20 Stimulating E-Learning in Europe: A Supply Chain Approach

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Abstract

This 'research in progress' paper examines a supply chain approach to stimulate e-learning in Europe. It builds on a recent study (van der Linden and van Baalen 1998), which found that it is possible to add a new dimension through distance learning to traditional pedagogical techniques. One of the unexpected side effects reported when using electronic mail was the disappearing of cultural boundaries. From a socio-cultural perspective within an increasingly international setting optimal e-learning requires a supply chain approach, in which face-to-face meetings play a critical complementary function to ensure that important clues such as body language and tone of voice are not filtered out (Lee 1994:143).

A relevant issue for institutions of higher learning is whether or not it is desirable for ICT applications to complement or substitute traditional forms of management education (van der Linden and van Baalen 1998:15). There is an increasing need to interact in the complex international environment, which implies that students must obtain the skills to bridge five identified gaps in the polycontextual learning environment (Fenema, 2001). In the early 1990s the Rotterdam School of Management, Erasmus University internationalized its curriculum. It is currently responding to the challenge of applying digital learning techniques to deliver management education. The diffusion of knowledge plays an important role in innovation processes. (Hertog and Bilderbeek (2000:222). This paper concludes with a summary and research agenda for higher education in the global knowledge economy.

1. Introduction

The emerging twenty first century global society is characterized by crisis, the convergence-divergence paradox, and conflict. The turbulent landscape affect how civic and business leaders make decisions and how policies are translated into actions within communities and corporations. In particular, the issue of competitiveness has raised the overall level of performance in terms of productivity, quality and profitability. Whilst the introduction of global performance standards can be very threatening, institutions of higher education in Europe have little choice but to acknowledge the global shift from a labor-intensive economy to knowledge-based economy. Assessing the consequences of such shift, within the context of the global era in human history, is fundamental to the appropriate future development, delivery and evaluation of educational programs.

Towards these ends this paper has three major objectives:

1. to assess the implications of globalization on the provision of higher education;

2. to determine whether higher education is presently meeting the learning needs;

3. to explore the future higher education agenda for e-learning in Europe.

This paper builds on the authors' backgrounds, teaching and research interests in the economics and management domains. This paper elaborates the theme e-learning from a supply chain perspective and why this subject matters to higher education. First, following an evolutionary innovation theorical perspective, it is assumed that higher education plays a key role in the efficient distribution of knowledge in a National Innovation System (NIS) which is 'at least as important as creating new knowledge'. (Hertog and Bilderbeek, 2000:222) the competitive environment is characterized by rapid technological change, globalization and blurring boundaries of competition. Second, the Internet and the World Wide Web generate substantial increases in the volume of information available to higher education. Therefore higher education faces complexity and has to decide not only how to compete but also with whom to cooperate. Third, these forces combined cause higher education to focus more on the emerging of 'a trans-European data communication network linking all its research institutes, universities and ultimately the educational system as a whole'. (RTD info 2000).

2. Implications of globalization

A recent study (van der Linden and van Baalen 1998) indicates that it is possible to add a new dimension through distance learning to traditional pedagogical techniques. One of the unexpected side effects reported when using electronic mail was the disappearing of cultural boundaries.

Increasingly, one of the key issues for higher education is how to address the local-global paradox in relation to learning and knowledge creation, transfer and application.

In this paper knowledge is understood as the content of learning with behavioral outcomes that reflect the patterns of cognitive associations that have developed (Daft et al, 1984). Knowledge is the result of the interaction between tacit (subjective) and codified (objective) components of knowledge (Nonaka, 1993). Tacit knowledge is embedded in specific relationships between a number of parties and transferable only within the specific network of interpersonal relationship that is based on commonly shared values at the local level. In contrast, codified knowledge is globally accessible because it is based on a set of assumptions that are commonly accepted independently from the specific membership of the parties'. (Ganzaroli 2002).

Nonaka (1993) views knowledge creation as a four-stage process: socialization, externalization, combination, and internalization. Value can be derived from the knowledge creation process if an organization has the capacity to transfer the potential value that resides within the organization into a value proposition that is of value to external stakeholders. The mission of higher education may be viewed as imparting knowledge through formal instruction that supports the learning process, i.e. learning as cognitive development and learning as behavioral development (Fiol et al 1985).

Presently, the learning process still depends on tacit knowledge creation that is tied to trust creation, which in turn is derived from socialization and the internalization of common values and experiences between members of a community of practice. (Nonaka and Takeuchi, 1995).

It implies that within the traditional higher education supply chain the classroom, the project work area and the library are still the focal points for purposes of learning management and assessment.

Meanwhile the value creation process increasingly depends on the ability to transform internal value into external value. Higher education must mobilize its abilities to capitalize on the new educational benefits of ICT, but making it happen in practice is not simple due to complex issues.

First, in the next five to ten years higher education will be inextricably linked to the new knowledge infrastructure that is emerging in the European Union. Developments in the European Union are driven, among other things, by new technologies (nano-technology, peer-to-peer networks, encryption), economic structures (e-markets, codes of conduct), and dependability (systemic dependence). The emergence of ICT is one of the expressions of a tendency known as the globalisation of the economy". The increasing international integration of economic activity is often at odds with existing governance structures, including those in higher education, that are closely tied to geographically defined nation-states. ICT revolutionized the way higher education processes function at present. Knowledge exchange occurs increasingly within 'global space' and in a new knowledge infrastructure that will be largely driven by e-learning systems. How will the stakeholders within the EU - EU bodies, higher

education, the private sector, EU member states - interact to generate appropriate regulation?

Second, today's higher education system is characterized by *"mass" education*. In the introductory classes in many major universities today, the learning environment is less than ideal. Students are often herded into huge lecture halls and sit in cramped seats, accompanied by several hundred fellow students and listen to a lecturer read a pre-scripted lecture. The professor who wrote the course they have to attend may neither be present and nor interface with any of the students during the entire course. Any new system that would be learner driven for instance, allowing the student to read the lecture at his/her leisure and respond in writing with illuminations, would likely encounter significant internal resistance.

The third issue concerns the current *quality of e-learning in higher education* and what can we be done about improving it. Learning does not stop at the door of the lecture hall. The best ICT has to offer currently is a "chat" room environment where students can discuss topics with other students either in mass or one-on-one. This discussion is truncated by distance and time constraints. One of the authors has a friend who actually did this. He attended a philosophy course, which was taught this way, and said that the bulletin board worked fine that people posted things and got things, the course material was fine, the reading and all that. He was learning a lot, but when they did the interactive chat, it was a total disaster. There were 10 or 12 people in the room and everybody was afraid to say anything, there was no trust, no community feeling emerged. Consequently, everybody was afraid to ask questions and the course flopped.

Within the 'borderless' supply chain framework higher education is affected by the issue of the *'international restructuring race.'* (Ruigrok and Tulder 1995). That is, organizations are continuously engaged in competition with existing and new providers and the opportunities and the need for co-operation. Multiple stakeholders with diverse backgrounds, interests and aims have become involved in the design and delivery of curricula, including, corporations, business associations and non-governmental organisations (NGOs). The faster pace of knowledge creation, transfer and application, the dynamism of shifting relationships and increase in costs have a considerable impact on higher education.

The fifth issue regards the emerging extended higher education network. It has its roots in ICT and the concept of *lifelong learning*. The latter implies that progressive curricular development is dependent not only upon institutions of higher education, but increasingly also on a 'shadow' educational network comprised of corporations and international institutions with their own governance structure and cultural values. It calls for higher education insight and foresight with respect to the competencies that exist are emerging within the substantial 'shadow' education network

within the corporate structure. Therefore, higher education shall have to explore the lifelong learning needs within global corporations and international institutions.

Finally, the issue of the *governance of cyberspace* and how social norms and principles are being designed to regulate the use of the Internet.

This is of critical significance, because as a result of cyberspace higher education will enter Baudrillard's fractal stage where everything interpenetrates; we will be in the era of what might be called the 'trans-educational'. Since education will be everywhere, since everything will be educational, in a sense nothing will be educational. (Ritzer 1998: 160) Without a thorough reflection on the ethical aspects and value issues in e-learning it will be impossible to be practically or theoretically adequate in the field of e-learning. Privacy and data-protection, responsibility for adequate information and trust are among the most important ethical issues. The nature and dynamics of e-trust need to be understood as it is a moral phenomenon, that is a necessary condition for successful e-learning practice. From a socio-cultural perspective optimal e-learning requires an approach, in which face-to-face meetings play a critical complementary function to ensure that important clues such as body language and tone of voice are not filtered out (Lee 1994:143).

Within this context, it follows that institutions of higher education require a new governance structure. In the next section we present a supply chain approach as a perspective on the potential re-structuring in higher education governance.

3. Supply chain perspective

The supply chain approach enables higher education to gain membership of a community that has access to codified knowledge whilst sustaining simultaneously membership within a network that is embedded in a specific territorial context. The supply chain approach allow higher education to formulate and implement strategic responses considering both the competition from new providers and the opportunities and needs for co-operation. As such the proposed supply chain approach would be typically embedded in the national innovative system. Therefore, it follows that designing the conditions for an international competitive performance in the higher education sector should be a shared responsibility for higher education, business and government. In the next section we present a supply chain approach that enables higher education to improve its coordination and control of relational networks that are required to enhance the higher education e-learning experience process at reduced costs.

3.1. Supply Chain Mapping

'Supply chain management is concerned with managing the flow of materials and information between the operations which form the strands or chains of a supply network' (Slack, Chambers and Johnston 2001:412) that are needed to deliver a given product or service. In this case, higher education is viewed as the deliverable. The suppliers that are part of the supply chain act more or less together to satisfy the end user demand for higher education. Some suppliers may work in one supply chain whilst others may service various competing supply chains. The learner is the end user and the demand for higher education is the stimulus that drives the actions of the participants.

The mapping process (SCOR – Supply Chain Council, 2001) allows us to blueprint he process of creating and distributing a product or service. (See exhibits 1 and 2 page 8). The exhibits use standard SCOR Reference Model icons and terminology. P stands for the planning process that is associated with each aspect of production. S is for sourcing or deriving input to the process. M is for make or manufacture, the process of taking raw inputs and turning them into a product or service. D is for deliver or making the finished product or service available for consumption. The numbers associated with each letter have to do with the type of the same process. In the case of S, M, D, the 1 stands for processes that produce a product for "stock". The product or service is made by the manufacturer and sourced by the end user with limited demand information from the end user. In contrast are type 2 and 3 process that refer to "assemble to order" and "engineer to order" respectively. In P, planning, the numbers refer to plans that take place during each segment of the supply chain process. P1 is the planning of the supply chain in total. P2, planning for sourcing, P3 planning for making and P4, planning for delivering the product or service to the end user. The supply chain, running left to right, involves suppliers of raw material, the process of making something and the process of delivering the finished product or service to the end user, the final consumer or user. The Decoupling point is the place where the needs of the enterprise to control the supply process (push) and the demand of the end user (pull) are exchanged. Findings regarding the Decoupling point is the focus of the analysis in the mapping process for Higher Education in both the traditional and the ICT environment.

The ICT infrastructure framework does not allow for the complete passage of subliminal types of messages. On the other hand, whilst the present infrastructure may be slower in nature, it has withstood the test of time. For example, an instructor who stands in front of a class may be able to collect the subliminal clues that she requires to evaluate how the learning environment should be modified to enhance the learning situation. Currently it is not possible to obtain such clues within the ICT infrastructure framework.

The input vendors may include professors, builders, administrators, projectors, blackboards are all arranged prior to and with the learning experience as its primary goal. The students who make up the end users function to pull the input together.

Presently, ICT software like Blackboard offers a package of interconnection possibilities. The package contains email for both individuals and groups, real time group discussion also know as "chat", discussion board to post articles for class input, post (drop) box to turn in finished assignments for the instructor to view and comment on and record keeping including contact history by time and date, grading and reports in various formats. Furthermore, the package allows one to send soft files by Internet through either a modem or broadband connection. Most universities like the University of Phoenix, the largest online long distance granter of university degrees, uses writing and reading as the primary methodology for learning stimulation and assessment. The elimination of technology such as Blackboard puts one back to the correspondence schooling that was popular in the 1950 and 1960s in the USA.

In other words whilst ICT may have revolutionized the way higher education processes information at present, the learning process seems still tied to tacit knowledge sharing in specific places. In contrast to the explicit knowledge exchange that occurs in 'global space'. It implies that currently the classroom, the project work area and the library are still the focal points for purposes of learning management and assessment within the Higher Education supply chain.

3.2. Decoupling Model

The introduction of ICT has a major impact because it enables higher education to push the decoupling point further up the supply chain. (Hoek, R. van et al, 2001)

The decoupling point is the place within the supply chain where a product or service changes from push to pull. We shall illustrate the notion of decoupling point with a common product such as canned soup. The production of canned soup has different decoupling points depending on where the demand of the end user takes over to pull the canned soup into their environment. Canned soup is a product that is manufactured to stock and then 'pushed out' to where a customer can take it off the shelf. The decoupling point is the place where the customer collects the canned soup. If there is a system in place to deliver the canned soup to the place where the end user lives, then the decoupling point is where the canned soup is picked for delivery. In supply chain parlance it is called "assemble to order". If the client wants a special soup made for a party and arranges with a soup company, design the soup especially for him and then orders 100 cans for a party, the decoupling point is at the point where the manufacturing process of the custom made portion of soup begins. It is referred to as "engineer to order".

The supply chain for a service varies slightly from that of a physical product in that the decoupling point is at the point of consumption. When a doctor provided her medical advise or an airline provides a seat for a trans-Atlantic flight, the service is pushed to the point of consumption then pulled by the end user through consumption. In both cases, there is a process

called postponement where the service is tailored to conform more closely to the value equation.

In the supply chain for traditional higher education, the decoupling point existed within the physical learning environment. However, the decoupling point within the ICT higher education supply chain is shifted from the physical learning environment to the place where the service is produced for distribution earlier in the chain. Why does this development occur? In examining the traditional learning environment, we can observe that although curriculum and lectures are created prior to the students entering the classroom, there the process of postponement taking place to allow the material to be modified through interaction and more closely suit the learning requirements of the end user, the student. Both curriculum and course material are prepared in the supply chain that drives ICT-learning process. But as the ICT lacks the 'face-to-face' interactivity of the traditional learning environment, there is no chance to postpone or modify same to suit the demand of the learner. As a result the subtle clues furnished by face-to-face interaction are not captured and disseminated through the ICT layer. Therefore the postponement process cannot take place. Although the student is free to draw a desired curriculum segment from the ICT layer at his own convenience, there is no real time "teacher" to modify the material to fit the learners' needs at the time of consumption.

Such a subtle change in the decoupling point has many ramifications in terms of preparation, delivery and evaluation of the learning process and material. Looking at the physical nature of the supply chain, there will be likely less demand for buildings and furnishings, student housing and transportation for commuting. At the same time there will be likely more demand for ICT and facilities that are required to produce, stock and diffuse the desired learning products and experience some learning segments in real time on location. For example, business attachments and excursions are requisites at Business Schools at for instance Nanyang Technological University, Singapore, the University of Southern California and the University of Twente. Although the roles of the professors and students remain relatively the same in both traditional higher education and ICT-driven world, both the classes and projects are pushed into the ICT layer and are thus dependent on the technology to provide context. It is this contextual change that bears great importance in our analysis.

Particularly, it implies that higher education will need to build new structures to accommodate the ICT-supported processes and ICT will need to adapt to the need to deliver these face-to-face clues to enable the learning environment to once again to adhere to the current postponement process. As we move forward higher education must ensure that the content actually does pass, is available because the content is more than just the codified text. The methodology in-use to stimulate the learner, business to understand, the government to respond, may be considered rather old-fashioned. It

requires one to call people, send faxes, emails and arrange for meetings and talk 'back and forth'. Higher education requires a system that enables it to exploit the ICT infrastructure to do essentially what is presently done the old fashioned way. Ideally, it will result in the integration of virtual and face-to-face encounters, where perhaps a phone call or a couple of meetings might be required during the entire information exchange process to support the virtual data stream.

In the ICT learning environment, most of the material world is left out and ICT is substituted. One interesting facet is that most professors have prepared for this encounter the "traditional" way, learning habits of stimulation and assessment in a face-to-face setting. Most students in the Higher Education setting have also prepared in this fashion. (process mapping of traditional and cyber University education). Students who work on an assignment over lunch or in the University library or study rooms experience instant stimulation that is lacking with today's ICT learning tools. ICT promises both connectivity and velocity for the creation of centres of expertise that can be matched to problem situations. Specialities available in other countries and universities. Construct on-demand incubators to bring together students in response to certain needs in a certain area and subsequently, operate and fund it. To maintain objective learning environment, service quality, Stanford University, the learning lab, where they've done a tremendous job in this regard? Will the future of higher education imply the mass customisation of the learning experience? Can higher education create the same kind of trusting, low risk environment that we have in a classroom to foster learning in an ICT context?

4. Higher education supply chain management

A community of practice can be described as a 'space', where according to David Snowden an IBM knowledge management guru, knowledge can be released only on demand as a consequence of the interaction of at least two persons. A community of practice is based on the principle that two minds are better than one. It depends on the connectivity of its members, the dynamics interaction between them for purposes of information and knowledge exchange. Whilst there are different ways of obtaining knowledge, learning typically involves a script, imitating observed behavior of one or more 'masters', in a community of practice (Nooteboom 2000 : 274; citing Brown & Duguid 1996). An important characteristic of a community of practice is the master-student relationship. The role of the master is to provide appropriate stimulation, guidance and evaluation of the learner's performance. The role of the learner is to adopt, practice new patterns of learned behavior, either in a group or individually. Similar to a dancer or tennis player would rehearse with a coach. Learning is a process of creating insight, knowledge and understanding to enhance the learner's effectiveness. The content of learning is viewed as knowledge (Fiol et al, 1985) which is subject to

constant assessment to establish if and to which degree learning has been accomplished. Assessment is paramount to the successful internalization of new knowledge and skills and to achieve a learning goal. Because (tacit) knowledge sharing is voluntary in nature, a trusting, non-threatening environment is essential functions for effective learning. A key issue is therefore how to create an ICT-supported, trusting, non-environment that enhance the learning experience.

Attending an institution of higher education, either on a full-time or part time basis offers one the opportunity to experience learning in a world unlike the workaday world. On a college campus, there are constant reminders that knowledge acquisition is the main focus. In that sense the campus of an institution of higher education may be viewed as a "safe haven". Higher education should focus on how to maintain the 'trusting environment' image where students can be stimulated to acquire knowledge on certain subjects, evaluate their level of learning and in the process enhance their own value proposition.

To this extent an open distributed architecture and prototype electronically supported learning market should be developed for use in the European Union. By electronically connecting learners to higher education providers (HEPs) this market will efficiently and effectively connect the diverse and geographically distributed Higher Education resources to individualized demand patterns of the diverse clients. For example, the Rotterdam School of Management has developed international student exchanges with 52 renowned business schools in 33 countries. Every year 150 Dutch students can be exchanged with 150 foreign students. Within the Community of European Management Schools (CEMS) network 17 universities cooperate with 57 multinational corporations. (FBK 2001). Finland is one of the European Union member nations that has taken the information society to heart, with its very high level of internet access. In future, the 'versatile use of networks in studying and learning' EC 2000) is likely to increase. This development calls for a support system that enables Higher Education to enhance international business and management learning experience both within virtual networks and through international exchanges and internships. What seems required is a proposed supply chain architecture and prototype for electronically supported higher education learning within the European Union.

The proposed comprehensive management system came about during sessions between Frank Go and Kuldeep Kumar, professor at Florida International University and applied to e-learning. The system consists of four modules: *a demand module* representing the learner's demand for designed learning solutions; *a supply module* representing the various suppliers culminating in higher education provision (HEPs); *a market module* providing market design and tracking service and *a scorecard module* designed to measure and evaluate performance. These modules are described in the sections 3.1, 3.2,3.3, and 3.4 below.

4.1. Demand

The demand consists of a number of independent customers. A software **Customer Identity Agent** is used to represent each learner. The customer identity agent, in addition to the learner's profile, includes information about the learner's preferences and requested activities (such as request for course information, request for course registration etc.). A learner may take one or more **courses.** In turn, initially each course consists of demand for multiple **course elements** or course-components such as a publication, software, flight and ground transportation, and accommodations. The switching function in the market module matches the demand for available services. Once a suitable match is found by the Switching function, the segment demand is considered fulfilled. A course is built up by incrementally combining matched segments in linear time precedence relationships.

4.2. Market System

The Market System consists of four modules: A Demand-Supply Switching Function; An Online Curriculum Designer; A Curriculum Tracker and Dynamic Re-Scheduler; and A Mobile Financial Payment System.

The **Demand-Supply Switching Function** matches the segment demand requirements and the Learner Identity Preference Profiles to available Higher Education Providers in order to satisfy learner's demands. This is a dynamic switching function that allocates appropriate course modules to a learner's specific course component requirements in real-time, within the constraints of the learner's preferences. It further makes reservations when authorized by the interactive curriculum builder.

The **Online Interactive Course Builder** is the intermediary between the learner's (changing) requirements and the Demand-Supply Switching mechanism. It strings together the matched demand segments into a sequential course itinerary. While the switching mechanism is concerned only with satisfying demands of individual demand segments, the Online Course Builder ensures the consistency of the learning process by ensuring and documenting that the demand segments are arranged in the right sequence and are within the constraints (such as time, budget etc.) of the overall course.

The **Mobile Tracker and Dynamic Re-Scheduler** is a workflow (learner-flow) manager that tracks the learner throughout the course using a combination of GSM and GPS technologies. It also tracks for involuntary (e.g., a traffic delay on the road) or voluntary (the customer wants to switch schedule) course attendance changes. When such changes are detected, through the Interactive Online Course Builder, it co-ordinates with the Demand-Supply Switching function to dynamically re-schedule the remaining course-segments.

The **Financial Payment System** is a mobile telephony (GSM) based system that lets the learner pay online for services received. It uses the GSM technology to receive the invoice for service, compare it to price contracted or agreed upon either when the switching match was made or when the service was received, and authorize payments, all online. And can also be used by learners to record their comments about the service received in a *rating service* designed to assess the course content and its delivery.

4.3. Supply

The Supply Module consists of: Higher Education service provision (the university) within the context of the Extended Higher Education Supply Chain. Particularly, this refers to providing access to the 'shadow network' of knowledge that is available in corporations. Corporations around the world are trying to create the learning organisation, a corporate environment that is conducive to learning. For example, the Ford motor Company issued computers to most of its employees to improve connectivity.

According to IBM guru David Snowdon 95% of corporate assets are embedded in tacit knowledge or the knowledge between the ears of employees, not the buildings. People can not be forced to surrender knowledge. They shall only do so voluntarily, under conditions in which they feel trust and friendship. Therefore, an important issue in learning is: Where and how within the Higher Education Supply Chain can 'safe havens' be created that allow for a learning environment, the sharing of information and dissemination of knowledge.

Another key issue is how to bridge the multicultural, multi-lingual and governance gaps in a European Union or global learning environment. Indeed transnational learning can only occur if the cultural gaps that divide organizations and institutions can be bridged effectively and efficiently. Academia, corporations and governments have to begin to support the process of trans-national learning, through the versatile use of networks in knowledge development, sharing and application. This requires a higher education information provision system that designed to cope with complexity.

4.4. Information Provider

As far as possible, the Higher Education Information Provider module will rely on existing online sources of information to provide its stakeholders with related information. It will also rely on publishers', consultants, corporate- and supplied information and data issued by government and regional government authorities. Finally it will connect to both local libraries and those outside the region as sources of information.

In addition this module will include a **Ratings Function** (learner-provided ratings function*)* to capture and organize learner's comments based upon his/her learner's experience. Following the business model of Amazon.com, this service will only store learners' comments and will not assume any liability

for the accuracy of the learners' comments.

5. Concluding remarks and future agenda

In our presentation we have taken a look at the globalization in relation to higher education. Knowledge creation is viewed as the product of the interaction between tacit knowledge embedded in local cultures and codified knowledge that is globally accessible because it is based on a set of assumptions that are commonly accepted independently from the specific membership of the parties'. (Ganzaroli 1999).

Partnerships have traditionally played a critical role in higher education, but in future their relationship to academic success will increase dramatically. The evolutions to strategic alliances in business challenge the notion that businesses are discretely bounded entities. Evidence indicates that alliances facilitate organizational learning (Hamel 1991) speed rates of process innovation and other sources of competitive advantage (Bardaracco, 1991). Clearly, this accumulation of evidence in business over the years underscores the importance of understanding if international competitive ICT-performance plays a role within cooperative strategies in higher education. A major issue for institutions of higher education is to create the conditions for an international ICT-performance.

To this end we introduced the supply chain as a mechanism to coordinate and control internal capabilities, the types of alliances and the scope of relationships with other institutions of higher education resulting in stimulating e-learning in Europe. A relevant issue for institutions of higher learning is whether or not it is desirable for ICT applications to complement or substitute traditional forms of management education (van der Linden and van Baalen 1998:15). When the answer to this question is affirmative it raises yet another question: "What separates e-learning from traditional learning in the higher education context?

One important barrier that stands in the way of virtual and boundaryless e-learning in the pure sense is trust. This paper has dealt with the question when (de-coupling) and why (tacit vs. codified knowledge) parties that develop and transfer knowledge need trust. We have looked at the implications of globalization and the application of a supply chain perspective to coordinate and control student-'master' encounters and relationships in the system, in which a trustful environment is key to overcome uncertainty and stimulate learning. The model that we have presented is clearly at the exploratory stage, requiring both further development and testing. We believe that the potential benefits of ICT in higher education are immense. Optimism about the potential of e-learning for economic, social and cultural development can be heard throughout the UN, the World Bank, and the World Trade Organization. Attaining the actual benefits of policy choices depend on practical implementation conditions.

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