Academic Capitalism and Academic Culture:  
A Case Study

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Abstract

This case study investigated the impact of academic capitalism on academic culture by examining the perspectives of faculty members in an American academic department with significant industrial funding. The results of this study indicate that faculty members believe that the broad integrity of the academic culture remains unaffected in this department and they consider industrial sponsorship as a highly effective vehicle for enhancing the quality of education of students and pursue their scientific interests.

Key words: commercialization, entrepreneurship, academic capitalism, industrial partnership, academic culture.
Universities have been identified as key agents for the development of competitive research products and training institutions for skilful labor in the global economy (Slaughter & Leslie, 1997). Despite the significant and growing role of higher education in contemporary society, public funding has been steadily decreasing in the last decades pushing higher education institutions to seek other sources of revenues. This situation is a developing trend for universities throughout the world as the increasingly global environment has created shifts in governmental funding and policies, increased reliance on private and corporate funds, and increased administrative decision-making (managerialism) within postsecondary educational institutions around the world (Naeve, 2001). One of the greatest concerns is that these changes are occurring quite rapidly throughout the world with little time or attention being paid to the effects of these shifts on academic culture, the relevance of academic work, the attractiveness of the academic profession, the productivity of faculty to generate and disseminate knowledge, (Duderstadt, 2001). Public universities are responding to these external forces by maintaining and expanding revenues through market-like behaviors, a phenomenon called academic capitalism. Some of these market-oriented activities that are the subject of this study involve university partnerships with industry, commercialization of research through patents, and the formation of spin-off companies (Slaughter & Leslie, 1997; Slaughter & Rhoades, 2004).

The emerging situation described above has fueled concerns that academic capitalism might be negatively affecting traditional academic culture as faculty members engage in market-like behaviors such as partnering with companies and commercializing research ( Gumport, 2002; 2005; Mendoza, In press). These concerns focus on the potential incongruence between the values embedded in the various logic models that shape meaning and guide behavior of academic professionals who must increasingly respond to the complex demands of contemporary academic life. From an organizational culture perspective, the academic culture of faculty is driven by and manifested in multiple logic systems – including institutional, social and industrial. Institutional logic refers to institutional practices and symbolic constructions that shape organizations’ culture (Friedland & Alford, 1991). The social logic of universities is based on a range of societal expectations such as mass education, citizenship, and knowledge preservation and
advancement. Conversely, industrial logic, which has been introduced into the academic workplace through increased academic capitalism, is based on market forces, the contribution to society via economic growth, the training of a skillful workforce, and research with commercial applications. This coexistence of multiple logics in today’s academic institutions is generating tensions over conflictive practices (Gumport, 2002). For example, academics are expected to foster and disseminate basic knowledge as part of their social mission (Merton, 1957). However, some of the direct implications of industry-university partnerships documented in the literature include overemphasis in applied research and secrecy of knowledge (Campbell & Slaughter, 1999; Gladieux & King, 2005; Slaughter, Campbell, Hollerman, & Morgan, 2002). Reward structures constitute another area where major differences between industrial and academic cultures exist (Mendoza & Berger, 2005; Slaughter & Leslie, 1997). The academic profession is driven by intrinsic motivation and rewards have historically been based on the fascination of research, the enchantments of teaching, and prestige rather than on material or monetary incentives (Clark, 1987).

Given fundamental differences among these logic systems, faculty members participating in academic capitalism might move away from values such as altruism and public service as they move towards market values (Slaughter and Leslie, 1997). This study is designed to provide empirical evidence regarding the impact of academic capitalism on academic culture by examining the perspectives of faculty members in a department with significant industrial funding.

**Theoretical Framework**

Kuh and Whitt (1986), drawing from the works of Allaire and Firsatro (1984), Becher (1984), and Clark (1970), provide a framework for analyzing culture in higher education. This framework has four layers of analysis that portrays culture in institutions of higher education as a dynamic system shaped by the interplay of these cultural layers. The four layers in question are: the external environment that surrounds a given higher education institution, the institution itself, subcultures within the institution, and individual actors. The external environment layer is characterized by the continually evolving nature of colleges and universities according to the interactions between conditions in the external environment and
the needs and concerns of groups within the institution (Tierney, 1988). The institutional layer refers to the different cultures present across types of higher education institutions. Some elements involved in institutional culture include size and type as well as the institutional mission, leadership, and symbols used to communicate values (Kuh & Whitt, 1986). For example, research at research universities is valued the most whereas in liberal arts colleges the highest value is given to interaction with students (Clark, 1987).

Numerous subcultures operate within higher education institutions, which correspond to the third layer of Kuh and Whitt’s framework (1986). Administrators, faculty, and students are the three most predominant subcultures in higher education. In addition, there are subcultures within these groups such as discipline-based among faculty, professional among administrative staff, and minority associations among students (Tierney, 1988). Another example is the case of subcultures within disciplines formed around people with different views about the discipline as it might be the case between clusters of professors who are more entrepreneurial and who hold values different from their colleagues (Slaughter & Leslie, 1997). Conflicts and tensions between subcultures are common, as is the case between administrators and faculty. Administrators tend to hold a managerial (Rice, 1986) or utilitarian (Etzioni, 1961) culture in opposition with faculty members’ core values of discovery and dissemination of knowledge through autonomy and academic freedom (Peterson & Spencer, 1990). Finally, the fourth layer includes the role of individual actors as shapers of culture such as presidents, heads of departments and individual faculty members. All agents participate in the construction of culture (Kuh & Whitt, 1986).

While the culture framework proposed by Kuh & Whitt (1986) focuses on the cultural complexity of college and university campus; Becher (1984) suggests that discipline-based subcultures are the primary source of faculty identity and expertise. Elements of disciplinary subcultures include assumptions about what is to be known and how, about the tasks to be performed, standards for effective performance, and about patterns of publication, professional interaction, and social and political status (Becher, 1984; Clark 1984). Some scholars assert that differences across disciplines have grater impact
on faculty than do individual similarities among faculty members (Becher, 1989). Moreover, Bowen and Schuster (1986) found that differences among faculty members were more related to disciplines than to type of institution. Similarly, Clark (1987) illustrated the nature of the academic profession as a multitude of academic tribes and territories of a widening array of disciplines and specialties. Departments are the main structure of higher education and their culture is a significant source of identity for faculty members (Becher, 1989). Finally, there is an overarching core culture of the academic profession based on the concepts of academic freedom, individual autonomy, production and dissemination of knowledge, collegiality, collegial governance, service to society through the production of knowledge, and education of the young (Clark, 1980; Morrill & Speed 1982, Ruscio, 1987). Given the multiple sources of influence and the complex nature of academic culture, this study uses a multi-layered approach for understanding academic culture as the basis for exploring how involvement in academic capitalism has impacted one academic department in an American research university.

**Research Question and Methodology**

Case studies that represent critical or unique cases are particularly useful to extend or challenge theories due to their revelatory nature. More specifically:

> Social researchers can opt to focus on instances that are anything but representative or typical. Extreme instances may be selected deliberately because they have certain qualities that exaggerate the influence of a particular factor that is of interest to the researchers (Denscombe, 2002, p. 147).

Guided by the approach described above and by other experts in the use of qualitative methodologies (e.g. Berg, 2004; Creswell, 1998; Denscombe, 2002; Yin, 1994), this study employs an embedded-case-study (Yin, 1994) as a strategy for studying a unique department that is heavily involved in academic capitalism and in which the faculty members themselves are the main source of empirical evidence. The primary research question that guided this study is: How do industrial partnerships within a specific academic context influence the culture of an academic department?
The department selected for this study is a top-ranked materials science unit in a large Research I University that exhibits a series of unique circumstances that provide insightful evidence related to the impact of academic capitalism on academic culture: the department is considered as one of the best centers in fundamental polymer science and the training of outstanding scholars, indicating high levels of academic achievement. Additionally, the department is heavily involved in partnerships with industry and attracts significant funds from businesses. We selected this department because we were intrigued by the department's apparent ability to be very successful at embracing what have often been portrayed as oppositional institutional logics.

The department studied has close collaborations with industry given the natural proximity of the field of polymer science to industrial applications. Industry-sponsored research in the department represents close to 30% of the total research sponsorship. According to several faculty in the department, this amount of industrial sponsorship is significant compared to most of the departments in the field, which according to these faculty, bring in 5% or less funding from industry. In the 1970s, the National Science Foundation (NSF) sponsored the establishment of a center in the department to promote interdisciplinary collaborations. Today, this NSF supported center integrates the efforts of over 20 faculty from various departments in science and engineering and has research collaborations and outreach programs with more than 10 other academic institutions in the nation. In the early 1980s, another center was established to enhance industrial interactions as part of the Industry/University Cooperative Research Centers (I/UCRCs) program sponsored by the NSF. The I/UCRCs were created to foster partnerships between universities and industry around industrially relevant fundamental research, education of scientists with an industrially oriented perspective, and transfer of university-developed research and technology to U.S. industry to improve its competitive position in the global economy. An I/UCRC often begins with a small grant to seed partnered approaches to emerging research areas for five years to a university professor, who is expected to form a team to run a successful center based on mainly industrial funding. At this point, the center is expected to be self-sufficient and supported mainly by industrial funds. The I/UCRC center in this department is one of the few centers of this kind that has survived
beyond the NSF support. Today, the center has more than 30 industrial partners and four basic programs of interactions with industry with specific guidelines and regulations. It mainly operates as a consortium where multiple companies invest into a common area of interest but it also channels sponsorships to individual faculty members around specific projects.

Semi-structured interviews of about one hour long were conducted based on the cultural knowledge around academic capitalism identified in previous studies (e.g. Mendoza, In press; Mendoza & Berger, 2005; Slaughter et al., 2004) with 10 faculty members from this department, who represent 85% of the entire faculty body. The interviews were transcribed and theme analysis was conducted in order to assess faculty members’ cultural knowledge guiding their behavior in light of academic capitalism.

Results

We have organized the presentation of the results through the identification of three main themes. First we describe participants’ general description of the department’s research and funding. Second, we discuss how faculty protect their academic values as they partner with industrial sponsors of research. Finally, we take a closer look to the implications of industrial funding to key components of the academic culture. Shared meaning was among the faculty as very few differences were found among participants. Therefore, unless explicitly stated, the results described represent the share view of faculty interviewed.

Participants’ Description of the Department’s Research and Sponsorship

Faculty unanimously concur that the main goal of the department is the training of polymer scientists followed by the production of fundamental polymer science, as indicated by the following quote:

If you think of the polymer science and engineering department, what is it that we sell? There are really two things that we offer; first of all, the scholarship that we perform, be it fundamental or applied, but equally or probably more important are the scholars we train.

This academically-oriented goal among faculty indicates the presence of a strong traditional academic culture despite the department’s active engagement in academic capitalism.
Professors believe that the department has a good combination of both applied and fundamental research as well as a balance across types of funding (private and public) as one faculty described: “The strength of this department has been the fact that we can marry the fundamental with the applied.” The faculty participants explained that their research is related to the fundamental physical and chemical principles of polymers but usually their research has clear technological applications, although several steps away from the actual manufacturing of a product in an industrial setting. In fact, several faculty members alluded to the notion that the boundaries between applied and basic research are very blurred in the field due to the nature of their work. However, they clarified that the department is very focused on fundamental science compared to other departments in the field, which are more product oriented or more interested in the development of new technologies. These views support findings from previous studies that have shown that faculty members in science and engineering have a clear sense that the boundary between academia and industry has changed (Mendoza, In press; Slaughter et al., 2004). For many faculty members in these fields, the "wall" between industry and academia is not present anymore, opening the possibility to a host of opportunities, but also providing surprises and even compromising situations for the integrity of the academic profession (Slaughter et al., 2004). Despite the fact that faculty in this department are mainly involved with fundamental research, they have also discovered materials that are worth to patent for future applications.

One faculty member indicated that faculty in the department are equally successful at obtaining both federal or industrial grants. Nonetheless, those faculty members who have been in industry for a number of years before becoming academics see differences between themselves and faculty who have not been in industry for extended periods of time. These faculty members recognize that faculty who have been in industry tend to think more about practical applications, which might facilitate their ability to attract industrial funds. In addition, some of these industry-experienced faculty indicated that faculty who have been in industry are better at dealing with people, sharing equipment and working collaboratively, bring different perspectives to their teaching and advising by being able to talk about real past experiences in industry and relate to the industrial world more accurately. These differences become clearer through
students' positive teaching evaluations of those faculty who have been in industry due to their ability to provide real world examples in their teaching.

Faculty believe that the department can afford to reject industrial funds at odds with their interests because of the reputations of its scientists and the large amount of overall funding that they enjoy. These results suggest that there is sufficient funding available and that it is the responsibility of individual faculty members to find sponsors and shelter their students from industrial demands by providing students with training in basic science that lead to publications.

I think certainly, we're at a point to negotiate. We have the luxury of being able to say no, and we're not so absolutely destitute or desperate that we almost have to take anything to make it work. I think a lot of companies appreciate our being very frank.

Some faculty mentioned that there are other institutions that tend to serve industry and bend their mission more in order to please corporate sponsors. One professor mentioned that once a long-lasting collaboration has been established with a corporation, there might be cases where faculty might service industry in very specific occasions. In these cases, an industrial sponsor usually provides support for a broader research program involving several students. Within that broader partnership, faculty in this department might agree to perform a few measurements for the company. Faculty justify this activity by noting that these measures do not typically demand a lot of time and energy on the part of the students, who at the same time are learning about how to conduct such specific measurements with sophisticated instrumentation. Faculty insist that this type of short projects might be looked as service to industry, but in reality, they provide an educational experience for the students, and it beneficial as long as it doesn't get on the way of students' main dissertation research. Faculty members assert to be aware of and to intentionally guard against the potential negative issues associated with such projects, for example one individual observes:

Some of these company projects, if you're not careful, they can be really contract work. Maybe the university has an electron microscope and all they
want is a technician to crank samples through those instruments and they can afford to give lots of money and it would be useful to train a student on those pieces of equipment in the short term. But that doesn't make science and it doesn't make a thesis, and so it's the job of the advisor to say "OK, well, your thesis is going to be partly of running these samples, and while you may be entirely funded at this, we've got to find something that demonstrates your full capability as a researcher."

It's a gray scale. If a company is supporting research in our lab and we've got a research project going, often times we have more intellectual liaison than just that research project. They come to the meeting, students and post-docs know the scientists, they talk about things and they get to a point that they say you know, "Geez you ought to get a photoelectron spectrum of that" and the company will send a sample and we'll get a photoelectron spectrum of it and send it back because it interested us, they're supporting our research, you know, makes the world a better place.

The Department's I/UCRC Center

Academic departments are affected in mixed ways by initiatives such as the I/UCRC centers given potential conflicts over intellectual property, secrecy of knowledge and exclusivity clauses against the formation of corporate-academia alliances. However, these organized research units (ORU) bring benefits such as the encouragement of interdisciplinary research, exposure to current industrial research and needs, additional funds, and job opportunities to students (Anderson, 2001; Gumport, 2005; Slaughter & Rhoades, 2004). The faculty interviewed in this study strongly support initiatives such as the I/UCRC centers and believe that those concerns raised by Gumport are manageable and minimal compared to the benefits that these initiatives bring to the department.
Several faculty talked about the uniqueness of the department’s I/UCRC and the benefits that it brings to the department by greatly enhancing the department’s ability to obtain funds. According to many of the faculty, the success of this center is in great part due to having a full time director dedicated to collect industrial funding and work on agreements attractive to both faculty and industry. The director handles all of the legal contracts, including timelines and identification of common objectives between potential sponsors and the department, organizes meetings with industry representatives, assists faculty in writing proposals that meet the demands and needs of industrial sponsors, and actively networks with potential sponsors. This quote illustrates how the director of the center goes about finding opportunities:

Our director for the center looks at faculty and says, “What is this person going to be interested in? What companies should be supporting that? What companies are also interested in those things? There are a lot of companies out there, thousands of companies. Let’s identify a few of them that are really going to be interested in his results. They should be supporting him.”

Another advantage of the center is that it manages one-on-one research contracts that are normally handled through the university’s office of grants and contracts. The arrangement is advantageous because the department’s director can talk directly to industry sponsors about technical, administrative and legal details, which expedites the contract process. In addition, a small portion of the industrial funds channeled through the center are saved to create grants for junior faculty members in the department. Faculty mentioned that an important aspect of the center is that it provides a structure and consistency that allows the development of long lasting relationships with industry and long-term projects. Similarly, several studies have indicated that faculty members believe that the collaboration between government and industry through centers dedicated to fundamental research is very beneficial because these structures allow long-term and big projects, which is the preference of academics (Slaughter & Leslie, 1997; Slaughter et al., 2002; Slaughter & Rhoades, 2004).

Given the success of the department at partnering with industry, faculty offered the following advise to programs interested in developing productive collaborations with industry: conduct a critical
assessment of what the department could offer to industry, find a niche according to what the department has to offer, devote substantial resources and planning, mentor junior faculty, develop a center similar to the one the department hosts and have a full time staff person dedicated to the center, encourage individual faculty to actively develop one-on-one relationships with industry, actively network in conferences and other meetings, and be loyal and honest about the department's values and protect the department from corporate interests. This last piece of advise, which reveals the way faculty approach industry, indicates the existence of a strong academic culture in the department, as illustrated in this quote:

You have to be loyal to the academic goals ...to the university. And, you have to make sure that those goals can overlap with industrial [goals]... there can't be any conflicts. So, you go in and accept those things that are in line with what you want to do and you have to be honest with industry up front, not just take money and promise them stuff that you can't deliver because your reputation will kill you.

**Public versus Industrial Funding**

Several faculty consider government grants more stable, competitive, longer term and related to the more fundamental science than industrial grants, except for the grants from the national Department of Defense. Faculty recognized that federal funds are more prestigious because they are awarded through a rigorous peer review process and are very competitive. The higher value of federal grants in the department agrees with the pillars of the academic culture related to the value of basic science and the peer review process. Moreover, one faculty member mentioned that national rankings are mainly based on federal grants rather than in industrial grants. Senior faculty in this study recognized that industrial grants are very valuable as well and that some industrial grants are as open-ended and competitive as federal grants, which makes them also prestigious. Another reason given by several faculty for the higher value of federal grants was related to the tenure review process. According to these faculty, in order to achieve tenure, it is necessary to have established a record of renewed federal grants as a measure of the quality of the faculty member's research. However, one faculty member mentioned that federal grants
were starting to lose their value within tenure review because their renewal process is beginning to take longer to occur than it takes for a faculty member to obtain tenure. In addition, another faculty mentioned that federal grants are been tailored towards large multidisciplinary projects involving several investigators, which diminishes the ability of individual junior faculty members to obtain federal grants. In agreement with what has been suggested by Slaughter et al., (2004), faculty believe that federal funding, which was very prestigious in the past, is losing its value and faculty members are more and more interested in funding regardless of the source because federal grants have become more difficult to obtain.

According to the faculty in this study, industrial grants are also becoming more difficult to obtain. Several faculty mentioned that over the last 15 years, industry sponsorship has been shrinking in this particular field. These professors also report that industries used to have unrestricted think tanks to support basic science; however, the internal research structure of companies has changed to more product dependent and short-term results as a result of companies needing to be more accountable and competitive in the global market. Many of the scientists that worked in those think tanks migrated to academia as companies started to cut funding for those programs. One professor noted that many chemical and materials companies have moved overseas and they don’t have central domestic research facilities anymore. This professor also suggested that the high costs of think tanks were less economically viable in times of increasing global competitiveness, resulting in greater industrial sponsorship of scientists at different academic institutions through small grants rather than the large-scale funding of the centralized think tanks of the past.

**Protecting the Core Values of the Academic Profession**

The faculty interviewed for this study tended to define good research in line with traditional concepts of rigorous scientific research. None of the responses reflected industrial or business related values such as the idea that research should lead to useful applications competitive in the market or costly efficient. On the contrary, faculty considered that good research should make an original contribution to knowledge or to a particular technological application, and have an impact on society or the scientific
community. None of the faculty considered that good research should aim directly to the development or improvement of a specific application. In addition, some faculty members talked of the importance of scientific rigor and originality in any good research. Faculty believe that good research is recognized through peer review processes in the form of publications and by its capacity to attract funding. However, some faculty members mentioned that the best research is measured by its impact over time. A couple of faculty members also mentioned that in an academic setting, good research should lead to the proper education of students.

Faculty believe that the department does a good job of balancing educating students, conducting research and working with industry. In fact, some faculty members believe that these are not opposing forces that need to be balanced. In general faculty are satisfied with industrial partnerships and have been able to successfully pursue both their scientific and educational objectives.

**Protecting the Education of Students**

Faculty unanimously expressed that their main professional goal is to educate students through basic science and to conduct fundamental research. Therefore, faculty carefully partner with industry assuring that such traditional academic goals are preserved. Some faculty mentioned having to turn down offers from industry in cases where those partnerships clearly had the potential to interfere with their academic goals. Similarly, faculty believe that if partnerships with industry are conducted properly, it is a win-win situation in which faculty obtain funds to support research and students, students engage in meaningful projects and learn about the industrial world, and industry gain access to new knowledge, expertise, and facilities. The key is to carefully plan and craft the agreements with industry in ways that students’ education is not negatively impacted. To accomplish this, faculty adapt industrial projects into a meaningful educational experience for students:

A lot of what we look at when industries come to us is, “Is there a synergy and does this fit with mine?” The company could come to me and say, “We have all this money and we want to get this done in three months,” and I look at the question and the problem and say, “Is this something I’m interested in,
is this an area that I have expertise, that I personally feel I can contribute to?"
But then I have to sit back and say, "Do I have a student who can contribute to this program where it's either directly in line with their thesis investigation, involves a slight deviation or in the point where we can take a detour for three months?" It's all timing and situational dependent... I'm not going to do every and anything just to get a few thousand dollars or tens of thousands of dollars or even one hundred thousand dollars if it's not going to be a really good fit because it's a waste of money from the industrial sponsors perspectives, it's a waste of time and energy and effort on my behalf and the students behalf...

There is a number of companies that call us up wanting help on something very specific and whether it is fire-fighting type of research where they need something in the next three months or six months and we're very upfront, I often point them to other places that could help them better. We're real honest, we don't do that kind of research here. Now, we pick programs that fit with educating students and post-docs... with getting their thesis and that's paramount here. I mean, you have to look at the students... we train students, that is what we do.

I'm not in the business of providing some company their next product; it's just not part of the game. You know, the game is to educate students, and if it's done properly, everyone wins.

As illustrated in the quotes above, faculty in this department strive to balance industrial funding with the education of graduate students. Most of the faculty interviewed said that the department's main product is
their students, who should be trained through basic research; therefore, industrial money must be used to achieve such a product.

The use students in industrial projects that compromise students’ education and ability to publish is unethical and exploitative according to most of the faculty in this department; and they believe faculty should avoid putting students in projects that are too applied without an educational component unless the student is about to graduate and that experience will help him or her to get a job.

One professor said that helping students obtain good professional positions is not only very rewarding for faculty, but also more important to the university and the department than patents or funds because a good education meant a satisfied alumni, which is essential for an academic institution to succeed:

    I have a post-doc who is applying to Harvard, I hope I can get him into Harvard... If I can get students and post-docs into these institutions, that's going to be far more important to this university than getting a patent or getting a bag of money... because these people go into these other institutions and are going to provide students to this university and students are what makes this university. What you want to be able to do is to get people into the institutions that provide feeders... if you increase the quality of students and grad students, everything else comes.

**Protecting Free Dissemination of Knowledge and Academic Freedom**

Unanimously, the main force driving faculty members’ choice of projects in this study is personal scientific interest and curiosity coupled with expertise. However, due to the blurred boundaries between basic and applied research in this field, scientific problems are related directly or indirectly to applications. Some faculty feel attracted by the intellectual challenge involved in coming up with original solutions or improvements of existing problems or technologies and other faculty are more driven than others toward what are the present needs of industry, although with a focus on the fundamental science behind those applications.
A significant result of this study is that faculty report they are able to obtain enough funding to fully pursue their scientific interests and that sponsors have not played a role in directing their research. This ability to find enough funding to pursue their research interests is associated with faculty’s success at selling their ideas properly to either government or industrial sponsors. Two faculty members highlighted the importance of writing large grant proposals and being very active at seeking funds in order to obtain enough funding to pursue their interests freely and afford to reject grants that might undermine their professional interests.

Faculty interviewed feel strongly about the importance of publishing for their careers as the most important measure of good scholarship. Also, some faculty member highlighted the paramount importance of freedom at research. Therefore, these faculty members carefully design contracts with industry to ensure satisfying degree of freedom and publications. These faculty members in general are very satisfied with their academic freedom and ability to publish despite their involvement with industrial sponsorship. In some cases, industry funds faculty without restrictions in the form of gifts or block grants. According to one faculty member, in some cases industry values greatly publications as an effective vehicle to learn the basic science behind their products. On the other hand, faculty perceive that in many cases, government grants can be even more restrictive than industrial grants, especially grants from the Department of Defense. One faculty member pointed out that the only difference between government agencies and companies is that the initial conversations with potential industrial sponsors tend to be more defined and with a clearer goal in mind than with grants from the government. Moreover, some faculty members feel that they have had more freedom with industrial grants than with NSF grants, which demand publications for renewals.

One faculty member mentioned that the bigger the scope of an industrial grant, the more control a company might have over the research group. Therefore, he prefers to set up contracts with industry around very specific and clear deliveries and expectations as a way to control the scope of control of the company on his research. On the other hand, he compensates that restriction by having government grants and industrial gifts to pursue his research interests more freely and educate students properly.
A Closer Look at Industrial Sponsorship

*Investment of Time and Human Resources*

Several scholars have mentioned that faculty are spending any marginal time in writing proposals, patenting, and developing relationships with potential donors, in other words, faculty are spending any marginal time in market-like activities. Over time, faculty members end up spending a significant amount of time acquiring an expertise to recognize the commercial value of their science, locating commercial partners and negotiating contracts (Clark, 1987; Gumport, 2005; Slaughter & Leslie, 1997). Similarly, the faculty in this study recognized that it requires significant effort to develop healthy and productive collaborations with industry.

It takes a lot of leg work to go to these companies and you are not always sure of who the main contact person should be; who makes the decisions in the company... each company is very different so there is no set kind of strategy for getting industrial money.

Your point of contact may get reassigned, transferred to a new position, might even leave the company... you cannot rely on one person to maintain a relationship if it’s going to be a long term relationship. So it’s better to go once a year to the company, give a presentation, talk to hopefully 30 or 40 people very year where they get to know your face, once a year at least and when one person gets reassigned, you know somebody else there.

A lot of times we spend you know, a year or two just in discussions with companies... I spend a lot of time talking to them and the dollar per hoop ratio is completely out of balance. You can often times spend six or eight months working on a company and maybe there’ll be $20,000.... and a lot of it is just laying some future ground work in trying to build up a rapport,
teaching them what you can do, having them develop some confidence…

And many times they test you: “We’ll give you a small project on a short
time frame. Can you deliver?”

**Impact on Students**

Findings from previous studies have raised concerns that the time spent by faculty members
engaging in academic capitalism might be taking professors away from their labs, students, and university
service (Gumport, 2002; Kerr, 2002; Lee and Rhoads 2003; Milem, Berger & Dey, 2000; Slaughter &
Leslie, 1997). Moreover, Gumport (2005) indicates that the training of graduate students has been
tailored towards the need of industrial sponsors and that this tendency challenges the presumptions that
faculty are interested in the disinterested pursuit of knowledge. However, faculty in this study strongly
believe that industrial partnerships, a clear form of academic capitalism, enhances the quality of graduate
education and does not undermine faculty desire and conduction of disinterested fundamental science.

I think that the industry funded program here is a huge opportunity for
students; it’s a wonderful, wonderful program. You know, 95% of what’s
going on there is very, very good from the projects they work on, to the
contacts they make, to what it can be too in the future, it’s very, very good.

And so the implications are mostly positive, mostly positive.

As an educator I think industry a tremendous vehicle that can be used to show
the students about life that you can’t do inside the classroom.

In fact, the high value of industrial involvement in the education of students inspired faculty to
create an educational program in which students have an opportunity to learn about the industrial world in
a structured fashion. Through this program, faculty invite outside speakers from industry to teach
students about what industry thinks is important, patents, scaling up and manufacturing, safety issues,
diversity in the work place, ceilings that women run into, communication, team research, etc. In addition,
some faculty mentioned that they intentionally set up things to expose students to industry by arranging
visits to companies with students, sending students to conduct research in industrial labs for a period or time, and encouraging companies to visit the department and meet the students.

Faculty mentioned that the most positive effect of industrial sponsorship to students that these research projects give students the possibility to learn about the industrial enterprise through visits to companies, direct interactions with industry representatives, and working on industrial problems that might have a significant impact on society. One faculty member prefers industrial grants because students are usually attracted to a specific industrial need or problem. Another positive experience for students according to faculty is when students give a talk to industrial representatives, which exposes students to different ways of communication with industry representatives as well as feedback on students’ research. Faculty believe that these are very powerful experiences that teach students about the industrial world including its culture, people, and research better that in any traditional academic setting. One professor alluded to the fact that usually alumni are very grateful about the good education they obtained in the department and the opportunities they had to interact with industrial sponsors.

The students who are working on a particular project are the ones that are actually doing the work. And when I have these meetings with these companies who come here to see their research, it’s my students who present the results with me, so those students are the ones who are actually involved, so that gives them more opportunities to practice communication skills, presentation skills... learn how to organize a presentation or respond to a question in a succinct way or expand as necessary based on the type of questions.

Job and networking opportunities for students was also mentioned by several faculty as some of the positive aspects of industrial funding.

It makes it easier for students to get a job, to share with prospective employers “I’ve worked on this application” or “I’ve worked on research toward this application.” A lot of prospective employers can identify with
that a little easier than they can with fundamental research and hire directly rather than tying in the fundamental research. Too, I think there is a difference in terms of culture between academia and industry in terms of what research takes place or how research takes place so the student can be exposed both to the advisor as well as a collaborator in industry to see what science in industry is like... to give them an idea.

When faculty were asked about the negative effects of industrial funding, they refer to potential situations that might negatively affect students, but clarified that normally there aren’t any issues. Some faculty mentioned that there is the possibility that sponsors might withhold students’ publications in rarely occasions. One professor said that he has seen few instances in which students were not able to talk about their industry-sponsored research in job interviews; however, this professor stated that these cases could always be worked out. Other professors mentioned that industrial funding has the potentiality to be restricted and constrained to specific demands. However, if a student is working in this kind of projects, it is usually a small portion of his or her research. Another faculty member said that sometimes industry has hard deadlines and demand quick results that may jeopardize the quality of the science, but again, according to this professor, students are involved in other projects with sufficient basic science that fulfill the educational mission of the department.

**Impact on Research**

According to the faculty in this study, there are also positive aspects of industrial sponsorship related to research such as the opportunity to learn about new materials and technologies being developed as well as information that might be part of trade secrets. Other benefits of industrial sponsorship reported include faculty members’ possibility to be connected to industrial research as well as to their needs and issues as sources of new research projects.

It keeps the department honest because you have to do research that actually is going to move the frontier of polymer science forward. So even though you still may be doing stuff that is blue sky and exploratory using
government funds or whatever, you're still able to push the boundaries of what is being applied and used out in the real world by having those industrial contacts.

Many of the positive aspects are just to exposure to new ideas and new materials... that are covered under patents... all the sort of knowledge and information that has been accumulated that is sort of hidden behind the veil of trade secrets. I think the other big positive is the fact that you get a feel for what modern industry is looking for and you can better prepare your students to go out and be competitive.

Other benefits mentioned by a few faculty include the fact that industrial grants offer more flexibility in terms of travel money for conferences. Also, according to one professor, industry researchers tend to be very critical of the research being sponsored and are willing to cut off the funding if they are not satisfied, which is a form of beneficial accountability nonexistent in federal grants:

With a company you have to be 99% sure you can deliver what you say... they will hold you accountable. In a government proposal, unfortunately, there's no accountability... an outside committee reviews the quality of the proposals that might sound like they are feasible at the time, but whether the P.I. actually executes what they say they are going to do is not evaluated by that same committee three years later... it's up to the program manager to assess that, but they don't have that expertise or that level of interest in every single project that they're funding.

Faculty mentioned the negative sides of industrial sponsorship are minimal compared to the benefits that these partnerships bring to the department, their academic careers and students. In any case, the most popular downside of industrial funding mentioned was that it was subject to economic and market constraints, which might force companies to suddenly cut funding. In those cases, faculty believe
that it is the job of the faculty member involved to continue funding the students from other sources. A couple of faculty members expressed their frustration with industry’s unwillingness to provide grants for at least three years making it sometimes difficult to accommodate these grants with the curriculum of students. Faculty felt that this was an obstacle to sponsor students given that the Ph.D. degree lasts at least five years.

To get that second year of funding up front is very difficult so you are always on a six month or one year kind of renewal basis, which makes it difficult to forecast for planning the growth of the group... whereas a government grant comes in for 3-5 years usually.

The biggest negative side is that you’re a foster child. What I mean by that is, when companies go through cost-cutting, the best way to save costs are through the academic kinds of funding that are doing once a year. And so you have to be mature and have enough different programs going so that when one disappears, you have another one that is up and coming that can support your student and put together a thesis that has good sound science and a good focus... So that’s the biggest challenge, the time frame.

Finally, two faculty members mentioned that one of the barriers involved in industrial funding is corporate competition. Sometimes, a faculty member might be working on areas that are of interest to more than one company. As industry strives to keep their research confidential, a faculty member might face restrictions impose by their industrial sponsors. In fact, according to another faculty member, some companies want to be acknowledged as supporters of certain research while others prefer complete animosity to avoid releasing valuable insights to competitors.

According to Slaughter et al. (2004), the three areas where the greatest disputes emerge between academia and industry are publishing versus patenting, secrecy versus access, and contested ownership over intellectual property. Findings from other studies demonstrate that faculty members consider
publishing more valuable than patenting despite the pressure by university administrators to generate streams of revenues from commercialization of research (e.g. Campbell & Slaughter, 1999; Gladieux & King, 2005; Mendoza & Berger, 2005; Slaughter et al., 2004). One of the reasons for faculty members' reluctance to patent is the perception that the chances of making significant monetary profits from a patent are very unlikely (Slaughter et al., 2004). Moreover, younger professors cannot afford long delays on publishing their research. In this study by Slaughter et al., some professors thought that in some instances, industry was seriously blocking the free flow of knowledge, including new discoveries. Sometimes the stakes are high when faculty members have developed long term and elaborate relationships with industry, forcing faculty members to maintain knowledge secret. However, professors in this study believe that it is possible to publish and patent simultaneously, especially among established faculty with long-term programs. In some cases, professors deal with secrecy of knowledge by removing confidential data from thesis and publications. These professors are convinced that this practice does not compromise the integrity of the science. This result suggests that despite industrial contracts and universities' policies to control faculty member's research, faculty seem to be able to manipulate the situations in order to protect their integrity as researchers. In great part this is possible because after all, faculty members are the experts and their sponsors or employers don't know enough to regulate faculty (Slaughter & Rhoades, 2004).

Much of what faculty in this study had to say about intellectual property issues supports the findings from previous empirical studies. Faculty mentioned that generally there aren't any intellectual property issues (IP) with industrial sponsors because there are agreements in place beforehand and usually companies agree to these provisions. Such agreements, which are in line with the University's IP policy, provide industrial sponsors with a period of grace of three months and in rare cases of six months in which sponsors can file a patent before publication. According to faculty, these three months do not represent a significant delay because the publication timelines are usually longer.

I could simultaneously be writing a very prestigious publication, drafting a patent disclosure, take that patent disclosure and file that in a very short time
frame, a week, and then, you know, 30 minutes after I knew the patent
application had been filed in the U.S. Patent Office in Washington, D.C. [then]
I'd submit it to the journal.

A couple of professors mentioned that industries are not interested in funding research that might lead to patents or too close to their products in order to avoid issues around IP.

Industry generally doesn't want me to be involved in research that is related to the next product and the reason is, quite clearly, intellectual property...

Because if I discover something, then the intellectual property remains at the university or there has to be some special accommodations made between the university and industry.

Finally, one professor commented that he has had difficulties around secrecy when he has worked for competitors simultaneously.

Also, a couple of faculty members expressed frustrations about the fact that the University see faculty’s research as a money maker, which in the minds of faculty is unrealistic because profitable research tends to stay within industries and faculty are not interested in making money but in conducting basic science, publishing and educating students as it is reflected in the quote:

Universities still don’t know what they’re doing. The look at it as a money making venture and you know it doesn’t really work that way that well... My main reason for being here is that I wanted to teach and I wanted to do the kind of research that I wanted to do... and I enjoy working with students... so when the university all of a sudden looks at you as a money-making entity, they want to make money off of patents, and they put all sorts of constraints on you... that’s difficult. The thing is that the rules have changed a lot since many of us first came here and what I’ve seen over the years is that the university in some way is trying to become more and more like industry...
Related to this point, several professors feel that the administration should take a stronger stand and understand that educating students, conducting basic research and publishing is the core mission of the university, which should not be jeopardized in order to generate revenues through patents and partnerships with industry.

**Discussion**

Previous empirical studies have shown that faculty members in science and engineering believe that collaboration between government, industry and academia bring benefits to academia such as providing faculty with opportunities to do research, contracts to fund students, networking for future funding, equipment gains, recruitment opportunities of faculty and staff from clients, service contributed by project personnel, spillover to research and teaching, and employment opportunities for students (e.g. Blumenthal, Causino, Campbell, & Seashore Louis, 1996; Campbell & Slaughter, 1999; Mendoza, In press; Slaughter & Leslie, 1997; Slaughter et al., 2002; Slaughter & Rhoades, 2004). Although the results of this case study also highlight most of these benefits, the rich descriptions provided by the participants illustrate the interplay of factors involved in partnerships between industry and academia that illuminate additional insights and questions for future research.

Powel and Owen-Smith (2002) portray the image of the post-modern life scientist in research universities in light of academic capitalism as:

> The traditional view of the university researcher as a dedicated and disinterested, though passionate, searcher for truth is being replaced in the life sciences by a new model of the scientist-entrepreneur who balances university responsibilities and corporate activities in the development of new compounds and devices designed to both improve human health and generate revenues for the investigator, the university, and investors (p 108).

The emergence of this new type of faculty members, who in many ways resemble the faculty in this department, demonstrates the effect of what Kuh and Whitt (1986) call the environmental layer of their
The neo-liberalist culture in our society of the last decades is the environmental layer that is pushing faculty members to turn to academic capitalism to maintain research resources and maximize prestige. Resource dependency theory offers a more detailed explanation of how this environmental layer affects the actions of individual faculty members (Slaughter and Leslie, 1997). Dependency theory is based on the premise that internal behaviors of organizational members are understood through the actions of external agents. In the case of higher education, the external agents are manifested in federal policies aimed to cope with global economic competition such as industry-academic collaborations forcing higher education to compete for the new sources of funds targeted to specific areas of R&D in applied fields. Since most faculty members teach and many perform public service but fewer win competitive research funds from government or industry, research is the activity that differentiates universities, where elite departments are defined in terms of excellence in scholarship and originality in research (Becher, 1989). Thus, research funds bring material gain and prestige to universities and push them to engage in academic capitalism. Departments in research intensive universities such as the one in this case study are particularly influenced by the environmental culture based on neo-liberalist ideologies due to the high value placed on research in this type of institutions.

The second layer of the framework refers to institutional cultures. The department studied belongs to a large top ranked research university. These universities are "citadels of the academic culture" (Kuh & Hu, 2001, p.2) based on concepts such as academic freedom, production and dissemination of knowledge, and education of the young. The results of this study clearly demonstrate a culture among participants that strives to preserve these fundamental values despite their engagement with industry and entrepreneurial opportunities. If fact, in opposition to what has been suggested in previous research (Gumpert, 2005; Slaughter and Leslie, 1997), the core academic culture in this department is not being consciously disrupted or altered in any significant way by academic capitalism. Moreover, the fact that very few differences where found among faculty members demonstrates that the department has a very strong homogeneous academic culture – even with the additional influences of industrial sponsors as external agents.
The results of this study clearly also suggest that significant clashes are occurring between faculty and administrators around intellectual property issues. These differences are explained by the tensions that usually occur among different subcultures in the third layer of Kuh and Whitt’s framework. For example, in this case, university administrators hold managerial values that are in sharp opposition with the academic culture of faculty. This study also discovered subcultures among faculty who have worked in industry and faculty who have followed traditional academic paths – although there were surprisingly few differences between these groups. Finally, the results of this study support the fourth layer of Kuh and Whitt’s framework, in which individuality plays a significant role on shaping the culture of a given unit. In several occasions, faculty made clear that it was up to the individual how to respond and protect their academic interests as they involved in partnerships with industry. However, this study found that the individual cultural differences where minor compared to a strong and cohesive academic culture in the department. In fact, the departmental academic culture in this department seems to be even stronger than the discipline-based cultures given that faculty believe that other departments in the field respond to academic capitalism differently.

One of the most significant findings of this study is the high value that faculty place on education. This finding is particularly important given concerns raised in previous literature about the diminishing time and effort spent by faculty in the education of students due to academic capitalism (e.g., Gumport, 2002; Lee & Rhoads, 2003; Slaughter & Leslie, 1997). Although faculty in this study recognize that they spend considerable energy developing industry-academia relationships, they emphatically state that the education of students is the most important goal of their careers and the department. The results of this study suggest that faculty intentionally utilize industrial funding to enhance the quality of the education of their students and actively protect students from sponsors’ demands to the point of rejecting funding if it may jeopardize the education of their students. Moreover, faculty strongly believe that industrial funding brings significant benefits to the education of students. Also, faculty in this study believe that industry’s main reason to fund research in the department is to support the training of a skilful workforce in basic science and have the opportunity to know students comprehensively throughout the years in the program.
in order to recruit those students that best fit their needs. Therefore, according to faculty in this department, sponsorship works positively to both industry and academia most of the time because the interests of industry are not necessarily in contradiction with the interests. These results support the findings of Mendoza's (In press) case study on the positive effects of industry-academia collaboration on the socialization and education of graduate students.

Faculty in this study report that despite their significant involvement with industrial sponsors, they are able to maintain their academic freedom, conduct basic research, and publish in peer-reviewed journals. This result contradicts previous assertions about potential overemphasis on applied research, restrictions in research and secrecy of knowledge as faculty engage with academic capitalism (e.g., Powell & Owen-Smith, 2002; Gumpert, 2005; Slaughter et al., 2004). Nonetheless, recent studies have also indicated that these constraints are not necessary the case and that faculty are able to publish, follow their scientific interests, and comply with sponsors' demands simultaneously (Mendoza, In press; Slaughter et al., 2004). Faculty in this study explain that this is possible because the research sponsored by industry is several steps away from direct applications. In addition, given that the development of any technology must relay on basic science, there is always possibilities to conduct fundamental research and publish in applied projects.

Conclusions

This study significantly contributes to our knowledge regarding the impact of academic capitalism on the academic profession by portraying a case in which the broad integrity of the academic culture of faculty members in a department with significant industrial funding remains purely Mertonian (Merton, 1957). Moreover, these faculty members consider industrial sponsorship as a highly effective vehicle for enhancing the quality of education of students and pursue their scientific interests. However, the results of these studies are highly context-dependent and might not be transferable to other academic settings. Therefore, in order to comprehensively assess the implications of industrial partnerships to the academic culture additional empirical research should be conducted across different types of institutions and disciplines in a variety of locations.
Despite the overall positive findings, this study suggests that there are areas of concern that require careful investigation. One of this areas relate to the general perception among faculty indicating that the general support for basic research is less and less favorable as both industry and federal funding for basic science continues to decrease (Mowery, 1998). This raises important questions about the fate of fundamental discoveries without clear applications in the future.

Another area of tension that was clearly voiced in this study relates to faculty members' negative perceptions of the University's IP policy, which they characterize as the greatest obstacle to partner with industrial sponsors. As suggested in other recent studies, faculty complained about the pressure they experience by university administrators to patent while they are not interested in pure monetary incentives (Mendoza & Berger, 2005; Slaughter et al., 2004). Moreover, faculty in this study believe that it is not cost-effective for universities to adopt these policies. Future studies should investigate the implications of universities’ intellectual property policies and technology transfer offices to the core mission of academic institutions.

Several faculty indicated that there are other institutions within their field that are less committed to fundamental science either by choice or necessity. In some cases, faculty mentioned that departments or individual faculty members might end up bending their core academic values in order to please industrial sponsors. This study suggests that this department is in a position to negotiate with industrial sponsors in order to protect their interests due to their privileged position as a top-ranked department with outstanding scientists able to attract significant funding both from industry and the government. This position of privileged combined with a strong Mertonian culture explains the department's ability to maintain its core values in light of academic capitalism. Future research should investigate other departments in less privileged positions and with less cohesive cultures in order to determine to what degree academic capitalism forces are encouraging these institutions to compromise their academic values.

Faculty in this department recognize that successful collaborations with industry require the carefully designing of contracts that suit both parties; otherwise, these partnerships can seriously
compromise the basic objectives of the academic profession. The I/UCRC center in this department has played a key role in helping faculty designing these contracts. Given that this center is one of the few that has been successful beyond the governmental support, future research should investigate the causes for the failure of other centers of this kind in order to provide the government and other departments with valuable lessons about ways to partner with industry effectively.

References


