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Promoting the Learning Mobility of Future Workers: Experiments with Virtual Placements in University-Business Arrangements

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Summary

Virtual placements are learning arrangements, which generate new possibilities for accumulating professional (work-based) knowledge. Virtual placements are beneficial in many ways; they merit increased training opportunities, exposure to not/never-thought-of occupations, integration of disadvantaged individuals, and preparation of, and blending with, physical placements. This paper reports about multi-country experiments with technology-enabled remote access to work, as a contribution to the work-based learning and professional mobility of students. The central question is: how may virtual placements be arranged so as to bring a contribution to the development of professional skills and competences? This paper first addresses the contribution of traditional placements, followed by the strengths and weaknesses of virtual ones. Next, real pilots with virtual (work-based) arrangements, are described. Regular universities experiment with virtual placements in on-campus courses and curricula, in frame of self-organised learning, whereas open universities experiment with virtual placements in off-campus courses and curricula, in frame of social-collaborative and networked learning. Subsequently, the results of the different arrangements, their pros and cons, are described. Final conclusions from the study are drawn on the development of professional skills and competences in students, the implemented didactics and the technology applied.

Keywords: virtual placement, learning arrangement, work-based learning, networked learning

1. Work-based training and placements

Placements are work-related learning opportunities, which provide students, graduates, and career changers with the opportunity to gain knowledge and skills in particular domains. A placement can be regarded as a short-term intra-curriculum experience within a public or

private organisation. It provides a work experience in the domain the student is already engaged in, or would like to know more about, in order to make certain academic or professional decisions. Placements provide valuable work experience: successful placements increase a student's confidence in his/her abilities and help determine if a student's interest in a particular career is genuine. Placements also help to create a valuable network of professional contacts, they are a good means of building credit for both the university and the student. Placements are applicable to any educational level, ranging from undergraduate students to postdoctoral fellows. Moreover, it appears that a growing number of interns is (also) able to train abroad, due to the availability of European Union (EU) funding.

The work or practice placement and the research placement are two of the most common types of placements. Most often the practice placement is served within the second or third year of the university period i.e., the Bachelor level. Such placements range from 2 months up to half a year, and sometimes even one full year. During the placement, the student is supposed to apply the academic knowledge as developed during university study, and put this into practice. The student can obtain valuable work experience during the placement period. The experience gained, could be helpful in finishing the last year of study, and future working life. The research placement is generally served to students in their last year of university study i.e., at the Master level. Students perform research for a particular public or private organisation. The organisation poses a research question or the student phrases one which is of interest to both the organisation and the university. The results of the research are described in a report, which usually is presented to a supervisory board (Van Dorp et al., 2008).

How may we view the benefits for students? Several authors have identified benefits of placements to students (Urquiola, Stern, Horn, Dornsife, Chi, Williams, Merritt, Hughes and Bailey, 1997; Hamilton and Hamilton, 1997; Pauly, Kopp and Haimson, 1995; Pedraza, Pauly and Kopp, 1997; as cited in Hughes and Moore, 1999). Some of the claimed benefits:

(i) acquisition of occupational, technical, and workplace readiness skills;
(ii) career exploration and planning, including learning about all aspects of a sector;
(iii) psycho-social development and preparation for adult responsibilities;
(iv) reinforcement of academic learning, through contextual or situated learning, and by increased motivation (Hughes and Moore, 1999, p. 1).

Work-based learning provides students with an opportunity to broaden their generic skills and add valuable real-world professional experience. For students, a placement is also an excellent way to explore a prospective employer or business domain. A placement is an easy and effective way to gain understanding of an organisation and to get to know the people that work in it. Placements not only offer opportunities to develop new skills, but they also allow for networking with individuals with whom the student might ordinarily not have come in contact with during his/her formal education. Having a professional network could induce recommendations for a first "real" job. In a competitive job market, a positive placement experience provides students with an edge, especially if fellow students have not had this afforded.

How may we view the benefits for organisations? Acemoglu and Pischke (1998) state that many economists view the skills of the labour force (human capital) as the engine of economic growth, or at the very least, a major contributor to economic performance. They note that although the most common indicators of human capital measure the amount of formal schooling, on-the-job training may be at least as important in determining productivity. Most lines of business require specific skills which cannot be provided by general-purpose education.

Similarly, new technologies and organisations require continuous learning, best accomplished by workplace training. There are at least two theories that can explain some of the reasons why organisations train.

A first theory is authored by Becker (1962) and Mincer (1958) and is on the investment in human capital. Becker has provided for leading publications on education, labour and distribution of income; some on an individual basis (1985, 1972 and 1967), and some in conjunction with authors Murphy, Tomes and Chiswick (1992, 1979, 1966). A large portion of human capital accumulates in the form of training and on-the-job learning, which takes place inside firms. Publications by Becker (1960, 1962, 1964), Becker and Chiswick (1966), and Mincer (1974) provide a theoretical analysis, explaining the relation between education, training, investment and wages of workers. The theory draws a crucial distinction between general and firm-specific training. General training will increase a worker's productivity in a range of employment opportunities, and therefore will translate into higher earnings in a competitive labour market. Thus, it is the worker who has to pay for general training. The firm should pay only for the firm-specific component of training that does not help the worker receive higher wages elsewhere. However, these predictions seem to be at odds with reality.

A second line of thought as to why firms train, comes from theory and evidence by Acemoglu and Pischke (1998). Both authors developed a theory of training whereby workers do not pay for the general training they receive. They explain that superior information of the current employer regarding its employees' abilities relative to other firms', creates ex post monopsony power[1], and encourages this employer to provide and pay for training, even if these skills are general. The associated model can lead to multiple equilibria. In one equilibrium quits are endogenously high, and as a result employers have limited monopsony power and provide little training, while in another equilibrium quits are low and training is high. Using micro data on German apprentices, they show that the predictions of the model receive some support from the data. Additional studies can be retrieved from Acemoglu and Pischke (1999a, 1999b), Winkelmann (2001), Mühlemann and Schweri (2003), and Mohrenweiser and Zwick (2009).

From the aforementioned economic theories, the notion that companies are interested in training, receives support. In this context, placements can be regarded as a special type of work-based training: a training which is particularly aimed at the skilling of future workers.

Largely unresolved is the question as to why firms participate in placement programmes in particular, as being a specific type of organisational training? As far as one can tell, economic theory says little about this type of training. But, there are many surveys on this matter and each has contributing suggestions. Take for example the case of Achieving Scale and Quality in School-to-Work Placements: Findings from an Employer Survey (MDS-902) by Bailey, Hughes and Barr (1998). Their data suggest that the most important motivation for participation in placement programmes remains philanthropic. Finally, Van Dorp et al. (2008), list five arguments for involvement of organisations in placement programmes:

(i) the increase of organisational productivity by training;
(ii) the acquisition of new employees to replace old ones;
(iii) as intermediate resource to cover temporal vacancies;
(iv) as a way to cover a temporary rise in the amount of work;
(v) as a way to diminish specific labour costs in the organisation.

[1] Monopsony is a market form in which only one buyer faces many sellers.

2. The added value of virtual placements

Virtual placements add particular value to traditional education, as well as to distance education (Van Dorp et al., 2008). Virtual placements are learning arrangements that provide a context in which professional skills and competences, and work experience can be accumulated (Kristensen, 2002; Lansu et al., 2009; Bijnens et al., 2006). In regular education, virtual placements can be implemented as elective, mandatory, or integrative elements within a course or curriculum. Students explore certain domains and subjects in more detail, and with a specific professional flavour. Virtual arrangements offer students the possibility of exploring additional training opportunities next to, or in combination with, the already existing and physical ones. Virtual arrangements can be used to stimulate learning mobility throughout all phases of education (Com, 2009). For organisations, the benefits are apparent: they benefit from an effective inflow of new knowledge by the interns (Silvio, 2003; Valjus, 2002). Virtual arrangements are specially advantageous for organisations with small budgets, heavy workloads, limited human resources and restricted office spaces (Kutylowski, 2002).

Virtual placement arrangements can be implemented in classic education, as a way to discover and explore neighbouring subjects for which the student always had an interest, but never had the opportunity to explore, and for which physical placements would be too far off. Additionally, virtual placement arrangements are a likely candidate in circumstances whereby not enough experience is present at the university or with the student, and where it concerns new or not/never-thought-of occupations. Virtual placements have a positive impact on the inclusion of disadvantaged groups. Such groups can improve their social and professional mobility. Additionally, virtual placement arrangements can be used in combination with regular placements. Virtual placements may smoothen the entry into the physical placement. Alternatively, they can be used in a blended model in which the physical presence of the student is reduced and substituted with virtual presence. Virtual placement arrangements are particularly useful to explore in the context of certain constraints: they enable more flexibility than physical placements, and allow for the combination of part-time learning and working.

With organisational and administrative capacity for regular placements lacking, virtual placements are also a particularly serious attribution to open universities (Van Dorp and Herrero, 2008). Virtual placements enable off-campus students to flexibly develop professional skills and competences in their domain of study. For distance students, flexibility is key. Flexibility can be expressed in terms of time, content, entry requirements, instructional approach, resources, delivery and logistics (Collis and Moonen, 2001; revised from Collis, Vingerhoets and Moonen, 1997). Distance students are unable to perform physical placements at regular office hours, as they often combine full-time jobs and hectic family lives, with their study. Given the flexible online nature, virtual placements represent a highly time-efficient pathway to professional development. Virtual placements are also a pedagogical solution for students with physical or physiological disabilities. Moreover, students in rural areas with geographical constraints and restricted access to regular education facilities, would benefit, including those students that have serious financial limitations. Finally, virtual placements enable professional skilling in situations where physical placements are not feasible. Taking full advantage of the opportunities of the modern, networked society, both the classic universities and the distance universities are able to develop whole new training and placement arrangements.

3. Models for on-campus and off-campus students

In this section the results of two major pilots, which deal with the delivery of virtual placements for (formal) higher education, are presented. One pilot concerns the classic European university and deals with the delivery of virtual placements to on-campus students, as part of the integration of virtual placements into traditional courses and curricula. The other pilot concerns the open university and deals with the delivery of virtual placements to off-campus students, as part of the integration of virtual placements into distance courses and curricula. The test method allows for the comparison of two educational modalities i.e., the on-campus and off-campus delivery, and allows for drawing conclusions along the dimensions of organisation, technology and pedagogy, and the effectuation of professional skills and competences, in these different student cohorts. Although on-campus and off-campus education increasingly resemble each other whereas modern content delivery is concerned, students in on-campus situations gain knowledge and experience by a multitude of formal, informal and non-formal learning activities, such as classes, study meetings, colloquia, workshops, apprenticeships, placements and research. In far as off-campus education is concerned, professional development has not been addressed properly. Especially within the realm of lifelong learning, open universities have an opportunity to improve communication with outside stakeholders through new learning arrangements, and help avoid becoming a poor relation to conventional education.

Three different virtual placement arrangements have been developed for on-campus purposes, by two universities. Two of these on-campus arrangements have been developed by the University of Miskolc, represented by its Open and Distance Learning unit, the North Hungarian Regional Distance Education Centre, a lead developer of e-learning programmes for education, small and medium enterprises (SMEs) and entrepreneurs, in partnership with the Faculty of Economic. One on-campus arrangement has been developed by Tallinn University, the university itself being a pioneer of virtual education in Estonia.

The experiments with off-campus arrangements have been performed by the Open Universiteit in the Netherlands, represented by the School of Science, which operates as a pioneer of innovation within different national and international networks and alliances. Similar to the aforementioned arrangements, the pilots conducted by the Open Universiteit among their Dutch and Flemish students, were an integrated part of the curriculum. Up to five different placement pilots have been conducted with different external organisations, and multiple off-campus student cohorts. The placement assignments served as an end of term integrated research thesis, for Bachelor-of-Science graduation, meeting the scientific requirements for that level.

3.1 First arrangement

One blended arrangement was made for assessing (virtual) practice placements at Miskolc University. Interns performed their work outside of the contracting organisation, partly on university premises and at home. In the summer and autumn of 2007, seventeen students from the faculty of economics, the faculty of mechanical engineering and information science, and the faculty of materials science and engineering of Miskolc University, participated. Six university tutors were engaged. External organisations had limited and advisory roles. The blended model on average, took one to three months and one to ten hours of student load per week. Although the practice placement was compulsory at Miskolc University, it did not provide credits. In preparation to the placement, draft assignments were developed and individual student activity plans created. In the course of the placement, individual student activities were paced by this work plan. In the end, the students handed in their final reports. The external

organisation, the university tutor, and the student all provided feedback on the quality of the work. Students could finally contest, by submitting their work to a Scientific Student Association Conference and Competition.

3.2 Second arrangement

One blended arrangement was made for assessing the infusion of a virtual placement within a regular university course, to assess the possibilities of synthesising course theory and field practice at Tallinn University. In the academic years 2007/2008, students from Tallinn University, Institute of Information Studies, conducted a (blended) virtual placement within the Bachelor course Business Information Sources (BIS). Two students, simultaneously attended the BIS lectures, served a joint placement for an external organisation. The students were coached by a mentor from the organisation and by a university tutor. On average, the students worked between one and three months on the assignment for approximately twenty hours a week. The final result, a report on business information sources, management and use in the company, was presented to the class mates and university tutor, for feedback and assessment. The students earned credits for the virtual placement, as a part of the BIS course. Also, the external organisation was consulted for feedback. The university tutor performed the final grading, based on performance and final reporting. The final report synthesised theory and practice in the use of business information.

3.3 Third arrangement

One blended arrangement was made for assessing (virtual) research placements. In spring 2008, twenty two students from the before mentioned faculties of the University of Miskolc started their research placement. Fourteen university tutors and twenty external organisations were involved. On average, the placements lasted half a year, in accordance with a full-time work week. The research placement was compulsory at Miskolc University and offered credits as final thesis work. In preparation of the virtual placements, discussions with organisations, students and tutors took place on the subjects and the formulation of the assignments. Prior to autonomous student activities, the university and the organisation provided two weeks of intensive structuring. Subsequent student activities were periodically supervised by the university tutor and the organisation mentor. The final thesis work was evaluated by the university and the external organisation, in a student defence session.

3.4 Fourth arrangement

In 2007 and 2008, five pilots were conducted by the Open University of the Netherlands. Off-campus students collaborated as networked teams on assignments of external organisations. Student teams collaborated through the university's electronic learning environment (Lansu et al., 2010). It mimicked an authentic professional environment providing consultancy services for business and (non)governmental organisations (Ivens et al., 2007). All pilots accounted for the participation of thirteen students, six academic tutors, and five external supervisors from organisations. The student teams worked for real clients. They were guided by the group process itself, the academic tutor, and the organisation mentor. The team-based internship, on average, took half a year, with an average work load of 10-20 hours per week. The virtual placement included formal credit points, as part of the Bachelor. Students had to prepare a joint project work plan and individual competence development plans. During the placement, they had to deliver an intermediate progress report, a self-reflection report, and a final thesis. Grading, by both the academic tutor and the organisation mentor, was implemented as a

mixture of cumulative assessment of individual and team-based products. The final grade expressed the individual and team contribution from both the academic and professional perspective.

4. Dimensions of arrangements 1–3 (on-campus)

In this section, the learning objectives, the didactics and the technology will be discussed for each of the arrangements offered to the on-campus students.

4.1 Learning objectives

In the first arrangement, students had to become familiar with research strategies, methodologies and reliable information sources, in conjunction with the possibilities of networked collaborative learning. In the second arrangement, students had to develop skills and competences for critically analysing, using, synthesising and evaluating business sources and data, through a process of team-based collaboration, in contact with other students and external organisations, and by communication and presentation. In the third arrangement, students (more strongly) had to direct themselves towards tangible solutions, through a strategy of more interaction with external stakeholders and more creative and trans-disciplinary thinking. This third arrangement included more self-organisation skills, which is needed on the Master level, as opposed to Bachelor practice placements. The learning objectives reflected the necessity to develop professional skills, research and collaborative skills, in an ever evolving context of external accountability.

4.2 Didactics

In the first arrangement, students were allowed freedom in subject, methodology and practical arrangements. Based only on an agreed activity plan with the student, a didactic role was attributed to the academic tutor. Formative reflection techniques were implemented to steer the learning process. Virtual elements were included in the communication process, i.e., the use of distance didactics. In the second arrangement, students synthesised theory, provided by lectures and independent reading, with practical problems in the company. The didactic model was more tightly organised. It consisted of a classic education format i.e., a face-to-face course, infused with a virtual placement. Intermediate formative coaching was provided by the university and the organisation. The teacher performed the final summative course evaluation. In the third arrangement, students had to solve a real problem for an organisation and had more external accountability. In the first two weeks, the student was at the organisation's, to structure the task. Strong support was provided by the organisation in these weeks. Thereafter, the student worked on an individual basis in contact with the academic tutor and the organisation mentor, off-site. Final summative evaluation was dealt with by the university and the organisation.

4.3 Technology

As of 2003, the University of Miskolc worked with a custom-made Hungarian electronic learning environment Coedu, for the delivery of blended education. The system was well suited to autonomous learning styles, but restricted in collaborative learning. Recognising the limitations, the university decided to introduce the widely used electronic learning environment Moodle. That system supports more sophisticated collaborative learning arrangements, among which team-based work in projects, virtual placement tasks, different levels of supervision and social networking. The virtual placement arrangements deployed by the University of Tallinn, used the

originally named IVA, as blended e-learning delivery platform. The virtual placement arrangements were supported by other synchronous and asynchronous communication tools as well, respectively: telephone and videoconference/Skype, and email/Outlook and document sharing/Google Docs.

5. Dimension of arrangement 4 (off-campus)

In this section, the learning objectives, the didactics and the technology will be discussed for the arrangements which have been offered to off-campus students.

5.1 Learning objectives

All team-based placements were executed in the domain of environmental consultancy. Students needed to show in word and result, what competences and skills they acquired so as to be a worthy environmental scientist at Bachelor level. They had to set out a task-oriented path and a systematic planning approach, so as to acquire yet underdeveloped skills and competences. Lacking individual professional competences had to be developed with the appropriate guidance. In the end, the students had to be able to study and address real environmental problems of external customers, within a team of peer students, and deliver real products.

5.2 Didactics

The five pilots, which had the team-based arrangements implemented, were all driven by assignments from external organisations. Students performed their activities within the electronic consultancy environment. Student activities were structured by the project proposal, the communication with the client, and the intermediate and final reports. Formative reflection between students and the supervisor took place on a regular basis through individual competence development plans. The formative interaction with the academic tutor, besides exploring the domain problem, concerned the learning process, the self-reflection, and the work performance. Students obtained feedback from both supervisors on their final report. All off-campus placement arrangements of the team-based type, were implemented through distance didactics, using an electronic learning environment servicing both the off-campus students, and the academic and organisation supervisors.

5.3 Technology

The Open University of the Netherlands fully integrated the placement arrangements into their distance learning concept. The virtual teams carrying out the virtual placements were facilitated by a professional web-based collaborative workplace environment, called EMC Documentum eRoom. It provided the off-campus students with the necessary access to virtual workspaces, tools and communication facilities, hosted by the university. Students could apply project databases, concept documents, virtual workrooms, newsletters, announcements, discussions, and individual portfolios. Outlook e-mail facilities and Skype videoconferencing were also at the students' disposal. The didactics behind the off-campus team-based arrangements were strongly influenced by computer-supported collaborative learning. Students worked in virtual teams with the primary intent to organise and develop themselves, and share expertise.

6. Virtual (work-based) arrangements: results

In this paper, four arrangements with virtual placements have been described:

(i) virtual (practice) placements;
(i) virtual (course) placements;
(ii) virtual (research) placements;
(iii) virtual (team-based) placements.

The arrangements have different benefits: for students in terms of contribution to their development of professional skills and competences, for organisations in terms of professional work conducted, and for universities in terms of knowledge inflow and networking.

The first arrangement was designed as familiarity practice for students in order to motivate them with challenging subjects and become acquainted with work strategies at the basic Bachelor level. The arrangement mostly served the general development of students, with the university and the external organisation being more or less functional to the objective. The arrangement was supportive to a student-centric learning process, but with no formal accountability. As a result of the arrangement, and the short duration of the placement, organisations observed few direct benefits.

The second arrangement was designed as a practical enrichment of a regular course at Bachelor level. Students had to solve a real organisational problem and synthesise with knowledge generated during lectures and independent reading. There was ample time for students to work on the assignment, also during classes. Although frequent consultation with the organisation was implemented, they indicated to have little practical use for the results. As the placement was placed inside a regular course, it could be that students felt formal accountability to the university only.

The third arrangement was designed as a field-driven, blended, research placement, with a short but intensive, physical interaction with the organisation and the university, prior to virtual activities. The arrangement was indicated to be beneficial for both the university and the organisation. Basically, at Master level, students show more self-organisation capabilities. A final defence session explicated students' accountability towards both the university and the organisation.

The fourth arrangement was designed as a team-based, field-driven assignment, for off-campus students i.e., adult learners, at the end of their Bachelor. Students benefitted from the interaction with real clients in their professional development. Although the arrangements were at Bachelor level, the participating organisations claimed useful benefits. The practice of self-discipline in adult students, in conjunction with external accountability, may have effectuated real benefits, even with the arrangements being fully off-campus.

In terms of didactics, the learning organisation was structured to obtain the intended learning objectives. The objectives were different: from exploration in arrangement one, to structured working in arrangement two, to self-organisation, academic-creative thinking and networking, in arrangement three. The control over the learning objectives was diversified accordingly in these arrangements: arrangement one was highly open-ended in its didactic approach, whereas arrangements two and three included more formative and summative methods, and inserted formal crediting and increased external accountability. Arrangement four, i.e., the virtual team

arrangement, also included formative and summative methods, but had to focus far more on technology-supported didactics, to account for students being completely off-campus.

The different arrangements increasingly relied on information and communication technology when the off-campus component became substantial. Most commonly-used technologies were email, chat and web-conferencing. In many cases, the students preferred email, whereas supervisors often preferred physical or virtual facial communication; asynchronous communication does not provide accountability on the spot, whereas synchronous communication does. Effective communication between student, organisation and university is especially important in maintaining control over virtual placements. Effective communication can be implemented by tools in an electronic learning environment, but also by more open and flexible applications, following mainstream developments on the web.

7. Final conclusions

This paper described results of pilots with virtual placements in university-business arrangements. In the course of our study, we asked the question: along which dimensions can virtual placements be arranged in order to contribute to the development of professional skills and competences and have an added value to the students, the organisations and the universities involved? The arrangements were presented by learning objectives, didactical approach and technological support.

In retrospect of the learning objectives, students indicated that these were adequately formulated, in line with their expectations, and felt feasible through achievements and outcomes. For the expectations of organisations, this was different. In the on-campus Bachelor studies, virtual (practice) arrangements had difficulties in meeting the expectations of organisations, as opposed to the fully off-campus Bachelor arrangements, and on those on Master level. The restricted time frame can play a role here. Regardless, more realistic communication to organisations is needed on the expected student outcomes, on that level. In addition, first-time Bachelor placements may require more stringent and directive (distance) didactics than was implemented in this study. The (fully) off-campus Bachelor students generally expressed sufficient self-organisation, but they were in between 25 and 50 years of age, and already familiar with the mindset of professional work. It appears that the frequency and quality of feedback from organisations to basic Bachelor students also needs improvement. Feedback from organisations is better organised in (virtual) Bachelor adult placements and in (virtual) Master placements, than in regular (virtual) Bachelor placements. Enhanced didactical formats, which include all parties more equally and which turns away from open supervision, may counter this. In addition, students should make a sound work plan at the start of the placement, along with an explicit communication plan.

As far as pedagogy was concerned, individualised (virtual) placements had the advantage of student self-control and articulation of one's individual achievements. This is very valuable in job openings, in which individual placements can be used to explicate one's own performance. The socio-collaborative (virtual) placements rather had the advantage of including the latest pedagogical theories of socio-constructive learning, claiming to facilitate the learning process. Although group dependency through joint marking is an often stated drawback in collaborative approaches, this can be resolved by weighing along the individual outcomes in the final marking process.

Considering the technological support in student guidance, control and supervision: technology has played a substantial role in the success of the virtual placements. Especially, electronic learning environments, customised with tools to facilitate and monitor virtual placements, appear beneficial. Many universities already apply learning environments for the delivery of blended learning. Such environments allow for the tracking of student progress through the registering of platform activities and products. Electronic learning environments are also an asset in structuring the placement. In cases where the learning environment could not be used, and students had to go residential, a less structured form of supervision was implemented. It is commendable in the case of virtual arrangements, that the ICT resources are delivered as an integrated part of the university infrastructure.

As an endnote, we would like to mention the observation that virtual placements were less likely to share in the benefits of corporate recruitment. As many know, traditional placements are often used as a corporate recruitment tool by external organisations: attracting new personnel in sight of a corporate career path. Within our study of placements, such organisation-related job offers did not occur as side-effect.

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