




Original Article

Interdisciplinary Centers in Latin American Universities: The Challenges of Institutionalization

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Universities represent a particularly interesting environment for interdisciplinary development; as institutions, they are simultaneously guardians of tradition and spaces for experimentation. This article focuses on initiatives for the creation of institutional spaces for interdisciplinary research in three Latin American universities: Universidad de Buenos Aires in Argentina, Universidad de la República in Uruguay and Universidad Nacional Autónoma de México. The article analyzes the processes of institutionalization of interdisciplinary centers. It compares (a) the context of creation, (b) the conception of interdisciplinarity, (c) the integration into preexisting structures and (d) internal organization and planning of the centers. Our analysis shows a diversity among institutionalization processes and supports the idea that there is no single model for the institutionalization of the interdisciplinary in the region. However, certain common characteristics can be found. These include a rigid bureaucratic structure and a paramount importance of creating consensus. These traits can be related to the legacy of the Córdoba Reform and the prevalence of a traditional institutional governance.

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Introduction

Interdisciplinarity¹ (ID) is not only a cognitive or epistemological challenge for researchers traditionally trained in the context of specific disciplines, but it is also an organizational challenge for institutions where interdisciplinary activities are developed. Universities represent a particularly interesting environment for such developments; as



institutions, they are simultaneously guardians of tradition and spaces for experimentation (Blume, 1985). This tension becomes evident when discussing interdisciplinarity since the university is the traditional place where disciplinary knowledge is generated and reproduced. On the other hand, however, it is also a place with enough freedom and autonomy to generate conceptual and organizational innovations that may allow new ways of knowledge production (Weingart, 2014). The transformations of universities call for collaborative approaches, such as interdisciplinarity, both on the level of organization and on the level of research. However, there is no universal generic or ready-made model to guide these changes (Göransson *et al.*, 2009a, b).

There is a growing body of literature on practices of interdisciplinarity (Lawrence, 2016) that provides insights into these collaborative research approaches, but also highlights remaining challenges and obstacles on both, epistemic and institutional levels.

Signs of change are visible as some universities begin to perform structural transformations that institutionalize interdisciplinarity (Göransson *et al.*, 2009a; Weingart, 2014). However, a broader discourse, on how to appropriately balance between the three missions of universities (research, teaching and outreach) and the role interdisciplinarity as a mode of research has in addressing these current challenges of universities, is urgently needed. This will be helpful in order to learn from unsuccessful experiences and strengthen those innovative structural arrangements that have proven to be useful the Latin American scientific context.

This article focuses on the experience of three interdisciplinary institutional centers developed at Latin American universities, namely: Universidad de Buenos Aires (UBA) in Argentina, Universidad de la República (UdelaR) in Uruguay and Universidad Nacional Autónoma de México (UNAM). The three institutions are representative of the Latin American university model characterized by its professional-oriented matrix and the influence of the University of Córdoba Reform of 1918 (Arocena and Sutz, 2001, 2005; Bernasconi, 2007). These are universities in which the organizational structure is arranged in schools that group degrees or disciplines. Key activities regarding teaching, research and outreach are carried out by the schools, which are autonomous in relation to the central government.

When the universities were considering institutional reforms, different proposals were suggested to create new institutional structures for interdisciplinary research. In the three cases, these innovative initiatives challenged the traditional organization of the university in professional schools or disciplinary research institutes. The three centers had a clear focus on interdisciplinarity as their main aim and a transversal position in the organizational structure of the university.

This article compares and contrasts the perspective of these three institutions and the process of institutionalization, taking into account different dimensions and the spatial and temporal characteristics of the contexts in which they operated. We aim to deepen in a stream of research on the ways in which interdisciplinarity has been institutionalized (Klein, 2010) in Latin American universities (Bursztyn,



2004, 2005). We explicitly pose the following question: What lessons and challenges can be systematized from experiences in Latin American universities and academic contexts? The objective is to fill a gap by systematizing the challenges of interdisciplinary and transdisciplinary knowledge production, focusing on institutionalization processes and cultural transformations (Vienni, 2016a, b, c). We consider the hypothesis built from Peter Weingart (2014) and Robert Frodeman (2014a, b) perspectives that moving toward interdisciplinary organizational structures in universities signals a fundamental change. According to Weingart (2014), there are obstacles, which lie in the nature of disciplines as forms of knowledge production and are, at the same time, institutionalized in organizational structures like departments or faculties that cannot be changed easily. We then analyzed those organizational structures in order to decode their main characteristics in Latin American contexts of knowledge production.

We pursue new data and analysis to examine the role of both top-down forces that encourage faculty to carry on interdisciplinary research and bottom-up inclinations from faculty themselves. In this sense, this paper also aims to contribute to the broader international discussion on how to institutionalize interdisciplinarity at universities (Weingart, 2014) and how and why universities differ in their commitment to interdisciplinary research (Leahey, 2016).

This study is exploratory in its effort. As such, the resulting view of interdisciplinary research practices is a detailed picture of a small number of centers in three different universities and periods of time. Moreover, we compare interdisciplinary processes of institutionalization by looking at interdisciplinary activities and networks in each program; this study used the case study methods approach (Gomm *et al.*, 2000; Yin, 2014).

The three centers will be described and compared in relation to four dimensions built from the literature systematization and from the empirical data, namely: (1) context of creation, (2) conception of interdisciplinarity, (3) integration into preexisting university structures and (4) internal organization and planning. A qualitative strategy (Denzin and Lincoln, 2000) was used integrating extensive semi-structured interviews as well as documents and reports analysis, and internal and external assessment of the centers taken as case studies.

The paper is structured as follows. In the next section, we present our research problem, i.e., the dynamics of the institutionalization of interdisciplinarity. Then, the characteristics of the Latin American university model are presented as the shared historical context of the institutions analyzed. In the third section, we describe in detail the three case studies and discuss each space analyzing similarities and differences among them. Then, we discuss our findings under the light of the rationale introduced in the second section. Finally, some conclusions are drawn related to the lessons learned in the three centers taken as case studies and the future challenges of the institutionalization of interdisciplinary research in academic environments.



Interdisciplinary Institutionalization as a Research Problem

In the last decades, there has been a call for interdisciplinarity in higher education policies. An important problem with ID, evidenced in a recent issue of a high-impact journal *Nature* (Ledford, 2015; among others), is that the term is used to describe a wide variety of practices. It was also found that there is very little impact of interdisciplinarity on the organization and behavior of research at universities (Weingart, 2014). There has been, however, evidence of change. Some universities have started implementing structural transformations to institutionalize concepts of interdisciplinarity and transdisciplinarity (TD) (Darbellay, 2015; Weingart, 2014) including those analyzed in this paper.

The creation of organizational structures focused on interdisciplinary knowledge is a challenge for higher education institutions in all continents (Donina *et al.*, 2017; Woelert and Millar, 2013). Traditional university structures either based on disciplinary departments or in professional schools come into conflict a priori with the creation of cross-curricular spaces that follow a knowledge integration logic (Boden and Borrego, 2011).

Institutionalization of interdisciplinarity as a research topic has been studied since the 1960s (Darbellay, 2015) when the Organisation for Economic Cooperation and Development (OECD) organized the first seminar in Nice to specifically discuss the issue of ID at universities (Apostel *et al.*, 1979). Dimensions of methodological implementation, definition of interdisciplinarity and different collaboration models among researchers were highlighted. The report that resulted from the seminar (Apostel *et al.*, 1979) forecasted an increasing interest in interdisciplinarity and predicted the complexity of research contexts and mainly of the social objects and problems that required, and still do today, a greater institutional synergy to tackle them (Darbellay, 2015). Since then, there has been an increasing number of studies analyzing the challenges of interdisciplinarity at institutional, epistemological, conceptual and methodological levels (Klein, 2010; Lattuca, 2001; National Academy of Sciences, 2005; Rhoten, 2004; Caruso and Rothen, 2001; Sá, 2007, 2008; Weingart, 2014; among others).

Regarding institutional arrangements, some authors (Harris and Holley, 2008; Holley, 2009) still believe that one of the limitations of scientific community working on this issue in Europe and the USA is not considering the organizational arrangement of higher education institutions and the culture involved. A similar problem is identified in studies analyzing institutional contexts in Latin America (Arocena and Sutz, 2001, 2003; Arocena *et al.*, 2015; Bursztyn, 2004, 2005; Vasen and Vienni, 2017).

Several studies (Holley, 2009; Sá, 2007, 2008; Weingart, 2014) agreed that every interdisciplinary approach either challenges or is challenged by regulatory, cognitive and normative factors defined by the disciplines, and questions the stability of certain regulations and activities that strengthen social behavior (Buanes



and Jentoft, 2009). In this regard, challenges of institutionalizing interdisciplinarity may be classified following the different university functions (research, teaching, outreach and knowledge transfer), taking into account that regulatory, cognitive and normative dimensions cut across institutional practices.

Holley (2009) divided institutional practices in three main strategies: (1) development of an organizational structure which favors interdisciplinary research, (2) support through competitive funds for interdisciplinary activities and (3) development of an interdisciplinary culture promoting this type of activities.

These previous studies provided us with the basis for the four dimensions developed to analyze the Latin American context, namely: (1) context of creation, (2) conception of interdisciplinarity, (3) integration into preexisting university structures and (4) internal organization and planning. Although these dimensions are not new, they provide a flexible framework to approach interdisciplinarity institutionalization at the Latin American universities.

In Latin America, the study of interdisciplinary organizational structures in higher education is still new (Vasen and Vienni, 2017; Vienni, 2016a, b). Not because interdisciplinary centers are young, but because there is still an urgent need to balance the impact of new structures and centers with the lessons learned from them. Although there is a large literature on interdisciplinarity from multiple perspectives and national experiences, understanding of interdisciplinary knowledge production is lacking in Latin America (Vienni, 2016a, b). The current variety of definitions and conceptualizations influences concrete actions in national contexts. This paper and the study that has preceded it aim to contribute to the consolidation of a field of research named “Studies on Inter- and Transdisciplinarity” (SoIT) (Vienni, 2016c), which explores practices, processes and relationships within interdisciplinary groups, cultures and institutions for the consolidation of a transformative science. The concept of regionalism that anchors this initiative seeks to build a dialogue and to systematize lessons. The SoIT does not supplant other proposals (see for example Darbellay, 2015, in which the author named the Interdisciplinary Studies as a field of study). Instead, it highlights questions currently being posed to Latin American researchers and professors interested in collaborative practices (Vienni, 2016a, b) in different academic contexts. This paper is an example of it as well as the research question that guides our study, namely: What lessons and challenges can be systematized from experiences in Latin American universities and academic contexts?

The role of top-down forces that may encourage faculty to pursue interdisciplinary research, and of bottom-up inclinations from faculty themselves (Leahey, 2016) has also been registered in our analysis. We aim to contribute to the international discussion on how to institutionalize interdisciplinarity at universities (Weingart, 2014) and how and why universities differ in their commitment to interdisciplinary research (Leahey, 2016). Our analysis aims to integrate



knowledge and lessons learned as well as to project future challenges and opportunities still to be materialized in Latin American universities.

The Context of Analysis: The Latin American University

The three universities taken as case studies share a common historical context² and were influenced by the Cordoba Reform. This Reform has a specific impact on how these universities relate to the communities in the society.

The 1918 Córdoba Reform was started as a protest by students against the ongoing traditionalism and clericalism at universities. The most relevant demands were mainly focused on *autonomy, co-governance and outreach*.

University *autonomy* has been one among the Reform's priorities both in its ideal concept and in its political–legal nature. The objective of autonomy was to achieve greater independence for university activities, overcoming barriers imposed by the Church, the government and social upper classes (Tünnermann Bernheim, 2008) in order to be able to perform social criticism. The concept of autonomy still contemplates today the possibility for the university community to select its own authorities and to choose its own professors and curricula, to make decisions on budget, and — in the event of an authoritarian government — it included the protection of the building against law enforcement agencies.

Co-governance refers to the involvement of professors, students and alumni in the government of the institution. Teacher participation is not specific to Latin America and can be traced back to the origin of universities conceived as self-regulated places for academic independence. Alumni's participation reflects their intention to stay in touch with the institution they once studied in as well as with its community to which, in a broad sense, they still belong to. Students' participation is the Reform's fundamental contribution. According to Arocena and Sutz, "(...) direct participation of students in university government was considered a value in itself, and also a safeguard against the tendency of the 'university caste' to lock itself in an ivory tower" (2005: 575).³ Along those lines, Naishtat and Toer pointed out: "(...) lack of students' participation generates endogamic processes and teacher conformism, thus creating a university of castes and mandarins (...)" (2005: 21).⁴ By doing this, the university transforms itself into an institution bound to democratic guidelines with political representation based on election processes. There is an intended similarity between the way in which the university is conceived and the government of a country, being considered as a "small republic" (Del Mazo, 1955).

University outreach represents its relationship with the disadvantaged sectors of society through technical assistance courses and activities. In this regard, Tünnermann Bernheim (2008: 95) stated that "all the range of activities generated by this social mission, sometimes reflected on a greater awareness and



politicization of students, contributed to define the Latin American university profile by taking up tasks not defined by other universities in other parts of the world.” The conception of this third university mission as social service is characteristic of the Latin American university and would become an identity mark with impact on the relationship between universities and science in the region (Naidorf, 2009; Mora *et al.*, 2017).

Although the Reform did not make any explicit comment on interdisciplinarity, saying so would be an anachronism, we believe that the implemented changes can be retrospectively associated with certain openness to interdisciplinary knowledge. Firstly, the social commitment of the university community was increased by the Reform’s essence of relating the university to the problems of its time. Secondly, outreach activities and so-called *Extensión* play a substantial role in the way research and teaching are practiced and performed. Following this same line of reflection, we can also argue that this has an impact in the way these institutions conceptualize interdisciplinarity. Finally, students participating in the governance of these universities have also secured a constant update of knowledge and paradigms.

Institutional Arrangements for Interdisciplinarity from a Comparative Perspective

Three Latin American universities (UBA, UdelaR and UNAM), which tackled the challenge of incorporating interdisciplinarity in their institutional structure and study programs, serve as case studies. The following criteria were applied in the case study selection: (1) the institutions’ background represents a diverse group of approaches toward interdisciplinary knowledge production; (2) these institutions pursue ID research, teaching and outreach per se and do not develop a single topic; and (3) the geographical location where these universities are located.

The dimensions of analysis were built from the literature systematization and also from ex-post processing of the data extracted from documents and semi-structured interviews. These dimensions are: (1) context of creation, (2) conception of interdisciplinarity, (3) integration into preexisting university structures and (4) their internal organization and planning. Our aim is to construct a flexible scheme to delineate lessons and challenges in interdisciplinary centers at Latin American universities. Although these dimensions are based on the literature that studies ID institutionalization, they allow certain flexibility for other new dimensions to arise from the analysis. Table 1 summarizes the features of the three interdisciplinary centers to provide a first overview of the differences among them, but also of the similarities they share that were not visible before.

In this section, we compare three interdisciplinary centers, namely: (1) the Centro de Estudios Avanzados at the Universidad de Buenos Aires (Argentina), (2)



Table 1 Center characteristics in Argentina, Uruguay and México

	<i>CEA-UBA</i>	<i>EI-UdelaR</i>	<i>CEIICH-UNAM</i>
Year of foundation	1985	2008	1986
Inspiration	Model of the institutes of advanced study	Ad hoc	Pablo González Casanova philosophy and work
Form of government	Only one director, with a periodical external evaluation committee	The Directory Committee is integrated by a president, professors, students and graduates related to ID research and teaching	Directorate, internal board
Conception of interdisciplinarity	Aggregative	Inclusive	Heterogeneous (additive) Complex systems, hybrid domains
Permanent affiliation	Yes	No	Yes
Affiliation to other university departments	Rare	Yes	Teaching at schools
Space of privilege	Yes	Not necessarily	Yes
Academic development plan	Not clear	Yes, with monitoring and follow up instruments	Yes, with assessment instruments
External resources funds	Limited	No	Yes
Integration into international networks	Limited	Incipient	Incipient
Criteria for staff incorporation and academic groups	Discretionary	Selection process, and call for competitive funds	Selection process
Reaction of university community	Negative reaction	Positive	Positive
Is it currently functioning?	No, it was closed in 2003	Yes	Yes

Source: Compiled by the authors.

the Centro de Investigaciones Interdisciplinarias en Ciencias y Humanidades at the Universidad Nacional Autónoma de México (México) and (3) the Espacio Interdisciplinario at the Universidad de la República (Uruguay).



Centro de Estudios Avanzados (CEA) (Argentina)

Context of creation

The Center of Advanced Studies of the Universidad de Buenos Aires (Argentina) was an organization mainly dedicated to robust interdisciplinary research which functioned between 1985 and 2003. The main lines of work developed were: landscape ecology, agro-food studies, urban management, technology services, history and social studies, and studies on labor, employment and economic development. More than thirty researchers worked contributed to 5 Master programs and 2 Diplomas in interdisciplinary topics.

The CEA was created in 1985 within the context of a university reform that took place after the recovery of democracy in Argentina in 1983. A big Reform started just after democratically elected President Raúl Alfonsín took office in December 1983. University entrance exams were eliminated and new innovative degrees were offered. Many academics that had gone into exile in the 1960s and 1970s returned to the country and brought new ideas and theoretical perspectives to a stagnated institution. Reforms were inspired in the idea of the University Reform Movement of 1918 and in addition to co-governance, autonomy and extension were also emphasized. Moreover, the idea of openness associated with extension inspired other changes such as the abolishment of all tuition and fees. The creation of the CEA during this period was also connected with the concept of renewing the university with new ideas and linking knowledge production with national and public problems.

Conception of interdisciplinarity

The inspiration for the creation of CEA came from provisional Rector Francisco Delich after a visit to Princeton and discussion with political theorist Sheldon Wolin. There, he was introduced to the idea of the Institutes for Advanced Study (IAS) (Wittrock, 2002). The IAS includes centers focused on curiosity-driven research and academic freedom as a means to greater creativity. The centers intend to be retreats where top-notch researchers freely can devote time to research activities with no teaching or administrative duties. In most cases, IAS centers are not directly affiliated with universities and operate as foundations or other forms of nonprofit organization.

Although CEA was indeed part of the University of Buenos Aires, it enjoyed special status as a center directly reporting to the Rector and later to the university Secretary for Science and Technology. Although the IAS model is not necessarily linked with the idea of interdisciplinarity, in the case of UBA, the center evolved in that direction. It was not only regarded as a center for frontier research, but also as a center that may use new and innovative frameworks to discuss the current national challenges. An explicit link to interdisciplinary studies was included in an internal reform held in 1988. The fact that researchers from all disciplines shared the same



facility created the right environment for ID, but this was a consequence rather than a feature of its design. No internal workshops were held, and no institutional mechanisms for interaction with other university structures were conducted. The emphasis on “freedom of research” and the organizational isolation derived from the IAS model was, in the end, counterproductive to the interdisciplinary orientation. We characterize it as an “aggregative” conception since interdisciplinary work was conceived without further conceptualization as the aggregate of research groups working in applied societal problems.

Integration into preexistent university structures

The CEA was set up as a permanent residence and working space for researchers. Most CEA researchers did not simultaneously belong to other schools. This aspect is fundamental when considering feedback between schools and interdisciplinary centers since it facilitates the horizontal, shared training of professors, researchers and students.

CEA’s insertion at UBA was problematic as the center was considered as a space of resource allocation without any control, a “blind spot” within management. There was also a conceptual discussion started by some scholars who considered that interdisciplinary research was to be carried out by schools, with their own staff, since they are in contact with undergraduate teaching. Nevertheless, the most important criticism was the discretionary way in which it was managed and its characterization as a political-academic privileged “place of exile.” The CEA was, however, a novel experience within the context of stagnation at the university level. These internal conflicts resulted in the center’s lack of support from the authorities and eventually the pressure of the Deans led to its closing in the year 2003. Well implemented, the CEA could have covered a fundamental need at the university, reinforcing a shared identity and constituting a place for exchange and knowledge circulation.⁵

Internal organization and planning

CEA did not have a clear institutional developmental program. Criteria for academic staff selection were mainly based on political affinity with the Rector and on the need to solve some specific governance conflicts at the UBA by inviting some researchers to work at the center. New members were not selected following a plan to strengthen any specific methodology or topic area. The center was then characterized as a “place of exile” within the institution. This center also hosted several Master’s degree programs, but they were not necessarily connected to the research groups based at CEA. This was not part of a comprehensive strategy, but of specific situations that did not take into account mid- and long-term planning.



Centro de Investigaciones Interdisciplinarias en Ciencias y Humanidades (CEIICH) (Mexico)

The main objectives of the Centro de Investigaciones Interdisciplinarias en Ciencias y Humanidades (CEIICH) at the Universidad Nacional Autónoma de México in Mexico City are to conduct interdisciplinary research in different areas of science and humanities and to contribute to the formation of interdisciplinary research groups in Mexico and internationally. Its three main areas of study are: (a) theory and methodology, (b) world and globalization and (c) development, rights and equality. The center has 77 scholars (48 dedicated to research and 29 to academic technical work) (CEIICH, 2016). About 90% of the financing of the UNAM corresponds to the Federal Government subsidy, and these resources are the basic source for funding these academic and interdisciplinary centers.

Context of creation

The CEIICH was created in 1986 as a center for interdisciplinary research in the humanities. Its vision was set from the scientific work of Pablo González Casanova, founding director, whose historical analysis has been fundamental for the construction of alternatives in the area of critical thinking. His main interest was the role of the sciences of complexity and the techno-sciences for the construction of alternatives to the system of domination (González Casanova, 2004).

Conception of interdisciplinarity

The CEIICH started studying the social problems at national and global levels gathering perspectives from specialists in different areas in a plural approach. It focuses on the creation of bridges of knowledge between sciences and humanities through a network of experts (CEIICH, 1997). In the period ranging from 1986 to 1994, there was not a clear concept of interdisciplinarity and heterogeneity prevailed. However, in 1995 a new period began in which more disciplines were included (earth, materials and life sciences) and an interdisciplinary approach based on concepts was introduced (CEIICH, 1997). This new framework had great affinity to the interdisciplinary tradition of the French School related to the unification of knowledge and the study of more comprehensive domains as an expression of the dynamic interaction of disciplinary knowledge (Lenori and Abdelkrim, 2004). The perspective of Rolando García (2000) on complex systems and interdisciplinarity was also included. The creation of research programs with a variety of interdisciplinary perspectives consolidated a problem-oriented approach promoting, in some cases, the development of hybrid domains,⁶ such as historical sociology, political ecology, econophysics and philosophy of law.



Integration into preexistent university structures

CEIICH's academic community intends its transformation into an institute. In the organizational structure of UNAM, this would constitute a sign of maturity. While institutes are permanent structures, the existence of a center is less stable and may be subject to revision. Centers also have less representation, since its participation in the university co-governance is much more restricted than that of institutes (UNAM, 2015). The CEIICH, like all the centers and institutes of the UNAM, mainly performs research, while teaching is carried out primarily in schools and faculties.

Internal organization and planning

CEIICH's activities are part of normative guidelines that require compliance with an institutional development plan registered in annual reports. These reports show the way in which interdisciplinary work is conceived as well as the strategies to promote it.

In the Mexican experience, the fact that interdisciplinary research is extended at UNAM's centers and institutes not only consolidated the existence of a sound academic group, but also promoted research in science and humanities as areas of knowledge, which interact to analyze complex problems. This has reaffirmed CEIICH's identity and its specificity at the UNAM. This role was significantly enhanced by the creation, in 2013, of the *INTERdisciplina* journal, featuring high social impact problems presented by guest editors with a thematic approach (cities, bodies, racism, medicine and sustainability, among others). Also, two closely related additional distinctive features were identified: (1) studies on theoretical-methodological foundations of interdisciplinary research and (2) its contribution to the training of researchers experienced in teamwork. This was mainly achieved through its diploma courses (face to face and distance learning) in interdisciplinary research.

Espacio Interdisciplinario (EI) (Uruguay)

Espacio Interdisciplinario, launched in 2008 by Universidad de la República (Uruguay), promotes collaboration among different disciplines to provide an integrated approach to multidimensional problems. This structure funds, fosters and facilitates the interdisciplinary approach to complex problems of all kinds and is being funded with public resources coming directly from Udelar, the main public university in Uruguay. In 2016, EI nucleated 7 centers (5-year projects), 15 nuclei (2-year projects) and other interdisciplinary groups (Cruz *et al.*, 2012, 2013). EI has funded 44 faculty positions and has funded 270 associated positions through other university schools.



Context of creation

The EI was created during the university Second Reform developed by the UdelaR in 2008. This Reform was also inspired by the Reform Movement of 1918 and intended to update its claims in a new context. The model proposed by Rodrigo Arocena, the university Rector, was a “developmental university” (Arocena *et al.*, 2015). A university of this kind has as its main mission to contribute to the integral development of society and the promotion of social inclusion. The model’s objectives should be part of the institutional strategy for teaching, research and extension and be embedded in all the internal policies of the university. The expansion of interdisciplinary studies was part of the agenda of this Reform, and EI was created to advance this idea. However, unlike CEA and CEIICH, the EI was conceived as a place for meetings and interaction between different university disciplinary structures and not only as a “research center.”

Conception of interdisciplinarity

The idea of defining interdisciplinarity a priori was explicitly rejected by the EI authorities. The Uruguayan center fosters a plural approach, which includes all forms of interdisciplinary knowledge production regarded as relevant and useful. Interdisciplinarity was conceived from an inclusive and open standpoint, coming “in” and “out” from an interdisciplinary environment as a possibility expressly sought. No ad hoc criterion is required to conduct interdisciplinary research. Although there are well-defined assessment criteria, a plural approach is promoted to the role of multidisciplinary, interdisciplinarity and transdisciplinarity. This means that there is not a preferred institutional approach to interdisciplinarity and the plurality of perspectives is constructed from the experiences and practices of researchers from all across the university. This bottom-up approach, however, generates some difficulties, especially when trying to define the “right” way in which the institution is to carry out interdisciplinary activities (Hidalgo, 2015). An Academic Department was created within EI that has the task of synthesizing the different interdisciplinary programs and extracting lessons from successful and failed experiences.

Integration into preexistent university structures

The EI is considered a temporary space from which practitioners would return to their own schools. EI professors work at the center without having to leave their positions at their departments or schools and also new positions have been created for those scholars and young researchers willing to be trained at interdisciplinary centers.

It is in this sense that the EI shows that if there is an articulated coordination with the different academic units the center can achieve recognition within the institutional structure. But even so, the existence of academic structures that are not constituted as “schools” is always problematic at universities which are structured



around strong faculties. There is an existing tension since the way to achieve more stability is by turning these centers into legitimate structures at the university. But this comes at a price, limiting experimenting capacities and transforming interdisciplinarity in a space of permanence rather than passage or encounter.

EI's integration into the international context has provided external recognition, which has been useful to strengthen its position within the Uruguayan university. Participation of EI's teachers in different international events as well as visiting professors taking part in activities organized by this center, have been an opportunity to increase the center's visibility (Vienni *et al.*, 2015).

Internal organization and planning

There was an initial plan with monitoring committees for the development of the EI, which still functions currently. An Academic Department was created with a specific focus on interdisciplinary methodologies and research. This Department supports the interdisciplinary development of the programs funded by EI and also develops teaching formats to promote ID learning at the university (Corbacho, 2016).

Results and discussion

As Donina *et al.* (2017) have proven for the Italian Higher Education system, Latin American scholars claimed that so far policies have failed to foster ID and pointed out a “paradox of interdisciplinarity” in HE research governance. The paradox considers that the discourse on interdisciplinarity is in conflict with the persistence or even reinforcement of modes of governance that almost exclusively rely on rigid discipline-based classification systems. After our analysis, we have registered some signs that also confirm that this paradox is present at the case studies when analyzing these centers with the dimensions we have proposed.

The differences among the three case studies regarding their internal organization and planning capabilities are very important. The CEA was a very weak institution and its closeness with the Rector did not allow the center to create its own culture and a clear strategic vision. In contrast, the EI and the CEIICH both have a clear institutional definition. While EI's identity is more plural, the CEIICH has to define the interdisciplinary character of its research and bases its actions on it.

CEA positions were mostly for full-time tenured professors who were not required to teach. This was an important privilege and subject of dispute, since these positions were scarce in the university system. Researchers at CEIICH, for its part, are required to be full-time professionals with statutory teaching responsibilities carried out by their own initiative and not assigned by a specific department.



Although CEA, EI and CEIICH were created at different historical moments, in all three cases their emergence is framed in times of institutional reform (return of democracy in Argentina, Second University Reform in the case of Uruguay and the change in economic development strategy in Mexico). Fundamentally, these reforms were partly inspired by the University Reform Movement of 1918, emphasizing the importance of bringing knowledge creation closer to the needs of the society. Interdisciplinarity seemed a fruitful path to encourage academics to move away from closed disciplinary agendas and engage in problem-oriented research.

In terms of organizational design, both the CEA and the EI were somehow new. The CEA was an isolated center reporting directly to the university central administration. Although facilities were not nice or well equipped, it was a privileged place. EI is also an exceptional facility, regarded as a place of encounter for members of the different academic communities within the university. On the contrary, CEIICH was constructed as a center specific for interdisciplinary studies with the same organizational status as other research centers at UNAM.

We also found out that in two of the cases (EI and CEA) there were tensions between the new interdisciplinary spaces and the traditional structures at university as stated by Weingart (2014) and Frodeman (2014a, b). These tensions reveal certain territoriality regarding schools, not only related to teaching and research activities, but also to the staff carrying them out. In the case of the CEA, this institutional territoriality was reinforced by its isolation from schools, being perceived as a privileged entity. At the EI, there is no such territoriality, but there are some difficulties regarding the integration with disciplinary entities (faculties and schools) as a result of the lack of flexible flow of academic staff. The fact that this tension does not exist at the CEIICH is due to the fact that it has been developed with full-time academic staff, what is to say, its development has not affected the university structure. In any case, contact between this center and schools takes place through teaching activities, though this does not necessarily imply transmission of an interdisciplinary perspective due to the schools' highly disciplinary approach.

For organizations like the EI, with temporary residence and mixed affiliation, researchers stay for some time at an interdisciplinary space without losing contact with their place of origin. The CEIICH has also tried to promote participation of academic staff in other entities working in interdisciplinary projects. This reduces the risk of competition between spaces or their disarticulation and encourages academic staff to have an interdisciplinary profile without having to resign to their positions at their department of origin.

Our comparative analysis has also pointed out the following challenges:

- The role of interdisciplinarity in building an institution that integrates all its missions (teaching, research, outreach and knowledge transfer) (Arocena, 2014)



and not just interdisciplinary research as can be seen in centers that are focused on a specific topic (e.g., climate change and sustainability).

- The need for an institutional strategy to develop interdisciplinary structures focus on directioning knowledge production toward the resolution of complex problems.
- The importance of participation in international networks to achieve a greater legitimization of these centers at the university level and to increase their visibility.

Holley (2009) refers to the support needed for the development of interdisciplinary activities in terms of competitive funds. Our analysis we found that:

- There is a bias in disciplinary-based academic assessment criteria, which does not consider the specific characteristics of interdisciplinary research and still punishes researchers who engage in collaborative research with partners outside academia. Specific criteria and assessment committees integrated by interdisciplinary researchers might be needed in the three centers.
- Interdisciplinary research requires long periods of preparation, mainly due to the collaborative dynamics, which also makes it necessary to revise the assessment criteria. This fact has been taken into account at the EI during the last year where some calls modified and enlarged the funding periods (Vienni, personal communication).
- Consolidation of assessment commissions made up of academic professionals specialized in interdisciplinary topics should be preferred to those integrated by a group of individuals representing different disciplines.
- There is a need to explore new funding sources, such as external funds not included in public funding for these centers and also for other interdisciplinary programs at the three universities. So far, the main source of funding is still each national state.
- There is also an urgency to promote academic publications focused to enhance the dissemination of interdisciplinary research and studies.

Lastly, the promotion of an interdisciplinary culture (Holley, 2009) in the three centers should involve:

- The creation of permanent teaching and research positions in interdisciplinary centers, which may allow the consolidation of courses in topics centered in problems more than in disciplines or specializations.
- The development of Ph.D. programs providing specific interdisciplinary training, such as the ones already developed at the Universidad de Valparaíso (Chile) or Universidad Autónoma de Querétaro (Mexico).



- The consolidation of a flexible organizational structure open to frequent modifications. These centers' conceptual innovation is paramount and that should be ahead of global trends.
- Integration of interdisciplinary centers into the university structure and culture should take place not only through their relations with departments and schools, but also through all university functions.

Based on interdisciplinary research training programs, it is possible to create the academic critical mass to reproduce interdisciplinary structures in other latitudes and train experts to assess interdisciplinary projects and design academic policies to approach complex problems.

Conclusions

This paper posed the research question: “What lessons and challenges can be systematized from experiences in Latin American universities and academic contexts?” We then analyzed three organizational structures in order to decode their main characteristics in Latin American contexts of knowledge production. The comparative analysis of the three interdisciplinary centers in Latin America leads to some conclusions and open questions for future research. Our analysis seeks to find common challenges and lessons learned that transcend national contexts and the peculiarities of individual universities.

The three case studies or so-called interdisciplinary centers are very different from each other, in regard to their inception, internal structure and integration into the university. The Uruguayan case shows an innovative experience in organizational terms based on a highly interactive and participatory process. The Argentinian center instead was created in a top-down manner without participation of the academic community, and its relative novelty in organizational terms was also a cause of its instability and later closure. Finally, the Mexican case shows a center with a network structure in organizational terms whose focus was redefined over time.

In this regard, we note that the experiences show the experimental nature of the processes of institutionalization of interdisciplinarity that was already pointed out by Weingart and Padberg (2014). The centers show an evolutionary path in which they simultaneously have tried to adapt to the characteristics of the production of interdisciplinary knowledge and to the culture of the host institutions. Flexibility to adapt to this changing context seems to be a necessary condition for survival. For example, the Argentinian case draws attention to the challenges of a center that stagnates in a model that does not have a good reception at the institutional level. However, in the context of institutional experimentation, this failed case has provided useful perspectives and contributed greatly to organizational learning processes.



The interdisciplinary policies promoted at the three case studies counterattacked the tendency of the traditional university built on professional schools. The relevance of these interdisciplinary centers rely on the fact that they envision crosscutting institutional arrangements at universities where disciplinary research practices are mainly legitimized as the only valuable form of research. In words of Donina *et al.* (2017: 2–3), “(...) there are organizational barriers to interdisciplinarity that arise from the structure and political organization of most universities. (...) discipline-based departments promote knowledge separation rather than integration, leading to the formation of departmental ‘silos’ wherein researchers hardly communicate across organizational boundaries (Sá, 2008), and scholars are rewarded mainly for the efforts and outcomes within their home discipline (Boden and Borrego, 2011).”

Moreover, it is interesting that although the three universities fall within the matrix of the “Latin American University,” this model did not establish a specific form for the institutionalization of interdisciplinarity. This tendency to neglect change was named as the “paradox of success”: structures and procedures which previously brought success may become obstacles to change because the organization loses the ability to modify a previously effective strategy, even when this is no longer appropriate (Audia *et al.*, 2000). To understand this tension as a paradox, even at Latin American universities, confirms that interdisciplinary structures are a solution to new policies fostering interdisciplinarity, such as the ones analyzed here. Although they were not built as faculties or schools for interdisciplinarity, they can be defined as “interstitial structures” (Lindvig *et al.*, 2017) where flexibility and crosscutting dialogues promote collaborative research and teaching. Nevertheless, they still fight with the disciplinary and more traditional university structures when dealing with legitimization and scholars try to recover their previous status in their disciplinary environment. This conclusion deserves a more detailed analysis to assess the validity of the paradox of success and the paradox of interdisciplinarity under the light of Latin American case studies. Future research in SoIT might help to build this dialogue among European (Donina *et al.*, 2017), Australian (Woelert and Millar, 2013) and Latin American studies.

Some important challenges common to all cases can also be mentioned, such as the training of experts in evaluation of interdisciplinary research, the integration of teaching and research and creating a critical mass of researchers in interdisciplinary topics to consolidate research agendas.

Finally, our analysis shows the actual diversity among institutionalization processes and does not propose a single desirable model for interdisciplinarity institutionalization. Questions that are still open to future research in the context of the studies on inter- and transdisciplinarity are: (1) What remains after interdisciplinary projects are over? (2) How is the interdisciplinary approach continued within schools’ structures? and (3) How can these experiences be enhanced from contradictions recorded? These questions aim to stimulate the reflection on a



heterogeneous context such as inter- and transdisciplinary knowledge production at Latin American universities. In this regard, we believe that the four dimensions built for the comparison (context of creation, conception of interdisciplinarity, integration with preexisting structures and internal organization and planning) are useful for analyzing the trajectories of interdisciplinary centers and can be a reference for future work involving a broader set of institutions in Latin America and other continents.

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Compliance with Ethical Standards

Conflict of interest

The authors declare that they have no conflict of interest.

Notes

- 1 Although the meaning of the “interdisciplinarity” concept can only be defined under certain contexts and purposes, the term is here used generically, including diverse knowledge integration and articulation processes, such as multi- and transdisciplinarity. The concept for each case study is developed throughout the article.
- 2 Universities in Hispanic America have been influenced by different legacies. On the one hand, they were conceived following the Spanish tradition strongly linked to the medieval university model. It can also be said that their later evolution was closer to the Napoleonic university model as the one training professionals than to the Humboldtian proposal of a university focused on pure science and freedom of research (Arocena and Sutz, 2001).
- 3 Translated by the authors.
- 4 Translated by the authors.



- 5 Although there are small interdisciplinary centers currently working, they are not part of a comprehensive university-level policy, but only the initiative of specific faculties and their research groups (see, for example, Senejko and Versino, 2015).
- 6 Mattei Dogan and Roberto Pahre first described a hybrid domains approach in the 1990s; instead of interdisciplinarity, they preferred the term hybridization to describe the process of knowledge integration. They used the analogy of genetics recombination in molecular biology with the recombination of fragments and specialized sections of science in hybrid domains. They considered that when conducting research involving different disciplines, you combine segments of disciplines and specializations, not whole disciplines (Dogan and Pahre, 1993).

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