

ENTERPRISE INTERNSHIPS: MODERN FASHION OR REAL NEED?

Rafael Garcia
rafael.garcia@udg.edu

Jordi Puig
j.puig@udg.edu

Joaquim Velayos
joaquim.velayos@udg.edu

Isabel Villaescusa
isabel.villaescusa@udg.edu

Maria Gispert
maria.gispert@udg.edu

Josep Xargayó
josep.xargayo@udg.edu

Martí Fàbregas
marti.fabregas@udg.edu

Joan Serarols
joan.serarols@udg.edu

Núria Mancebo
nuria.mancebo@udg.edu

Escola Politècnica Superior, Universitat de Girona

ABSTRACT

Enterprise internships stand nowadays as one of the key educational activities carried out outside the classroom. While internships help students in their curriculum development, the increase of student placements due to the Bologna process raises a number of issues such as: (a) the establishment of adequate protocols to guarantee enough high-quality industrial internships for all our students; (b) lack of adequate management tools to efficiently organize and monitor internships. In this paper we present a transversal enterprise internships programme, which targets quality improvement, academic control and satisfaction of collaborating enterprises. The fundamental infrastructure of this programme combines a web-based intranet platform with a protocol of procedures and tasks that are observed and followed at all internship stages.

INTRODUCTION

The Bologna process started back in 1998 with the *Sorbonne Joint Declaration on Harmonisation of the Architecture of the European Higher Education System* [1]. Since then, it has driven the most important reforms in higher education in the modern era. Thus, European universities have implemented in the last few years a good number of procedures to build the European Higher Education Learning Area and thrive in the emerging global knowledge economy. Student internships have appeared as one of these procedures, becoming a key component in the Bologna process. Although internships existed already in some majors before the Bologna process, student placements have appeared and/or increased in many other disciplines as a fulfilment of the Bologna convergence. While the common opinion states that exposing students to a real working environment provides the student with a complimentary view about his field of study [2,3], there is a lack of studies that prove how beneficial internships are in many of these disciplines. Therefore, further studies are required to quantify how enterprise internships improve the training of the students in the different disciplines, or if, on the contrary, in some cases this is just a new fashion with little or no impact on the student's education.

Following this trend, and with the Bologna process in the sighting-pole, the *EPS* started in 2005 a new transversal program of work internships placements that we named EEL (standing for “*Estades en l’Entorn Laboral*”), which was designed specifically to overcome the limitations of pre-existent programs while taking profit of their positive aspects. Before the implementation of the EEL model, the Polytechnic School (*Escola Politècnica Superior*, *EPS* hereafter) already understood internships as a key component of the academic curricula. However, there was a lack of control of the working plan carried out by the student in the enterprise, due to a strong dissociation between the University and the enterprises. The coordinator of every engineering degree was formally responsible for the evaluation of the internships, among the many other tasks he had to carry out. Therefore, he could not effectively audit the academic contents of the internships. It should be noted that the coordinator’s assessment was based only on a “*pass/don’t pass*” strategy, and the student obtained a positive evaluation as far as he could prove that he had carried out the internship. Unfortunately, the university did not have a catalogue of companies offering academic internships, i.e., a list of supervised internships whose academic content had been validated by a faculty member. Therefore, the student often had to look for a company on his own, and the first contact between the university and the company was carried out by the student itself. With this situation, the offers could be too balanced towards the particular interests of either the enterprise or the student. Thus, in some cases, companies proposed working plans that were too biased towards their needs, sometimes without a valuable academic content for the student. The other undesirable situation with the existing internship model was that some students reached agreements with small companies where they had a personal/family contact, so that, in those cases, the student could not be objectively evaluated by the company. Finally, we had confirmed some cases of dissatisfaction with students regarding the academic content of their working plan, and with companies that were also disappointed because they were hiring students with the wrong profile and/or motivation.

Thus, the new EEL model is focused on internship quality improvement [4], aiming to increase the academic control of the activities carried out by the student while, simultaneously, promoting the interest and satisfaction of collaborating enterprises. One of the key elements in the success of EEL is that it makes available to all internship participating agents (students, enterprises and university staff) a specifically designed intranet web platform which centralizes the set of tools, procedures and tasks involved in all internships stages, providing fluent communication among participants, partner contacts, information, registration, management, statistics and evaluation tools.

Summarizing, the objectives of this work are twofold. First, it aims to reflect on student internship placements as a tool for developing the engineering curriculum. Secondly, we present a web-based software tool for the efficient management of enterprise internships. This tool is scalable, allowing the management of an increased number of students while minimizing the requirement for managing time.

MANAGEMENT OF THE INTERNSHIPS

From the perspective of EPS, exposing engineering students to a real working environment provides the student with a fundamental view about engineering [5]. Enterprise internships have always had a great importance in the bachelor engineering programs of EPS, even before the Bologna process. This preliminary professional training experience provides the students with an opportunity to apply what they have learnt in a real environment and to acquire useful and efficient new work habits. Moreover, internships become a fundamental key factor in the student academic motivation [6].

Before the deployment of *EEL*, the methodology to audit student internships was based on awarding some academic credits that were proportional to internship time. In contrast, in this new programme, students are enrolled in a specific *EEL* course –which is included in the engineering curriculum– having a selected team of coaching professors devoted to follow the advances of the student during the internship. A key point of the *EEL* programme is the adequate selection of these coaching professors, who not only monitor the internship, but also actively counsel students involved in this off-campus learning experience. For this reason, coaching professors should have experience in working with private companies, but should also know and understand the “culture” of every enterprise where a student is placed, guiding the student not only in the technical aspects of his work, but also in the typical way of behaving within the organisation. On the other hand, beyond providing support and guidance to the students, coaching professors also participate in the design of the internship activities, providing feedback to the companies and enabling synergies with existing research groups of the university that could add value to the company through technology transfer contracts. Therefore, adequate selection of coaching professors is one of the pillars for the success of the *EEL* programme.

One of the key elements in the success of *EEL* is that it provides a specifically designed intranet web platform to all internship participating agents (students, enterprises and professors). This platform centralizes the set of tools, procedures and tasks involved in all stages: information, meeting, contacts, registration, management, statistics and evaluation. This model is perfectly scalable, so that an increase of the number of internships can be easily handled by the platform.

The *EEL* web platform works as follows: (1) participating enterprises and institutions propose online their *in situ* engineering placements, (2) placement proposals are revised and approved by the *EEL* administration, (3) students access the web and apply for placements according to their curriculum and interests, (4) enrolled enterprises automatically receive an email with a link to examine the curriculum of the applicant every time a student selects that offer. Once the enterprise receives all the applications, the students are interviewed and, possibly with the help of coaching professors, the enterprise carries out its selection. (5) Whenever a student has been selected for a given placement, a coaching professor from *EPS* and an engineering coach from the enterprise are assigned to the student. (6) The internship starts with a

meeting between the coaching professor, the enterprise coach and the student. During this meeting a working plan is defined in detail, pointing out the tasks that will be carried out by the student. (7) During the internship, those three partners are in contact at regular arranged times under the supervision of the coaching professor. (8) After the internship, the student is assessed by the coaching professor taking into account the enterprise opinion (this is carried out by contacting the enterprise coach).

The EEL Web tool

The EEL intranet Web Platform (EELWP) has been designed, implemented and configured specifically by the EPS to satisfy the requirements of the EEL model [7]. From a technical viewpoint, the platform is hosted on a Red Hat Linux server in our faculty.

EELWP has been developed mainly in PHP language while some user interacting functionalities had been implemented in Javascript and AJAX. EELWP is supported by a MySQL independent database and performing temporary data connections with other university central databases for data interchanging. Despite its faculty specificity, EELWP design easily allows being adapted and configured to be used by other faculties either in our university or outside. For instance, at present, and due to the success of the EEL model, the Faculty of Economics of UdG is using its own adaptation of our EELWP. Moreover, other faculties of UdG are following the same procedure to adapt EELWP to their needs, and there is a project to use EELWP as a standard internship management platform for the whole university.

Functionally and from the user point of view, *EELWP* has been split into five “agent” zones corresponding to the actors playing a role in the *EEL* model: *public-common zone*, *enterprise zone*, *student zone*, *coaching professor zone* and *administrative staff zone*. Moreover, there is a “super-agent” zone of *administration-managing*.

The platform works always under HTTPS network protocol to provide users a secure data flow. Access to the registered “agent” zones is protected by means of user defined passwords and specific PHP authentication code, while the “super-agent” zone uses a particular HTTP authentication scheme.

A. Public-Common zone

This area is the public unregistered zone of the intranet and also the common login door to “agent” registered zones. Its main functionality is allowing the registration of new enterprises to the platform; but it contains also general information about the *EEL* performance, the list of coaching professors, the list of collaborating enterprises and the public news section.

Whenever an enterprise has filled in the registration form it receives an email message to verify its email address. To verify the confidence of those registrations, the *EEL* platform administrators contact all new registered enterprises at regular intervals or whenever a new enterprise makes a placement offer.

B. Enterprise zone

As already stated above, enterprises require a compulsory registration to access this zone which is dedicated to participating companies.

The *enterprise zone* includes the following enterprise devoted services:

- *Offers service.* It includes: adding offers, state of offers, full offer information, cancellation of offers, list of applicants for every offer, access to curriculum of the applicants, etc.
- *Selection service.* Includes: selection of applicants setting the preference order, interview information, etc.
- *Enterprise data service.* Data modification of every enterprise in the platform.
- *Coaching professors' service.* The list of coaching professors (including contact information) in every *EPS* degree.
- There is also a news and documentation section, a collaborators section and a help section.

C. Student zone

Students, as members of the university community are already registered users of the university network, so *EPS* students do not need any specific registration in the *EEL* intranet and they should simply use their corresponding university intranet authentication data to access also our platform.

The *student zone* includes the following student dedicated services:

- *Application service.* It includes: state of allocation, full application information, cancellation of applications, change of preferences, etc.
- *Curriculum service.* The personal data and *EPS* training data are automatically filled in, so the student needs to complete only his/her work experience and additional information.
- *Placements service.* The complete list of placement offers (details, vacancies, number of applicants, state of allocation, etc.) which can be filtered depending on student interests and the application form.
- *Coaching professors service.* The list of coaching professors (including contact information) in every *EPS* degree.

- As in the enterprise zone there is also a news and documentation section, a collaborators section, a help section, a FAQ section and a surveys section.

D. Coaching professor zone

As explained before in the case of students, specific registration for EELWP professors is not required.

The *coaching professor zone* includes the following services:

- *Coaching service*. Including: list of assigned student-enterprise pairs, partner contact information, assess form, placement documentation state, etc.
- *Enterprise service*. Complete list of enrolled enterprises with complete contact information.
- *Placements service*. Complete list of placement offers (details, vacancies, number of applicants, state of allocation, etc.) which can be filtered depending on user interests.
- *Coaching professors service*. List of coaching professors (including contact information) in every *EPS* degree.
- It also includes: a news and documentation section, a collaborators section, and a help section.

E. Administrative staff zone

Administrative staff members are also users of the university network, so they do not require registration either. This zone is devoted to administrative staff services focused on providing information (list of placement offers, list of enrolled enterprises, list of coaching professors, administrative staff news, etc) and not on acting on the platform.

F. Administration-Managing zone

This zone is devoted to administrative and managing tasks of the *EEL* model and de managing utilities of the *EEL* web platform itself.

The *administration-managing zone* includes the following detailed and extensive management services: *enterprises, placements, applications, students, allocation*

algorithm, coaching assignments, coaching professors, placement documentation, emails, news, call for offers, statistics, etc.

An interesting and useful functionality implemented in the “super-agent” zone is the possibility to emulate a login playing the role of any registered “agent” of the *EELWP*. That login emulation is complete, in the sense that the “super-agent” could, not only monitor exactly what the emulated “agent” would see, but also act, if necessary, as the emulated “agent” itself. This emulation has several benefits: (1) instantaneous and exact monitoring of user’s activities from their point of view, (2) efficiency in user problem solving, (3) executing actions on user demand, (4) testing new functionalities and (5) easiness of implementation by means of the correspondent “agent” zone services.

EEL Allocation Algorithm

Finally, *EELWP* includes also an Automatic Allocation Algorithm (*EEL3A*) which, taking into account the declared preferences of the allocation’s phase actors (placement offering enterprises and applicant students) performs the allocation.

From the *EEL3A* point of view, students can be in one of these three different allocation states:

- *Not allocated*, when the student does not have an allocation.
- *Provisionally allocated*, when the student has an allocation which he has not yet accepted, so that allocation could be replaced by other student’s priority allocations.
- *Permanently allocated*, when the student has an allocation already accepted by him or an allocation which has the highest student’s appliance preference.

And placements can be in one of the following four different allocation states, according to the allocation algorithm:

- *Free allocation*, the placement has no applicants or the algorithm has not set a different state to the placement yet.
- *Void allocation*, the placement does not have an allocated student after algorithm execution.
- *Provisional allocation*, whenever the placement has a *provisionally allocated* student.
- *Permanent allocation*, whenever the placement has a *permanently allocated* student.

EEL allocation proceeds as follows:

- (1) Students can apply simultaneously to several placement proposals setting a preference order.
- (2) Enterprises can also select several students from the corresponding applying offer list and set their preference order too.
- (3) Every time *EEL3A* is executed, placements in the *void allocation* state are set to the state of *free allocation*. Then the algorithm looks for the set of placements in state of *free allocation*, which is named the *Free Placement Set (FPS)*. One *free placement* is taken from *FPS* and named the *target placement* –i.e. the placement that the algorithm would try to allocate–. Therefore, accordingly to the enterprise preference order, the first selected *not allocated* or *provisionally allocated* applicant in a lower student preference placement, if any, would be allocated in that *target placement*; otherwise –i.e. the *target placement* has no applicants, has only applicants *permanently allocated* or *provisionally allocated* in a higher preference placement– the placement is set to the *void allocation* state. Any new allocation would be always *provisional* excepting those cases where the *target placement* has the highest student preference or the student has already accepted it; only in these above mentioned cases the allocation would be *permanent*. The target placement would be always removed from the *FPS*. One of the collateral effects of this procedure will be that some *provisional allocated placements* could be let into a *free allocation* state and added to *FPS*, because its students “had been stolen” by other placements which are more interesting for those students. The process is repeated, by taking another *free placement* from *FPS*, until *FPS* is empty (i.e. there are no *free placements* left).
- (4) *EEL3A* could be executed automatically whenever any agent carries out an action or in a managing supervised scheme at regular time intervals.

Finally, it must be noticed that despite the fact that both (applicant students and offering enterprises) had pointed out its preference order and enterprises had carried out a selection of students, the final decision (placement acceptance) and the prevailing preference criteria (for instance, whenever several enterprises had selected simultaneously the same applicant student) would be, obviously, on the student side.

RESULTS

The EEL programme is currently on its sixth year of operation. Figures 1 and 2 summarize the results obtained on the first 5 years. It should be noted that although the number of enterprises that joined the programme has been increasing at a good pace, the number of student placements has also increased, but it decreased on the 2008/09 academic year. This decrease is explained because of the international economic crisis, which has especially affected several companies of our local industry. On the contrary, the number of students that participate in the programme has kept a constant growth, with 450 students on the last year, generating more than 1,150 applications. This compares to the 111 students of the first year that generated 174 applications (see Figure 1).

One of the keystones that enables this growth is the efficient performance of our automated web service, which allows an optimal interaction between students, enterprises and academic staff. This web portal is scalable, and allows the increase of the number of internships and companies with a very limited overhead for the administrative staff.

On the other hand, we observe that the performance of the students is very good. Since the students are qualified on a 3-grade system, most of them obtain the “optimum” grade (9 points out of 10), a few obtain a “suitable” (6/10) and a much reduced number of students do not obtain a positive evaluation of the internship (see Fig. 2). In this grading, coaching professors consult and take into account the opinion of the company before judging the work of the student. Finally, it should be noted that the allocation of placements works very well by automatically following the algorithm described in the previous section. It is also important to note that, currently, the programme is not pre-defined. On the contrary, it is constantly developing. Continuous interaction and dialogue between faculty and industry is the cornerstone of the internship programme. For this reason, the web service has dedicated zones to for interaction between the different participating agents (students, faculty and companies) to interact in an optimal way. Moreover, at the end of the internship, we collect the opinion and observations of the enterprise coach, the student and the coaching professor. This feedback is crucial to the success of the project and critical for adopting corrective actions in the benefit of the programme.

Finally, regarding the coaching professors devoted to follow the advances of the student during the internship, we have observed two interesting aspects. First, the satisfaction of the companies for their active participation in the design of the internship activities (the reduction in their teaching load is a good motivation to increase their involvement). But also, by establishing links between industry and the existing research groups of the university, coaching professors are generating synergies that have become reality through an increase of technology transfer contracts. This increase in university-enterprise contracts compensates for the financial effort of hiring two additional part-time lecturers to cover the courses for which coaching professors get a reduction. For all these reasons, and provided that coaching professors are a key

element in the success of the project, it should be noted that efforts are also being made to obtain new faculty members with industrial experience who will eventually act as coaching professors.

CONCLUSIONS

The EEL programme has been found to be a valuable asset in addressing enterprise and student needs in the experiential project. We should remark that both enterprise and student feedback has been overwhelmingly positive for *EEL*, with a special emphasis in the functionality of the web application and the active participation of the coaching professors. Indeed, many of the participating companies regularly repeated his offer of placements. Moreover, the growing interest of students is clearly evident in the increasing number of candidates and their strong wish to repeat the EEL experience.

On the other hand, one of the most important lessons that we have learnt is that the adequate selection of the coaching professors, with solid experience in working with companies and industries, is key for the success and positive turnaround of the programme for students, companies and also research groups of the university.

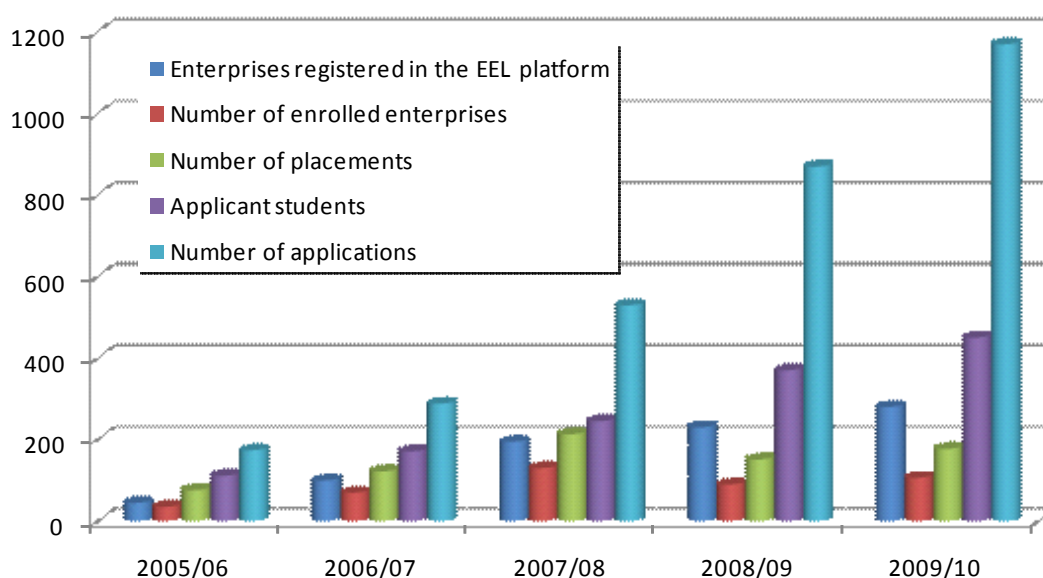


Figure 1. Evolution of the number of participating enterprises, internship offers, student demand, placements and evaluation results, for the first 5 years of the *EEL* programme.

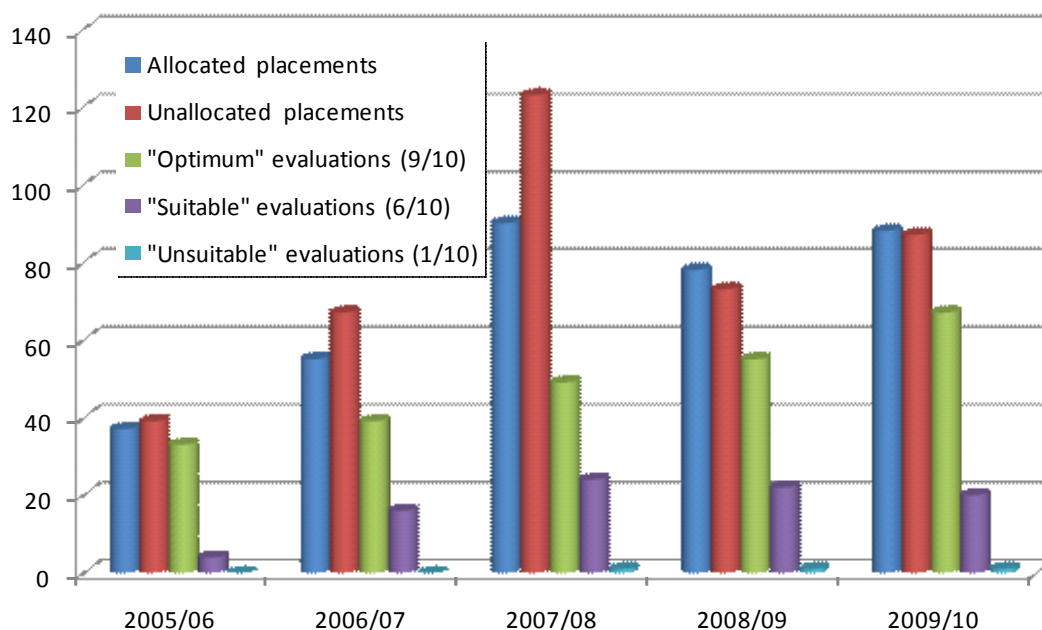


Figure 2. Number of placements and evaluation obtained by the students for the first 5 years of the Work Internship Placements (*EEL*) programme.

Moreover, it should be noted that we see many cases where, from a practical internship, the link between student and company continues and formalizes a contract of employment once the student completes his degree in engineering. Thus, work internships not only help to supplement the practical training of students but are also an excellent tool for future job placement.

For all the reasons stated above, it is important to develop scalable web-based intranet platforms that provide tools, procedures and tasks to manage student internships at all stages, providing feedback not only to students but also to enterprises, coaching professors and administrative staff.

The dominant opinion of our regional industrial environment states that *EEL* makes a very significant contribution towards providing industry with engineering graduates who are well-prepared to assume engineering assignments, with less need for on-the-job training and with generic skills through problem-based learning. While this agrees with other works that can be found in the literature [8,9], the Bologna process has driven a wave of enterprise internships in all disciplines, even when there is still a lack of studies that prove how beneficial internships are in many of these disciplines.

Finally, a number of drawbacks of *EEL* should be taken into consideration. These drawbacks include the need for adequate coaching professors, with the required experience and willing to participate in this off-campus experience. It should be noted

that the quality of the internship highly depends on the task carried out by the coaching professors. Secondly, once EEL becomes a mandatory course, it is not possible to guarantee a placement in an enterprise for each and every student, unless enterprises keep the internships regardless of the student that is finally assigned. This goes against the possibility for the enterprise to select the student by using the *EEL* web platform. Therefore, further adjustments are required to ensure that EEL becomes an internship quality placement programme for our students.

REFERENCES

- [1] C. Allegre, L. Berlinguer, T. Blackstone, J. Rüttgers (1998). *Sorbonne Joint Declaration On Harmonisation of the Architecture of the European Higher Education System*, Paris, the Sorbonne, May 25 1998.
- [2] E. Martin (1997). *The Effectiveness of Different Models of Work-based University Education*. Department of Employment, Education, Training and Youth Affairs J.S. McMillan Printing Group.
- [3] I.T. Wangsa, L. Uden (2007). *Towards the development of industrial placement in Higher Education*". 3rd EUI-Net International Workshop: European Models and Best Practice on Practical Placements of Students. Rome, pp. 9-14.
- [4] E. Helerea, M. Popescu, L. Bădescu, A. Dascălu (2007). *Management System for the practical placement in higher education*. 3rd EUI-Net International Workshop: European Models and Best Practice on Practical Placements of Students. Rome, pp. 87-90.
- [5] J. Brennan, B. Little (1996). *A Review of Work Based Learning in Higher Education*, Department for Education and Employment, Sheffield.
- [6] D.A. Colley, D. Jamison (2008). *Postschool results for youth with disabilities: Key indicators and policy implications*. Career Development for Exceptional Individuals, 21(2), pp. 145-60.
- [7] <https://eps.udg.edu/empresa/php/index.php>
- [8] D. Hall, *Industrial Placement-Preparation for Success*. Available online through: <http://www.science-engineering.net/placement_g.htm> [Access: April, 2011].
- [9] L. Uden, G. Moran (2007). *More than subject-specific skills for students*. 3rd EUI-Net International Workshop: European Models and Best Practice on Practical Placements of Students. Rome, pp. 51-56.

QUESTIONS AND CONSIDERATIONS FOR THE DEBATE

- How are student internships helping in the curriculum development?
- Are enterprise internships a new fashion triggered by the Bologna process? Or are they real need?
- How can we guarantee enough high-quality industrial internships for all our students if we keep increasing the number of students that need to carry out an internship in their curriculum development?
- To what extent can a web-based system such as the one introduced in this paper facilitate the management of work internships?
- How could universities effectively manage internships at international enterprises within the European area? That is, how can we successfully match the internship positions offered by our local network of enterprises with the need of the universities of the European Space of Higher Education to look for international internships for their students? Can platforms such as LEO-Net be the answer to this question?