead it is to characterize knowledge resulting from their experiment of the implementation of the internship, operational knowledge likely to guide their action.

And the situation of the teachers is not simple. Antonio Monaco wrote it (Monaco, 1993), the teachers are confronted with the dilemma to refuse companies as internship place which would not have an optimal training potential and so risking not to be able to find a placement for all the students of the class. In addition their task is multiple. It is at the same time to lead students to certification, to prepare them for their professional integration and to teach technical and technological contents. And difficulties are numerous (see Thienpont, 2009). They relate to the relation between student and company, relevance of the in-company activities, administrative constraints, economic conjuncture, availability of companies, etc

Their experience is constituted by their decision making, in spite of the dilemmas, in the opportunities offered by the reality which arises to them, by the going beyond difficulties, and by their confrontation with the effects of their decisions. We aim to explore the criteria which define an ideal training course for the teachers, from their experimence. This ideal is supposed to be a reference for the decision making of teachers for implementing students' internships. What is a "good" intership for them? What is a "good" internship topic? What is a "good" internship environment?

## **3. Method**

The method is a qualitative survey by semi-directive individual interviews with teams of teachers in two technological schools ("lycées technologiques") in the suburbs of Paris. One team consists of 5 teachers of mechanics and production engineering for the vocational education of high-level technicians who design and build automation devices for the manufacturing industry (diploma B.T.S. M.A.I.). The other one is composed of 6 teachers of Civil Engineering for the vocational education of supervisory staff for building construction industry (diploma B.T.S. Bâtiment). In these curricula, young have got a status of students. Apprenticeship exists in France too to achieve the same diplomas.

These two curricula last two years, have a national syllabus and concern 18 years old students (theoretical age), after their "baccalauréat". During their internship, students remain under scholar authority, and keep a statute of student (and not a statute of employee). An agreement is signed between the company and the school. The teachers of the technological disciplines are also in charge of internships' implementation. They are in relation with the companies. They teach in this curriculum and most teach also other courses in the same school, and take part in board of examiners for the students' certification. Companies do not a priori arrange their organization for the trainee; they only have to appoint somebody as internship supervisor. In order to specify the context, we present in the appendix regulations concerning internships in the two studied curricula. Their objectives are very general compared to objectives allocated with courses at school. Trainee has to produce a written report which will be the support for an oral examination leading to the delivery of the national diploma of B.T.S.

Topics explored in the interviews are the following:

- a- Vocational activities of the interviewed teacher. What does he teach for which class levels?
- b- Internship reports of students deals with the study of a technical system or an industrial process. What is a "good" subject for that? How can we characterize it?
- c- What is a "good" environment for internships? How can we characterize it?
- d- Which jobs this curriculum does prepare the students for? How can we characterize them?
- e- How the teacher knows these jobs? (from his vocational activities, from his academic and professional background, ...)
- f- How does he use this knowledge for teaching?

Questions asked in the interviews are focused mainly on their idea of the ideal of a work placement, first as regards the technical system or the industrial process studied in their internship placement report, secondly as regards the internship environment. Some students internship reports, selected by teachers, were used as support for the interviews. The interviews were conducted to ensure that teachers give generic characteristics (criteria) of their ideal, but starting from actual "good" examples and from actual "bad" examples. These criteria are supposed to be supporting elements for decision making when following up students for their internship.

The interviews were transcribed and they were subjected to content analysis, without prior classification criteria, enabling the emergence of categories of criteria.

In this text we don't deal with what teachers says about themes (d), (e), (f) : what do they know about jobs and work process, how do they know it and how do they use it ?

#### **4. Results: How Teachers Define the Ideal Work Placement?**

We present here the results obtained by gathering the answers of all teachers, to the questions (c) and (d) which relate to the ideal work placement. The one relates to the subject of internship reports, the other one relates to the internship environment. The two aspects were often mixed in teachers' comments, because often considered as interdependent. From our analysis five dimensions emerge from the ideal work placement and we detail the associated criteria given by the teachers. When aspects are specific to one of the two teams of teachers (that means specific to one specialized industrial field) we indicate it in the text in this way: (industrial automation) means that is specific to the speciality "M.A.I. : Mécanique et

automatismes industriels"; (building) means that it is specific to the speciality "Bâtiment". We chose not to quote teachers' talks because they are in French language.

### ***A technical environment appropriate to the programme contents and complementary to the scholar courses***

The criterion which is often first given is that the report's subject and the internship environment should be appropriate to the training specialty. On the one hand the technical system process observed in internship and studied for the report should correspond to the standard technological contents of the programme. It should be an automation device for manufacturing industry, whose definition is given in the programme (industrial automation) or a medium-sized collective housing unit, in the shell building phase *i.e.* the heavy work (building). On the other hand, professional field and trainee's activities should correspond to the job targeted by the curriculum and by the prepared diploma, even to the first potential employment, and not to another. This criterion is formulated in terms of technical complexity, of level of responsibility, and of line of business.

### ***A technical environment complementary to scholar technology courses***

In addition the majority of the teachers announce that internships is ideally complementary to the technology courses at school. Thus internships should be an opportunity to learn knowledge different that those learned at school, about technologies which are not studied at school, topical and varied. Indeed some of them are difficult to treat at school (building) or difficult to understand without seeing them "for real". But they should not be disconnected from what is studied at school: knowledge acquired at school should allow students to understand and analyze technologies observed in company. Work experience should content particular cases of application of generic knowledge learned at school. In addition it should be an occasion to go about a case in what it is specific and particular, that can't be done at school. In technology courses, the objective is on the contrary to deal with general knowledge even if they are illustrated with concrete cases. Civil engineering teachers (building) stress this point.

### ***Internship as support for a potentially successful certification***

The students should write an internship report, which is the support of an oral examination, which counts for the certification (see appendix for more details). This aspect appears in a systematic way in the talks of the teachers. The choice of the studied case should captivate examiners, it should be original. Internship's environment should thus allow student to observe this technical case, and to have several vocational activities around it: to use it as operator and if possible to carry out maintenance work or to make an adaptation of it (industrial automation) or to take part in its building or the following-up of its building (building). Student should access to technical documentation, to qualified people, and to the socio-technical environment of this studied case. It should allow him to control his subject and to emphasize himself in front of the board of examiners.

### ***Educational Characteristics of Internship Context***

Teachers say conditions so that the internship is an opportunity to learn. Firstly internship should be a rich technical context. Technologies used should be varied and recent, if possible different from the machines of the school laboratory (industrial automation).

Secondly it should allow student to carry out varied tasks, non repetitive, adapted to its qualification level if possible with various levels of responsibility, from workman to assistant of supervisory staff.

Thirdly, so that the trainee finds his reference marks, internship socio-technical context should not be too foreign with what was learned at school, and should be easy to comprehend. Work organization and industrial relations should be easy to be decoded and some contexts allow it more easily. For example a big manufacturing company (industrial automation) with a quality management system imposes more formalization of work organization than in a small company. An other example is building sites of a medium-sized collective housing unit, in the shell building phase (building) where various building trade are working simultaneously.

Fourthly the trainee should be followed up at workplace with a teaching intention: internship supervisor should listen to student's needs, they should be used to follow up trainees, they should not push him "aside" but define a real training project for him, and let him take initiatives. Company workforce, especially the internship supervisor, should be technically qualified and enough open to constitute a resource person for the investigation student should lead for his report.

### ***Internship for inquiring and understanding work process in its entirety***

Internship should provide resources for the student, so that he can realize the various elements of a technical system and process and interactions between these elements and work context.

With regard to the field of building, the technical subject studied in the internship report should, for interviewed teachers, relate to an element of the construction process but also to what occurs before and after it, to its place in the total building site organization, on the consequences of unforeseen in this process on all the organization of the building site. In addition students should be able to understand and explain not only traditional technologies used on the building site, but especially what was really problematic in the process (at least about the studied subject for the report). Students should take an interest in "delicate details" and in what is not immediate to understand but requires technological knowledge learned at school. It's often what required a serious reflection from the site foreman. At building site, the construction phase and the size of built part should be adapted (if possible included completely) to the internship period so that the student can have a comprehensive view on the process.

With regard to the field of industrial automation, the training course should provide the occasion to see and study a complete automated system and the production process in which it has its role, in its totality.

## **5. Discussion**

### ***A consensual ideal ?***

The ideal work placement presented above in its broad lines is an elaboration of the researcher, starting from what each interviewed teacher says separately. Is this idealized representation shared in a consensual way by the teams of teachers? Complementary data are necessary to answer this question in a final way, but we give here some brief replies resulting from interviews. First majority of criteria are seldom given by only one teacher, and even if it is, the various criteria do not appear incompatible. However we can identify tensions between different criteria. And some of teachers say that they debate about it inside the teaching team, there is even some disagreement between them. We raised one such tension in each of the two teams and we explain below what kind of tensions.

In the first one (industrial automation) : on the one hand trainee should hold a post as worker on a production line, as operator of an automatic device, to be able to collect necessary information about how this device runs and what is its function for writing their report (as it is recommended by institution, see appendix). On the other hand he should carry out activities which correspond to the target job, namely adapting and assembling an automation device on a production line and supervising production workers on this line. These two activities could exist theoretically in the same company at different times, or in two different companies. But in reality it is very difficult to have these conditions, as reported by the interviewed teachers. That leads some teachers to give priority to the first criterion, and others to give priority to the second one. That is like they organize criteria in a hierarchy. Thus the disagreement between the teachers relates rather to this hierarchy than on the criteria themselves.

In the second team (building), one teacher raises his disagreement with his colleagues on the types of companies relevant for internships. For him, a company whose specialty is to equip the building (after the heavy work: plumbing, electricity, windows frames, etc) can be relevant and this is not the opinion of the other colleagues. What is important for the internship is the building site, and the type of company (the heavy work or others) does not predetermine the relevance of the building site. It is difficult to anticipate this relevance. This teacher evokes a debate inside the team on realities of work organization in companies and on building sites and on learning opportunities for students.

### ***A world which escapes the control of teachers***

Interviews let us feel that "bad examples" given by teachers are more numerous and more structuring than "good examples" to define the ideal internship. In addition some teachers express their feeling not to be able to control what happens on work placements. The economic world seems to them like a constraint, with which they have to do, rather than like a possible partner or as opportunities of learning for students. They say that preparing and planning the internships is quite improvised, primarily depending on human relations between teachers and staff of companies. They talk about a lack of administrative support and about a lack of means to help them. A significant difficulty is to make the company subscribe to the learning project of the student. Teachers deal with the complexity of the implementation of internships, with the "not deterministic" nature of internships. That questions us on the governance way of internships, when public schools seem to become an intermediate space of regulation because of the process of decentralization of the French state (Dutercq & Lang, 2001).

### ***Archetypic situations***

The ideal that we built can have an interest for other people than interviewed teachers in their specific context, thanks to its general and synthetic characteristics. But would it be operative? In other words can it be the beginning of a practical guide for teachers? The answers of some of the most experienced teachers, more structured, seem to reveal a reasoning based on archetypes, and not reasoning by applying criteria to each new case which arises. For example a teacher (building) reasons with four types of companies students can find: "A- Cottage industries", "B- Medium companies which equip buildings and carry out finishing touches", "C-Medium companies which build the shell (heavy work phase)", "D- A big group". Each type involves potentialities for internships, under conditions, and risks.

We detail this example below:

A-Cottage industries are to be avoided because the internship supervisor is the owner and manager. He has no time to take care of the trainee. Moreover this kind of company works on small building sites, technically less interesting. This type of company is relevant provided

that it is very specialized and it works on large building sites as subcontractor, during a short interval time.

B- Medium companies which equip buildings and carry out finishing touches are relevant provided that activities have links with the shell (the structure of the building) and in this way concern the education programme. Work placements in this kind of contexts is of particular interest to prepare student's professional integration. Indeed, the first employment of graduates is usually in this type of company.

C- Medium companies which build the shell are difficult places because the supervisor, follows the work of its workmen on several building sites at the same time, and does not have time to take care of the trainee. This type is relevant provided that a strong agreement is established about internship conditions and that the trainee is determined and solicits his supervisor.

D- The big group is of particular interest because staff has great technical skills and because internships can have the function of pre-recruiting. A disadvantage is that the supervisor is very busy and has little time for the trainee.

## 6. Conclusion

The two teams of interviewed teachers are today in a process of improving and trying out other way of connecting internships and courses at school. The results presented in this text could be a support for exchanging between the teachers about a collective representation of the ideal work placement, or about atypical work placements. A strong interest of work placements is, for the teachers of civil engineering (building), to be closest to the least details of a building site. That enables to comprehend its characteristics and specificities. That is impossible at school. And we think that has a didactic interest to learn product and process design, especially in the two fields studied in this investigation. Indeed products are here prototypes (and not of products in series): respectively automation devices specific to a production line and buildings. Here we use the idea developed by Yves Cartonnet that designing a product consists in particularizing, *i.e.* to adapting a concept of technical solution (a general model) to a particular environment (here a production line or a geographical environment and local socio-technical resources). Each product being single, their design requires a taking into account of the environment, always specific. This idea finds an echo in the talking of the teachers who make links between the generic nature of technology courses and the specific nature of the internship building site. Identifying and studying the relation between the technical system (a product or a process) and its environment seems to us to be an idea to develop ways to integrate internships into the curriculum. It can be also an angle to characterize existing practices of experienced teachers to use students' work experience at school.

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## APPENDIX

### Institutional Prescriptions about Work Placements under Student Statute.

Source : Appendix of Decree of the Diploma Creation

	<b>Prepared diploma : B.T.S. Bâtiment</b>	<b>Prepared diploma : B.T.S. M.A.I.</b>
	Decree published in 1999 Field : building industry Curriculum duration : 2 years	Decree published in 1996 Field : industrial automation for manufacturing industry Curriculum duration : 2 years
<i>Educational Objectives of Work Placements</i>	<p>-To complete student's education. To complete student's knowledge about professional environment and about what the target job requires.</p> <p>-It should give a priority to the learning of competences which are difficult to learn at school.</p> <p>-It should be an opportunity to increase student awareness of environmental issues and of quality management and security management.</p>	<p>-Knowledge about in-company life</p> <p>-To lead to knowledge about industry in order to comprehend : its components ; its functioning, in its technical sides, its know-how and its organization</p> <p>-To enable student designing, making, and integrating or using an automation device on a production line</p>
<i>Characteristics of Internship Environment</i>	A building site. A company in the field of building.	Industrial production company
<i>Students activities and what students have to produce</i>	During the internship period, student writes an activities report which must be given in November for the exam. This report includes a presentation of the company, a presentation of principal achieved tasks and of their technical sides, and reflections and conclusions which the student drew from his in-company activity.	<p>-Using an automation device on a production line. This activity must lead to the internship report, including : •the description of an automation device; •how it runs; •how it is used on production line; •the story of its dysfunctions; •maintenance operations on it.</p> <p>-Other complementary activities are possible: designing an automation device, activities on an automation device (integrating, using, making and assembling, maintaining).</p>
<i>Length, position and number of periods</i>	<p>- A period of sensitizing to the corporate environment at the beginning of first year, during two weeks.</p> <p>- A work placement at the end of first year, during eight weeks.</p>	<p>One or more periods, minimum duration six weeks.</p> <p>Two phases: • In-company life phase, at the end of the first year • Phase of using an automation device. This second phase is recommended in second year. It can be fractionated</p>
<i>Assessment Modalities</i>	<p>- An attendance sheet filled in by the supervisor in company which report the list of activities carried out on work placement</p> <p>- Oral examination (at the end of the second year) based on the internship report written by the student : 15min presentation + 15 min of questions (jury is composed of two technology teachers from other schools and one person from the profession)</p>	<p>- An attendance sheet filled in by the supervisor in company</p> <p>- Assessment sheet, filled in together by teachers team and by the supervisor in company</p> <p>- Oral examination (at the end of the second year) based on the internship report written by the student : 15min presentation + 10 min of discussion (jury is composed of one technology teacher, one French language teacher and one person from the profession)</p>