

Full Length Research Paper

Organizational complexity and departmental leadership: Perceptions of leadership and teaching/learning in a US research-intensive academic department

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This study aims to contribute to the discussion about the role of leadership in academic departments in research-intensive universities. The objective here is to understand how leadership and teaching are perceived in the context of an academic department of one elite US research-intensive university. Semi-structured interviews carried out in a dialogical manner, with the aim of grasping teachers' perceptions of leadership in their academic department, were the main data gathering method. Complexity theory which involves the investigation of how apparently random patterns of behaviour form complex dynamic systems, constitutes the theoretical framework of this study. The contribution of this school of thought is the emphasis on non-linearity as the main approach to understanding living systems. The main finding of this study is that participants identified self-organization as their main organizational strength. Dispersed, non-hierarchical leadership was described both as an outcome and a major factor contributing to what was perceived as organizational success.

Key words: Leadership, complexity theory, systems thinking, higher education.

INTRODUCTION

In most European countries, higher education policy reforms have been implemented as part of the Bologna process aimed at restructuring and unifying degree systems, promoting internationalization, and increasing commercialization of knowledge thereby transforming universities' relation with society. Policy makers claim that such reforms provide institutions with greater autonomy and increase accountability to different stakeholders and to society in general. It is also argued that in autonomous institutions, the quality of management and decision-making processes are decisive in a competitive environment. In official documents, competitiveness is expressed as a driving force in at least two ways. First, the contribution of European higher education to economical growth and national competitiveness is emphasized. Second, it is the need to compete in a global market which is expressed through the claim that European higher education institutions are "lagging behind"; "the European university world is not trouble-

free, and the European universities are not globally competitive with those of our major partners, even though they produce high quality scientific publications" (European Commission, 2003). The same policy documents present American research universities as Europe's major competitors usually implying that the US higher education is the result of the marketization of their system, high private investments in education coupled with low state intervention (Gornitzka et al., 2007).

The present study which aims at understanding perceptions of leadership and teaching in an academic department in one US elite research university, was designed and conducted based on the assumption that, especially in large research-intensive universities with highly decentralized structures, academic departments are the key organisational units when it comes to understand organisational features such as leadership. This is due to the fact that for most academic staff, the department or its subunit is the main activity system. Another

assumption is that, instead of being a unilateral activity of one single individual in a single management position, leadership is the result of relatively complex interactions of activities and meanings of many individuals across the organization. The study followed a phenomenological research strategy aimed at understanding perceptions of leadership and quality teaching in their own work environment. Individual interviews carried out in a semi-structured manner on regular teachers and people in formal leadership positions were the main data gathering method. The goal of phenomenologic studies like this is to identify the essence of human experiences as described by participants (Creswell, 2003). The research was formulated in a context of organizational change in higher education institutions worldwide and aims at contributing to the discussion about leadership and teaching in European higher education. However, rather than looking for generalizable practices in one US institution, this study applies new conceptions of complexity in organization theory to empirically investigate and discuss assumptions regarding the US system that seem to permeate some political discourses in Europe.

By adopting complexity theory as the theoretical framework, the study analyze the academic department as a complex adaptive system (CAS) which is a network of interactions among interdependent agents who are connected to a cooperative dynamics by a shared goal, perspective or necessity (Uhl-Bien et al., 2007). The paper begins by presenting complexity theory which has its origin in the natural sciences and how it is perceived to contribute to the study of organizations. Rather than a meta-theory, it is an ontology that by acknowledging the self-organizing character of living system, contributes to the understanding of diversity and change.

THEORETICAL FRAMEWORK

Complexity theory has been presented in the social sciences as a new set of conceptual tools to help understand process change in contemporary societies (Walby, 2003). Colloquially the word “complexity” is associated with difficulty or as a synonym of “complicated”. In the specific case of organizational studies, complexity theory assumes that organizations are characterized by non-linearity, generation of variation rather than uniformity and adaptiveness (Hatch, 2006). However, in order to understand complexity, there is need to focus on its origins mainly in the field of physics and how it has been associated with an emerging world view which has many parallels with the development of realism in sociological thought. Historically, the development of general theory in social sciences has involved a process of reducing complex phenomena to simpler ones (Walby, 2003). This has happened in two contrary ways. One movement has been downwards as a reduction to

the level of smaller units of analysis rather than focusing in large scale processes. Another reduction which is usually associated with structuralism has taken place upwards mostly aiming at reaching casual explanations. Complexity theory overcomes this polarization as it aims at addressing different ontological concerns: “this facilitates the development of some of the concerns of classical sociology, such as combining an understanding of both individual and social structure, that does not deny the significance of the self-reflexivity of the human subject while yet theorising changes in the social totality” (Walby, 2003). This is due to a multidisciplinary process of re-thinking of the concept of systems.

While in the natural sciences the concept of systems has developed rapidly, during the past three decades notions of systems did not change at the same pace in the social sciences. However, a re-conceptualization of systems has turned out to be vital in the light of complexity theory and has taken place mainly since the late 1990s. Globalization itself urged a new re-thinking of the concept of systems in social sciences as its analysis requires a reflection of the notion of systemness in order to understand how events in one part of the world might have impact on those in another. Thus, in order to address social processes in the globalized world it is crucial to reflect upon potential systematic interconnections at a global level (Walby, 2003). Here the main shift in relation to much of what had prevailed in terms of conceptions of systems in social sciences is the rejection of the notion of equilibrium that was perceived to limit the ability to understand diversity and change. This rejection reflects broader shifts in scientific concepts which pave the way for a theoretical linkage between different fields. However, rather than reducing them to a common set of rules, complexity theory aims at understanding processes from describing self-regulating properties of living systems. Einstein’s mathematical description of photo-electric effect explained how light is not only wave but also composed of particles – photons. This is known as the wave-particle duality. Einstein did not invalidate Newtonian physics but demonstrated that there are more perspectives to understanding reality. Rather than an obstacle to the understanding of the world, contradictions were then seen as inherent part of reality. This new view also challenged Newtonian physics by asserting that systems were greater than the sums of its parts and could not be explained by the properties of its parts alone. Newton’s assertion that “Numero, pondere et mensura Deus omnia condidit” (God created everything by number, weight and measure) had demonstrated its intrinsic limitations. Some of the developments of system thinking are rooted in reflections of organismic biologists during the early twentieth century in terms of connectedness, relationship and context (Capra, 1996). Central to complexity theory is the concept of self-organization of living systems. Capra (1996) lists three characteristics of self-organization:

- i) Self-organization is the spontaneous emergence of new structures. In early cybernetics, possible structural changes were perceived as depending on a given variety of internal structures. However, more elaborate models approach the emergency of new structures and behaviours in the light of development, learning and evolution.
- ii) Self-organization deals with open systems characterized by lack of equilibrium. It demands flows of energy and matter. The emergence of new structures and new forms of behaviour can only occur when the system is far from equilibrium. Thus, equilibrium will constitute the death of an open system rather than its survival.
- iii) Self-organization is characterized by the non-linear interconnectivity of the system's units.

There is no clear consensus of what complexity is. Although, not presenting a clear definition of complexity, Waddington (1977) states that the complexity of a system has to do with the number of components of a system and the number of ways through which they are related. If Waddington's claim is followed, then the level of complexity of system varies according to how the observer identifies and understands these relations. Thus, rather than being a fundamental characteristic of the observed system, complexity is associated with the different descriptions that the observer can produce: the more the different descriptions, the more complex the system will be regarded. Casti (1986) defines system complexity as "a contingent property arising out of the interaction / between a system S and an observer/decision-maker O ". Rather than an inherent feature of the problem studied, complexity becomes then a mode of thought and even a worldview as described by Tôrres (2005). He presents the Complex Worldview which arises from global transformations and perceptions of intrinsic limitations of the Mechanicist Worldview and the Economical Worldview that had previously been hegemonic. All these worldviews have profound implications to the management of organizations and how they are to be studied. A worldview here is understood as an individual's set of fundamental beliefs and principles, sometimes not fully examined or questioned; often they are unconscious assumptions about the nature of reality.

Mechanistic which was the dominant worldview from the 17th century impacted all areas of knowledge by advocating for an objective reality as explicated by Newton's law of legitimation and its main implications: linearity, monocausality, determinism, reductionism and immediatism (Tôrres, 2005). It was a worldview characterized by the rise of the positivist philosophy and the technological development that originated from the industrial revolution. Then, organizations were divided in different units according to specific tasks. With the exception of individuals in formal management positions who centralized power and control, people were seen as "human resources". Strategy was formulated by following a principle of mechanical efficiency. During the late

1970s, when the economical worldview rose from new developments in information technology, the metaphor of the market substituted to a great extent the metaphor of the machine (Tôrres, 2005). In this worldview, the focus of organizations was on the market and customer. Structure and tasks were similar to the mechanistic worldview: the worker applies knowledge that already exists while managers try to implement procedures that have been associated with examples of success. Competitiveness was emphasized in different spheres of human life and a culture of quality control and benchmarking was imposed. From the complex worldview, reality is essentially defined by relationships and processes. Monocausality is seen as the exception and not as the rule as outcomes are seen as the effects of multiple interactions. Rather than searching for one single "right answer", it is accepted that there might be many right answers which might sometimes be paradoxical and even contradictory. Reality is seen as a web of relationships where non-linearity is the main feature (Capra, 1997). When it comes to understanding organizations, this worldview claims that more important than focusing on structures, it is necessary to observe the quality of relationships and processes. It also claims that rather than a management culture of command and control, it is necessary to encourage dialogue and shared leadership which will contribute to creativity. Table 1 illustrates these different worldviews.

Complexity is thus, an evolving concept resulting from multidisciplinary scientific developments that helps contribute to building a worldview which claims to address limitations of previous perspectives to the nature of things. This new perspective has been increasingly applied to the study of organizations. The language of complexity, non-linearity and systems analysis have been translated and applied to the field of organizational studies generating a way of seeing organization based on the following claims (Hatch, 2006; Tsoukas and Hatch, 2001):

- a) Each complex system presents unique features as it is constituted of a number of different elements with a wide range of interactions and feedback loops. Systematic behaviour is the outcome of multiple chains of interactions. They are dynamic and need to be adaptable because environments are mutable.
- b) Complex systems are non-linear which means that there is no proportionality between effects and causes. Simple cause-effect relationships are rare. It becomes impossible to make precise predictions of how living systems behave.
- c) Systems become more complex as they evolve. Emergence, which is understood as the rise of new structures and patterns of behaviour from internal interrelations is a property of such systems.
- d) Self-organization as an order can emerge from chaos or even contain order. Popularly the word "chaos" has the connotation of "anti-order" or "disorganization" but in the

Table 1. Comparing the three worldviews.

	Mechanistic	Economical	Complex
Organizational outlook	Parts	Parts	Holistic
Knowledge claims	Right answer	What gives profit	Many right answers/contradictions
Thinking	Linear thought	Linear thought	Complex thought
Ontology	Objectivity	Objectivity	Collective, focus on diversity
Success	Mechanical efficiency	Efficiency and competitiveness	Cooperation
Decision-making	Top – bottom	Top – bottom	Shared meaning and consensus
Leadership	Command and control	Command, quality control	Shared leadership
Organizational focus	Structures and Tasks	Market, customer, profit	Relationships and processes

Table 2. Data categorization describing perceptions or personal experience.

Leadership	Teaching
Flat, collegial organization	Internal discussions about teaching are content-driven
Consensual decision making	Little changes in terms of student background
Non-positional leadership	Top students as factor of motivation (learning from students)
Shared leadership	- Internal pressure and competition for PhD students
Emergent leadership	
Strong funding support the leadership model	

jargon of complexity theorists, it means a state when small variations can send off a system in a completely different direction. It rejects the idea that big changes can only be produced by big causes. Instead small causes can produce large changes and vice-versa.

e) Non-equilibrium organizations are open-systems that import, accumulate and export energy. In the particular case of organizations, information and financial resources, for example, can be seen as forms of energy.

In a more prescriptive fashion, complexity theorists (Stacey, 1996) claim that today's organizations should be seen as adaptive systems which are interacting with an environment of complexity and uncertainty and, that complex thinking enables organizational conditions that enhance creativity and adaptability. In other words, organizations should take benefit of internal complexity to face complexity. The main units of analysis of complexity science are complex adaptive systems which are defined by Uhl-Bien et al. (2007) as "neural-like networks of interacting, interdependent agents who are bond in a cooperative dynamic by common goal, outlook, need, etc. They are changeable structures with multiple, overlapping hierarchies, and like the individuals that comprise them, CAS are linked with one another in a dynamic, interactive network". Complexity science challenges the dominant approach to leadership that focus on how individual leaders in hierarchical organizational structures influence others in order to achieve predetermined outcomes. It distinguishes leadership and leaders as it regards leadership as the emergent dynamic resulting to

interactions that produce adaptive outcomes. However, this process of interaction takes place and is socially constructed in a context (Uhl-Bien et al., 2007): "context in complex adaptive systems is not an antecedent, mediator, or moderable variable; rather it is the ambiance that spawns a given system's dynamic persona – in the case of complex adaptive system personae, it refers to the nature of interactions and interdependency among agents (people, ideas, etc.) hierarchical divisions, organizations, and environments". The adaptive leadership concept sees leadership as a process of mutual influence, that is, a property of social systems. It is that perspective that permeates the strategy adopted in this study.

RESEARCH STRATEGY

The study accepts Uhl Bien et al. (2007) proposition that complexity leadership is more identifiable in process of adaptive change typical of the knowledge era than in processes of technical problem-solving processes usually associated with the industrial age. In this sense, much of the discussion about organizational change in universities deals with the improvement of learning and teaching in the context of expansion of access to higher education. The study interviewed professors that agreed to participate and they represented 25% of the academic staff members of this department. The semi-structured interviews enquired how teaching and learning were perceived and how leadership was experienced and if any relation was identified between these. In phenomenological studies, the researcher aims at identifying the essence of human experiences as described by participants in the study (Creswell, 2003). Among the interviewees, there were also two faculty members occupying formal management positions. The interview

with the Chair and the Associate Chair responsible for educational affairs were important not only as a way of learning about their personal experiences but also as sources of information regarding internal regulations, financial patterns, and access to documents, such as the department's four-years strategic plan that were also analyzed. The contribution of analyzing strategic documents in this study is two-fold: first, it gives valuable information on how decision-making is taken, and: second, it gives possibility of comparing more formally explicit organizational views of the department with individual perceptions. The sample of interviews was composed of recently appointed staff as well as professors who had been there for over two decades. Some had been students in this department before assuming academic posts. The fact of having interviewed people who had been at this department for a long time gave an interesting insight of what might have changed (or not) in a historical perspective. However, gender was a limitation as no female among the 10% of faculty of this department agreed to participate.

Perceptions and personal experiences that were repeatedly evident in the interviews provided categories of codes that were revised and analyzed with the help of NVivo, a software package that supports the structuring of findings and analysis of a qualitative study. The study conducted a coding procedure that identified pieces of interviews that exemplified main ideas and concepts. These categories were provided by the data itself rather than being pre-determined by the literature. However, knowledge of main theoretical concepts regarding leadership in higher education and teaching influenced the construction of the interview guide and certainly influenced the categorization and analysis of the data. Nevertheless, the data categorization procedure used here was mostly data-driven (Gibbs, 2002). Over thirty categories were identified describing either perceptions or personal experience, being the most reoccurring ones presented in this paper. In order to report the findings in a clearer and more structured manner, these were reduced to the nine that were both more recurrent and more directly answered the problem statement of this study (Table 2).

Perceptions of leadership

Different theoretical models have been presented to understand organizational changes in higher education. The model presented by McNay (1995) describes a process of shift in terms of organizational culture in higher education in the west: from a collegial culture to a bureaucratic one and, then to corporate and finally to enterprise, involving first a tightening up on implementation, then a tightening up on goals and policy definition and, finally a loosening up on control of implementation while retaining clear goals.

This shift however, cannot be witnessed in the same terms at the studied department. There were very few variations in terms of perceptions of leadership in the department as interviewees described organizational processes that are characteristics of the collegial culture model which is described by McNay (1995) as: decision-making is consensual and management style permissive. Leadership assumes here a "first among equals" style and authority of professional power is more present than authority based on positional power. Academic autonomy and self-regulations are among fundamental principles here. Decision-making usually takes place in the form of consensual processes. In collegial culture, organizational change is expected to happen as a result of a process of discussion among institutional actors in professional networks (Miller, 1995). In this department, interviewees described a very flat internal organization characterized by consensual decision-making and little positional power. Here are some illustrations of this perception:

"It is not a strongly hierarchical arrangement. It is a very weak hierarchy. There is a Department Chair who is more of an

organizer and a cheerleader than a boss. Each faculty member is their own boss and they do fundamentally what they want to do."

There is no strong leadership in the department in the sense of someone telling the others what to do. The leadership is pretty much distributed among faculty members" (Interview 4, recently appointed). "I think that universities are the canonical flat organisations. It is the proto-type of the organisation where everybody has a franchise of their own. Everybody here is a professor. They can call themselves professors in their business cards and besides that; they can pretty much do anything: they teach the way they like and they do research the way they like. There are periodical evaluations done by the Chair of the department and then the major tenure review and promotion. They come every six or seven years. But there is nobody telling you what to do" (Interview 6 – five years in the department).

"I have to accommodate the wishes of the department Chair to some extent but I consider him much more as colleague who has a difficult job rather than my boss" (Interview 4).

They identified leadership with non-positional power. Some individuals were regarded as leaders either because of their professional expertise or, by gaining collective support in relation to what they suggest. They described processes of organizational change that were initiated and led by individual initiatives of faculty members. It demonstrated a personal interest in a certain challenge faced by the department. Changes occurred when these individuals obtained collective support which was described as:

There are no leaders but suffice to say that leadership is not so much by title as it is by example. The Chair of the department is a leader because he has control of certain budgets and other kind of things, so they are in a leadership position. But there are some people in the department who provide leadership because they are highly respected by their peers and the things they have done before demonstrating leadership. 'Professor Y is one of these people. She is not the director of this laboratory but in terms of her involvement in pushing things like student research projects and new programs forward, it would be said that things she does from educational and research perspectives have demonstrated a huge amount of leadership. I think she has demonstrated more leadership than some of the previous directors of the laboratory but she does not have the title of directorship of the laboratory (Associate Chair, one year in the department)".

"People are very consensus-driven but the consensus does not emerge out of vacuum. The most successful academic leaders set consensus. It is not their own vision that they are putting forward. They articulate it and build consensus about it and good consensus does not just happen. I think that leadership is about building that consensus (Department Chair, 11 years in the department)".

Interviewees justified the flat organization of the department in two ways. First, by evocating the history of the department claiming that since its foundation and consolidation process, the department has been composed of highly capable and independent people who had been leaders in their respective field. Those who had stayed longer at the department reported not having witnessed internal changes in terms of leadership throughout the years. Another argument to justify this non-hierarchical leadership model supports some assumptions by the complexity theory: it gives space for personal initiative and creativity. Formal leaders are not seen as source of innovation when it comes to organizational challenges. Instead, innovation was enabled by interpersonal relations. This was described as: Looking back over the years and taking a broad view,

there is very little “change in leadership.

“The attitude was similar to when I came here: the department Chair gets things running; he gets money and also the professors to do what they want on their own (Interview 3, about 35 years in the department)”.

One of the interesting things in the department is that in the history of the department, when it started, the people hired were all very strong. The initial teachers had three or four award winners, which is just kind of stunning when you think about it. That tells you that from the beginning, there was not just one leader, there was a bunch of leaders and that kind of helped to shape the department. That was why as times went on, it fitted into that model (Associate Chair).

There is a fundamental rule of organizations that says that good ideas usually do not come from the top. They come from the bottom. The role of leadership is not to develop the good ideas, it is to recognize them. The reason why good ideas can not come from the top in a large organization is because people on the top spend most of their time with management. They are too far away from details with which you discover the problems and the opportunities. The people working down there in the trenches are the first ones to perceive a problem or to get an idea about a new solution. So, in a great organization, be it a university or a company, the way to structure is to allow these ideas from the bottom to find their way up to the top as quickly as possible. You can then take advantage of them. The leaders never come up with any good ideas. It is not that they are dumb people. They are just not in the position to do that (Interview 4, recently appointed).

“The way priorities are set is very collegial, people talk to each other about what is going on, and it is not an imperial style. It is not like someone saying “this is what we are going to do”. It is more like building support. Let us say “here is a good idea” and if enough people get together and support it, then the department moves in that direction” (Associate Chair).

This department has consolidated a central position in their research area in a technology-related field and has throughout the years established close links with industry. The department’s strategic plan shows gradual shifts in previous years towards a more diverse funding base with both private and public resources. Interviews revealed a self-perception of success in the department which is sometimes expressed by the capacity that the department has historically demonstrated in raising funds from different external sources. It does not provide an entirely harmonic sight, as interviewees reported situations of internal conflicts which were mainly manifested in strategic discussions. However, a situation of economic stability and abundant flows of external financial resources was identified as a main enabler of this leadership model as there was little internal competition for resources as described by interviews: The distributed leadership concept is definitely there but what makes it work is this monetary structural support (Department Chair).

The research funding does not come from the department or from the university. It comes from the outside. As a department Chair, there is an operating budget for the department and that includes all the teachers’ salaries and staff, 12 million dollars a year but the department brings in about 30 million dollars a year in research funding and it does not go through the department, it goes directly to the individual faculty member. The 12 million is only for paying infrastructure, teachers’ salaries and put staff in place but the research funding is not through the department. And that is because individual teachers are good at raising money and not because the department is doing anything. What the department leadership tries to do is to position the department so that it will always be that way (Department Chair).

The formulation of the strategic plan is not only associated with internal vision of the department but is also a mechanism to promote the department in the overall university structure with which the department has to interact in order to struggle for resources to hire new staff and invest in new study programs. While the process that led to the formulation of the strategic plan was regarded as an interesting exercise in terms of discussion of a vision for the department, most interviewees also claimed that it had a more direct impact on the department relations with the university structure. The role of the strategic plan was described as such:

‘Yes, the deal of the strategic document is in part a sale document to convince. The department has to fight for bailouts, resources. One important challenge is how many staff that will be hired. So in the case of getting more teaching position, there is need to make case for the higher ranks of the university that have reasonable hiring priorities. We are not trying to hire more people to do what we already do because we do not have any imagination. We have to argue why it is more important for us to hire more staff than for other departments. In order to do that, we have to say that our area is very important, growing in importance and there are important things that we need to do and we do not have enough staff in these areas. I do not know how much impact it (the strategic plan) had on the department. Mostly, it was about packaging in a certain way so that the dean and some other areas could understand what we were trying to do (Interview 5, 21 years in the department)’.

When it was founded in the 1960s, this department was exclusively devoted to research with no undergraduate education. Undergraduate education was only established after some years when the overall management of the university put that as a condition to hire new teacher. Till today, research is seen as the main priority in the department. For example, research excellence plays a much more decisive role in the appointment of new staff than teaching. The same can be said in relation to decisions regarding tenure and internal promotion. That is why the shift in teaching paradigms is important in research-intensive environments like this one, as previous research shows that change in approaches to teaching encounter much more resistance in such environments than on “teaching-focused” universities (Gibbs et al., 2007). The next section presents findings regarding perceptions of teaching in the studied department.

Perceptions of teaching

Higher education institutions face the challenge of providing quality education for more students coming from more diverse socio-economic backgrounds. Promoting a learning-centred approach has been presented as a way of facing this challenge. This is based on the assumption that better learning is related to the behaviour of the lecturers and in the way they design courses which facilitates deep learning rather than some essential characteristics of individual students (Ramsden, 1994). According to Knight and Trowler (2000), university lecturers tend to adopt an approach to teaching which may be more, or less sophisticated: they can adopt a “surface” or “deep” approach to teaching. Deeper approach shift the emphasis towards the student and the learning environment, concentrating on the need to motivate, encourage independent learning activity and establish a conducive environment for learning which is now defined in qualitative rather than quantitative (“knowing more”) terms. In this sense, this study sought to understand how this challenge is perceived (or not) in a successful department in one US research-intensive elite university.

The claim that a shift from “teaching-centred” to “learning-centred” higher education shows that the expansion of the higher

education sector has diversified student bodies in terms of previous abilities, motivation and socio-cultural background (Biggs, 2007; Nygaard and Holtham, 2008). When university programs were targeted to highly selected students, traditional methods of teaching were seen as appropriate. However, with the expansion of access, there is now the claim that a shift from syllabus-driven didactics towards learning-centred higher education will benefit students' development of independent thinking and analytical skills. In the core of this argument is the recognition that students are now different and more diverse. Thus, the study tried to investigate if and how teachers perceived changes in the student population over time. The strategic plan of the department gave initial signs that changes can not be witnessed at the department as gender imbalance and under-representation of ethnic minorities remain one of the main strategic challenges to be faced. According to this document, only 15% of the undergraduate population in 2006 were female, contrasting with the national figures in the same year which showed that 57% of all undergraduate students were female. The strategic plan also presents data suggesting under-representation of minority students in 2006: only 7% of the students were African-American, 6% were Hispanics and not a single student was Native American. This document described this situation as unacceptable and that the undergraduate program reform should develop ways of attracting more female and minority students and increase the success rate of these underrepresented groups on the department. Interviews with teachers reinforce the internal perception that little has changed in terms of student's cultural background but give a blurred picture in terms of describing students' previous skills and motivation. In terms of motivation some reported not witnessing changes at all while others noticed that students seemed to have become more pragmatic and concerned with their professional future. One of them claimed that:

"I do not sense that students have a lot of expectations when they come to class. They come to be told things. They do not come with particular plans or expectations about material. They are there to learn and today it is similar to what it was before; and the overall attitude does not seem any different. College kids are still college kids" (Interview 4, one year at the department and a teaching award winner in his previous institution where he taught for about twenty years).

On the other hand, another interviewee claimed that:

"I come from an academic family. My parents were both university professors. The change in the perception of university education has changed dramatically. My childhood was in the tail end of a period when the university education was perceived as something you did to be a fully educated person. It was a finishing school for adulthood. You would not necessarily use it in your life but it would make you a better person. That was the main reason for going to school. In the last thirty years, it has been much more of a career. It has been much more about getting your first job. In a global scale, the value of higher education has gone up dramatically, bringing very different expectations to someone who has college education and someone who does not. And it means that college has been more important in people's lives. There is a push to be more pragmatic, I think. If you have a choice between teaching them a very beautiful theory or something that they would be able to use in a job interview or to have in their resumé... the students themselves were torn towards what they want (Interview 6, five years in the department)".

In terms of previous skills, interviewees provided a general perception of students arriving at the department now better prepared and with more technical knowledge. They claimed that the university's highly competitive selection procedure played a central

role. The selection of top students was perceived by the teachers as a factor that facilitated their task and made teaching often more enjoyable as they often could also learn from students. They reported that: Some students come in with a wide variety of past experiences and having done a lot of different things, some of which have not been done. You can find yourself falling behind the students which are one of the advantages of this freshmen seminar that is taught: you can find out what people are doing on Facebook and the kind of thing of which there is, otherwise, no clue about (Interview 5).

You notice some differences in people's background. There is a lot more people coming in with experience in programming. The type of programming experience they have has changed over time. They are stronger in some things and weaker in other things because of this change in their background. But one needs to adapt to that. There are some things that you could assume but with this programming background you cannot assume that anymore. There were things that no one used to know about and now quite a few students know about (Interview 6).

"If I am to presume one thing that seems most different in terms of student mentality, I would say that there are more students with significant programming experience. I think they get exposed to technology earlier before now. Those are the ones that have more opportunities to take programming classes earlier or they just learn on their own on the web. The students that come in the high end of the curve are those with more experience than they had twenty years ago (Associate Chair)".

It is thought that having top students helps a lot. From the point of view of someone who is lecturing, it makes it a lot more fun because you can move quickly, you do not have to spend a lot of time helping people over the simple points. You can get the simple stuff out of the way and address really immediate issues of the topic while if you have a slower group of students, you have to spend more time getting over the basics (Department Chair)".

The overall argument for a shift in terms of educational paradigms, that has its roots in the expansion of the access to higher education, to groups that previously did not have access (Biggs, 2003) can not be found in this department. Here, the overall perception was that being part of a very selective private university enabled the department to work only with top students who taught themselves with very little help. When asked about what motivation they had in teaching and/if it continuously improved their teaching, interviewees presented three sources of motivation: personal motivation (pride), peer pressure and internal competition for PhD students. It was continuously expressed as:

"That is definitely not leadership but an interpersonal mechanism throughout the department, these are things you might want to look out for although they are not related to hierarchical leadership in the traditional sense" (Interview 1, 18 years in the department).

Honestly there is not much of institutional motivation. You are not rewarded that much for being a good teacher. It is more of a personal thing. It is about pride and just fun. It is fun at the end of the course when people realise that this was the best class they ever took (Interview 4). There are a lot of very good people here and that creates some interior pressure to do well (Interview 5).

In a very pragmatic and short term, teaching is a means of recruiting for research. Teaching is about conveying excitement about ideas and getting students to want to work on these ideas. Attracting people to an idea is crucial to the success of the idea. You may have a good idea but if you cannot communicate this idea,

then the idea is going to die. So every scientist has two jobs: one, you have to be in possession of a good idea, another is to communicate that idea (Interview 6).

In the research environment, one of the reason for teaching well is to get very good students because when you go to teach a class, it is like a window in the student community. It goes either way, you want to see who the students are but they also get to see if you are a good professor (Interview 8). 'In some sense, I think the biggest job of the leader is to make sure that they get the right people so that they can do the job. If you get the right teachers and students, the rest will be taken care of in some sense. And I think that our leader has these qualities (Interview 8, three years at the department)'.

Discussions about reforms of study programs also gave signs that the teachers had a "content-centred" approach to learning. Both the strategic plan and informal conversations with the teachers showed that changes in study programs were mostly initiated by perceptions in the field that happen quite often in their research area. Most internal discussions about program reform and teaching in general are led by developments in their field of study. In order words, internal discussions about teaching are almost exclusively about what to teach and rarely about how to teach.

DISCUSSION

The findings show striking differences between higher education in Europe and the context of the department that was studied here particularly in relation to change. While change in terms of both organizational structures and educational approaches is advocated not only in Europe but worldwide, the word "change" was hardly mentioned by interviewees and in strategic documents. While policy documents in Europe (European Commission, 2003) present the US top universities as successful institutions by emphasizing competitiveness, participants of this study presented a self-perception of success that had its roots on their history and on internal interrelations that according to them create an environment that enhances creativity and initiative. Rather than an obstacle, the collegial leadership model was presented by participants both as an underpinning and an outcome of what they regarded as organizational success. This paper discusses here how these findings can be interpreted in the light of complexity theory focusing particularly on leadership.

An analysis of how participants experienced decision-making and their own approach to teaching showed properties of emergence which are characteristic of self-organizing systems (Capra, 1996). Main strategic decisions were emergent of processes of interrelations rather than driven by positional power. The perceptions of teaching regarding what was defined as quality, as well as motivation to teaching seemed to emerge from personal experiences and from a horizontal process of relations which involved individual pride, peer pressure and internal competition for research students. Leadership was an emergence of these horizontal relations with different individuals assuming leadership roles in different moments by gaining support (Uhl-Bien et al., 2007). Although, participants demonstrated a positive view in

relation to the collegial and distributed leadership model that they experience, their description of their work environment is far from one of equilibrium. By non-equilibrium, the study do not refer here to existence of internal conflicts and personal disagreements which were actually also described by participants, it refer more to inherent dissipative characteristics of open systems. Open systems present dual dissipative properties: they import energy from the immediate environment that transform and enhance internal complexity; as well as export complexity (Harvey and Reed, 1994).

Thus, organizational outcomes in this environment can not be understood within the scope of linear models as a multiplicity of both internal and external factors interacting and shaping the organization. In the jargon of complexity, interaction does not refer only to the general sociological connotation as describing social interactions among individuals but also in the statistical sense where the relationship between two variables is affected by the value of other variables (Byrne, 1998).

Organizational studies about knowledge-based organizations in which the theoretical framework is based on complexity science have suggested a leadership model that rather than being hierarchically based, emerges from complex interactive system dynamics. As earlier stated from a complexity perspective, this model enables learning, innovation and creativity in complex adaptive systems. However, the flat leadership encountered in this department emerges from a context in which it is supported by at least three main factors: tradition, abundant financial resources and extremely well qualified teachers. And it is also true that they are in context where they do not have the same external pressure to change as is the case with public research-intensive universities in Europe that are faced with a much faster expansion of access to higher education based on the assumption that they should respond more directly to economical imperatives and system reforms driven by a principle of competitiveness together with fiscal austerity (Morley, 2003). Thus, the analysis of differences in terms of profile, financial patterns and historical perceptions of social role of higher education in different parts of the world makes the claim that European higher education institutions lag behind elite institutions abroad extremely questionable.

CONCLUSION

It was not the objective of this study to identify patterns of behaviour that could be generalized to other academic departments. The findings here regarding leadership and teaching can not be generalizable even in the US context with a diverse system where management varies a lot according to many factors, for example the size and the wealth of the institution (Cohen and March, 1986). These findings can not also be generalized even to other departments in the same university. The goal of this

paper was to depart from a complexity theory perspective towards the study of organizations to investigate perceptions of leadership and teaching in one affluent academic department in one of the main research-intensive US higher education institutions. However, the investigation of leadership perceptions and teaching in this department have become relevant in a context where system reform proposals in Europe identify such institutions as those to which European are lagging behind. The paper shares Olsen and Maassen (2007) proposition that this claim is not as a result of how American elite universities are organized and governed neither does it take into account the different economic, social and cultural environments surrounding higher education institutions in the US and in Europe. The findings of this study illustrated a dispersed leadership model that was identified by participants both as a dynamic contribution to what was perceived by them as organizational success, as well as one of its outcomes. But as earlier stated, this collegial model seems to have been fairly unchanged throughout the years due to a series of contextual factors. Further studies on leadership in academic departments in the context of expansion of access to higher education and competitiveness-driven reforms in Europe would certainly contribute to enhance the understanding of how leadership is perceived in other settings.

This study found evidences that in the specific context of a prosperous elite US university, non-hierarchical leadership is present in a department that has largely contributed both in terms of technological transfer and provision of qualified labour force to economic development of the region where it is located. The findings here support the complexity theory approach in organizational studies that describe leadership as emerging from complex dynamics "in the edge of chaos" (Urry, 2005). This is a radical transformation in a historical period where management practices related to bureaucratic paradigms and top-down decision-making are still hegemonic. It is an interesting intellectual exercise to imagine what kind of organizations would be in a favourable position to move towards this emerging leadership paradigm. Maybe one would not need to travel very far to notice striking differences. Just a 15 min drive from the university where this study was conducted, there is a town which is characterized by high poverty rate, urban violence, high levels of unemployment, disparity of opportunity and a very limited tax base. Would non-hierarchical leadership likely emerge and be internalized, for example in an organization in such context?

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