Chapter 9
University Service: Conceptions and Enactments of University Service in the Knowledge Economy: Case Studies from STEM Faculty in the USA

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9.1 Introduction

Service has long been considered one of the foundational responsibilities of public universities in the USA, along with teaching and research. Hence, faculty work has long consisted and been evaluated in terms of service, although research and teaching are more heavily weighted. The nature of service has, in some regards, been more varied and less clear than the nature of research and teaching. While research is easily determined by the number of publications, journal rankings, impact in the field (i.e., citation index, journal impact indicators), and teaching has come to be evaluated in terms of student evaluations and enrollment, service is more difficult to define and assess. Service is sometimes referred to as "almost anything outside teaching and research" (Weerts and Sandmann 2008, p. 92). Furthermore, service is typically considered secondary to research and teaching, sometimes even referred to as the "third mission" (Roper and Hirth 2005), "our lost middle child" (Brazeau 2003), and "the swampy lowlands" (O'Meara 2002a).

For all the changes in higher education, the university service function remains foundational to the public mission of US universities. For example, as indicated by the institutional association representing such institutions, more than 100 land-grant universities are engaged in "public service missions of educating students, seeking new knowledge, and helping to solve problems locally, regionally, nationally and beyond" (APLU 2012). While service, in its broadest form, may arguably include research and teaching, it is also considered a separate component that may involve serving in local, state, national, or international committees, professional

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associations, public outreach, and more. What research and teaching do not always encapsulate, however, is the university's public responsibility in extending its knowledge and services to the local and state context. Such a local and state role, historically in agriculture (land-grant universities typically have strong professional schools of agriculture, traceable to their origins in the late 1900s) and more recently in a wider range of economic and social arenas of development, makes for an interesting contrast with continental European universities, which have been central players in nation building.

Despite continuity in the significance of service and involvement in local and state communities, there are some indications that, with the rise of academic capitalism (Slaughter and Leslie 1997), the orientation and nature of service have changed—e.g., from service for free to service for a fee (Lee et al. 2005). The new knowledge/learning regime has involved new circuits of knowledge production in higher education, and a blurring of boundaries between the public and private sectors. In this chapter, we explore the extent to which these changes have translated into changing patterns of service.

The changes that are likely to come with academic capitalism and a market logic that shapes academic work are heightened with the pressure on institutions to generate more of their own revenues. The current economic downturn has shifted faculty work from producing public to private goods. We explore the extent to which that plays out in faculty service. As state appropriations in the USA continue to decline in relative terms and in terms of per student allocations, and as operational demands increase, universities are under increasing pressure to generate their own funds, beyond what states allocate. These alternative revenue streams might include increasing tuition fees, expanding fee-for-service programs, seeking industry partnerships, and emphasizing grants in determining research pursuits, to name some. In addition to increasing financially profitable activities and partnerships, core functions have also diversified towards entrepreneurial and technological development, altering the identity of universities as "flexible, economically responsive institutions" (Bird and Allen 1989, p. 583).

In short, faculty as a workforce and faculty roles are also being reshaped. As universities are downsizing the number of full-time tenure-track faculty (AAUP 2012), there remain fewer tenured faculty to handle internal administrative duties, such as governance and committee participation (Lounder et al. 2011).

With the preceding considerations in mind, this chapter briefly reviews the history of university and faculty service, and then provides case examples of how service is being reconceptualized in the new knowledge economy. There are three major conceptions of service in both the literature and our data. The first is that service consists primarily of activities that support institutional structures, i.e., committee work at the departmental or institutional level. This is a view put forward by many of the faculty. Second, service is also outreach to the community. This view is historically based but is becoming less evident as market interests are pervading faculty work. Finally, service is being framed as building university partnerships, often with economic and revenue-generating goals in mind.

9.2 Literature

The onset of university service in the USA commonly refers to the late nineteenth century, with the passing of land-grant and cooperative acts. By the 1800s, higher education emphasis expanded beyond educating the relatively few to benefiting a broader range of students in more practical and applied areas of study. The Morrill Acts of 1862 and 1890 were instrumental in the process. Four-year land-grant universities were established to serve the state and its citizenry. These acts provided federal land to the states and endow "land-grant" colleges towards the purpose of widespread education in agriculture, science, and engineering as a means towards economic prosperity. Since then, the Hatch and Smith–Lever Acts led to the creation and funding of agricultural experiment stations and cooperative experiment services, which, more importantly, formalized the role of the university in bettering the state and nation.

With the industrial revolution, including massive developments in transportation, manufacturing, and energy, came the rise of universities and the development of graduate education. By the late 1800s, graduate education was beginning to be established, further propelling specialized studies and strengthening disciplinary units within the institution. Following World War II and the eventual growth of the postwar economy, the National Science Foundation (NSF) was created in 1950, which provided significant federal funds toward scientific research. With the increasing emphasis on research has come some change in, and in some cases, declining emphasis on, service (Roper and Hirth 2005). Faculty loyalties to their disciplines began to take precedence over identifications with their institutions and local concerns, thereby appearing aloof from public life (Hollander and Saltmarsh 2000). With faculty emphasis and rewards on research and teaching, a divergence between the academy and public service emerged (Roper and Hirth 2005).

With the 1980 Bayh–Dole Act, which encouraged universities to patent government-funded research and then earn royalties based on the licensing of research findings to private industry, came the rise of the entrepreneurial university (Slaughter and Leslie 1997). The identity and logic of universities changed "from centers of knowledge to complex businesses with products to market" (Roper and Hirth 2005, p. 10). Since the 1990s, the conception of university service increasingly shifted from altruistic one-way giving to the local community (i.e., outreach and extension) for its taxpayer support, to more research-based scholarly "engagement," whereby universities engaged in a two-way relationship with society (Boyer 1995; Roper and Hirth 2005; Weerts and Sandmann 2008). While traditional forms of service exist, private partnerships are the new and emerging path of service. Economic development is now central to higher education in all forms of faculty work. However, while that pattern has been studied in the case of research and teaching, it is relatively unexplored in the case of service.

Service has traditionally been mentioned in almost every institution's mission statement, but less commonly has it been internally and externally clearly defined or fully incentivized (Holland 1997). Universities and faculty members are

renegotiating their conception of and commitment to service. In their review of mission statements, Weerts and Sandmann (2008) found that institutions tended to frame service as a transfer of knowledge to the public. Whereas the notion of public used to refer to state citizenry, it has, since the 1990s, expanded to include the global society. But while research brings prestige to a university, the institution has little to gain in their rankings from faculty who devote themselves to service (O'Meara 2002b).

Typical university and faculty service/outreach includes activities both internal and external to the university, and may involve partnerships with the community and industry. In this chapter, faculty service is used interchangeably with faculty outreach to better capture the extended scope of this type of activity. Internal service includes university or departmental committee work and handling of internal administration, while external service includes outreach, consulting, and service to one's professional association. While industry partnerships typically involve funded research, faculty members may engage in coordinating events, providing training, and lending expertise as a consultant. In addition to these examples, there are other forms of service that overlap with faculty teaching and research (Brazeau 2003).

Research on the topic of faculty service is limited but demonstrate positive regard for service, although it is not a priority compared to research or teaching. The latest national data of college faculty indicate that faculty at all types of institutions, on average, allocate the vast majority of their time to research (74 %), then teaching (28 %), and a much smaller fraction of time to service (12 %) (NSOPF 2005). In a survey of 4-year college faculty, 37 % of faculty devote no time to community service and 49 % allocate 1–4 h on this activity (DeAngelo et al. 2012). When asked to rate the value of their activities, 66 % of the respondents noted service as "very important" or "essential," while 71 % rated the same for research and 98 % for teaching.

Despite limited time allocation towards service activities, faculty tend to strongly support the idea of the university's public service mission. Among all 4-year college faculty surveyed, 85 % reported that they "somewhat" or "strongly" agree that colleges have a responsibility to work with their surrounding communities to address local issues. The same percentage believe colleges should encourage students to be involved in community service activities. Further, 71 % "somewhat" or "strongly" agree that colleges should be involved in solving social problems (DeAngelo et al. 2012).

Past research also differentiated faculty attitudes towards different forms of service. Moreover, Blackburn et al. (1991) found that faculty tend to report much less personal interest in internal administration (i.e., "serving on a campus committee, being involved curriculum revision, chairing a committee of your unit, and solving a unit problem") (p. 411) compared to research, but do engage in considerable effort to this undervalued activity. And when comparing public and professional service, faculty tend to refer to public service as service to the profession over the local region (Weerts and Sandmann 2008). Overall, such findings suggest that faculty support the idea of service, but tend to devote their service activities to professional associations and internal administration over service to the community.

Numerous reasons may account for a lack of affective commitment to civic engagement over other faculty duties. One is faculty members' greater commitment to a particular academic specialty that may not easily translate to benefiting overall society. Another is that faculty are socialized in institutions and professions that do not prioritize and, in some ways, discourage public engagement. Further, there are limited rewards and recognition for service compared to research and teaching when it comes to tenure and promotion. Further still, there is a prevailing (though unsupported) view that service comes at the expense of research, and that too much attention to service may jeopardize academic careers (Checkoway 2001; O'Meara 2002b). In other words, service is "discretionary time" (Checkoway 2001, p. 137). Moreover, salaries are negatively associated with faculty time in service in all 4-year institutions (Fairweather 1993). Further, faculty are rarely hired for service or held accountable to their service. And, in some cases, untenured faculty may avoid or abandon community engagement out of fear of job loss (Weerts and Sandmann 2008). The importance of the disincentives noted above is evident in Weerts and Sandmann's (2008) finding that faculty tended to be involved with community engagement if it yielded monetary rewards, special recognition, or enhanced their research or teaching.

Moreover, faculty have strong disciplinary affiliations that often take precedence over institutional loyalties (Lee 2004, 2007). Particularly in research universities, "cosmopolitan" faculty (in contrast to "locals") tend to seek recognition from their disciplinary over institutional peers, which then often translate to institutional promotion and rewards (Gouldner 1957). In the case of the USA, such shared disciplinary values tend to cut across the academic profession, beyond institutions. As such, it is not uncommon for faculty to change their institutional affiliation several times throughout one's career, but maintain, and often even increase, their professional status. The disciplinary recognition and rewards, however, are solely based on one aspect of their tripartite work—their research.

Despite the strong disciplinary cultures that continue to exist, institutions continue to shape faculty values and behaviors (Lee 2004, 2007). Universities have played an active role in promoting and supporting faculty entrepreneurialism over traditional public service/outreach, thus potentially reshaping the values of faculty across all disciplines. They have done so by providing space, human resources, venture capital, and formalizing curriculum with new entrepreneurial requirements (Bird and Allen 1989). Yet, sometimes what constitutes service is difficult to delineate. For instance, the dividing lines between faculty research and service become blurred when considering the university's role in spurring regional development. Faculty research commercialization may indirectly benefit state citizens in spurring the local economy via private industrial growth. In this case, linking research with entrepreneurialism, often in the form of knowledge transfer, has been classified as the "third mission" of universities, beyond education and basic research (Laredo 2007). In the current shift towards economic interests, service has been reconceptualized as private growth and has become an increasingly important university function.

Much work beyond the traditional faculty tripartite roles is unconsidered and undocumented; consulting is an example of this. Whereas there is evidence that faculty who engage in significant consulting activities in the community are more productive researchers and better teachers than those faculty who do not engage (Checkoway 2001; Lee and Rhoads 2004), the particular role of faculty consulting is still underexplored. Nevertheless, its existence speaks to the important linkages between industry and the academy, sometimes leading to more formal research partnerships, business ventures, and product developments (Bird and Allen 1989), particularly in the basic science and applied science fields (Lee and Rhoads 2004). More than ever before, universities are trying, mostly unsuccessfully, to become "incubator organization[s]" to spawn new business (Bird and Allen 1989, p. 587), again with implications for traditional conceptions of faculty work. Despite the possible blurring of faculty work, a national study of university faculty revealed a significant negative relationship between using funds for research and commitment to teaching (Lee and Rhoads 2004). Entrepreneurialism likely holds negative consequences for traditional service as well.

In the USA, as is evident in the data we report in this chapter, these entrepreneurial efforts do not follow the anticipated model of Mode 2, or context-driven, problem-solving, and transdisciplinary research. Part of the conception is put forth by Gibbons and his colleagues and identifies the emergence of fluid organizational structures that emerge and then disappear around specific problems, in contrast to the fixed, discipline-based departmental structures of Mode 1 research (Gibbons et al. 1994). The institutes and centers analyzed in this chapter constitute more fixed structures, coexisting with discipline-based academic departments. The flexibility lies more in the new categories of non-tenure-track faculty, and in new interstitial units between academic units and the external world, than in fluid organizational structures. Part of our analytical focus in this chapter is on whether and how institutes and centers, like universities, intersect with the external world in terms of service.

Faculty perceptions about service and partnerships are not uniform. Campbell and Slaughter (1999) found that faculty who work with industry tend to believe that collaborations with industry "should be considered part of the public service aspect of academics' responsibilities," and that any profit (private or university) were in the "public's interests," whereas faculty who did not have such relationships did not share such views (p. 324). There was a similar divide of opinions about university–industry profits being in the public's interests when comparing business faculty with those in the social sciences and fine arts. Moreover, Baez (2000) has argued that, for faculty of color especially, service is an important form of critical agency in changing educational and social structures of inequality. And there are many examples of such community-minded faculty service in the literature (Antonio et al. 2000; Bellas and Toutkoushian 1999; Kiyama et al. 2012). In these cases, the internal commitment to social change drove faculty commitment to service, sometimes even at the expense of other professional activities.

An emergent form of university and faculty outreach is charter-building activities with the local business community. In such cases, faculty get involved

with building the preferential access to employment and training for their students. For instance, a study of public community colleges and for-profit and private occupational colleges noted that the latter were more likely to build preferential access to employment (charters) by forming relationships that ensure employers of a dependable supply, type, and quality of students (Deil-Amen and Rosenbaum 2004). For the purpose of this study, chartering is mostly maintained and enhanced by reciprocal relationship-building activities between faculty and external agencies. It depends on trustful and authoritative information exchange that values relationships and will not risk losing them for short-term gains. This type of service activity on the part of faculty is realized without any revenue generation.

By contrast, there may also be entrepreneurial activity reflecting a market-driven approach in which activities and structures are established for the purposes of generating revenues. In this chapter, we explore the extent and mechanisms of each.

9.3 Methodology

Multiple case studies sought to explore how service is conceptualized at the institutional and individual levels. The research sites for this study were three public research universities (all university names are pseudonyms): (1) Midwest University (MU), (2) Midwest Central University (MCU), and (3) Pacific West University (PWU). MU and PWU are internationally renowned universities, more globally oriented, whereas MCU is a considerably less prestigious, regionally oriented university. All three are relatively large universities by US standards, with enrollments ranging between 28,000 and 41,000 students. All were established in roughly the same time period: the two Midwestern universities at the end of the nineteenth century, and PWU in the early twentieth century.

After reviewing numerous institutional websites, three universities were selected for three reasons. First, each of the universities' websites stresses the importance of community relations and recognizes a need to serve the communities. This was important given our interest in service generally, and particularly in the extent to which that service consisted of intersections with external communities. Second, the three institutions are comprehensive in scope, and represent three types of large research universities—an elite land-grant university (PWU), an elite non-land-grant university (MU), and a regional research university (MCU). Lastly, all three have large and active research centers in life sciences, physical sciences, and engineering fields, which is the focus of our work, ensuring sufficient populations from which to select participants.

Our interview sample consisted of 19 in-depth, semi-structured interviews. Participants were drawn from life sciences, physical sciences, nanosciences, and engineering research centers at each of the three university sites. Our focus is on centers, not traditional academic departments, because of our interest in newer, more fluid structures and sites of academic work. Our interviewees were restricted to faculty, but we included non-tenure-track faculty because of our interest in

changing and newer forms of academic staffing and academic production. We want to understand how newer structures of academic work translate into forms of service and connection to the community in a new, knowledge-based society. Furthermore, we purposely selected STEM-based centers. While there is ample evidence that faculty entrepreneurialism occurs across all academic disciplines, past research suggests that they mostly occur within science and applied science fields (Lee and Rhoads 2004).

9.4 Findings

From the institutional profiles and interviews, we can observe some major trends in how service/outreach is conceptualized at the institutional and individual levels. Our results highlight interesting patterns of continuity and change in the construction of university service, often within the same category of institution and employee. In other words, different constructions of service work coexist alongside one another. In this chapter, we concentrate on two key findings.

First, we found considerable differences in the ways in which the interviewees talked about their service, including in terms of how they perceived it in relation to their research and teaching. Some participants articulated a segmented perspective about their service, as compared to others who articulated an integrative orientation. Faculty who held a segmented view of service saw it as mainly associated with administrative, maintenance responsibilities that they perform internally, within their institution, or externally, for their profession. Moreover, these faculty described their service as being separate from their research or teaching activities. By contrast, faculty who held an integrative view of service saw this work as inextricably connected to their teaching and research. Moreover, these faculty tended to devote more time to service-related activities, to be more likely to see this work as more meaningful, and to engage in community-oriented service that went beyond their organization and discipline.

A second major finding concerns a distinctive form of service that appears to be connected to the emergence of more entrepreneurial activity in public universities in the past several decades. A number of faculty we interviewed described service/outreach activities that are very much analogous to active "chartering" efforts undertaken by colleges to establish important connections with particular groups in the community. In some cases, those activities were entrepreneurial in terms of having implications for revenue generation.

9.4.1 The "Segmented" View of Service

The "segmented" view of faculty service meant that service/outreach took mostly administrative forms and was described as not being directly connected to research

or teaching. When asked what forms service takes in their academic activities, a majority of the interviewees mentioned that service consists primarily of activities that involve the maintenance of institutional and professional structures. Within the university, the dominant form of such service is committee work. External to the university, a common example of such service was serving on editorial boards of academic journals.

These participants indicated that there is very little overlap between service work and their teaching and research. They considered service as, for the most part, independent from teaching and research. A physics professor at MCU offered a typical response to this effect: "I certainly try to bring in aspects of contemporary physics research into teaching, so there's a certain amount of cross talk there. But I wouldn't say that there's a significant overlap [with] service in any way" (Hirschi, Professor, MCU-Physics). Similarly, a research scientist at the MU's Transportation Institute provided the following answer to the question, "Are you required to do service activities in your position?": "Ah, yeah, the service activities are—like committee work. Yeah. I feel like those are kind of necessary things I have to do and they don't really benefit my research, or my teaching" (Bingham, Research Professor, MUTRI). As exemplified in the latter quote, faculty sometimes considered service a required duty that yielded little benefit to their professional advancement.

Although these faculty members viewed service as work that was necessary to maintain the organization and/or their profession, they did not express any real investment or intellectual effort in service work. It did not appear to be particularly meaningful to them. Some saw service as a "necessary evil"—a requirement or load that they had to carry out within the institutional structures, and, in some ways, a distraction from their real work of research and (to a lesser extent) teaching. Thus, there was little creativity or innovation in this realm, as service was considered mindless, unimportant work.

Such views were held by faculty at the three institutions across all ranks and types of appointment. The Transportation Institute at the MU is a case in point. The institute is home to a large number of non-tenure-track research scientists. As research scientists, these individuals are not expected to do any teaching, but they are expected to do service. "Part of what we get judged on is service. So for instance I'm an associate editor of a journal—that's service. I serve on committees at MUTRI, so I do those sorts of things. And that does count towards promotion" (Eby, Research Scientist, MUTRI). Service activities at the institute take the form of committee participation in the institute, the university, or in external entities such as academic and professional associations, journal boards, or conferences (e.g., as organizers). In some cases, student advising and mentoring were also cited as examples of service work (whereas others categorize such activities as teaching). But for these faculty, there are few to no service activities that involve the immediate community or region (individuals may pursue such endeavors; they are neither encouraged nor discouraged by the institute).

Some subtle differences exist in the segmented group regarding the extent to which they see overlaps between their service work and their research and teaching activities. For example, for some participants, committee work does intersect with

research as a way of maintaining the structure that supports the research. A physics associate professor at MCU expressed this view: "There's certain committees that I've served on at the university level that dealt with, say, internal funding for research. I guess you might say that at some level connects to what I do, as far as research is concerned" (Tycner, Associate Professor, MCU-Physics). An assistant researcher at PWU estimated that "90% of my activities are research, the other 10% involve helping with different activities for the day-to-day maintenance and management of the facilities [at my institution]" (Reed, Assistant Researcher, PWU-Nano). For these participants, the main aim in committee participation is to contribute to the internal organization of the institute, as well as to build up each faculty's portfolio in preparation for tenure/professional review.

Most interviewees who subscribed to the segmented view of service were quick to point out that service is not connected to research. Still, a common pattern among these participants was to categorically state the divorce between research and service at the outset, but then to proceed to provide examples in which service and research do overlap somewhat. These instances were constructed as exceptional and temporary, as in the following example of a faculty member who contradicted his own perspective on the overlap between service and teaching:

Interviewer	To what extent do teaching, research, and service overlap in your work?
Participant	Um [pause]. So, service doesn't really overlap—service overlaps right now with teaching in that we're trying to change the curriculum, in the curriculum committee. So I have that overlap there. The research doesn't overlap with service... there is some overlap with teaching. (Mueller, F, Associate, MCU-Chem)

Similarly, a research scientist who had said that service has little impact on his teaching and research mentioned that his service activities include membership in statewide and national committees on driver safety. "There have been a couple of occasions when I was asked to be on committees outside of the university because of my expertise on certain areas of research methodology, but it's usually the transportation safety stuff" (Bingham, Research Professor, MUTRI). Although this research scientist sees research as disconnected from his service, his participation in this type of advisory board is certainly linked to his research expertise. It may be that, in this regard, some adherents to the segmented view of service are expressing a deeply held conception of service as undesirable and lacking importance. That may lead them to downplay the extent to which service is linked to other scholarly activities, which is an important indication of professional values. Application of their work to local practice may be perceived as degrading their first professional priority and identification—their research.

The segmented view of service is understandable, even predictable. That is how service is framed in the way it is evaluated in universities. Indeed, in this regard, our findings are consistent with the literature on faculty rewards and recognition (Checkoway 2001). As pressure increases to do more grant work and be better at

teaching, what gets squeezed out? The answer is the investment of time in and commitment to service.

Indeed, a common theme in the interviews was the growing importance of research at the expense of teaching and, more pressingly, service. One adjunct professor at PWU blatantly stated that the reality of research universities in the USA is that "research [comes] first, teaching second, and service to the community and the university third" (Maida, Adjunct Professor, PWU-IoES). Another professor at the same institution mentioned that, over time, "somewhat more credit is given to teaching, but not very much to service at all." He made a connection to the need to bring extramural funding and the growing focus on research, to the detriment of teaching, but mostly of service work:

> The fact is that even to this day advancement depends on your scholarship, the quality and quantity of your scholarship, and how much extramural funding you bring in is a very important metric for advancement as well, which can have both positive and negative aspects to it. That's the reality in an era where the funding of the university has fallen to 15 percent by the state. Basically we're becoming a private university and we need to bring in tremendous amounts of extramural funding; so that is increasingly emphasized (Winer, Professor, PWU-IoES).

In fact, none of the interviewees expressed any external pressure to increase any participation in outreach or community-related service.

The pattern of faculty reducing time devoted to service as they and institutions increasingly emphasize research was evident even at the regional teaching and service-oriented university in our study. An associate professor of chemistry commented that, "From what I hear from especially the time before I came, I think the service has gone down a little bit." This shift involves moving some of the service responsibilities to more senior faculty. "What the new chair is trying to do is to give [new faculty] a little less exposure on the committee side and put the older people, you know, that already have tenure, experience, and give them a bit more time on the committee work" (Mueller, F, MCU-Chemistry). This is a multifaceted phenomenon. On the one hand, there is an institutional pressure to conduct more research, even in institutions historically committed to teaching and service (MCU). That burden reflects a longstanding historical pattern of aspirational academic drift (Rhoades 2007; Riesman 1959; Tuchman 2009) and, yet, it also reflects the increasing pressure and aspiration of generating new revenues through external research grants.

Such a pattern of academic drift is a function not only of academic administrators' aspirations, but also of the aspirations of the faculty, some of whom, particularly those in the sciences, support this transition. New faculty are hired and encouraged to prioritize grant-funded research. Even institutions without a history of research productivity may hire new faculty, particularly in STEM fields, based on their research prowess and potential to generate grant revenues.

In short, then, for these faculty members, there is a zero-sum game operating in regard to research and service. Some faculty who had a segmented perspective of service, nevertheless, believed that their teaching overlapped with research (Brazeau 2003). But such a meaningful intersection did not apply to service.

9.4.2 The Integrated View of Service Work

In contrast to the segmented view, other participants saw service as an integral aspect of a public institution and, often, as very much connected to their teaching and research. The integrated view of service suggests that the nature of academic work is such that the three core functions (teaching, research, and service) are interconnected. Notably, faculty with this perspective identified some types of service work, such as sitting on committees, similar to those identified by faculty with a segmented view. The difference lies in the way such work was interpreted in their scholarly lives. For example, when asked to what extent teaching, research, and service overlap in his work, the director of a nanotechnology center at PWU said:

> Oh, very much. I mean, that's really all what we do in laboratories, basically to teach students and postdocs... The special thing here is the proximity of our Institute is next to Science, Engineering, Medicine, Public Health, Neuroscience, and Psychiatry, so part of the exciting thing here is bringing everybody actually together to work together.... So when we do teaching and generally, and closely tied research and then service – you know, my own service involves the journal, which ties nicely to my work and it broadens my own knowledge and where the field is. I work with the federal government in terms of grant reviews and advising to the Office of Science and Technology Policy that also is another place for me to learn something in addition to contributing back ideas when I review manuscripts for other journals (Weiss, Director, PWU-Nano).

In contrast to many who held a segmented view of service, this participant not only possesses an integrated view of his work, but also demonstrates noticeable enthusiasm and conviction across all his activities.

Some of the adherents to this integrative view of service indicated that it is, at times, challenging to tie service to other areas of their work. A physics professor at MCU said that, because of his disciplinary affiliation, it is not always possible to link service to research or teaching: "There's not a lot of physics involved in, you know, the library committee work and that sort a thing." However, one way in which he tried to tie service with his academic work was through organizing public lectures. "To me... it's a lot a fun to bring interesting people here, talking about interesting things that the public might be curious about. So that's, that's a kind of service that you can do that overlaps pretty strongly with your professional work" (Jackson, Chair, MCU-Physics). According to this professor, such service is a "fun" aspect of his job, but ties in closely to his scholarly expertise.

For some faculty members who took the integrated view of service, the latter took on a dimension of translating science into public policy. Although, at the institutional level, public policy creation as a type of service work was highly visible at MU and MCU, this orientation to service work was articulated particularly strongly at PWU and MU. For example, at PWU, faculty associated with the Environmental Institute spoke of trying to influence environmental public policies as an important component of their service work. An adjunct professor stated that he does advocacy work by "working with lawyers trying to implement policy, and so we have some donors but we're primarily grant driven; write grants, get grants,

and do things" (Longcore, adjunct, PWU-IoES). Another professor in the same institute provided an extended description of his advocacy work, and how it relates to his teaching and service activities, in terms of the case-based approach to teaching. As such, he tries to incorporate "both the science and policy aspects of my activities in the air pollution field from the past 40 years into my classroom work, into my mentoring of graduate students." Students are encouraged to think not only about the egregious effects of exposure to pollutants, but also about the societal, economic, and institutional barriers to addressing environmental problems:

> I used the battles we've had that I've been involved with over the years in trying to reduce vehicle emissions and other kinds of emissions in the [region where school is located]. I've used my own experiences in trying to translate science to decision makers and try always to be giving both past and current examples this role that I think a scientist has in the environmental and sustainability area of trying to interpret what the basic research means or the applied research means for making appropriate decisions to reduce air pollution impacts, in my case, on vulnerable populations (Winer, Professor, PWU-IoES).

This advocacy orientation of translating scientific knowledge into public policy (not just of informing policy) can also result in major initiatives to impact policy. A professor of ecology was a founding member of a non-governmental organization (NGO) based in Washington, D.C., whose mission is to improve the scientific basis of environmental decision-making. The NGO, which has an annual budget on the order of 3–4 million dollars, holds annual conferences on a wide range of topics, such as food security and environmental health. For this faculty member, the creation of such an organization was an outreach effort to "deal with my feeling about we need to have a society that's more literate about science, particularly on environmental issues" (Hubbel, Professor, PWU-Ecology). That orientation of increasing scientific literacy is, in some ways, quite consistent with initiatives in the NSF to support efforts to educate the public about science, though it also has an advocacy, to shape public policy orientation, as well.

Faculty perspectives about service may be influenced by their interdisciplinarity. For example, the above examples come from faculty working at an environmental research institute, whose disciplinary training is in ecology, environmental sciences, and related fields of study. At the same time, this orientation has a more generalized focus on science than on a particular scientific subdiscipline.

Yet, it is not only the scientists in the institute in question who articulated this view. An adjunct professor at the institute, who is an anthropologist by training, made the connection between his view of service and his disciplinary affiliation. This professor stressed that, "as an anthropologist, you don't just take from people to move up in the hierarchy. You're giving back." A central aspect of this scholar's work is community-based participatory action research, an approach to conducting research that seeks to effect meaningful impact or change. The ethics of this approach stipulate that community members and researchers must be involved in the entire research process—from defining the problem to publishing the findings. In this way, researchers cannot remain outside the community but must, instead, become a part of it. Over 15 years "of tremendous outreach and advocacy," this

adjunct professor has built a network of nonprofit organizations ranging from community-based, resident-focused organizations, to professional organizations. His strategy to building these networks relied heavily on emphasizing the service aspect of his work. "We didn't want to go in there as researchers, we wanted to go in there first and do service and now we're beginning to be seen as a partner rather than coming over the hill and basically turning them into research subjects." He then transfers his research and service activities into his action research courses at the Institute of Environment and Sustainability. "So that works, so there's my teaching, there's my research. . .. It's all connected" (Maida, adjunct professor, PWU-Public Health).

The community-based and oriented research that is articulated by faculty in the above institute is also promoted at the institutional level by the university in which these faculty members are employed. That suggests some sort of organizational effect on or pattern to faculty orientations to service. Many of these initiatives come from the School of Public Health, which is the unit where this professor holds his adjunct appointment. The School of Public Health houses a Community Health Promotion Program that supports community service projects to benefit poor and underserved communities. Moreover, community-based research is also a central component to other university initiatives. For example, the university offers a number of minor programs that stress this type of scholarly work, including a civic engagement minor, Urban and Regional Affairs Minor, program evaluation, leadership, labor issues, peer mediation in K-12 settings, legal issues, immigration issues, research on education, and healthcare issues. The institution also provides a number of community-based research/travel grants for undergraduate students. Through various mechanisms, then, a university can foster and encourage patterns of service that involve an integrated approach.

9.4.3 Chartering and Entrepreneurship

A second major finding about service is the emergent types of activities that seem to reflect important aspects of academic capitalism (Slaughter and Leslie 1997; Slaughter and Rhoades 2004) as higher education institutions intersect in various ways and through various mechanisms in new circuits of knowledge production. Two patterns emerge from the data. One we characterize as "chartering" (Deil-Amen and Rosenbaum 2004), by way of faculty forming connections to facilitate the placement of students in training activities and in the workplace without financial gain. A second is entrepreneurship driven by market forces that foster relationships with community industries to generate revenues.

Much of the service/outreach work carried out by the interviewees consisted of activities aimed at securing job placement and/or training for students. Instead of simply relying on the human capital and credentialing benefits of a college degree, faculty and institutions may actively cultivate relations with employers, essentially negotiating a charter that legitimizes their students. For example, part of the service-related activities of a computer science professor at MCU involved

maintaining relationships with different companies in the region. The primary purpose of these linkages was to provide work opportunities to students. The professor works closely with a public utility company that hires many of his graduating students. This type of work involves careful consideration of the external partners' needs. "I contact them and they contact us. We talk about what we could do to help strengthen our program and strengthen our students' backgrounds to meet the company's needs."

Expressing the tensions of academic capitalism and the blurred boundaries between public and private sectors and purposes, the professor spoke of "a fine line" between catering to the company's needs and "design[ing] my students so that they can work at [public utility company]." Yet, the company's feedback was invaluable to ensure that the students received the necessary training to secure jobs upon graduating. This relationship and others like it, therefore, goes "back and forth" in an ongoing negotiation of who public universities are serving, the extent to which it is the interests of employers, students, and society.

A chemistry professor at the same institution described another type of service involving partnership work. Specializing in chemistry education, she has established networks with various constituencies in ways that bring together her teaching and service. "In my methods classes, I have the students who wanna become teachers. Often we go out into the local schools and do practice lessons with their own student—with their students." Likewise, as the regional organizer of an international chemistry Olympiad, she works with area teachers to find students interested in participating. For this activity, she also works closely with a volunteer who works in the chemical industry. "It's, you know, people who are interested in getting more involved with outreach with students in local schools" (Tomasik, Assistant professor, MCU-Chemistry). These two examples exemplify a chartering model of service/outreach in which faculty establish and navigate networks of employment or training for their students by forming relationships that ensure private and public employers of a dependable supply of graduates.

Although the examples provided were of tenure-track or tenured faculty, this particular intersection between chartering and service is also found among non-tenure-track faculty. So, the bridge-building function, although certainly carried out by tenure-track faculty, is not confined to them. Just as non-tenure-track faculty engage in segmented and integrated forms of service, we also found research scientists, adjuncts, and administrators engaged in chartering (as well as entrepreneurship) service. Indeed, adjuncts and research scientists spoke of being heavily involved in service activities—some of which took the form of student advising, lectures, and conferences with an important teaching component.

However, despite the extent of their service/outreach, in some cases, non-tenure-track faculty receive little or no credit for this important work, either by the institution or by tenure stream faculty. That may be particularly true when service does not take the form of committee work. A physics professor at MCU offered this view of adjuncts' and postdocs' academic responsibilities: "The temporary faculty... have a pretty heavy teaching load, and they will occasionally come to department meetings, but they don't have committee responsibilities, they don't have other service responsibilities; it's pretty much just teaching" (Jackson, MCU, Physics).

Depending on the type of appointment held by non-tenure-track faculty, there were some differences in terms of service expectations. For example, at MU, research scientists, but not adjunct faculty, are expected to carry out service activities. In fact, at the Transportation Institute, the annual staff review includes a section on service. As with tenure stream faculty, service takes the form of participation in institute or university committees: "We are expected to do service; part of what we get judged on is service. So for instance I'm an associate editor of a journal... I serve on committees at [the institute]. And that does count towards promotion" (senior research scientist).

Another type of service/outreach that relates to chartering is activity that involves faculty brokering relations among various groups and units within the university, as well as between universities and external constituencies and entities. For example, one research scientist who had a particularly strong record of conference organizing observed that this type of service activity is highly beneficial to his work. According to this participant, organizing conferences has a variety of uses. "[T]hey create a linkage between myself and the rest of the university, because I actively seek out speakers from other parts of the university to present their research at the conferences. They [also] help me make contacts with students." Although, as a research scientist, this interviewee does not hold teaching responsibilities, his service work actively puts him in contact with students who might be interested in doing research with him. More importantly, the conferences, which feature numerous industry representatives, are free to the staff, faculty, and students at the MU. This setup allows this participant to foster connections between faculty, students, and industry, which can, in turn, lead to different research and work opportunities.

One of the interesting aspects of the above activity, which sets it apart from entrepreneurial service, is that the direct aim is not revenue generation. Thus, the conferences are free to various parties. Rather than utilizing the conference as a revenue generator, the purposes of the conference are driven by partnering and chartering purposes.

Thus, adjunct faculty (as well as tenure stream faculty) can also act as important brokers in partnering and chartering. An adjunct faculty member at PWU mentioned that the extent of his service expectations at the institution is limited to attending faculty meetings and serving on a curriculum committee. However, his teaching appointment involves running an environmental science practicum for senior students. The practicum requires students to spend a term in a lecture and lab environment, and an additional two terms working on a project for off-campus clients. The latter part of the practicum calls for a great deal of interaction with businesses, nonprofit organizations, and government agencies in which the students will be placed.

> I solicit all of the clients, select them; there is usually about twice as many as projects we can do. And then I coordinate all the project advisors who range sort of from very advanced graduate students to full professors. I advise a couple of groups myself, make sure everybody is else is on time through the winter and spring, and then give them some career advice and send them on their way.

The importance of such external connections is considerable. So much so, that this interviewee considers the fostering of these relationships as his main

contribution to the institution. The practicum "is a good way to introduce companies to what the institute does. And [when] we're looking for corporate sponsors, I'm basically serving as a gateway drug to the institute by inviting them to apply to be a client for the practicum" (Longcore, adjunct, PWU-IoES).

In a way, the partnering and chartering work brings these academics close to the kind of interstitial work described by Slaughter and Rhoades (2008). Interstitial organizations are intended to facilitate the interaction and intersection of higher education, state, and market organizations. Faculty and academic units in the science and engineering units have been important drivers in the creation of interstitial units (Slaughter and Rhoades 2008).

One of our interviewees was the director of such an interstitial unit in environmental science. Although her work is very research driven, she estimated that up to 85 % of her time is spent in what she called "outreach partnering" efforts, especially with state and federal agencies such as the U.S. National Park Service. Her work involves "understanding what these agencies are doing, helping to develop a research agenda and prioritize, making connections, better understanding who does what within the university." An outreach component of her work is the organization of public lectures in coordination with state partners. "We have this big international conference... we participated in a science festival that the park service had that was geared toward K-12 kids" (Federico, Executive Director—PWU La Kretz Center).

While interstitial work is often assumed to connect the university with the external commercial world (Fisher and Atkinson-Grosjean 2002), the "chartering" work described here seems to have more diversified aims, including but not limited to linking students to potential employers and creating goodwill towards the institution.

A second form of distinctive partnering activity is entrepreneurship. Yet, the extent to which faculty engage in entrepreneurial activities is limited, and varies considerably. For some of our participants, entrepreneurship grew out of other non-entrepreneurial service activities. For instance, an associate professor who specializes in chemistry education mentioned an instance in which her teaching and service work took an entrepreneurial turn. As a doctoral student, this interviewee was part of the education and outreach group within a large center specializing in nanotechnology. As part of her work in the center, she developed an online course in nanotechnology for K-12 teachers. After completing her doctorate, she continued collaborating with researchers at the nanotechnology center, while expanding the online course she created. The course also serves as a platform for her to conduct research on online learning environments in chemistry education. "I survey the teachers in the course [to] see what the best way of representing the material is. And then ultimately I assess them a year later to see if they have used what we gave them in the course" (Tomasik, Assistant professor, MCU-Chemistry).

The entrepreneurial aspect of the course is that it is offered through the university's professional education program—an academic unit that prepares teachers and other school professionals to work in K-12 settings. This program,

which is independent from the institution's school of education, focuses on online learning. Being able to offer her course through this professional education unit has been beneficial financially to the unit, although it has been more expensive to the students. It has also enabled the course to reach a wider audience. "Before I got here, [the course] was offered through [the participant's alma mater], and they did not have sort of a separate online division that we could offer it through, and it just was a lot more expensive." In contrast, the professional education program at her current institution "has a lot of networks, a lot of advertisements throughout the whole country. . .. So we're able to recruit a lot of people for the online courses that way." The unit is a quintessential example of an interstitial unit developing in an academic capitalist knowledge/learning regime.

Although the interviewee was glad that her course was so successful, it was interesting that her knowledge of how her work was used by the institution was rather vague. "I hear there's many different MCU sites across all of the country. . . I'm not familiar with it I'm sorry." When the interviewer asked for more details about the reach of the professional education unit, the participant said, "When I've met with the [unit] representative, they [said the unit is] mainly stationed here on campus, but they talk about having—I guess they call them 'campuses' all across the country. And it sounded like it was very far reaching."

The above example provides an interesting window to the different ways in which the service work of individual faculty can be capitalized upon by an institution seeking to generate revenue from that activity. For the chemistry professor, developing her online course was a way of integrating the research, teaching, and outreach work she began as a doctoral student. For the institution, unbeknownst to the faculty, it was an opportunity to capitalize on a faculty member's intellectual property. The university took a service activity and injected an entrepreneurship dimension to it by making it part of a fee-for-service program (the professional education unit generates about $13,000,000 in tuition revenue annually).

The discrepancy between how individual faculty and institutions conceive and carry out service/outreach work is noteworthy. The faculty we interviewed seemed to think of for-fee projects more as consulting, not as service. Indeed, most interviewees had clearly distinct categories for "consulting" and "service" work.

By contrast, however, for the institutions, there was no distinction between service and making money from the activity. Indeed, universities have shifted from service-for-free to fee-based services. For instance, on its website, MCU frequently called attention to the many venues through which faculty and students reach out to the broader community. One of the most prominent examples was the "community connections" program, an online database that provides a list of faculty and staff members who are available to provide expertise services to the community. Available expertise ranges from arts and diversity training to health services and geographic information systems. Faculty and staff who offer their services through this directory specify their area of expertise and availability, as well the remuneration system for the services provided. The MCU website emphasizes that these and similar services offered by the institution are available for a fee (though at a lower cost than in the private sector). Similar clearinghouses

to locate institutional for-fee services were also foregrounded as part of the outreach activities of the other two institutions analyzed.

Although in the examples mentioned above the institution appears to be the main driver of initiatives that blur the distinction between service and entrepreneurial activity, some faculty are involved in similar endeavors. For example, the director of an energy institute spoke about the connection between service and entrepreneurialism. This faculty member mentioned that sitting on the advisory board for high-tech startup companies is not only a tacit requirement for faculty in his field of study, but also an important component of his outreach work:

> There's a lot of community outreach that we do, but that comes more with territory of being the director of the institute. For example, sitting also on advisory boards for several entities... I'm also on the advisory board for the high-tech startup companies. I'm the cofounder and also part owner of two high-tech start-ups, which is now almost an expected norm, at least in the Engineering College, that faculty transfer their know-how into business development and help launch operations (Schwank, Professor, MU-Phoenix).

The above interviewee also elaborated on what he saw as an increasing institutional expectation for both faculty and students to be involved in entrepreneurial activity. "Many of our students [are] heavily involved in entrepreneurial activities. Our university has very interesting and successful programs in entrepreneurship." As an example, he mentioned an "entrepreneurial boot camp" cosponsored by his institute, the university's college of engineering, and a local utility company. "We are mentoring teams of students who have essentially some ideas for new technology and helping them build a business plan and to get mentored by venture capitalists and also by professors at the university." After 6 months in the program, the ultimate goal is to help students launch a company. "Then, the university is actually inside venture capital to help these students get off the ground." According to the interviewee, this type of entrepreneurial activity constitutes "a totally different look at undergraduate education... [T]hat's certainly a new development that I've seen evolving in the last 5–6 years." The above situation illustrates how blurred the lines between service/outreach and entrepreneurship have become.

9.5 Conclusion

As higher education has changed, so have conceptions and enactments of faculty members' service. The changes apply both to institutions and to faculty members themselves. Much has been written about academic capitalism's impacts on the research and (less so) educational activities of faculty. Very little consideration has been devoted to service.

It is clear in research and teaching that academic capitalism has impacted the daily work activities, expectations, and conditions of work for faculty. Indeed, it has changed the very meaning of faculty. What, then, of faculty's service work?

As with research and teaching, it is clear that, in some important regards, elements of previous and/or competing knowledge regimes continue in conceptions of service. The most prominent example of this is faculty's committee work. Across

all settings, and even across different segments of the faculty, committee work is both common and most commonly recognized as service.

In addition, it is evident that the most common forms of service continue to be focused on the organizations and professions in which faculty are situated, more than in the communities in which they are situated and constituencies they are serving. Faculty engage in service for their academic unit, university, and discipline. And many construct that work as segmented, distinct, and largely isolated from their research and teaching.

Nevertheless, a number of faculty adopt an integrated conception of service. They speak to ways in which that work intersects with and informs their research and/or instructional activity. For these faculty, service tends to be seen as more meaningful. And they tend to invest more time in service than do faculty with a segmented perspective.

Two other types of service work emerged from the data. Both involve partnerships and new circuits and networks of activity and knowledge production. One form, which we have called chartering, involves faculty establishing connections with private and public employers, by way of linking students (especially as graduates) and employers. Although such linkages certainly benefit the university and help to secure employment for students, the direct, short-term aim is not revenue generation. By contrast, a second form of service is entrepreneurship, in which revenue generation is foregrounded in the brokering activities of faculty. That aspect of service/outreach work, however, tends to be promoted less by faculty than by institutions, through new, permanent, interstitial units growing in number and staffing. In addition, various categories of non-tenure-track, contingent faculty are engaged in such entrepreneurial "service/outreach" activity. Both of these patterns speak to the prominence of academic capitalism organizationally, as opposed to the Mode 2 conception of Gibbons and colleagues. And both augur the emergence of very different forms of service with different, and ironically in some ways, narrower ranges of beneficiaries than before, in a global economy.

9.6 Implications for Research and Practice

The findings of this study have implications on how faculty service is conceptualized and enacted. In regards to future research, faculty service is an underinvestigated area of faculty work in comparison to research and teaching. More studies that can further illuminate the many different conceptions of service that are held by faculty are necessary to clarify how faculty might be recognized and rewarded for such duties. While faculty service in relation to their professional associations and field, such as serving on editorial boards and elected positions, may heighten one's personal reputation and expand his/her networks, service in relation to their local community and department may have less professional payoffs but may be equally, if not more, impactful. Nevertheless, the latter aspects

of service can be more arguably tied to the university's service function and, thus, deserves recognition.

As faculty appear to be engaged in private partnerships more than ever before, entrepreneurial activities are now a significant and growing area of faculty service. Whether consulting, for example, is service remains debatable, but more research should clarify what exactly constitutes service and whether service should include anything that does not relate to research or teaching. The question of whether a fourth category of faculty work related to entrepreneurialism and fundraising might be considered.

Our research found that faculty who engaged in service that was directly related to their research and/or teaching found more value in their work compared to those who identified their service as being unrelated to their professional agendas. While serving on university and departmental committees are necessary for shared governance within the institution, encouraging faculty to identify greater connections between their intellectual agendas and university work is recommended. While making such linkages might be easier in some fields than in others, all faculty should be encouraged to participate in at least some service that they not only find interesting, but also meaningful.

Perhaps the areas of service that were not only scant but may be most threatened are local outreach and other nonprofitable service activities. We recommend identifying ways that faculty can be encouraged and rewarded for their service to assisting disadvantaged communities and other groups that depend on volunteerism to sustain their operations. Sharing existing faculty expertise and partnering with administrators are two possible ways that faculty can be involved without simply adding more to their already demanding workloads.

In conclusion, the future of the university's role in societal development will highly depend on how faculty service is conceptualized. At its current trend, private agendas and entrepreneurial interests will largely shape faculty service, with diminishing attention to local, nonprofitable needs. While faculty service is linked to research and teaching, it's important to acknowledge that research and teaching are also increasingly market driven. Thus, close attention must be paid to the university's distinctive service contributions, particularly for local groups that may be benefiting less as universities become increasingly entrepreneurial.

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