
11 Interdisciplinarity in cross-campus entrepreneurship education*

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Introduction

During the last 30 years, the scientific community has shown a growing interest for entrepreneurship, driven by the increasing dynamic role of small and medium-sized enterprises (SMEs) in job creation and innovation and boosted by the emergence of new business environments, new technologies and globalization (Fiet, 2001). Parallel to this, a growing number of entrepreneurship education programs (EEPs) have appeared, first in the United States where, today, more than 2,200 courses are offered at over 1,600 schools (Katz, 2003; Kuratko, 2005), and then, more recently, in Europe, where most programs have been created in the last decade (Klandt, 2004).

The educational system, in particular universities, now plays a significant role in the emergence and diffusion of entrepreneurial culture (Fayolle, 2000). It strongly influences how students are able to detect, evaluate and capture attractive value-creation opportunities. Education is therefore a core element in the development of entrepreneurial spirit and initiatives. This, coupled with the growing importance of SMEs in their socio-economic environment, has pushed a growing number of European universities to develop EEPs.

Today, entrepreneurship also tends to be recognized as an academic field (Bruyat and Julien, 2001; Cooper, 2003). It has an important scientific community that has produced a significant body of research (Acs and Audretsch, 2003; McGrath, 2003). Some authors tend to think that it is a blossoming field that cuts across different disciplines (Acs and Audretsch, 2003). It can also be argued that the field is inclusive and eclectic (Low, 2001) and that it cannot be reduced to a single definition (Verstraete and Fayolle, 2004). It is certainly larger than the single 'business creation' perspective. According to Kuratko (2005, p. 578), "an entrepreneurial perspective" can be developed in individuals. This perspective can be exhibited inside or outside an organization, in profit or not-for-profit enterprises, and in business or non-business activities for the purpose of bringing forth creative ideas'. From an educational point of view, this means that entrepreneurship education cannot limit itself to firm creation, but has to be broadened to the development of an entrepreneurial spirit that consists of, in business or in any other human activity, identifying opportunities and gathering different resources in order to create richness value that meets a solvable demand (Albert and Marion, 1998).

Nascent or mature, entrepreneurship as an academic field is by nature interdisciplinary and therefore requires adapted teaching methods. Several universities have tried to develop such educational approaches, dedicated to the specific objectives and requirements of their EEP. However, only a few of them appear to have adopted educational approaches that are truly interdisciplinary. Indeed, universities are often locked

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into their disciplinary structures in which entrepreneurship classes are school specific and only offered to students from one or sometimes two disciplines. Apart from business schools, entrepreneurship courses are sometimes offered by engineering schools. Nevertheless, truly interdisciplinary EEPs have emerged in a few universities. These programs act as pioneers and are likely to have contagion effects on other university education programs. Greene et al. (2004) underline that EEPs have often played the role of experimentation fields for several pedagogical approaches, such as virtual business simulation games, practitioners' testimonies and interdisciplinary education, which tend to be more common in traditional management education programs today.

In this context, the aim of this chapter is to discuss the link between entrepreneurship and interdisciplinary teaching approaches, through the case analysis of an interdisciplinary EEP run since 1997 at the Université Catholique de Louvain (UCL), in Belgium. Hence, this chapter attempts to provide an answer to one of the criticisms towards entrepreneurship education literature recently stressed by Béchard and Grégoire (2005). These authors underline the necessity to develop research and expertise at the intersection between entrepreneurship and education science, whereas the literature in entrepreneurship education seldom borrows concepts or theories from disciplines other than management (Gorman et al., 1997).

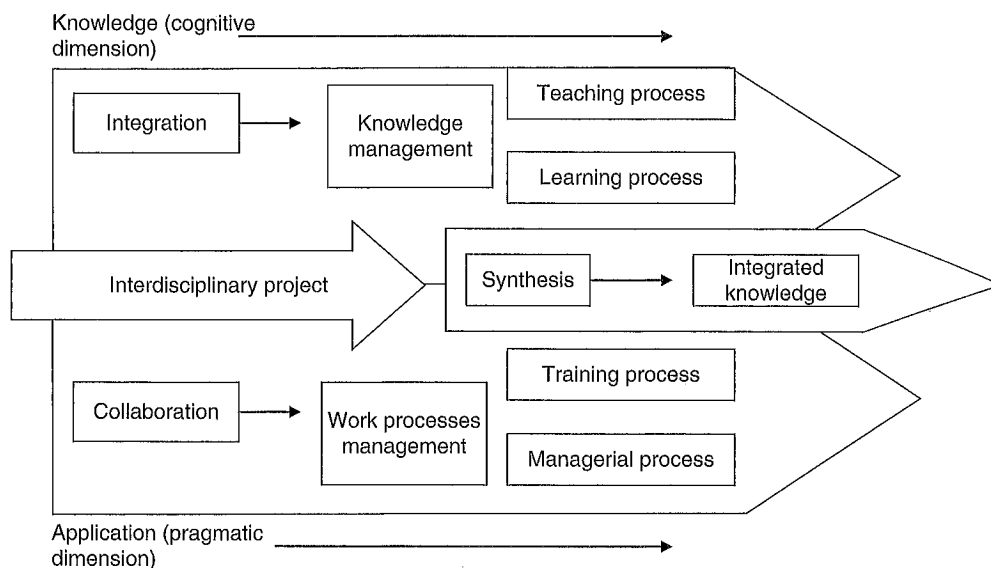
The chapter proceeds as follows. First, we present a conceptual model developed in order to assess the interdisciplinary level of EEPs. Second, we describe an existing interdisciplinary, inter-school EEP, run since 1997 at UCL. Third, on the basis of the interdisciplinary framework, we assess the interdisciplinary aspects and student satisfaction, and discuss the entrepreneurial impact of the interdisciplinary EEP. A final section concludes.

A conceptual model of interdisciplinary teaching

With regard to interdisciplinary education, the lexical diversity as well as the lack of either a generic definition of interdisciplinarity or a reference operational framework have led Rege Colet (2002) to propose a model that supports the application of interdisciplinary principles to education and enables us to assess those practices. The author defines an interdisciplinary teaching approach as the implementation of a learning experience where disciplinary skills and knowledge are confronted by a specific situation or problem defined in a non-disciplinary way, in order to foster the acquisition of an integrated body of knowledge¹ (Rege Colet, 2002). Let us stress that interdisciplinary education differs from multidisciplinary approaches. On the scale of relationships between disciplines, multidisciplinary approaches pertain only to the juxtaposition of several disciplines, whereas interdisciplinary pedagogy implies the integration of these disciplines.

In examining current definitions of interdisciplinary education, Rege Colet observed that such definitions are based on three principles that form what she calls 'the conceptual base for interdisciplinary approaches'. First, there is the principle of conceptual, theoretical and/or methodological *integration* of two or more disciplines put together. Second, in order to reach this integration, the *collaboration* principle of the different disciplines' representatives is necessary, which implies the coordination and cooperation between the scientific competencies. Third, the expected result of integration and collaboration takes the form of a *synthesis*. These three principles are therefore interrelated, particularly the synthesis, which is a consequence of the two first principles.

Rege Colet's own model, which is graphically represented in Figure 11.1, is based on



Source: Rege Colet (2002).

Figure 11.1 *Conceptual model of an interdisciplinary teaching approach*

these three principles. First, the integration principle defines the interrelation and the organization of the respective disciplinary bodies of *knowledge*. Second, the collaboration principle addresses the interaction and the management of the work *processes* that prevail between the stakeholders of the interdisciplinary project. Third, the synthesis principle covers the combination of the two first principles – that is, the resulting learning experience and impact. This last principle represents the connection between the objectives (that is, disciplinary integration) and the means (that is, collaboration). Moreover, any project contains a cognitive dimension, as in the integration principle, and a pragmatic dimension, required by the collaboration principle. These two dimensions are interrelated and their interactions produce synthesis. Finally, disciplinary integration pertains to a knowledge organization issue and collaboration pertains to work organization.

True interdisciplinarity implies a balance between the level of organization of the bodies of knowledge and the level of organization of the work processes. Two sorts of displacement are possible: either the organization of work dominates the organization of knowledge, or the organization of knowledge dominates the organization of work. In the first displacement from balance, the integrated content is neglected in favor of teamwork, project regulation and negotiations with the institution. Under these circumstances, the process can at best be multidisciplinary, as the different disciplinary bodies of knowledge are juxtaposed one to the other. In the second displacement from balance, the construction of an integrated conceptual referent is achieved at the expense of practical considerations. The process then becomes the extension of a paradigmatic work and becomes similar to a disciplinary approach. When real teamwork is lacking and disciplinary divisions prevail, disciplinary cooperation, confrontation and enrichment cannot take place.

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As for the cognitive processes that may be involved, Bloom's (1979) taxonomy is often used in the interdisciplinary education literature in order to describe cognitive processes. This taxonomy uses six levels of analysis to express the level of learning difficulty. The construction of integrated knowledge implies a learning experience and cognitive processes of the highest levels of Bloom's taxonomy: that is, analysis, evaluation, and synthesis. In order to reach these levels, learning activities and working methods become more important than content (Petrie, 1992). Answering to this level of requirement, interdisciplinary teaching becomes instrumental and, in a converging approach, disciplines are mobilized to address a situation or a problem at hand.

In that sense, interdisciplinary approaches favor round trips between the purpose and the process.² Real-life problems often appeal to several disciplines. Therefore disciplines make sense only if they converge in order to bring out significant learning. This convergence process allows the discipline to go beyond the classification and simplified representation of the complexity of reality to the generation of a significant learning experience grounded in genuine problems or situations (Rege Colet, 2002).

The results are no longer central, but the process is – the purpose being to build coherence between the aims and the means mobilized to find a solution, not an optimal, but a satisfying one. A project cannot be separated from its environment and, as a result, from an educational point of view, an interdisciplinary approach becomes necessary.

Therefore, project- and problem-based learning approaches, in which the process occupies a central place, appear to be natural choices. The choice of the teaching method could be conditioned by the interdisciplinary nature of the entrepreneurship field. However, it could also result from the field itself. Whatever, there seems to be an overlapping between the approaches imposed by the nature of the field and the educational choices that pertain to interdisciplinarity. In other words, it seems that the best entrepreneurship education can only be interdisciplinary.

In the next section, we illustrate the close link between interdisciplinary teaching approaches and entrepreneurship through the analysis of a cross-campus EEP developed at UCL.

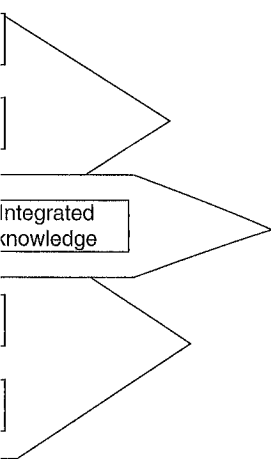
Example of a cross-campus interdisciplinary entrepreneurship education program

In this section we first present the relationship between the university and entrepreneurship at UCL and second describe the EEP run at UCL since 1997.

University and entrepreneurship: building a relationship around interdisciplinarity

Unlike many other EEPs, the EEP launched in 1997 at UCL has emerged from cross-campus initiatives and demands. The specifics of this interdisciplinary program result from the comprehensive offerings of the university and from its links with its local economic environment.

Entrepreneurship education at UCL is one of the multiple facets of broader and older questions about the relationship between the university and its economic environment. This questioning is based on the three fundamental missions of a university. UCL wanted to play a role in the entrepreneurship domain, not only through its *teaching mission*, but also in the context of its *research mission*, particularly through creating economic value from research results. In the context of its *mission of service to society*, UCL wanted to contribute to the socio-economic development of the region where it is located, the



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Walloon Region, in the southern part of Belgium. The *Global Entrepreneurship Monitor* annual reports on Belgium (GEM, 2002 and 2003)³ confirm that the Walloon Region is a poor performer in terms of entrepreneurship. Several of the leading local industries (steel, coal, textile and so on) had experienced a steep decline since the early 1980s, and helping to 'boost entrepreneurship' in its environment was perceived as a valuable objective by the university.⁴ As a result, UCL has set up entrepreneurship support systems, working at three levels: managing intellectual property rights, financing new ventures and venture creation support.

First, in order to help to protect the university's intellectual property, on the one hand, and to manage and facilitate technological transfer from the university to *extra muros*, on the other, in 1982 UCL created a company dedicated to these goals, called Sopartec. To date, Sopartec manages about 80 patent families. Second, UCL has set up a device, managed by Sopartec, facilitating the access to funds for entrepreneurial project bearers from the university. Either the university directly reinvests funds that have been raised by the valorization of past research in new entrepreneurial projects, or it helps to find public and private funds. Moreover, the university has participated in the creation of a venture capital fund, called VIVES. Third, besides an incubator, created in collaboration with the Walloon Region, a business center has been offering information and support services since the late 1980s.

In the area of entrepreneurship education in itself, the Louvain School of Management (LSM) has been offering various courses in entrepreneurship and SME management since the early 1990s. In 1997, at the engineering and law schools' request, an interdisciplinary program in entrepreneurship and firm creation, called CPME,⁵ was launched in collaboration with the LSM. Thanks to the rector's support, this education program has benefited from the financial support of several firms and from the University Foundation. In order to distinguish itself from other programs intended for venture creators or designed for management students, and to emphasize its complete character, UCL has decided to offer it as an optional program to students in engineering, bio-engineering, law and management who are between their undergraduate and their graduate cycles of studies. This choice resulted from a desire to bring together students from different schools around one common entrepreneurial project. At the beginning, it meant that the students had to work in teams containing representatives of at least three of the four above-mentioned orientations. The interdisciplinary option has been the result of three elements: a faculty demand external to the LSM, a will for differentiation, and a collective, rather than individualistic, view of entrepreneurship.

Although mainly aimed at an interdisciplinary audience, the EEP could have limited itself to disciplinary teaching. However, entrepreneurship appeals to disciplines as divergent as economics, management sciences, law.⁶ Therefore, entrepreneurship education should necessarily be interdisciplinary. It also should focus on the different functions of organizations simultaneously rather than in parallel.

Next, we illustrate the close link between a university and entrepreneurship through the analysis of the interdisciplinary cross-campus EEP developed at UCL.

The CPME program at UCL

This subsection details the interdisciplinary program in entrepreneurship and firm creation, CPME, which was created by UCL in 1997. We present the program's objectives,

target audience, and pedagogical approach.

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The program's initial objective was 'to train students to deal with the issues related to new business creation', and 'to provide potential student-entrepreneurs with the analysis and problem-solving tools and concepts that will help them along their process of new business creation'. Since then, the goal pursued by the program has been broadened in order to include entrepreneurial skills and activities in their widest sense and, more generally, the development of entrepreneurial spirit.

The program has been integrated into the engineering, bio-engineering, law and management curricula. The target audience of the CPME program is students in the process of completing a degree in one of these four disciplines. The CPME program is not a separate degree. Its courses replace some compulsory courses and seminars of the bachelor's and master's degrees.

Since September 2007, the CPME program has undergone some changes. It has been offered to all of the 10 schools of UCL: the Economic, Social and Political Sciences School, the Law and Criminology School, the Engineering School, the Bio-engineering, Agronomy and Environment School, the Psychology and Education Sciences School, the School of Theology, the School of Sciences, the Liberal Arts School, the School of Philosophy and the School of Medicine. However, in 2007–08, only the first six schools joined the program.⁷ Other schools are planning to offer it to their students, in particular the School of Medicine and its Department of Physiotherapy and Physical Education.

In terms of format and content, the CPME program is spread over the last three years of its parent bachelor's and master's degrees. About 30 students are selected each year, leading to a total number of about 80 students over the three cohorts of students, taking into account those who have failed or left the EEP. Students are selected through a written application and an individual interview on the basis of their motivation. They start the program with a self-assessment seminar concentrated on one weekend. The first-year courses total 135 hours and include three courses, of 45 hours each, that cover the main aspects (legal, financial, economic and managerial) of entrepreneurship. About 20 percent of the classes are co-taught by the teachers coming from different disciplines. Students' final evaluation is based on an interdisciplinary oral presentation and a paper containing all these aspects in one single work graded by all teachers. Teachers quickly bring the students to address real-life problems. This early exposure to real-life problems forces them to test their ability to leverage their disciplinary knowledge as well as to apprehend how those disciplines interact and overlap in a business context. The second year includes two courses that represent a total of 100 hours and are dedicated to an SME analysis and to an international entrepreneurship class. For the SME analysis class, students have to choose an SME, analyze it in all its aspects, and to present it in class in the presence of the entrepreneur. This class also has interventions from faculty, SME specialists and entrepreneurs, case studies and fieldwork. The international entrepreneurship class focuses on familiarizing students with other entrepreneurial cultures through collaborative work with students from foreign universities⁸ on international venture projects or on international new venture creation simulation games. These courses are more interactive, as students have to collectively address various business problems within a given cognitive context. Finally, the last year is mainly devoted to the completion of a master's thesis project addressing the creation of a new venture, and to

a 30-hour class addressing business planning methodologies. Through the joint development of their new business project, students must identify, analyze, combine and develop on their own the relevant specific knowledge. The master's thesis project must be completed by an interdisciplinary group consisting of three students from different schools.

Since September 2007, CPME courses have been concentrated on the two last years of studies, that is, the two years of the master's degree, as a consequence of the Bologna Reform. The former first- and second-year courses are now taught in the first year. The second year of the EEP still centers on the master's thesis project. Instead of 30 students, 50 students are now accepted each year.

In terms of learning objectives, the CPME program targets both training and support objectives, through which the program addresses both cognitive (integration principle) and non-cognitive (collaboration principle) skills. *Training* programs target students who aspire to launch entrepreneurial activities, but who would not have identified a specific business opportunity yet. Such EEPs or courses aim at providing students with specific tools and abilities, in order to allow them to develop entrepreneurial attitudes and aptitudes, and to be prepared to start or buy a new business or to develop new activities within existing businesses in a more or less distant future. *Support* programs target students who would already have identified a potential business opportunity and who are looking for personalized support and advice to help them to capture that specific opportunity and build their project.

An adapted pedagogical approach corresponds to each of those categories. Training programs, while also requiring the learning of the models, concepts and theories of entrepreneurship, must go beyond traditional knowledge 'transmission-reception' teaching approaches. Indeed, they must confront students with reality in order to develop their entrepreneurial attitudes and skills (Saporta and Verstraete, 2000). Active involvement of the students and problem-based approaches appear adequate in such EEPs in order to achieve the right confrontation between theoretical concepts and practical business problems. Finally, such programs, like any learner-centered program, tend to require more extensive teaching resources and supervision and are better suited for smaller groups of students than traditional academic programs. Support programs typically require a more individualized approach, fine-tuned for the specific characteristics of the business opportunity identified by each student or team and involving a significant amount of coaching, networking and data gathering. This type of learning experience can, for example, be achieved through a student's final thesis or a business plan competition.

The CPME program clearly focuses on problem-based learning and interactions between students and teachers. The first two years provide students with specific skills, as well as relevant concepts and tools, through problem-based learning activities, combining interventions from academic experts and entrepreneurs, case studies, fieldwork and business games. During the third year, students receive dedicated and individual coaching and support for the completion of their master's thesis project which has to be about the creation of a new venture, which can be any kind of organization (commercial, social and so on).

In summary, the CPME program begins with the learning of theoretical concepts, continues with projects and problem-based approaches and ends with a master's thesis project for which each student receives personalized support.

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groups and are evaluated on the basis of class participation. The spatial and temporal framework has been adapted to the interdisciplinary class requirements: shifted schedules, specific classrooms and equipment exclusively reserved for CPME students and for which they are responsible. These settings have been specifically designed to foster students' autonomy, responsibility and professional approach. The classes are taught in the evening in a dedicated building and students have an exclusive 24-hour-a-day access to the program facilities, including computer and telecommunication equipment, meeting room, logistic support, and so on. Those facilities are managed by the students themselves, with the different cohorts sharing responsibilities. This collaboration and the access to an exclusive space generate a 'club' effect among students who develop their own learning community, cutting across the different cohorts and across their original disciplinary affiliation. Moreover, sharing a physical space fosters the exchange of knowledge and experience among students and creates a bonding effect that provides a sense of security. This helps students in their attempt to face the challenges and uncertainties of entrepreneurship.

As announced in the name of the program, the approach used within the EEP is interdisciplinary. The next section presents an assessment of the interdisciplinarity of the EEP and of its impact.

Assessment of the EEP

In this section, we first describe and analyze the interdisciplinary aspects of the program's design on the basis of the conceptual framework developed by Rege Colet. Second, we look at the interdisciplinary index of the CPME program on the basis of Rege Colet's assessment tool. Third, we evaluate the students' satisfaction. Fourth, we assess the entrepreneurial impact of the EEP. This analysis will enable us to draw some lessons, concerning strengths and weaknesses, that we shall support through the students' point of view on the EEP and, particularly, on its interdisciplinary nature.

Interdisciplinary integration and collaboration aspects of the program

The interdisciplinary character as well as the length of the program are features that differentiate it from many other EEPs. Aspects of the CPME program's design are inherent in its interdisciplinary nature. Throughout the program, students must complete numerous group projects, including their master's thesis project, involving students from distinct disciplinary affiliations. But the interdisciplinary dimension of the program's design is much deeper, represented in its objectives, pedagogical approach, target audience, governance, and the students' assessment. Those aspects are discussed below.

The CPME program addresses the two types of objectives of Rege Colet's model – cognitive and pragmatic. Indeed, along its first learning objective (training), the CPME program addresses cognitive abilities, such as the review of the relevant concepts and tools and problem-solving activities. These abilities refer to the integration principle in the sense that they aim at integrating various bodies of knowledge. Moreover, along its second objective (support), the EEP also addresses pragmatic abilities, such as providing dedicated coaching and support to students for the completion of their master's thesis project. These pragmatic abilities refer to the collaboration principle in the sense that they aim at gathering the various stakeholders of the program in the support and assessment of the master's thesis project. In non-cognitive terms, this EEP also aims

at developing autonomous and responsible citizens as well as collaborative leaders. Following Rege Colet's model, we first address the knowledge organization, and then the various aspects of work organization.

Beyond being rooted within the disciplinary structures and processes of the university, it is through its pedagogical approach that the EEP aims to be truly interdisciplinary. The team of teachers and coaches, the students' projects, the learning and assessment activities, and the examination and master's thesis jury all feature a strong interdisciplinary dimension. The sequence of learning activities and content is designed to drive students to progressively free themselves from their disciplinary point of view and adopt a wider perspective, allowing them to understand entrepreneurship as an integrated body of knowledge. The initial classes start with the basic disciplines (management, law, and so on), then rapidly bring the students to address real-life problems. This transition forces students to apprehend how disciplinary bodies of knowledge interact and overlap in a business context. Although the first classes typically involve teachers sharing specific issues, concepts and tools with students, they are followed by more interactive sessions where the teachers limit their intervention to the presentation of business problems that students have to address collectively within a given cognitive context. Finally, through the joint development of their new business project, the students' growing autonomy goes hand in hand with a level of coaching and support that is increasingly personalized around the specific expectations, objectives and abilities of the student groups. Furthermore, the involvement of the teachers becomes in itself entrepreneurial, having to respond to changing demands, deal with projects with uncertain prospects and sometimes explore uncharted territory.

The CPME program also shows various interdisciplinary aspects in terms of work organization, such as target audience, governance and student assessment. First, in terms of target audience, as mentioned above, the aspiring entrepreneurs are selected from within different schools early in their program, that is, at the end of the first cycle of studies. This allows students to be trained in parallel with their disciplinary specialization, rather than subsequently. This feature distinguishes this EEP from other experiences which rely on entrepreneurial education offered in the context of postgraduate, lifelong learning or executive education programs.

Second, in terms of governance, the program is managed by a Scientific Committee that includes academic representatives from all the schools involved. This governance body meets once a month. Moreover, the program's structure and contents have been validated by each of those schools and are recognized as an integral part of their respective bachelor's and master's degrees. This full recognition is demonstrated by the fact that the EEP master's thesis project, although managed by the interfaculty Scientific Committee of the CPME program, actually replaces the master's thesis required in each discipline's master's degree program.

It should be noted that this strong integration of the EEP within the respective disciplinary programs, in terms of both student audience and governance, is quite unique given the deep and secular trends of most universities. To us, it seems particularly revealing of the dynamics of opening of UCL. Such dynamics are propitious to the emergence of a true interdisciplinary teaching and learning experience.

Third, we investigate the students' progress through the interdisciplinary master's thesis project. Like any teaching program that goes beyond the simple acquisition of

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disciplinary concepts and tools, the student assessment process is by nature difficult to implement, be it in terms of the definition or the measurement of evaluation criteria. As an academic program integrated into the bachelor's and master's degrees, the CPME program must, however, include a formal assessment that has to be consistent with the requirements of the respective disciplines, and recognized as such by the respective academic authorities. This interdisciplinary assessment of the student's learning represents a particular challenge given that the respective disciplines tend to rely on different assessment criteria, measurement methods, scales or philosophies. The assessment must therefore take into account not only the integration principle of the EEP (assessment of the acquisition of an integrated body of knowledge) but also its collaboration principle. Indeed, it must also aim at assessing how well tasks, responsibilities and deliverables are shared and coordinated among the members of each entrepreneurial team. Both principles are often intertwined, as each member tends to take responsibility for the issues related to his/her disciplinary affiliation, but also for the implications of those issues and their resolution on the other dimensions of the projects and for the resulting interactions with the other team members. Depending on the characteristics of the entrepreneurial projects, the tasks and issues at hand might be strongly unbalanced towards the disciplinary expertise of some of the team members (for example, in a high-tech project, unbalanced towards engineering, or in a service business involving complex contractual agreements, unbalanced towards legal aspects). However, it is the collective work that is judged, as individual team members are evaluated on the basis of the quality of their team's work. This leaves the responsibility for the balance of the workload and quality of deliverables to the team members themselves. Individual assessment is therefore used only for an assessment of the disciplinary skills involved in the EEP and of the students' ongoing participation in the learning activities. Importantly, it is the quality of the teamwork that is evaluated, not the economic potential of their entrepreneurial project. Indeed a group might do a good job by correctly concluding that the entrepreneurial opportunity they had considered has limited or no potential, given its features, resource requirements, competitive environment or market. The result of the project in itself cannot constitute the unique assessment criterion. It is the ability of the team to reach this conclusion, to argue and to synthesize it that is assessed, as it reflects their ability to adopt the integrated point of view required in an entrepreneurial context.

The master's thesis project that the students have to complete at the end of the program provides a good illustration of this collective interdisciplinary assessment and its degree of complexity. As each group includes members from different disciplines, it is mentored by a team of academics including members of the corresponding faculties. Thus, there are typically three thesis advisors (instead of one in traditional projects), from three different schools of the university. This multi-advisor structure, with which academics are sometimes uncomfortable, can generate two types of *negative side-effects* that might harm the collaboration principle underpinning the EEP. Some could feel that their contributions are diluted or underrepresented in the project, and therefore could not contribute enough to its success. On the contrary, others could try to bias the project towards their own disciplinary interest or assessment criteria, threatening the overall balance and coherence of the project. It is the EEP manager's responsibility to ensure that those potential pitfalls are avoided across the portfolio of projects that is generated each year.

Detailed and quantifiable assessment criteria are therefore difficult to define and/or implement a priori, as the assessment of each project tends to be consensus based, with the program manager balancing the opinions of each of the thesis advisors involved. Although this approach appears relatively pragmatic, nevertheless it generates some discomfort among students faced with an assessment process that sometimes appears arbitrary, or at a minimum lacks transparency. This assessment issue is actually frequently raised in the feedback provided by the students, although it does not affect their overall (positive) perception of the EEP itself. We shall discuss this later.

The CPME program ultimately aims at contributing to the launch of interdisciplinary entrepreneurial teams, as student groups consist of future professionals, coming from different schools, who should be able to combine their respective expertise, learn to adopt each other's point of view and use each other's language. This learning process across multiple disciplines is a key element of the EEP, frequently stressed by the students and by the teachers. This again reinforces the interdisciplinary dimension of the EEP. The exposure to real-life business projects that could ultimately lead to entrepreneurial career opportunities for the students also contributes to this dimension, as students are forced to adopt interdisciplinary perspectives if they want to be able to deal with the complexity of real business problems. Doing this as an entrepreneurial team requires students to learn, on the one hand, how to reach a sufficient level of autonomy and professionalism and, on the other, how to trust, leverage and recognize the specialized skills of each member of the group. The entrepreneurial projects that are progressively shaped by the students along the CPME program therefore constitute a cornerstone of the professional development objectives of the program.

For the teachers and program managers, these projects are the core around which the contributions of each discipline can be combined and integrated as the different facets of entrepreneurship. The projects also generate a stronger commitment by the students to achieve practical results, leading them to engage more proactively in the learning process. Let us stress again that the learning process *per se* can be considered as more important than the end product, as significant learning can be extracted even if the entrepreneurial project does not ultimately succeed. Of course, content is not totally irrelevant. For example, having the same interdisciplinary teams concentrate on managing the process of bronze casting would not teach them as much about new venture creation as would concentration on an entrepreneurial problem. Through this active learning process, students will have confronted the various aspects of entrepreneurship and its diversity of tools, terminology and perspectives by testing, exploring, challenging, assessing and ultimately validating (or not) their entrepreneurial project. This is achieved with the help of the tools and concepts provided and through interactions with their learning peers. Let us note that project-based learning is indeed a natural choice for EEP because the notion of a project is common to all types of entrepreneurial activities.

As it results from the principles of knowledge integration and of collaboration between the program's stakeholders, the synthesis principle can only be analyzed through the evaluation of the CPME program's interdisciplinary aspects as a whole.

Synthesis aspects of the program

The CPME program has been evaluated by adapting an assessment tool based on the interdisciplinary dimensions developed by Rege Colet (2002). This tool, approved by the

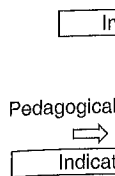


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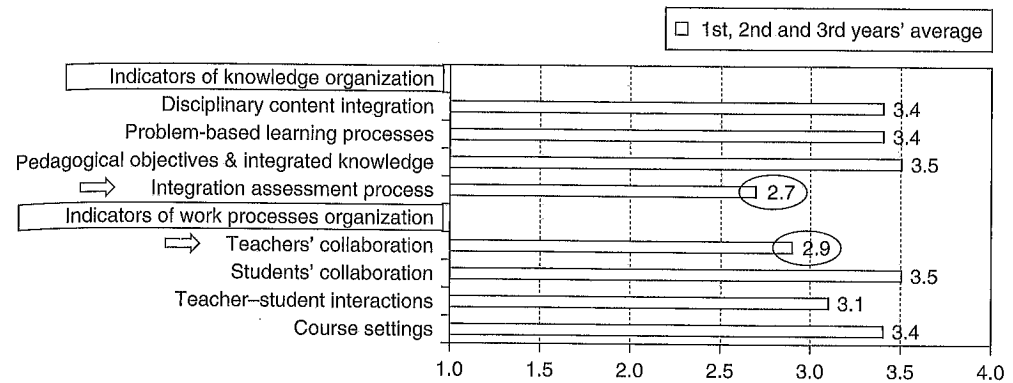


Figure 11.2 Evaluation of the interdisciplinary dimensions according to Rege Colet

original author, evaluates the level of integration, collaboration and synthesis involved in an interdisciplinary learning process, using Likert-scale surveys. The resulting data locate students' and teachers' perceptions regarding the degree of integration in the structure of the knowledge content, on the one hand, and the degree of collaboration in the work processes organization, on the other. In this approach, the integration principle is measured by four indicators: the level of disciplinary content integration, the level of integration in problem-based learning processes, the level of integration in pedagogical objectives and finally the level of integration in the assessment process. The collaboration principle is measured by four other indicators: teachers' collaboration, students' collaboration, teacher-student interactions and course settings. Each of the eight indicators consists of several items on which the questionnaire tests the level of agreement of the students (the four levels used in the original article are: completely agree, partially agree, partially disagree and completely disagree). Finally, an interdisciplinary index is defined as the ratio of the scores (total of the scores obtained for each indicator) along the integration and collaboration dimensions. A truly interdisciplinary program should be balanced along those two dimensions, that is, achieve an interdisciplinary index of 1 (Rege Colet, 2002).

This test, conducted with the first-, second- and third-year student cohorts in April and December 2004, confirmed that the CPME program is actually quite interdisciplinary, with interdisciplinary indices of, respectively, 1.08, 1.17 and 0.99 for the three years of the program. The balance between the organization of the knowledge content and of the work processes, during the three years, appears therefore to be well perceived by the students (see Figure 11.2).

The test also provides detailed information regarding the perceived strengths and weaknesses of the program in terms of the teaching strategy's coherence. Those results were consistent with the student satisfaction surveys discussed in the next subsection and identified specific dimensions on which to act in order to improve the quality of the EEP as a whole. Again, and not very surprisingly, despite a very positive report regarding the interdisciplinary quality of the program, room for improvement was noted in terms of collaboration between the teachers and in terms of clarity of the student assessment process. As highlighted above, collaboration between teachers and consensus about the

assessment process are contingent on the willingness and ability of teachers and speakers from distinct disciplines to work together, exchange information and experience as well as communicate and act as a team. All of these are aspects that do not tend to emerge spontaneously from an academic environment.

Note that this evaluation of the interdisciplinary dimensions was developed and conducted with the intention of providing the teachers and the EEP manager with feedback that could be used to assess and regulate the quality of this complex interdisciplinary program.

In the next subsection, we look at the students' satisfaction with the EEP.

Students' satisfaction

Parallel to the evaluation of the interdisciplinary dimensions mentioned above, surveys have been conducted during five successive years (2000, 2001, 2002, 2003 and 2004), on the initiative of the EEP manager, in order to collect students' opinion on the program. Note that the surveyed students were, prior to the survey, preselected on the basis of their interest in entrepreneurship.

A first qualitative survey, including open and semi-structured questions, was sent to the first three cohorts of students, those who completed the program in 2000, 2001 and 2002. Based on this preliminary survey, a questionnaire with 57 closed-ended questions and three open-ended questions (related, respectively, to the key strengths of the program, its key limitations and some suggestions) was defined and sent by mail to the students of the 2003 and 2004 cohorts. All of the students completed the first survey and 54 percent replied to the postal questionnaire.

Those surveys provide very encouraging results: they indicate that 98 percent of the students are 'quite satisfied' or 'very satisfied' with the CPME program as a whole. The two main advantages noted by the students related, on the one hand, to the interdisciplinary approach of the program and, on the other, to the high level of interactivity in the learning process. Those two features of the EEP are not only sources of motivation a priori, but also appear as the main drivers of student satisfaction a posteriori, indicating that their expectations regarding the interdisciplinary approach and interactivity have been met. In particular, students report a high level of satisfaction regarding the interdisciplinary dimension of the program content, the teaching team, the student groups, the guest speakers and the evaluation jury.

Compared to traditional courses, the EEP requires extra efforts from the students who have to dedicate two evenings a week to their entrepreneurship classes for several years and to provide a lot of additional work for their different assignments. This means that these students are probably more motivated, but also probably more demanding than 'regular' students. In terms of evaluation, we can assume that the process is more similar to adult education programs, grouping people with different backgrounds and expectations, than to traditional disciplinary student evaluation. However, compared to adult education evaluation, the fact that the students have different educational backgrounds is not perceived as a problem, because interdisciplinarity is at the core of the program. As a result, students are not dissatisfied because of different initial levels of knowledge among their peers. This highly motivated audience constitutes one of the sources of success of the CPME program (Table 11.1).

With regard to factors that students believe could be improved, the answers to these

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Table 11.1 Students' satisfaction survey: some results (% of students who agree partially or completely)

Some results: May 2006	1st year	2nd year		3rd year
		Business students	Others	
At the time of my enrollment, I had a project of venture creation	31	33	33	18
The program of this year reinforces my motivation to create or take over a business in the medium term	81	57	87	83
<i>Content and training activities</i>				
The progression of activities through the year is adequate	78	100	67	83
The practitioners' contributions are of sufficient quality	81	86	100	83
The teaching methods tally with the program's objectives	78	86	93	92
The interdisciplinary teamwork is useful	94	86	93	100
<i>Learning evaluation</i>				
The evaluation criteria of the teamwork are clearly explained	33	43	47	82
The 'content' dimension of the teamwork is sufficiently taken into account in the evaluation	76	60	69	83
The 'process' dimension of the teamwork (stages, methodology, progression, etc.) is sufficiently taken into account in the evaluation	31	67	42	83

surveys mention the coordination among the teachers and the assessment process. Students seem to wish for a stronger collaboration between teachers, as well as greater transparency in terms of assessment. They report that the links between the different classes should be made more explicit, indicating that the integration between the various classes could be improved. They also tend to perceive that the collective assessment process lacks transparency and is somewhat unfair. In particular, as mentioned above, a small weight is attached to the individual contributions relative to the collective results of the group. Furthermore, the interdisciplinary dimension of the program makes it difficult to select detailed and explicit assessment criteria and thresholds that would cope with the diversity of the students' projects in terms of scope, content and disciplinary knowledge. In particular, the respective expectations of the teachers coming from various disciplines, and how they are combined towards a consensus, appear sometimes unclear to the students, or at least are not communicated clearly enough. The weakness of the program thus seems to be in the collaboration principle. However, recall that the interdisciplinary dimension is present at the level of the program content, the teaching team, the student groups, the guest speakers and the assessment jury. These multiple sources of interdisciplinarity probably partially explain their concern.

We have also assessed the CPME program in terms of the professional development of our alumni. Finally, in the last subsection we discuss the issue of the entrepreneurial impact of the EEP.

Entrepreneurial impact of the EEP

Due to an explicit regional economic concern, in the early stages of the CPME program, at least from a formal point of view, its aim was limited to entrepreneurship in its most restrictive meaning, that is, new firm creation. In this perspective, such an education program could only be targeted at potential firm creators and would be conditioned and measured by a single success imperative: the number of new firms created. This approach is largely predominant in university entrepreneurship courses and/or education programs.

In order to assess the direct entrepreneurial impact of the CPME program, we conducted a survey in 2005 (Heylemans, 2006). The sample consisted of students who took the CPME program between 1997 and 2005 (our first students graduated in 2000). A total of 124 questionnaires were sent. Eighty-four percent of the questionnaires reached their destination and 16 percent were returned because of address changes. The results show that 63.8 percent of former CPME students think that the EEP has had an impact on their entrepreneurial intentions. Before starting the program, 58.7 percent of students considered themselves likely to create a business. After they had taken the EEP, 79.3 percent estimated that it was more than probable. The EEP has also had a positive impact on their estimated capacity to set up a business: 89 percent of students felt that they were capable of setting up a business at the end of the EEP, against 63.8 percent before starting the program.

With regard to the impact of the EEP on student motivation to start a business, the results show that 75 percent of the students want to become entrepreneurs after their first, second or last year in the CPME program, whereas only 35 percent (on average) claimed to have a project of venture creation in mind at the time of their entry into the program (see Table 11.1).

Among the alumni of the CPME program, some have already started a business. The survey showed that 11 percent of the students who graduated between 2000 and 2005 have created a firm. Privileged sectors are retail, accounting, leisure, the Internet, tourism and telecom companies. This rate is even more impressive when it is compared to the results of surveys that have been conducted by 'traditional' European students. These show that the great majority are, above all, interested in job security and that the risk aversion rises with the education level (Boissin and Aimin, 2006; Guyot et al., 2006). Moreover, our results do not reflect the number of spin-offs that CPME students have helped to set up, or their entrepreneurial activities among existing organizations.

However, this also means that many alumni of the EEP have made 'traditional' career choices, joining existing organizations. Those choices correspond in general to their disciplinary origin. They would probably have been made even if students had not followed any venture creation program.

Over time, we have identified various potential explanations of this apparent discrepancy. These are related to delayed effects, selection bias and technology intensity. These explanations have largely contributed to the evolution and the enlargement of the original objectives. We discuss these below.

First, delayed effects result from the fact that European university education seems to encourage students to regard venture creation with caution, highlighting the pitfalls of naive 'dot-com type' projects. Some students wish to develop entrepreneurial activities in a more or less distant future, but decide first to work for large organizations. For those

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students, the entrepreneurial impact of the EEP in terms of future intentions (Kolvereid and Moen, 1997; Noel, 2001) is not yet visible, and can only be observed from a long-term perspective. The students' 'cautious patience' and the 'observation delay' of the EEP's impact is consistent with several empirical studies which have shown that a strong functional or sector-based professional experience actually improves the subsequent survival prospects and increases the growth potential of the entrepreneur's venture (Dunkelberg and Cooper, 1982; Hambrick and Mason, 1984; Storey, 1994; Westhead and Birley, 1995; Dahlqvist et al., 1999). This explanation is consistent with students' motivations and tends to demonstrate that the assessment of the entrepreneurial impact of an EEP should include data collected several years after its launch (Block and Stumpf, 1992). Informal studies quoted by Vesper and Gartner (1997) have indicated a strong correlation between the participation in an entrepreneurial course and the likelihood of launching one's own business in a more or less distant future. This conclusion is probably reinforced in the case of students attending a complete EEP rather than an isolated course. The survey among our alumni also shows that 70 percent of the students who graduated between 2000 and 2005 and have not yet created a firm wish to do so within seven years maximum.

An inadequacy between our selection methods and our objectives could constitute a second potential explanation for the discrepancy. A selection bias in the students attending the EEP, diverging from the initial new business creation objective, could be another potential mitigating factor of the entrepreneurial impact of the program. Anecdotal evidence suggests that some 'résumé-driven' students apply for the program not because they want to become entrepreneurs, but because they realize that attending this program would boost their perceived value on the job market, either because of its interdisciplinary dimension or because of the positive perception often associated with entrepreneurship by recruiters. Dealing with this selection bias would require the EEP managers to be able to select students with the right entrepreneurial aptitudes more effectively at the beginning. Academic research (Brenner et al., 1991; Chell et al., 1991; Fillion, 1997; Chen et al., 1998) tried to identify factors that could be associated with entrepreneurial aptitudes: individual characteristics (desire for independence, result-orientation, internal locus of control, flexibility, leadership, and so on), entrepreneurial motivations (need for achievement, search for autonomy, and so on), external factors that can stimulate the appearance of entrepreneurial skills (socio-cultural environment, family context, professional experience, education, and so on). Similarly, typologies of entrepreneurs have been suggested. However, these a priori factors have to be put into perspective as the entrepreneurial process remains multifaceted and contingent, and cannot be reduced to a predefined model that could be used to identify future entrepreneurs. Indeed, some psychological tests or typologies that had been developed to identify entrepreneurs have been severely criticized (Chell, 1985). The same applies to typologies and traits that only constitute ideal types. The entrepreneurial aptitudes of a student remain difficult to assess a priori in a systematic manner. Moreover, even this audience of résumé-driven students can play a role in the diffusion of an entrepreneurial culture within their future organizations or within society at large and therefore contribute somewhat to the objectives of the EEP. The promotion of an entrepreneurial culture should also involve the education of students whose career will have indirect entrepreneurial features. Therefore, the goal of an EEP is not only to create entrepreneurs, but also to educate students who

will work with entrepreneurs, whether as employees, consultants or managers and, more widely, who can contribute to the emergence of a more entrepreneurial environment. Finally, students who, after exposure to an EEP, decide that this life is not for them will probably avoid opening businesses that could be doomed to failure. Learning what you are not made for can be as important as learning what you do well.

Finally, a third potential explanation is the technology intensity of the program, as technology-oriented start-ups such as university spin-offs were probably overrepresented in the early versions of the program. Indeed, as part of the interdisciplinary master's thesis requirements, all project groups had initially to include a student from the engineering school. As a consequence, due to this school's internal requirements, most of the master's thesis projects had a strong technology dimension. In particular, a large proportion of them related to the commercialization of intellectual property and technologies developed within the university. This technology bias excluded de facto a wide range of entrepreneurial opportunities in other potential domains of creation – for example, in the retail or service sectors – that could otherwise have been pursued in the context of the EEP. To deal with this 'technology' issue, the rules defining the structure of the master's thesis groups have been made more flexible. Students are now allowed to form groups according to their own interest in the topic and not on the basis of their scientific discipline, even if it involves no or limited technology and therefore offers limited room for an in-depth contribution from an engineering student. Yet, all groups must remain interdisciplinary, that is, include students from at least two different schools.

The evaluation process has contributed to the evolution of the program. Under the simultaneous influence of students and professors, beyond new business creation in a restrictive sense, the goal pursued by the CPME program has been broadened to include entrepreneurial skills and activities in their widest sense, such as intrapreneurship, working for an SME, not-for-profit venture, spin-offs, and, more generally, the development of an entrepreneurial spirit. This consists of, 'in business, as well as in all human activities, identifying opportunities, gathering resources of different natures, creating wealth that encounters solvable demands' (Albert and Marion, 1998, p. 28). This also clearly shows that entrepreneurial impact assessment of EEPs needs to look beyond the measurement of the number of firms created by the EEPs' alumni.

Conclusion

In their introduction to the *Academy of Management Learning and Education* special issue on entrepreneurship education, Greene et al. (2004) stress the fact that entrepreneurship classes have often played the role of testing grounds for teaching methods that tend to be generalized today to traditional business courses. Entrepreneurship is a good training ground for universities wanting to develop interdisciplinary teaching approaches, because entrepreneurship as a theoretical body of knowledge is by nature an interdisciplinary field, and because entrepreneurship education is well suited to the teaching approaches related to interdisciplinary content.

The case study of a university EEP presented in this chapter illustrates how interdisciplinary university programs can, at bachelor's or master's degree level, already help students to build bridges between academia and the 'real' world, as well as between themselves and their future professional development. It allows students to be exposed not only to interdisciplinary content and problems but also to interdisciplinary teamwork

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managed, in the case of the CPME program, around their entrepreneurial master's thesis project. For institutions, these interdisciplinary programs amplify the university's strength as a locus of varying knowledge and culture that blend to create new knowledge. Therefore such programs can build bridges between the local socio-economic environment and university. For teachers, programs such as this interdisciplinary EEP provide fertile ground for the development of new educational approaches and skills that can spill over to other (disciplinary) programs of the institution. This reinforces interdisciplinarity as one of the core assets of the university, where various experience, theories and knowledge can confront and feed each other. As Joseph Schumpeter emphasized decades ago, most innovations do emerge from the creative combination of existing knowledge.

Furthermore, and as stressed by the students, the interactive and embedded learning approach developed in interdisciplinary programs such as the EEP presented here is one of its most attractive features. This approach is now being reinforced within academic institutions and developed throughout the university as a way to address new problems within normal disciplinary contexts. Paradoxically, as the approach moves into the traditional disciplines there could be decreasing student interest in an EEP, as its way of operating becomes less novel. Alternatively, the generalization of active and contextualized teaching methods could lead more students to be attracted by interdisciplinary programs like the UCL EEP, because they would already have been accustomed to its methods.

The interdisciplinary dimension of an EEP also generates specific 'cultural' challenges in an academic environment where such connections are seldom rewarded, despite their being very time consuming. The broader academic environment is still not very propitious for interdisciplinary EEPs. On the one hand, it is extremely difficult to pry professors from their disciplinary framework. Indeed, international assessment and evaluation systems do not generally include pedagogical efforts, notwithstanding the fact that interdisciplinary teaching is more demanding. Moreover, university promotion systems favor research and, in particular, strictly disciplinary research, and it is quite hard to define and apply common assessment criteria to interdisciplinary work. In sum, the major difficulties in launching these kinds of programs are linked to the fact that they have to subsume academic imperatives from distinct schools. Interdisciplinary governance bodies and dialogue with faculty authority are therefore essential elements.

Finally, the intrinsic value of an EEP should be considered in the light of its overall objectives. Those objectives should definitely relate not only to the number of start-ups created in the short term, but also to entrepreneurial activities, intentions and attitudes in their widest sense. This includes new business development, involvement in SMEs, and all the activities directly or indirectly related to entrepreneurship. The objectives of an EEP should therefore also be conceived from a cultural perspective, as a contributor to the emergence of an environment that stimulates and values entrepreneurship. In other words, as David Birch declared in an interview (Aronsson, 2004), the role of entrepreneurship education is to stress the social and economic role and importance of entrepreneurship, as well as to make the public and the political leaders aware of it in order to generate a favorable environment.

Notes

- * The authors would like to thank Kelly Shaver for his very useful comments and suggestions.
- 1. Translated from French.

2. We are not saying that contents do not count, but that 'goals for students are much more process oriented' than content oriented (Petrie, 1992, p. 320).
3. These are the only two reports specifically analyzing the Walloon Region. Although the data for 2003 show some improvement, later reports about Belgium as a whole conclude that the situation is still troublesome.
4. There was no scientific evidence for the lack of entrepreneurial spirit back in 1997. The first GEM report for Belgium was written in 2000.
5. CPME stands for 'Formation Interdisciplinaire en Création de Petites et Moyennes Entreprises' (Interdisciplinary Education Program in SME Creation).
6. Psychology and sociology are also integrated in some entrepreneurship courses.
7. These six schools represent 60 percent of the UCL students (Report of the Rectoral Council of the University of Louvain for 2006-2007, Chantiers et Défis 2006-2007, p. 66).
8. We have developed an international entrepreneurship course involving a student exchange in collaboration with some US universities. See Jones et al. (2008).

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