

The Changing Academy – The Changing Academic Profession
in International Comparative Perspective 9

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Chapter 11

The Divergent Worlds of Teaching and Research Among Mexican Faculty: Tendencies and Implications

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11.1 Introduction

While the academic profession and its associated work are recognized as central to higher education, the function which has been associated with faculty work since its early times is teaching (Altbach 1991). Identified as the “key” profession, it is recognized as such because of its training function in relation to all other professions (Perkin 1987). Research is, on the other hand, a relatively recent development in the history of universities (Perkin 1991). Nowadays, however, higher education confronts, coming from society, a greater expectation of relevance, which includes the training of highly skilled personnel for a knowledge-based economy, research both in terms of the production and the application of knowledge in a relatively short period of time, and the enrichment of technologies currently in use by different sectors of society (Brennan 2007).

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Given the importance of teaching and research activities for higher education institutions, it is most relevant to analyze the relationship between these two central activities of academic work. In this paper we will explore this relation for the case of Mexican faculty. The paper is organized in four sections. In the first one, and in a brief manner, we will discuss the way in which teaching and research might be related, as well as the way in which such relationship might be studied. In the second section we will provide a brief historical and contemporary context of Mexican higher education, paying particular attention to current public policies relevant to academic work. At the end of this second section we propose, because underneath it runs a trans-institutional continuum of prestige and compensation, an academic ranking scheme based on the academics' membership in the National System of Researchers (SNI, Sistema Nacional de Investigadores) and his/her highest degree (HD), which we identify as the SNI-HD academic rank. This ranking system will be used to organize the information that constitutes the third and core section of the chapter. In the third section we will deal with the way in which Mexican academics view their work, and data will be presented on faculty activities, use of time and productivity, academic preferences and notion of academic work, recognition and compensation, personal characteristics and, finally, job satisfaction and commitment. It will be argued that teaching and research activities serve to differentiate two academic worlds that, in the case of Mexican higher education, are increasingly drifting apart. The paper ends with a recapitulation of the information presented and a small set of reflections based on it.

11.2 The Teaching-Research Relationship

While it is commonly recognized that teaching and research, together with service, are at the core of higher education institutions and, therefore, are central components of academic work (Bowen and Schuster 1986; Boyer 1990), it is also now more commonly recognized that doing both with a high level of involvement and quality in the same institution or by the same individual along its entire professional career is not the rule (Clark 1987; Rice 1996). Additionally, it must be kept in mind that teaching and research admit various ways of being interpreted and implemented as a function of the discipline in which they take place (Becher 1989). So it is to be expected that the teaching-research relationship might vary depending upon the involved institution (e.g., undergraduate focused vs. graduate concentrated), the discipline, and the individuals, including their career stage. In this chapter we will center upon global individual differences, leaving for another moment the analysis of institutional, disciplinary, and stage-related dimensions.

Three general perspectives can be identified regarding the potential relationship between teaching and research in higher education at the level of individual academics (Fairweather 2002; Marsh and Hattie 2002). The first one states that teaching and research are mutually reinforcing and, in line with such a position, faculty can be highly productive in both activities. A second position maintains that there is actually an inverse or competing relationship between research and teaching,

particularly at the undergraduate level, where both activities compete for the limited time, resources, and energy that a faculty member has for doing his/her work (Leisyte et al. 2009). Finally, a third position holds that teaching and research are unrelated and, therefore, an academic can be productive in one aspect without necessarily being productive in the other. This last position is probably the one more consistent with Boyer's (1990) proposition that there are four types of scholarship that, although sharing a common substantive theme and requiring all of them intensive and high-quality work, differ in their emphasis on the teaching, integration, discovery, and application of knowledge.

In analyzing the potential relation between teaching and research, it is possible to proceed in at least two ways. In one manner, measures of teaching and research productivity are identified, and, afterwards, correlations between the selected measures are estimated to test the nature of the relationship under study. A second way to proceed is to identify groups of academics, for example, faculty that can be identified as teachers, researchers, or administrators (Villa-Lever 1996), or those fully and marginally involved in research versus teaching activities (Gil-Antón et al. 1994), and afterwards look how measures associated to teaching and research might vary between the identified groups. This last approach is the one we will follow in this chapter. More specifically, the starting assumption will be that research and teaching "productivity" are inversely related (Fairweather 2002; Marsh and Hattie 2002) and, thus, both activities can be captured, at least for the current Mexican situation, by way of a single classification scheme, which we propose can be considered a *de facto* ranking system. The work will be done taking into account only full-time faculty ($N_T = 1775$) sampled according to a procedure described in previous work (Galaz-Fontes et al. 2008, 2009).

11.3 Mexican Higher Education

Higher education in Mexico has a long tradition, as the first university dates to the sixteenth century with the creation of the Royal and Pontifical University of México in 1553, which in turn found support in the arrival, 1539, of the first printing press in our country (Torres-Mejía 2003). Since the creation of the leading modern universities of México, the National Autonomous University of México (UNAM) in 1910, the National Polytechnic Institute in 1936, and later other public universities historically associated to nineteenth-century higher education institutions, Mexican higher education has passed through significant changes in its teaching and research. Such evolution has been significantly related to the social commitment *ethos* of the public university and, as well, its close links to the construction of the modern Mexican State (Ordorika and Pusser 2007).

The main features of the current Mexican higher education emerged during the second half of the past century and, as a system, was composed mainly of institutions dedicated primarily to teaching. In addition, there were a few institutions dedicated to scientific research, but they represented a small proportion in the national tertiary education system, despite the creation of National Council for Science and

Technology (CONACYT, Consejo Nacional de Ciencia y Tecnología) in 1970. In order to analyze in some detail the more recent transformations of Mexican higher education, this section is divided into three parts: recent developments and present situation, current higher education public policies identifiable as the central drivers of change related to teaching and research activities, and, finally, the SNI-highest degree academic rank system that serve as a reference point to organize and discuss the data presented afterwards.

11.3.1 *Recent Developments and Current Status*

Mexican higher education changed substantially since the 1950s in three main dimensions: size, territorial decentralization, and diversification. The change in size is clearly evidenced by the increase in the number of students, institutions, and faculty; the decade of 1970 has been highlighted as the period of greatest expansion of the system (Gil-Antón et al. 2009; Rodríguez-Gómez 2010). So, while in the early 1950s México had 23 higher education institutions with the enrollment of 30,000 students, during the 1970s the students population enrolled in undergraduate programs increased by more than three times, from approximately 233,000 in 1970–1971 to 731,000 in 1979–1980 (Rodríguez-Gómez and Ordorika 2011). While in the late 1970s students represented an enrollment rate of 10 % relative to the 19–23-year group, by 2007 they constituted about 27 %. Another growth indicator is the fact that from 1990 to date, the higher education student population doubled, going from 1.2 to 2.8 million students, representing a change from 15 % to 28 % in terms of enrollment (Rodríguez-Gómez 2010). The number of institutions was also associated with this expansion. As early as the decade of 1970, there were about 115 higher education institutions (HEIs), while in 2007 the number had risen to a total of 2,314 institutions. Finally, the number of faculty augmented from 25,000 in the 1970s to 279,886 in 2007 (SEP 2008).

The changes just described did not only represent numbers. Mexican higher education also changed along other more qualitative dimensions: student body composition in terms of gender, socioeconomic status, and cultural diversity; type and geographical distribution of public and private HEIs; and, as a general context for the above aspects, institutional and system-wide planning and administration, as well as a new way by which HEIs were financed by the state (Rubio-Oca 2006). From the 1980s, the system maintained the same growth dynamics based on two factors: the presence of private higher institutions and the creation of new types of institutions in the public sector. More specifically, the decade of the 1990s is the period of greatest growth in student enrollment in private institutions compared to public ones, as their students made up about 30 % of the total system enrollment (Rodríguez-Gómez 2010).

Enrollment in higher education has gone through a decentralization process that has impacted the distribution of students in the geography of the country. From being concentrated in Mexico City during the 1950s, student enrollment had

decentralized towards the states, up to the point that the highest percentage of students enrolled now in them. Along with the decentralization of the system, diversification of institutions has been another dimension along which the transformation of Mexican higher education has taken place during the last two decades. More specifically, this change was achieved by creating new types of institutions: technological institutes, polytechnic universities (since 2003), and intercultural universities (since 2004). During the 1990s the number of new institutions reached nearly 100, with the largest number being technology oriented (Rodríguez-Gómez and Ordorika 2011).

Because the expansion of higher education during the 1970s demanded a huge increment in the number of faculty, academics were frequently incorporated into permanent positions independently of their fragile academic profile. For example, around one third of all new faculty hired during that expansion period had not obtained yet a licensure degree, and nearly another 50 % only had such a degree (Gil-Antón et al. 1994).¹ With the economic downturn of the 1980s, the Mexican State faced a higher education system in which faculty had serious limitations in their professional profile but also were severely underpaid, as by the end of the 1980s, faculty salaries have shrunk to around 40 % of its previous levels (Gil-Antón 2002).

Mexican authorities faced a dilemma in trying to solve such situation. They could provide, on the one hand, a general increase in faculty income and, at the same time, create conditions for significantly promoting academic work and/or, on the other hand, create programs targeted at high-performance academics in order to solve their income situation and, at the same time, send a message regarding what was considered an appropriate expected profile and work among academics. Public authorities at the highest level choose to follow the second option, and so it was that faculty merit-pay programs appeared in Mexican higher education, the National Researchers' System (SNI, Sistema Nacional de Investigadores) was established in 1984 being the first of its kind. It was expected to be temporary, but it was actually the seed for future merit-pay programs that are discussed below.

11.3.2 *Public Policies and Programs Targeting Teaching and Research*

At the core of the above changes, it is possible to identify, as it has already been hinted, a new set of public policies that have organized the relationships between the state and public higher education (Rodríguez-Gómez and Casanova-Cardiel 2005). In the context of decreasing public financial support, evaluation, accountability,

¹The licensure degree is the Mexican equivalent to a nongraduate bachelor's degree. However, the licensure degree is closer to a first professional degree, as it emphasizes professional practice, as the name of the degree testifies to.

efficiency, and performance-based funding are now central concepts in the way Mexican higher education was coordinated by federal agencies and managed at the institutional level (Mendoza-Rojas 2002; Díaz-Barriga et al. 2008). The central actors and major components of higher education, students, faculty, academic programs, and institutions themselves, have been subject to a diversity of assessment processes since the early 1990s. We describe next the evaluation programs alleged to have had more influence on the teaching and research activities of academics.

First, at the institutional level, there is the Integral Program for Institutional Improvement (PIFI, Programa Integral de Fortalecimiento Institucional), a program with funding implications for the institution in which faculty work. In this program the profile of the faculty, particularly that of full-time academics, is most relevant and influences the attainment, beyond a base-level funding assigned to the HEI being evaluated, of additional funds critical to the development of the institution at question. At the center of the PIFI program are the concepts of academic capacity, defined by faculty's characteristics (highest degree, membership in SNI and PROMEP, and the "consolidation" level of the academic bodies in which they participate), and academic competitiveness (licensure and graduate programs accredited). PIFI includes other aspects of the functioning of an HEI (administration and infrastructure, to name two more), and so it has become central to institutions, to the extent that public funding based on student enrollment and faculty body is kept barely at a survival level, and additional financial resources are contingent upon academic and management performance, at least upon that reported in the documents and formats handed in to the federal Undersecretariat of Higher Education.

Second, at the level of assessment of academic programs, accreditation of licensure programs is considered an important component of the effort to ensure academic quality in Mexican higher education. The strategy has been to motivate institutions to earn accreditation from a group of independent agencies supervised by Council for the Accreditation of Higher Education (COPAES, Comisión Nacional para la Acreditación de la Educación Superior). In an effort to make such motivating more effective, since 2000 the Mexican State has funded incentives for public institutions that obtain accreditation for their academic programs. According to Rodríguez-Gómez and Ordorika (2011), by 2008 just over 1,000 programs had already received accreditation. Accredited programs represented 28.4 % of the 4,000 undergraduate programs offered at public universities in Mexico. Additionally, 222 (10.2 %) of the 2,169 academic programs offered by nonuniversity public institutions were accredited. For institutions it is very important to have accredited undergraduate programs, as this factor is heavily considered in the evaluation of the PIFI program, with definitive funding consequences for each institution. As it would be natural to expect, the characteristics of the faculty, including its amount relative to the number of students attended, are highly important for licensure programs to attain accreditation.

The National Graduate Program Register (PNP, Padrón Nacional de Posgrados de Calidad) is one of CONACYT's core programs, and its main purpose is to increase the quality of graduate programs. Being positively evaluated in such program implies, among other things, the availability of scholarships for students of the program in question. So PNP does have strong funding consequences for the

program and, indirectly, for the institution. As in the accreditation of undergraduate programs, a central aspect evaluated by PNP is the profile and performance of the faculty involved in a graduate program.

Finally, in the case of academics, there are four programs that affect them in a direct way: the SNI program already mentioned, the Program for the Improvement of the Professoriate (PROMEP, Programa de Mejoramiento del Profesorado), Academic Bodies (ABs), and, finally, institutional merit-pay programs (IMPPs). Two of the above programs, SNI and IMPPs, provide faculty with additional personal income for the period in which the academic is part of such programs. PROMEP and ABs, on the other hand, provide funding for infrastructure and complementary support for research-related activities. SNI is a national program run by CONACYT; it evaluates a faculty member on the basis of his/her research productivity and awards a monthly scholarship depending upon the level (out of four) in which his/her performance locates him/her. In addition to its personal income impact, SNI has become increasingly important for securing research funds. A central aspect of SNI is that the evaluation that supports the program is done by highly recognized peers, so it is the most prestigious of these programs, and it even influences strongly the outcome of the other three programs. The income provided by the already mentioned scholarships, although maintained along 3 years and even more, is not permanent, and the level of it can be reduced depending upon the evaluation performed at the renewal of the scholarship.

IMPPs, in contrast to SNI, are programs run at the institutional level. Although some HEIs provide extra funding for their programs, their financial support comes largely from the federal government. Also, while the rules and provisions under which these programs operate are dictated by the Ministry of Finance and Public Credit (Secretaría de Hacienda y Crédito Público), it is not uncommon to find HEIs making adjustments to these programs in response to their particular realities (Cordero-Arroyo et al. 2003). As stated, IMPPs also provide additional personal income, although, when compared to SNI, on the basis of shorter time periods.

PROMEP is a national program that provides individual faculty with a one-time only stipend, while ABs provide support groups of faculty to improve their quality or "level of consolidation" (Urbano-Vidales et al. 2006). In general, such funds are labeled and are usually used for equipment, infrastructure, and research-related activities. The participation in these programs, however, has become increasingly important to HEIs as faculty's involvement in them influences powerfully licensure program accreditation, and PIFI considers it in an important way in its evaluation scheme. CONACYT, on the hand, has started recently to consider it as a factor in the decision of awarding research funds to a particular academic.

It should be noted, however, that associating funding to the evaluation of performance introduced powerful incentives for higher education actors to reach performance criteria in order to attain needed or expected levels of funding and its associated prestige. This situation has caused problems to Mexican higher education, as in the initial stage of the implementation of such programs, there was no evaluation culture to secure the prevalence of quality in the educational processes underlying the involved evaluations (Estévez-Nénninger 2009). So, for example,

some academics, confronted with the pressure of holding a graduate degree in order to attain a higher scholarship level, decide to obtain a graduate degree in institutions with questionable credentials, if not openly diploma mills.

11.3.3 *The SNI-Highest Degree Academic Ranking System*

Boyer (1990) warned of the need to rethink the roles of the teacher-researcher and proposed four dimensions for analyzing academic activity, all equally important: discovery, integration (both form the basis of research), application (service function involving technology transfer and consultancy), and teaching. Other authors have argued that teaching and research are often conducted in accordance with common rules, that the quality of their joint performance can be expected to be high, and that the degree of involvement of academics in the same institution or by the same individual over his/her academic career is constant (Clark 1987; Rice 1996).

The involvement and commitment of faculty in teaching and research and how these two activities are related has been recognized as something that can be diverse and varies according to the institution of labor affiliation (Clark 1987), membership in a discipline (Becher 1989), and the stage of academic career of individuals (Rice 1996). The analysis in this chapter will be based upon the differences that can be identified among academics, so differences between institutions, disciplines, and career stages will be left pending for further research. Furthermore, we will analyze the relationship between teaching and research through a process of identifying, first, groups of academics and thereafter analyze how the identified groups differ or are similar in relation to measures associated with teaching and research. Under this same logic, Gil-Antón et al. (1994) compared groups of full-time academics and marginal part time; Villa-Lever (1996) explored differences between faculty that could be classified as teachers, researchers, and administrators, and more recently Galaz-Fontes et al. (2010) proposed a classification scheme based on the degree of involvement in academic teaching and research activities. Because it has been found that the importances attached to the performance in each function are inversely related (Fairweather 2002; Marsh and Hattie 2002), both activities can serve as extreme points in one continuum that can help identify Mexican academics in the new classification scheme (Galaz-Fontes et al. 2010).

The analysis carried in this work classifies Mexican FT faculty according to, first, their participation in the National Researchers' System (SNI, Sistema Nacional de Investigadores) and, second, to their highest academic degree (HD). This ordered double consideration served as the basis for the SNI-HD ranking system. As membership in SNI is attained through a national peer-review process that focuses on published work, academics that declare to be SNI members, by necessity strongly research oriented, were located at the SNI rank, the highest. Out of the 1,698 FT faculty members that answered the pertinent survey items, 366 (21.5 %) were at the SNI rank level. Out of the 1,409 academics that did not reported to be SNI members, 240 (14.1 %) reported to have, as their highest degree, a doctorate or a postdoctorate.

All of them were classified as Non-SNI Doctors. Non-SNI academics holding up to a master's degree (765, or 45.0 %) were then classified as Non-SNI Master's, and, finally, Non-SNI Licensure faculty (327 or 19.3 %) were identified by not being an SNI member and, at the same time, by holding a licensure degree at the most (327 or 19.3 %). Using highest degree as a second classification criterion was considered reasonable because of the importance given to it by institutional academic regulations that usually assign less teaching and more research responsibilities to the faculty with the highest degree and rank and, most importantly, by the way in which recent public policies support faculty activities through specific institutional funding schemes (Rubio-Oca 2006). The order found in the results that are reported here justifies further, and most definitively, the use of the two criteria considered.

11.4 Teaching and Research Correlates of the SNI-HD Ranks

Having defined a faculty ranking system based on SNI membership and highest degree (SNI-HD), in this section we will analyze the relationships between teaching and research, having the proposed SNI-HD ranking as a background. The analysis presented is organized in six subsections. First, we will deal with academics' research and teaching productivity and, associated to it, with the way in which academics use their time. Second, differences in academic preference and the notion of teaching are considered. Third, income and recognition are looked at. Fourth, we observe how job satisfaction and commitment varies with the SNI-HD ranks, and, finally, several personal characteristics are explored in their relationship to those same ranks.

11.4.1 *Research and Teaching Productivity, Use of Time*

Table 11.1 shows, for each SNI-HD rank, the mean of a typical research productivity index based on the number of various academic publications and conference presentations for the last 3 years. As it can be observed, differences in the mean number of reported publications for the last 3 years are considerably and statistically different between each successive rank, ranging from a mean of 2.3 publications for Non-SNI Licensure faculty to a mean of 17.1 publications for SNI members. Non-SNI Master's and Non-SNI Doctorate academics reported means of, respectively, 5.9 and 10.8 publications. As it can be observed, the rank ladder created discriminates quite acceptably research productivity.

Table 11.1 also presents data on the average weekly hours that surveyed faculty reported to invest in research activities. Once again, differences are in the expected order, considerably and statistically significant for each successive rank. So, while Non-SNI Licensure academics reported a mean of 4.2 weekly hours devoted to research, the corresponding figure for SNI members was 20.3 h per week, with

Table 11.1 Academic publications in the last 3 years and weekly hours devoted to research activities, by faculty's SNI-HD rank ($N_T = 1,775$)

SNI-highest degree rank	Academic products ^a			Weekly hours in research		
	n	Mean ^b	SE	n	Mean ^c	SE
Non-SNI Licensure	267	2.3	0.3	283	4.2	0.4
Non-SNI Master's	711	5.9	0.3	697	7.4	0.3
Non-SNI Doctorate	237	10.8	0.8	224	11.8	0.6
SNI members	364	17.1	0.8	335	20.3	0.6
Total	1,578	8.6	0.3	1,539	10.2	0.3

^aIndex built by adding directly the number of academic books authored, books edited, journal papers, book chapters, research monographs, and conference presentations reported for the last 3 years

^b $F_{3,1575} = 125.527, p < .00001, \text{Eta} = 0.439, \text{Eta Squared} = 0.193$

^c $F_{3,1536} = 223.697, p < .00001, \text{Eta} = 0.552, \text{Eta Squared} = 0.304$

Table 11.2 Weekly hours devoted to classes and to teaching activities in general, by faculty's SNI-HD rank ($N_T = 1,775$)

SNI-highest degree rank	Weekly hours devoted to classroom instruction			Weekly hours devoted to all teaching activities ^a		
	n	Mean ^b	SE	n	Mean ^c	SE
Non-SNI Licensure	283	14.7	0.6	283	24.4	0.7
Non-SNI Master's	697	14.0	0.3	697	23.5	0.4
Non-SNI Doctorate	224	11.6	0.4	224	21.3	0.7
SNI members	335	8.0	0.3	335	15.2	0.5
Total	1,539	12.5	0.2	1,539	21.5	0.3

^aIn addition to classroom instruction, this category includes class preparation, grading, and tutoring students

^b $F_{3,1536} = 62.212, p < .00001, \text{Eta} = 0.329, \text{Eta Squared} = 0.108$

^c $F_{3,1536} = 57.948, p < .00001, \text{Eta} = 0.319, \text{Eta Squared} = 0.102$

Non-SNI Master's and Non-SNI Doctorate academics reporting, respectively, means of 7.4 and 11.8 h per week. So, as SNI academics reported investing more of their time in research activities and, at the same time, reported a larger number of academic publications than faculty reporting not being an SNI member or holding a lesser degree, the way in which these two variables behave provides acceptable concurrent validity, from the research dimension side to the SNI-HD ranking system built; the higher the SNI-HD rank of an academic, the larger and more productive his/her research activities.

Having documented that the SNI-HD ranks correlate highly with commonly used measures of research productivity (number of publications) and effort (time involved in research activities), Table 11.2 presents data related to the relationship between SNI-HD ranks and teaching activities. Specifically, for each SNI-HD rank, Table 11.2 shows the mean number of hours that faculty reported to be involved in classroom instruction and, on the other hand, the mean number of total hours devoted to teaching activities in general, which include not only classroom instruction but also activities such as class preparation, grading, and tutoring students.

As it can be observed, weekly hours devoted to classroom instruction and to teaching in general are very similar in each case, for Non-SNI Licensure and Non-SNI Master's faculty (approximately 14 h in the first case and 24 h per week in the second). It seems, then, that teaching responsibilities (classroom instruction) and teaching involvement (teaching activities overall) are little affected by whether an academic holds, as its highest degree, a licensure or a master's degree. In contrast to this teaching invariance, it might be recalled that Non-SNI Master's faculty reported investing more hours to research than their Non-SNI Licensure colleagues (means of 7.4 vs. 4.2 h per week) and, additionally, they also reported more publications (means of 5.9 vs. 2.3 publications during the last 3 years).

While there was practically no change in time devoted to classroom instruction and teaching activities when comparing Non-SNI Licensure and Non-SNI Master's faculty, Non-SNI Doctorate academics reported, on average and when compared to Non-SNI Master's, about 2 h less per week of classroom instruction and, as well, of teaching activities in general (11.6 vs. 14.0 and 21.3 vs. 23.5 h per week, respectively). On the other hand, Table 11.2 also shows that SNI members reported, compared to their Non-SNI Doctorate colleagues, nearly 4 h less of classroom instruction and, moreover, about 6 h less of global teaching activities (8.0 vs. 11.6 and 15.2 vs. 21.3 h per week, respectively). The previous figures show that, while not as strongly as with research measures, the SNI-HD ranks correlate quite well with time measures of teaching and teaching involvement. On the other hand, it appears that Non-SNI Master's, in comparison to their Non-SNI Licensure colleagues, are more involved and productive in research while, at the same time, maintain a high level of involvement in teaching.² Moving to a higher SNI-HD rank and, ultimately, becoming an SNI member, however, takes FT faculty to a situation in which there is a significant exchange between research and teaching involvement, to the extent that they become more involved in research while, at the same time, they reduce their involvement in teaching activities. It seems clear, then, that for a good number of academics, the relationship between teaching and research is such that they do not report doing it at the same time with high levels of performance.

In the same way that with research activities, it is also important to incorporate a measure of teaching productivity going beyond an effort measure. In this sense an informative measure of teaching productivity is the number of students attended during the current academic year. Non-SNI Licensure and Non-SNI Master's academics reported attending more than 100 students in licensure programs. In contrast, Non-SNI Doctorate faculty reported to attend, on average, 79 students, while SNI members reported a mean of 40 students being attended by them at the same program level. So the higher the level of research involvement as implied by the SNI-HD rank of the faculty, the lower the number of students attended at the licensure level ($F = 63.501, p < .0001, \text{Eta} = 0.332, \text{Eta Squared} = 0.110$). On the

²The majority of countries participating in the CAP International Study reported that their faculty invest less than 20 h per week in teaching activities overall.

contrary, the relationship between research involvement and the number of students attended at the master's level is direct when comparing Non-SNI Licensure academics to Non-SNI Master's, then to Non-SNI Doctorate, and finally to SNI faculty members (means of students attended, respectively, of 0, 5, 12, and 10; $F=37.097$, $p<.0001$, $Eta=0.257$, $Eta\ Squared=0.066$). A similar pattern, although with lower numbers, is also observed between the relation of research involvement and students attended at the doctorate level ($F=20.628$, $p<.0001$, $Eta=0.193$, $Eta\ Squared=0.037$). So a higher level of involvement in research is associated with attending fewer students at the licensure level, but with more students at the master's and doctorate levels. The "more" students involved at the graduate level, however, represent a small amount, particularly at the doctorate level, as compared to the licensure level. Notwithstanding this situation, these figures speak of a mutually reinforcing relationship between teaching graduate courses and tutoring graduate students on the one hand and research on the other. However, this relationship is relatively small compared to the relationship between SNI-HD ranks and hours spent in research activities, as evidenced by the fact that the Eta Squareds reported for the relationship between the SNI-HD ranks and students attended at the master's and doctoral levels are considerably lower than the one reported for the relationship between SNI-HD rank and hours involved in research (0.066 and 0.037 vs. 0.304).

11.4.2 Academic Preference and the Notion of Teaching

In this subsection, we describe the relationship between the SNI-HD ranks and academic preference and the notion of teaching held by different academics. While 36.0 % of Non-SNI Licensure faculty reported an exclusive interest in teaching, 21.9 %, 10.8 %, and 0.8 % of, respectively, Non-SNI Master's, Non-SNI Doctorates, and SNI academics reported the same. Conversely, 20.8 % of SNI members expressed an exclusive interest in research, while 6.6 %, 3.0 %, and 1.6 % of, respectively, Non-SNI Doctorates, Non-SNI Master's, and Non-SNI Licensure academics reported the same preference. It is interesting to observe that Non-SNI Licensure and Non-SNI Master's faculty do not differ in terms of interest when "in both teaching and research, but leaning towards teaching," is considered (46.9 % vs. 47.9 %, respectively), while they did differ in relation to an interest in both activities when giving preference to research (15.4 % vs. 27.2%). This last alternative was selected by 51.9 % and 70.9 % of academics in the SNI Doctorate and SNI ranks (Pearson chi-square₉=552.546, $p<.0001$, Eta directional towards preference=0.535). Thus, attaining a higher degree has an incremental effect, in each step forward, in the interest in research when both teaching and research activities are considered. Interest in teaching when both teaching and research are considered, on the other hand, decreases only when a doctoral degree has been obtained, and diminishes even further for SNI academics (from 47.9 % to 30.7 % and 7.5%, respectively). It appears, then, that this result is consistent with the previous result regarding how interest in teaching changes less than

involvement in research when comparing academics from the Non-SNI Licensure and Non-SNI Master's ranks. However, the data also shows that academic preference is associated with the SNI-HD ranking: the higher the rank, the more preference for research than for teaching.

Table 11.3 presents data relative to the way Mexican FT academics understand scholarship and the associated nature of academic work. For various statements having to do with several topics, the percentages of respondents that stated to agree or strongly agree with them are specified. As it can be observed, the data show that academics in different SNI-HD ranks reported different ways of looking at scholarship and academic work. While Non-SNI Licensure, Master's, and Doctorate faculty stress teaching and tutoring as the core of scholarship, SNI academics are somewhat less prone to such statement (70.1 %, 73.0 %, and 66.7 % vs. 60.1 %, respectively). It is quite interesting that the assertion "scholarship includes an application dimension" generates high levels of agreement (83.7 % overall), from 79.0 % for Non-SNI Doctorates to 90.0 % for Non-SNI Master's, but again, less SNI academics agree on this assertion (72.4 %). Such figures most surely are related to the fact that Mexican higher education has been traditionally oriented towards the training of professionals. So, while according to Boyer (1990), the scholarships of teaching and application are highly regarded overall, the scholarship of integration (preparation of synthesis reports) is somewhat less seen as part of scholarship by survey respondents (64.8 % overall). The scholarship of research, on the other hand, is seen, overall, by a lower percentage (58.7 %) of respondents as the best way to define scholarship. As expected, SNI members agree considerably more with such a perspective than Non-SNI Licensure faculty (72.1 % vs. 52.4 %, respectively). In addition, SNI do not agree as highly as the other groups do, particularly compared to Non-SNI Master's, with the view that faculty in their discipline have a professional obligation to use their knowledge to address societal problems (57.0 % vs. 82.3 %, respectively). Why SNI academics expressed such view when compared to academics in other SNI-HD rank? Has the dynamics of becoming an SNI member and retaining such status reached a point in which "reality" has moved into a secondary plane? Or is it that SNI academics consider that generating and applying knowledge is a set of tasks difficult to perform by the same person? Finally, there is a low general agreement (11.6 % overall) with respect to teaching and research being incompatible, something that runs against the data previously presented, which shows, quite unambiguously, that for a vast majority of Mexican FT faculty, teaching and research are very difficult to do at the same time, particularly for those doing their teaching mainly at the undergraduate level.

The levels of agreement reported over two more statements show, from another perspective, that faculty in each of the SNI-HD rank see academic work from different points of view. Specifically, it appears that the quality of teaching and research is judged depending on the rank they hold in the SNI-HD ladder. So, for example, while only one in ten of Non-SNI Licensure faculty agrees or strongly agrees with the assertion "faculty with higher degrees do better teaching than faculty without those degrees," four in ten of the Non-SNI Doctorate or SNI academics reported the same. On the other hand, while three out of ten Non-SNI Licensure academics

Table 11.3 Percentages of FT Mexican faculty that reported to agree or strongly agree with various statements having to do with the nature of scholarship, by SNI-HD rank ($N_T = 1,775$)

Statement	N ^a	Teaching-research involvement classification				Total
		Non-SNI Licensure	Non-SNI Master's	Non-SNI Doctorate	SNI members	
Scholarship is best defined as teaching and tutoring students	1,667	70.1	73.0	66.7	60.1	68.8
Scholarship includes the application of academic knowledge in real-life settings	1,673	85.2	90.0	79.0	72.4	83.7
Scholarship includes preparation of reports that synthesize the major trends and findings of my field	1,656	58.8	69.0	67.2	59.6	64.8
Scholarship is best defined as the preparation and presentation of findings on original research	1,663	52.4	55.9	55.5	72.1	58.7
Teaching and research are hardly compatible with each other	1,679	12.4	11.0	13.5	11.0	11.6
Faculty in my discipline have a professional obligation to apply their knowledge to problems in society	1,680	78.4	82.3	77.2	57.0	75.3

^aThis N refers to the total number of surveyed academics that answered the question. Percentages for each TRIC group are calculated in relation to the number of academics within each such group

accept that the best research is carried out by SNI members, seven out of ten of this last group expressed the same opinion. These figures, along with those of Table 11.3, speak of a faculty body that is not homogeneous in terms of the nature of scholarship, academic work, and the credentials to perform it at higher quality levels.

11.4.3 Recognition and Compensation for Academic Work

This section focuses on data related to faculty's participation in two individual incentive and recognition programs in addition to SNI. The various SNI-HD ranks serve to differentiate participation of faculty in institutional incentive programs, which have been largely under the control of higher education institutions and which, like SNI, provide faculty with a monthly additional income. Thus, while 32.8 % of Non-SNI Licensure academics reported to participate in such incentive programs, 72.7 % of SNI academics take part of them (Pearson chi-square₃=114.918, $p < .0001$, Eta directional towards program participation=0.261). The federal Program for the Improvement of the Professoriate (PROMEP, Programa de Mejoramiento del Profesorado), although not providing a monthly installment like institutional incentive programs or SNI do but rather constituting a recognition program targeted mainly to faculty in state public institutions who have obtained at least a master's degree, is also sensible to the SNI-HD ranking system. Only FT faculty working in public state institutions ($n=705$) have been considered in this analysis, as the PROMEP program has been mainly targeted at such institutions (Urbano-Vidales et al. 2006). The results show that while 33.0 % of Non-SNI Master's academics participate in the PROMEP program, 58.2 % and 84.1 % of Non-SNI Doctorate and SNI academics, respectively, participate in it (Pearson chi-square₃=174.721, $p < .0001$, Eta directional towards program participation=0.498). In short, participation in these recognition programs seems to be associated to faculty's highest degree and, at the same time, involvement in research, rather than in teaching.

Having observed that recognition for faculty involvement in research activities is stronger than that provided for being involved in teaching, the question could be asked about the extent to which such recognition, in addition to that associated to highest degree, makes a difference in income. Table 11.4 presents data relevant to this question. As it can be observed, the more research-involved SNI-HD ranks, which are also those with the highest degrees, receive the highest mean contractual income: \$24,465 and \$22,458 Mexican pesos (MP) for Non-SNI Doctorate and SNI academics versus \$17,703 and \$19,622 MP for Non-SNI Licensure and Master's faculty. The difference between the lowest and the highest paid rank (Non-SNI Licensure and Non-SNI Doctorate groups, respectively) is around 38.2 %. The situation with income from incentive programs, however, is quite more differentiated. While Non-SNI Licensure faculty earn, on average, an extra \$1,309 MP per month, Non-SNI Master's earn \$3,553, Non-SNI Doctorates receive \$6,670 MP more per month, and, finally, SNI members obtain \$24,221 MP more every month! Actually, it can be observed that SNI academics, on average, have a larger income from the

Table 11.4 Mean monthly income (current Mexican pesos) from various sources for FT Mexican faculty, by faculty's SNI-HD rank ($N_T = 1,775$)

SNI-highest degree rank	N	Contractual income		Incentive programs' income		Total income ^d	
		Mean ^a	SE	Mean ^b	SE	Mean ^c	SE
Non-SNI Licensure	318	17,703	557	1,309	220	21,134	741
Non-SNI Master's	751	19,622	365	3,553	273	26,390	634
Non-SNI Doctorate	237	24,465	732	6,670	665	33,802	1,118
SNI members	330	22,458	541	24,221	959	48,768	1,413
Total	1,636	20,523	257	7,734	328	30,954	519

^a $F_{3,1632} = 26.077, p < .0001, \text{Eta} = 0.214, \text{Eta Squared} = 0.046$

^b $F_{3,1632} = 368.766, p < .0001, \text{Eta} = 0.636, \text{Eta Squared} = 0.404$

^c $F_{3,1632} = 146.406, p < .0001, \text{Eta} = 0.460, \text{Eta Squared} = 0.212$

^dTotal income incorporates other income sources, so it is larger than the sum of the contractual and incentive programs' income, which integrate both institutional and external merit-pay sources

incentive programs in which they participate than from their contractual income (\$24,221 vs. \$22,458 MP, respectively). Putting together all income sources, Table 11.4 shows that the total monthly income varies from a low of \$21,134 MP for Non-SNI Licensure to a high of \$48,768 MP for SNI members, a difference of 130.8%! The very interesting thing about this income differentiation identifies two points of interest. First, it favors largely research involvement and, second, it is based largely on the additional income provided by incentive programs.

Incentive income comes from both internal and external institutional sources. While the external federal incentive program known as SNI was created first, in 1984, and was targeted at faculty doing research, internal institutional merit-pay incentives were developed several years later and intended to compensate faculty mostly devoted to teaching (Cordero-Arroyo et al. 2003). Notwithstanding such intentions, the data just presented shows that research is by far the activity that is recognized by incentive programs as a whole, showing that institutional programs have not been able to counterbalance the additional compensation first awarded to research. Additionally, such data also shows that as FT Mexican faculty increase their professional qualifications (highest degree) and their involvement in research, the less stable is their income, as their average contractual share of their total income diminishes from 83.8% to 74.4%, then to 72.4%, and finally to 46.1% for Non-SNI Licensure, Master's, Doctorate, and SNI academics members, respectively. Is this a planned outcome of federal and institutional policies currently in place? Is this a long-term "healthy" situation for faculty, institutions, and Mexican higher education in general?

11.4.4 Job Satisfaction and Commitment

The findings related to the way in which faculty of the various SNI-HD ranks responded to questions about their perspectives on the academic profession and job satisfaction in general are next described. Irrespective of whether academics are

teaching or research oriented, only one in ten faculty agrees or strongly agrees with the statement that, if they had to do it again, they would not become an academic. Consistent with such responses, almost nine out of ten academics reported a high or very high level of overall satisfaction with their current job. It appears, then, that Mexican faculty are satisfied not only with their current job but also with their profession in general. Notwithstanding this situation, surveyed faculty reported some level of tension in their jobs, which grows somewhat as research becomes their main activity. So, while 18.1% of Non-SNI Licensure academics agree or strongly agree with the statement that their job is a source of personal strain, 28.7% of SNI academics reported the same (Pearson chi-square=32.152, $p < .01$, Eta directional towards statement=0.096). As it happens with institutional merit-pay systems, faculty's SNI participation is based upon a performance assessment done every certain number of years, with a real possibility of having a negative evaluation, which would represent not receiving, at least for the following year, the additional income that SNI provides, which in case of SNI members can represent, together with the income from their institutional merit-pay, more than half of their income. In addition to this situation, a lower percentage of SNI members, when compared to other SNI-HD ranks, reported to be tenured (e.g., 70.7% vs. 81.9% of Non-SNI Doctorate academics). Probably associated with both of these situations, a small percentage (about one in ten overall) of Mexican faculty evaluate negatively the convenience for a young person to begin an academic career in their field, but, again, this opinion is stronger for SNI academics than for Non-SNI Licensure (22.0% vs. 9.0%, respectively) (Pearson chi-square=59.017, $p < .0001$, Eta directional towards statement=0.144).

The CAP survey also asked about the level of affiliation of FT faculty in relation to their academic discipline, their unit of assignment (faculty, school, department, etc.), and their institution. The results show that for Mexican FT faculty, all levels of affiliation are high, ranging from 89.8% of respondents stating a high or very high affiliation with their unit of assignment to 93.6% reporting the same for their institution and, lastly, to 97.3% stating such affiliation levels with respect to their academic disciplines. Despite the above results pattern, SNI academics reported somewhat lower levels of affiliation for both their unit of assignment (81.0% vs. 94.4% when comparing SNI and Non-SNI Licensure faculty) (Pearson chi-square₁₂=79.592, Eta directional towards statement=0.199) and to their institution (89.1% vs. 95.6% in the case of SNI and Non-SNI Licensure academics) (Pearson chi-square₁₂=66.950, Eta directional towards statement=0.167).

11.4.5 Personal Characteristics Associated to the SNI-HD Ranking System

Having presented data relative to the discriminatory capacity of the SNI-HD ranking relative to various measures of research and teaching, as well as in relation to academic preference and work recognition and income, we now turn to ask whether academics in the various SNI-HD ranks differ along some personal characteristic.

Table 11.5 Gender and age characteristics associated with each rank of the SNI-HD ranking system classification ($N_T = 1,775$)

SNI-HD rank	Gender ^a		Age ^b		
	N	% Female	N	Mean	SE
Non-SNI licensure	322	30.4	321	49.3	0.6
Non-SNI masters	758	41.6	753	49.7	0.3
Non-SNI doctorate	238	31.5	236	51.4	0.6
SNI members	356	30.6	352	49.3	0.5
Total	1,674	35.7	1,662	49.8	0.2

^aPearson chi-square₃ = 21.047, $p < .001$, eta directional towards gender = 0.112

^b $F_{3,1658} = 2.900$, $p < .05$, eta = 0.072, eta squared = 0.005

Table 11.5 presents data on gender and age relative to the four SNI-HD ranks. As it can be observed, female participation is higher among Non-SNI Master's faculty (41.6 %), while the rest of the SNI-HD ranks has a female participation of around 30 %. A lower percentage of Non-SNI Doctorate reported being female, but also females are more teaching oriented, as a higher percentage of Non-SNI Master's, relative to the overall female participation rate, are women (41.6 % vs. 35.7 %, respectively). In relation to age, Table 11.5 shows that, despite the fact that all four SNI-HD groups have a similar age average, around 49.3 years for Non-SNI Licensure and SNI members alike to 51.4 years for Non-SNI Doctorate faculty, this last SNI-HD is around 2 years older than the other SNI-HD ranks.

We also consider in the analysis the SNI-HD rank and the period in which the implicated faculty first entered the academic profession, as defined by having had their first FT or half-time appointment in a higher education institution. There has been little change between the first entrance period considered (up to 1982) and the last one (1999–2008) for all the SNI-HD ranks, except for the Non-SNI Doctorate (Pearson chi-square₉ = 17.515, $p < .05$, Eta directional towards period of entrance = 0.073). So, of all Non-SNI Licensure faculty, 26.6 % entered the academic profession up to 1982, but 28.9 % did so during the last period considered. Given the teaching orientation of academics at such rank, it is natural to conclude that enrollment growth and, on the other hand, a low offering of personnel with higher degrees are influencing such dynamics. Moreover, the fact that 31.6 % of the Non-SNI Doctorate entered the profession up to 1982, while 19.0 % has come into higher education during the last period, speaks that many of these academics obtained their doctoral degree while already working in the profession. A point of interest here is why these faculty members, even though they have obtained their doctorate, which is a prerequisite to enter SNI, are not yet members of it.

The information related to the highest degree with which faculty in different SNI-HD ranks first entered the academic profession is described next. The current highest degree has been obtained, to a considerable extent, with faculty already been employed. Thus, 63.3 % of Non-SNI Master's faculty entered academic profession with a licensure degree, while 50.9 % of Non-SNI Doctorate did the same. It is interesting to observe that of all SNI academics, 42.1 % entered the academic

profession already holding a doctorate, while 23.6 % of Non-SNI Doctorate faculty entered the profession under similar conditions (Pearson chi-square₆ = 543.694, $p < .0001$, Eta directional towards highest degree = 0.536). It would appear, then, that obtaining a doctorate while already working in the profession is associated with conditions that make it more improbable to enter SNI, despite the fact that additional income that faculty members of SNI receive. Could it be that Non-SNI Doctorate faculty have engaged more significantly in teaching and that they prefer not to make the exchange in such work in order to gain entrance into SNI? Could it be that such faculty, having obtained their doctorate while they were already working, have not had working conditions that allow them to perform as to gain access to SNI? Could it be that the doctorate that these faculty obtained did not provide the immediate necessary training and academic capital that allow them to enter SNI? Or could it be that many Non-SNI Doctorates obtained their degree in order to be eligible to receive more incentives, but are not really interested in becoming researchers according to SNI criteria? Given the efforts targeted at increasing the highest degree level of in-service faculty, these questions are central in analyzing the public policies associated to such efforts.

11.5 Concluding Comments

What have we learned from our exploration of the teaching-research relationship based on the SNI-HD ranking system? In the first place, it has been shown that teaching and research activities and academic productivity of Mexican faculty behave quite orderly in relation to the proposed ranking system, which captures significant variations of these two central aspects of academic work. Based on the level of training and research performance of Mexican faculty, as well as the relevance assigned to highest academic degree by public and institutional policies, the SNI-HD ranking system was built to be closely associated with highest degree and, on the other hand, with the membership to the National Researchers' System (SNI), which is a nationwide merit-pay system based on proven levels of research productivity (referred publications essentially). It is our contention that the proposed SNI-HD ranking constitutes a supra-institutional academic rank system for all FT faculty working in public HEIs: it constitutes a series of stages, it requires time and meeting a set of criteria, and, finally, it has associated to it an increasing set of benefits, most obviously prestige and income.

Second, comparisons of academics in different SNI-HD ranks showed that, in the Mexican case and beyond a certain level of teaching activity (around 8 h of classroom instruction and an additional seven of complementary teaching activities), teaching and research activities are inversely related, particularly at the level of undergraduate academic programs. The same holds for productivity measures like number of publications reported in last 3 years and number of undergraduate students attended during the current academic year. When considering number of graduate students, however, there are signs of a positive relation between teaching

and research. The intensity with which graduate teaching takes place, however, is so low that it does not modify the general relationship between teaching and research. Mexican higher education system confronts a very important challenge in terms of increasing student enrollment rates from about 30 to 50 and even 60 % within the next 10 years, but, at the same time, there is an increasing pressure for academics to increase their contribution in science and technology (ANUIES 2012). The data presented should be considered in the design of an appropriate strategy, as it shows that left to its own dynamics, more teaching implies less research.

Third, faculty members that are more involved in research are more recognized and, moreover, have a larger income than faculty more involved in teaching. The extra income, however, is based in a disproportionate way on income coming from merit-pay systems. Of these, the most important, the SNI membership, is administered at the federal level, so research-oriented faculty are faced with the challenge of having to respond to two, not always aligned, sets of rules in order to maintain their status. This might be related to the fact that, despite high levels of affiliation to the unit in which they work and to their institution, SNI members reported lower commitment levels to both of them than Non-SNI Licensure academics. Such arrangement, on the other hand, has an important negative side effect. Because such an important percentage of an SNI member income comes from the corresponding federal agency, they are forced to be more attentive to the dynamics of such agency than to the dynamics of their local institutions. There is evidence, in this respect, that in many HEIs local academic life, including particularly faculty participation in the governance of the institution, is not being attended properly by SNI members.

Associated with the way it is structured and its growth, Mexican higher education has kept bringing in faculty without a doctorate or, even more so, without a master's degree: four out of ten new faculty members hired during the 1999–2007 hold a licensure as their highest degree, while only two out of ten hold a doctorate. This dynamic is creating and reinforcing two worlds of scholarship that, afterwards, institutions and governmental agencies will try to integrate by various professional development programs which, because they are targeted at so large a number of faculty members, will require significant amount of institutional resources. However, the question remains to what extent these two worlds will be compatible given that one responds to an institutional teaching-oriented reality while the other is more related to an external agency decided to increase research.

Given the public agenda of the federal government in trying to reach an enrollment rate of 60 % by the year 2020 (Tuirán and Avila 2011), it is very important to promote an open discussion about the implications that such growth can have. In particular, such growth could separate more the teaching and the research worlds, much to the detriment of all those involved in higher education and society in general.

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