

UNIVERSITIES IN THE LEARNING ECONOMY:

Balancing Institutional Integrity with Organizational Diversity

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ABSTRACT

Over the past decade there has been an increased discussion on how universities can play a more effective role in contributing to promote wealth creation in Europe. A significant stream of that discussion has regarded American universities as a reference and has resulted, within the diverse range of institutions in the European higher education system, in various organizational and strategic arrangements that go much beyond the traditional roles ascribed to education and research. The unifying characteristic of these different arrangements is provided by the unique characteristics of “the university” as a societal environment for exploration and interpretation of knowledge. Under this context, we begin by describing traditional perspectives on the impact of universities on economic prosperity and by discussing recent conceptual advances that shed new light on the importance of formal and informal learning processes for economic development. We conclude that while the role of the university needs to be re-examined, the institutional integrity of universities must be preserved. The analysis is focused on engineering education, where the variety of demands and the continuously changing social and economic environment surrounding the discipline is calling for *diversified systems* able to cope with the need to integrate policies for the generation and diffusion of knowledge. Within this broad perspective, the role of universities in promoting sustainable socio-economic development is discussed, namely in terms of the traditional functions of teaching and research, but also by promoting living environments that facilitate the ability to understand the development of sustainable societal conditions and entrepreneurship.

1. Introduction

The important strategic role that universities can play in helping nations to meet public goals has been extensively recognized. These roles have a multifaceted nature, including such diverse aspects as public safety, quality of life, health care, environmental protection and economic development and growth (e.g. Clark 1995; Lucas 1996; Noll 1998). The specific ways in which universities have played these roles are dominated by activities associated with the creation and distribution of knowledge (Rosenberg 1998). The generation and diffusion of knowledge is translated, for example, in improved competencies and skills in the labour force, and in the development and commercialisation of new technologies. However, in face of continuous and ever more demanding public scrutiny, traditional suppliers of knowledge – such as schools, universities, and training organizations – as well as businesses and knowledge based organisations in the public sector (growing users of knowledge), are urgently seeking fundamental insights to help them nurture, harvest and manage the immense potential for their knowledge assets for capability to excel at the leading edge of innovation.

To a certain extent, it can be argued that a trend is emerging leading to a breakdown of the institutional boundaries that separated companies and universities. This process of “institutional convergence” can be understood as a result of two forces that come together to impose an ever-closer identification of firms and academic institutions, and vice-versa. The first force results from the fact that the creation of added value and wealth is increasingly associated with the production of knowledge, so it is natural that companies look to the way university function for inspiration on how to perform creative tasks. Secondly, the universities find themselves facing difficulties in obtaining sufficient funds for their basic tasks of teaching and research (see Caraça, Conceição, and Heitor 2000), so it is also natural that they look to companies to learn how to derive commercial benefits from their intellectual assets and endeavours.

As various studies have shown, while this convergence is, to a certain extent, to be welcomed, it can also be dangerous. Rosenberg and Nelson (1996), Dasgupta and David (1994), David (1993), and Pavitt (1987) argue that this convergence is “acceptable” as long as it does not harm the institutional integrity of the university. Companies and universities have evolved in a social context to the point of attaining what these authors call “institutional specialization”. Thus, whereas companies are concerned with obtaining private returns for the knowledge that they generate, universities have traditionally made it public. By means of this specialisation, or “division of labour”, the accumulation of knowledge has taken place at a rapid pace, as is shown by the unprecedented levels of economic growth since the end of the Second World War (Rosenberg and Nelson 1996). These authors show that the universities we know today, despite their long historical inheritance, are relatively new institutions, namely in the way they relate to theirs surrounding social and economic context. And universities have defined themselves almost as *non-firms*, in the sense that they produce knowledge that is publicly available. To do this effectively, a complex set of incentive structures and organizational features emerged, which are relatively easy to destroy, despite the long time it took for these to evolve.

The argument on the dangers of harming the institutional integrity of the university is analysed in detail in the context of the knowledge-based economies in Conceição, Heitor and Oliveira (1998). The threats to a university’s institutional integrity in fact go beyond the extension of its activities to links with society, which, if excessive, could lead to resources being spread too thinly. The analysis is based on the more serious problems that may arise if universities take the path of privatising the ideas that they produce and the skills that they develop.

In other words, an evolutionary metaphor could, with some liberties, be used here. Both firms and universities have evolved over time as institutions adapted to an environment where different types of knowledge were generated by each institution for mutual benefits. Thus, in a simplified way, while firms were able to commercialise and diffuse technologies, universities specialised in advancing the knowledge frontier at the forefront of the unknown. No insurance mechanism or system of private rewards could possibly lure investors into this most risky of ventures. Universities assumed this role, with a structure of incentives which never penalizes too much for failure, but that also does not reward exceedingly for successes. This is particularly true in Europe, where university professors are, to a large extent, civil servants, and their salaries are rigidly structured by the civil servant system in which seniority carries a very heavy weight, and there is not much possibility for competition along the salary dimension (Rosenberg 1998). The danger addressed in this chapter is in the “extinction” of one of knowledge creating “institutional species” identified above. If universities become, at least in the way they deal with knowledge, very much like firms, we will be in fact witnessing the death of an institution!

Therefore, our chapter suggests two important ideas. First, we propose that the *institutional integrity of the university needs to be preserved*. Universities are a special type of learning organization specialized in producing and diffusing knowledge in unique ways. Second, we argue that, important as universities are, they are not enough to guarantee prosperity, and there *is a need to promote a diversity of organizational arrangements*, even at the higher education level. Indeed, this organizational diversity could be a major contributor to ensure the institutional integrity of the university.

Our analysis is based on the way organizations deal with knowledge, that is, the way organizations promoting “learning”, where learning is understood as the mechanisms through which knowledge is produced and diffused. Therefore, we start, in section 2, by describing a conceptual framework where we make explicit our understanding of *learning* as a process of knowledge accumulation. In section 3 we discuss the application of the model to the context of the university. Finally, in the concluding section 4 we summarize the main arguments of the chapter.

2. Learning As Knowledge Accumulation: A Conceptual Framework

From our perspective, *learning* is understood, broadly, as *knowledge accumulation*. There are different levels of “learning entities”, from individuals, to organizations, to whole economies. Our discussion of universities is based, as we indicated above, in the exploration of the ways in which universities promote learning and, thus, contribute to knowledge accumulation. A first important step in our discussion is the clarification of our conceptual understanding of terms such as “knowledge” and “learning”, often loosely used with dramatically different meanings. This conceptual clarification of our understanding of learning as knowledge accumulation is the objective of this section.

We find it useful, as developed in more detail in a previous paper (Conceição and Heitor 1999), to follow Nelson and Romer’s (1996) differentiation between ideas and skills, or software and wetware, to use these authors’ nomenclature. These two kinds of knowledge differ in the way they are used, diffused, and produced. However, they are strongly interdependent in the learning processes that lead to the accumulation of knowledge.

The conceptual difference between *software* and *wetware* (i.e., ideas and skills) lies in the level of codification. While ideas correspond to knowledge that can be articulated in words, symbols, or other means of expression, skills cannot be formalized, but always remain in tacit form. Under this taxonomy, knowledge is divided into two worlds: the world of codified ideas (*software*) and the world of non-codified skills (*wetware*).

The difference in the level of codification has implications in terms of the “economic properties” of the two types of knowledge that we consider. The most important implication is associated with the differences in the rivalry associated with the consumption of each type of knowledge. Since the knowledge underlying *software* is codified, it is easily articulated and reproduced by simple, inexpensive means. In general, the costs of disseminating ideas are extremely low, especially in comparison with the costs of producing them. Indeed, the ease, speed, and low cost of distribution are characteristic of virtually all codified knowledge. Consequently, rivalry in the consumption of software is low, in the sense that many people can share exactly the same ideas (*software*) without precluding each other from joint consumption. By contrast, the transmission of skills (*wetware*) is complex, expensive, and slow. Skills result from a combination of factors, ranging from their largely innate quality, through individual experience, to formal training. Thus, rivalry is comparatively higher in the consumption of wetware.

The differences in rivalry between *software* and *wetware* have important implications for knowledge production. The non-rivalry of ideas, and their low distribution costs, mean that it is very hard to assign property rights to them and to protect those rights, on the one hand, and on the other that ideas tend to be abundant, especially given advances in information technology and telecommunications, which enable codified knowledge to be easily and inexpensively used and transmitted. In contrast, the rival character of *wetware* means that, in principle, the market provides incentives to produce this type of knowledge, at least when it is analyzed in isolation.

From this perspective, *what type of incentives exist for the production of ideas?* Dasgupta and David (1994) suggest that there are basically two alternatives. The first consists of **intervention by the state** in the production of ideas, by means of direct production (such as occurs, for instance, in state-controlled research laboratories), or by subsidizing production, such as funding of university R&D. The second alternative consists of granting property rights for the creation of ideas, that is by defining regulations for **intellectual property** specific instruments that include patents, registered trade marks and copyright (see Conceição, Heitor and Oliveira 1999, for a more comprehensive analysis). Therefore, the conclusion from

this analysis is that production of ideas requires more complex institutional mechanisms than those provided by the market. As for skills, the market provides a large proportion of the incentives needed for their production, at least when these are analyzed in isolation. We will see below that we challenge this interpretation, and, in fact, suggest that the role of institutions and of public support probably needs to be much stronger than is normally acknowledge, even when the production of skills is at stake.

We bring our own understanding to the process of knowledge accumulation when each of the categories of knowledge ceases to be seen in isolation and the interaction between them is explored. Considering the two types of knowledge together is a requirement, since it is the accumulation of knowledge as a whole that we are interested in, which means that the way ideas and skills are related to each other needs to be taken into account.

The idea of interaction between ideas (software) and skills (wetware) is crucial to our model of learning. In fact, each fuels the other. Without skills, ideas may be irrelevant. What good is a car if we miss the skills to drive it? And without ideas, there is no need for new and better skills. Why would we need further our knowledge of computers if new applications were not continuously forthcoming? Analysis of the interaction between ideas and skills leads us to explore the learning processes associated with the generation of each type of knowledge in a more integrated and dynamic way, beyond the mere accumulation of ideas and skills, each in isolation.

Indeed, according to Soete (1996), ideas and skills are no more than two sides of the same coin, two essential aspects of the accumulation of knowledge. Herbert Simon, quoted by Varian (1995), puts the argument as follows: “What information [in the sense of ideas, according to our terminology] consumes is rather obvious: it consumes the attention of its recipients. Hence, a wealth of information [that is, of ideas] creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it”.

It is worthwhile to restate again our argument, which is that without skills, ideas may be irrelevant, and without ideas, there may be no need for new and better skills. The invention of writing (one important idea) required the development of writing skills. Similarly, the widespread in the usage of another important idea, the computer, is increasing demand for computer skills. New ideas spur the development of the skills required to use those new ideas. The bridge from the production of ideas to the usage of ideas is established by producing new skills. Increased use of an idea, which require its diffusion, will lead to a constellation of other ideas, aimed at improving and extending the initial idea, which will lead to the need for further skills and so on, in a self-reinforcing cycle that leads to the accumulation of knowledge. The accumulation of knowledge results from the production, usage, and diffusion of both software and wetware. Figure 1 summarizes this understanding of the learning processes that leads to knowledge accumulation.

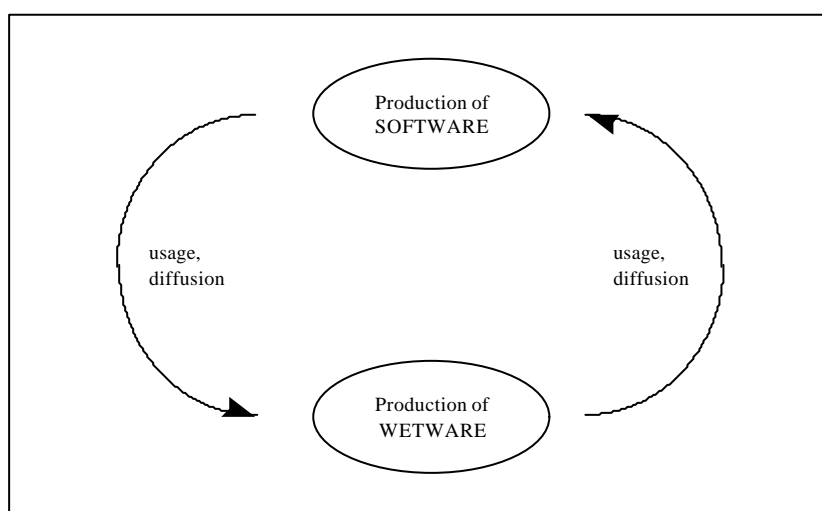


Figure 1 - **The Self-Reinforcing Learning Cycle Leading to Knowledge Accumulation**

To systematize the close and complex interdependence between ideas and skills that lead to overall knowledge accumulation, we suggest two major categories of learning processes:

Learning by codifying (Foray and Lundvall 1996)- production of ideas, through the codification of knowledge: this includes new scientific and technological results, but also major ideas of relevance to the progress of humankind, such as democracy, the equality across race and gender, but also ideas of relevance to a single person or a firm.

Learning by interpreting (OECD 1997)- production of skills, through the usage, or more broadly, the interpretation of ideas, of codified knowledge, including machines, which can be regarded as embodied ideas; this includes skill development as a result of training or of experience.

The mere **production** of skills and ideas is, nowadays, well rewarded economically, namely through the public and private mechanisms which include those associated with the institutional arrangements in universities. Learning processes that result in the codification of knowledge (generation of new ideas) include R&D and artistic creation. In both cases, the creators of the ideas (scientists and artists) are rewarded economically as a result of their efforts.

However, the substantial gains in wealth and knowledge generation are to be found in the **usage** and **diffusion** of knowledge. In fact, history is full of examples in which producers of ideas and skills, by not using and diffusing them, were surpassed by others that did use the new ideas, even though they were not the initial innovators. Two examples, one at the grand scale of the history of civilization, the other at the much smaller scale of contemporary corporate warfare, serve as illustrations.

China developed what was, after the invention of writing, one of the most important ideas for the progress of humankind: the movable type printing press. This idea produced an unprecedented increase in the possibilities of codifying knowledge. However, Imperial China restricted its usage to the affairs of the Emperor and its court. It was Europe that was able to capitalize on this invention, by promoting its widespread usage and diffusing it vastly and quickly (the historical account is taken from Elvin 1973, and Landes 1998). At a more prosaic level, the history of the invention at Xerox PARC of what would become the basis of today's Windows operating system is well known. Not even Apple, initially more successful than Xerox, was able to fully capitalize on the potential of wealth in these new ideas, by underestimating the returns that could accrue from a widespread diffusion and promotion of usage. In the end, it was Microsoft that reaped the most of the potential benefits.

Thus, with Figure 1 we achieve our main objective for this section, making explicit the way in which we understand learning as knowledge accumulation, which is a result of a complex set of learning processes where there is considerable interdependence between the accumulation of ideas and of skills. Our next challenge is to examine how universities, and other institutions, fit into these processes. That will be the subject of section 3.

3. Universities in The Learning Economy

Our conceptualization of the mechanisms through which *learning* occurs emphasizes the **importance of the learning processes**. This section discusses how these concepts can be used to analyze the challenges facing universities in the emerging learning economy.

The university as an institution is recognised primarily through two important functions: teaching and research. However, universities have recently also committed themselves to a range of additional activities, normally grouped together under the heading of "links with society" (for detailed discussions on the context of the university's mission in Europe, see Caraça, Conceição, and Heitor 1998, and in the United States, Christopher Lucas 1996).

At the same time, there is a growing tendency to classify companies as "learning organisations". Nonaka and Takeuchi (1995) are perhaps the classic example of this trend, with the publication of their book *The Knowledge-Creating Company*. Against this background, is the university still the "Knowledge Factory", as described by *The Economist* (1997)? Or, given the profusion of activities associated with university extension, should it structure itself along business lines? At the same time, companies themselves are becoming involved in the production of knowledge, when they are not set up and run from the beginning along similar lines to a university, as is the case with Microsoft (*The Economist* 1997). In short, will the trend towards a breakdown of the institutional boundaries between companies and universities become a fact of life in knowledge-based economies?

To a certain extent, the description already given of recent developments in companies and universities indicates that there will be a convergence. This convergence is the result of two forces that come together to drive an "identification" of companies as universities, and vice-versa. Firstly, the creation of added

value and wealth is increasingly associated with the production of knowledge (OECD 1996), so it is natural that companies look to the way universities function for inspiration on how to become more creative. Secondly, the universities find themselves facing difficulties in obtaining sufficient funds for their basic tasks of teaching and research (see Caraça, Conceição, and Heitor 1998), so it is also natural that they should look to companies to learn how to derive commercial benefit from their intellectual assets.

The issues we want to address is the extent to which this convergence is to be welcomed. As we suggested in the introduction companies and universities have evolved in a social context to the point of attaining what an “institutional specialization”. Whereas companies are concerned to obtain private returns for the knowledge that they generate, universities have traditionally made it public. This argument is analyzed in detail, in the context of the knowledge-based economies, in one of our previous papers (see Conceição, Heitor and Oliveira 1998). In the scope of that article, we started by analysing the university function of **teaching**, which was understood as contributing to the accumulation of knowledge, specifically of skills, through the formal process of learning through education. The development of the paper continued with an analysis of **research**; noted that the great majority of the ideas that are generated in universities are of a public nature, this being the essence of the specific contribution that the university makes to the accumulation of ideas. Incentives for the production of these public ideas come from a complex system of reward and prestige within the academic community.

Our conclusion in that paper was that the institutional integrity of the university should be preserved, and one important point in terms of public policy was that state funding of universities should not be reduced. In terms of teaching, and besides the well-known externalities associated with university education, which justify state support for education in virtually every country in the world with the possible exception of Japan (Eicher and Chevalier 1993), we discussed the need to provide skills that accompany the growth in codified knowledge. The threat of increased privatization of teaching could thus cause serious problems, in that it would lead to a reduction in the resource that really could be in short supply: the skills to use and interpret ideas. This conclusion does not cast doubt on the contributions currently made by students, but rather questions a possible trend that could jeopardize the institutional integrity of the university itself. Similarly, in terms of research we described the risks of following the temptation of privatizing university research results, which could threaten fundamental aspects of the way universities work and could harm their essential contribution to the accumulation of ideas.

The current chapter extends the arguments outlined in the paragraph above by addressing issues that were not dealt with in the original paper. Firstly, in Conceição, Heitor and Oliveira (1998) we focused on the contribution of universities to augment the **levels** of science and human capital, and said very little about the **processes** of learning. Secondly, from a more pragmatic viewpoint, society’s demands from the universities are more complex than we allowed for in the 1998 paper. These demands include rapid and unforeseeable changes in the structure of the employment market, and the need to furnish its graduates with new skills beyond purely technical ones, particularly learning skills.

Here we suggest that the response to the complex and mutating demands of society involves the design of arrangements that combine the strengthening and preservation of the institutional integrity of the university with a second ingredient. The universities cannot actually be expected to foresee and respond to all the demands. If they were to try to do so, this would certainly entail jeopardizing the university’s institutional integrity. A solution to this problem is to develop that second ingredient: a **diversified higher education system**, which would include various institutions with different vocations, in a way that promotes a functional stratification of the system. This could be the way to ensure **sustained flexibility** capable of providing society with the instruments it needs to deal with instability in employment and, more generally, the inevitable changes in technology, tastes, markets and needs. This seems moreover to be the way to meet the challenge of maintaining excellence. The expansion of university education is obviously irreversible in the emerging society, but this fact cannot be allowed to stand in the way of creating centers of excellence. On the contrary, it should encourage their development, notably by means of the stratified system suggested above.

The American education system can give some pointers towards a possible path to follow. According to the Carnegie Foundation for the Advancement of Teaching, which produces a semi-official classification of American higher education institutions, there are around ninety “research universities”, being those that have generally been called simply “universities”. These ninety institutions operate within a system of 3 706 institutions (not counting the 6 256 others that only provide vocational training), with a total of over fourteen million students enrolled. In this way, the diversity and functional stratification of the system as a whole helps it to respond to rapid changes in society’s demands, particularly through those institutions oriented more towards teaching and with shorter graduation times, without putting undue pressure on the universities.

But beyond suggesting a diversified and stratified higher education system, there is also a need to analyze further the way in which the university can contribute to create a truly enhanced culture of learning where its unique contributions to knowledge generation are enhanced and nurtured.

To explore the role of the university further, we begin by constructing a model that, building on the general learning model presented in Figure 1, intends to codify the learning processes that are promoted in universities. Figure 2 is an expansion of our simplified learning model. To begin with, skills appear as a cluster of small ovals, reflecting the individual nature of the skills of people, ideas appear as a single oval. This represents the indivisibility of ideas (David 1993), meaning that, once created, an idea remains at least potentially accessible everywhere, and there is no need to rediscover it. Figure 2 also shows more detail in terms of the several learning processes that have been analyzed in various places in the literature. Our two main categories of learning processes are now presented more thoroughly:

cycle 1 - codification of knowledge: the great number of existing ideas that are the starting point or “feedstock” for new ideas to be constructed using existing skills;

cycle 2 - interpretation of codified knowledge: using existing skills as a starting point or instrument to decode the ideas which are being studied or used, leading to improved skills.

Cycle 1 covers learning processes that result in the **codification of knowledge**, that is the generation of new ideas. Specific examples within universities include R&D and artistic creation. In both cases, ideas are generated as a result of a **process of exploration**, searches in science or in artistic forms of expression. This type of learning is **convergent**, meaning that on the basis of different and unique skills, ideas are generated that have the potential for common use.

Cycle 2, on the other hand, relates to learning by **assimilation of knowledge**, which results from activities such as education, experience, and social interaction. Through the **interpretation** of existing ideas, different skills emerge. Imagine a mathematics class: all the students are using the same book, they attend the same classes, they do the same exercises. However, the ways in which they assimilate and interpret these are different, meaning that the learning process is **divergent**.

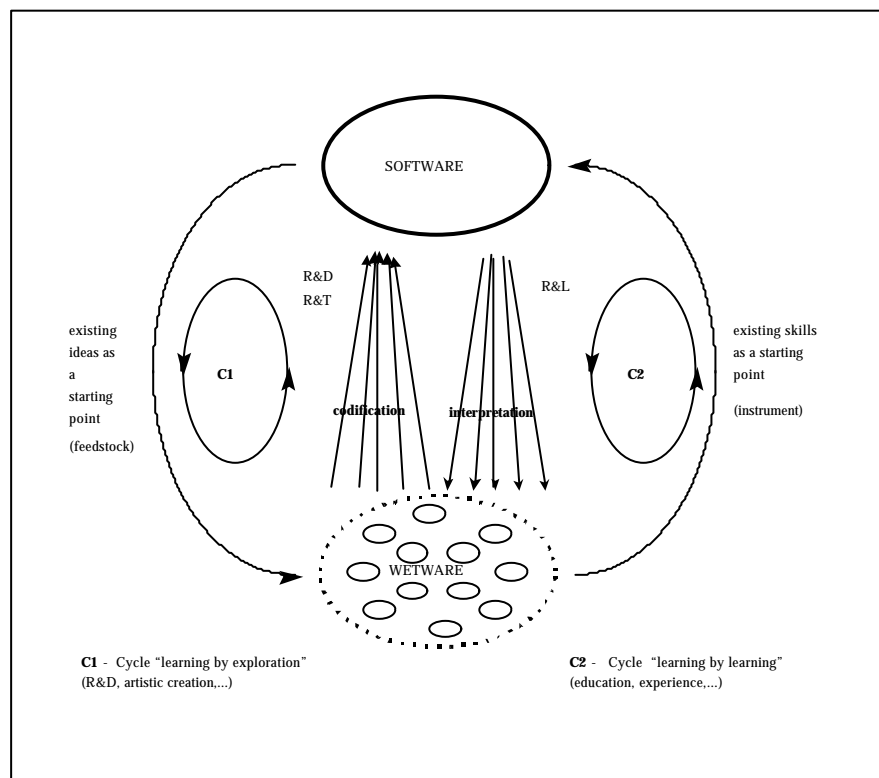


Figure 2 - Learning processes and Different aspects of University Research

(R&D: Research and development; R&T: Research and Training; R&L: Research and Learning).

In terms of the university functions, we think that expanding the way research is performed at universities is the way to intensify the learning skills that people are required to have in order to sustain a society wide learning culture. Research can be viewed as various sub-functions, not always clearly defined, but which should be the subject of separate public policies and forms of management, as follows:

R&D, Research and Development, which aims at the accumulation of ideas through convergent learning processes, which are associated with the processes of codification represented in Figure 2. This is the commonest form of research, particularly in the context of economic development and from the standpoint of the relationship between universities and companies.

R&T, Research and Teaching, in which research functions as a way of developing teaching materials, as well as of improving the teaching skills of the teaching staff, and which is also associated with the convergent processes of knowledge codification represented in Figure 2.

R&L, Research and Learning, in which the value of the research is not necessarily in the creation of ideas, but in the development of skills that enhance opportunities for learning. Research appears as a divergent function, associated with the process of interpretation represented in Figure 2.

According to the definitions of the learning processes, R&D and R&T are convergent learning processes, the purpose of which is the creation of ideas. In this context, **selectivity** is required in the choice of individuals with suitable skills for these types of activity. In turn R&L is associated with a divergent learning process, which seeks to develop learning skills through the experience of doing research. It is important to **disseminate** these opportunities, presenting research as a cultural factor.

In these circumstances, a diversified system could respond effectively to the different demands made of it in the emerging economy, by being selective in R&D and R&T, and comprehensive in R&L. Indeed, the comprehensive nature of R&T should be extended beyond the university to cover the whole education system, as a way of promoting learning skills. In this situation, it seems essential to place renewed emphasis on education and, to a certain extent, to reinvent its social and economic role. Educational institutions must rethink their relationships with the individuals, families and communities among which they find themselves, presenting themselves as vital providers of opportunities to develop formal learning processes, while at the same time encouraging a way of life that promotes learning through social interaction.

We regard these types of initiatives as a way to deal with one of the main challenges facing the university and the education system in general: the need for lifelong learning, going beyond formal teaching to participatory learning, which is directly associated with continuous (lifelong) training. Furthermore, the fact that informal learning processes are shared between a varied range of institutions opens up new possibilities for the universities' ability to create and disseminate knowledge.

4. Conclusions

Over the past decade there has been an increased discussion on how universities can play a more effective role in contributing to promote wealth creation. A significant stream of that discussion has regarded American universities as a reference and has resulted, within the diverse range of institutions in the European higher education system, in various organizational and strategic arrangements that go much beyond the traditional roles ascribed to education and research. The unifying characteristic of these different arrangements is provided by the unique characteristics of "the university" as a societal environment for *exploration and interpretation of knowledge*. Exploring and interpreting knowledge are two sides of the learning process. Therefore, in this chapter we attempted to look at the university as a *learning organization*, exploring its role in the broader context of the learning economy. Under this context, we described a conceptual understanding of the relationship between *learning* and *economic prosperity*. Our analysis led us to suggest that while the role of the university needs to be re-examined, the **institutional integrity of universities must be preserved**. The analysis also shows that the variety of demands and the continuously changing social and economic environment surrounding higher education organizations is calling for **diversified systems** able to cope with the need to produce policies that nurture and enhance the learning economy.

To sum up, rather than presenting a detailed plan of public policy options and forms of management for the universities, this chapter sets out to show how our conceptualization of *learning as knowledge accumulation* can be used to analyze the challenges facing the university. Among our substantive conclusions are the importance of preserving the institutional integrity of the university by maintaining the academic character of its basic functions of *teaching* and *research*. In a situation in which education

should promote learning skills, we put forward the need to identify and understand the different components of university research, so as to enhance the **selectivity** of the *Research & Development* and *Research & Training* sub-functions, while ensuring the **widespread availability** of *Research & Learning*. It is argued that a diversified higher education system can free the universities of many of the pressures that they are experiencing today, by helping to ensure the preservation of their institutional integrity.

The ideas put forward in this chapter are largely exploratory, and we hope they will trigger the development of lines of research. In terms of future research, we advocate an approximation between the more formal work on *economics* with more appreciative (or institutional) perspectives on *learning and knowledge*. This task, though difficult, for at the root of the differences are often epistemological considerations, may be key to illuminating the process by which the role of existing institutions can be enhanced in the emerging knowledge based economies.

One final point has to do with the role that university leaders can, and should, play in the process of rethinking the role of the university, in the larger context of the higher education system, as a “learning engine” that contributes in unique ways for knowledge accumulation. We did not touch this issue in this chapter, but it is upon university management to give visibility to a research agenda for the role of the university.

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