Capitalizing on Innovation:

Entrepreneurship and Graduate Education

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Council of Graduate Schools

CAPITALIZING ON INNOVATION: ENTREPRENEURSHIP AND GRADUATE EDUCATION

COUNCIL OF GRADUATE SCHOOLS

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TABLE OF CONTENTS

FOREWORD

When issues arise that require the reflection of the graduate community, the Council of Graduate Schools (CGS) draws on a "best practice" model to stimulate that reflection, to determine whether a national course of action is merited, and to solicit input on what role CGS might play in effecting positive change. We typically invite a broad spectrum of perspectives to inform our thinking on each topic and rely upon key graduate deans with expertise in each area to shape the larger projects that may emerge from these discussions. Examples of prior issues on which CGS has engaged the graduate community and other stakeholders include: the professional development of graduate students, the responsible conduct of research, and doctoral degree completion and attrition. All of these discussions have resulted in multi-year initiatives involving grants to CGS member universities to embark on pioneering innovations and the identification of best practices that will serve as resources and models for other institutions in the North American graduate education community. This publication represents recent CGS activities devoted to exploring the topic of entrepreneurship.

Entrepreneurship is a particularly intriguing concept in the graduate community. In one sense, the term connotes the innovation and discovery (and the potential economic value resulting from that discovery) that we believe is at the very heart of pioneering research across all academic fields. At the same time, the term can meet with some resistance in academic circles, where profit motive is often suspect as the enemy to the pure discovery of truth for truth's sake. This publication discusses the role of entrepreneurship in graduate education. Through a review of the literature and a report on a meeting incorporating a wide range of perspectives, *Capitalizing on Innovation* explores the ways in which effective entrepreneurship programs and activities can enhance what universities are already doing to encourage graduate students to create or contribute to enterprises that add both economic and social value to their

communities. We do not expect this to be a final CGS statement on the topic, but hope rather that it provides a framework for beginning a very important conversation.

Debra W. Stewart, President
Council of Graduate Schools

INTRODUCTION

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This monograph summarizes the results of CGS' year-long investigation into the relationship between graduate education and entrepreneurship. The growing recognition of the benefits of entrepreneurship education, combined with the apparent neglect of entrepreneurship education within the non-business graduate curriculum, has led CGS to initiate a national discussion around entrepreneurship in graduate education. This conversation occurred through four venues with funding from the Ewing Marion Kauffman Foundation.

First, CGS undertook a literature review on graduate education in entrepreneurship in the summer of 2006. This review led to the conclusion that, notwithstanding the many calls for entrepreneurial thinking across the curriculum, the most rigorous projects and analyses come from business schools, led by business faculty who specialize in entrepreneurship. Nevertheless, the literature surfaces some key themes on entrepreneurship education that are applicable to emerging efforts in other fields.

In August and September 2006, CGS staff developed questions and conducted structured interviews with 12 deans of graduate schools whose institutions are involved with entrepreneurship education. Seven of the deans represented institutions funded by the Kauffman Foundation in 2003 as "Kauffman Campuses," a project designed to introduce entrepreneurship education across the campuses. The remaining five deans were from institutions selected because of the rankings of their entrepreneurship programs by Entrepreneur Magazine and the Princeton Review. The graduate deans provided insights into the workings, as well as the challenges, of existing entrepreneurship programs.

CGS used the information gathered from the literature review and graduate dean interviews to develop a white paper on graduate education and entrepreneurship. The white paper served as the basis for a stakeholder workshop in March 2007; the paper guided the sessions and prepared participants for active engagement in the discussions. The workshop gathered graduate deans, current and recent entrepreneurship

1

students, entrepreneurs, and leaders of academic/research programs in entrepreneurship for a discussion less structured, and more broadly-based, than the initial interviews with graduate deans.

This monograph summarizes the highlights of the literature review, the principal findings from the focused interviews with graduate deans, and important perspectives from the workshop, juxtaposing the viewpoints of the four stakeholders involved. It concludes with recommendations for continuing this conversation about how the graduate dean can "capitalize on innovation" through graduate curricula in entrepreneurship.

HISTORY OF ENTREPRENEURSHIP AND HIGHER EDUCATION

Entrepreneurship first appeared as an academic subject in 1947, when an entrepreneurship course was taught in the business school at Harvard University. Since that time, entrepreneurship courses have multiplied to become common in higher education, though they are offered mostly at the undergraduate level and mostly by business schools. According to a recent estimate, there are currently more than 2,200 courses at 1,600 colleges and universities in the United States (Brush, et al., 2003, p. 310). There are also "44 English-language refereed academic journals, 100+ entrepreneurship centers, 277 endowed positions, and over 1,200 members in the Entrepreneurship Division of the Academy of Management" (ibid., p. 310). Despite this explosion of entrepreneurship teaching and entrepreneurship research, there are still only a few Ph.D. programs in entrepreneurship in the country, and entrepreneurship as an academic subject is only beginning to be taught outside of business colleges and outside of the undergraduate curriculum.

Spectacular successes in business ventures by members of the university community, particularly in high-technology areas, have alerted university administrators to the importance of entrepreneurship within academia. Business incubators, research parks, and technology transfer offices are now regular features even of mid-sized universities, and many institutions have liberalized intellectual property policies to provide incentives for faculty and students to market their research. But even this significant structural change within the academy has not yet produced a corresponding curricular change, at least not in the graduate research programs where many of the most important new ideas are being generated.

Other stakeholders in higher education have recognized the significance of the growth in academic entrepreneurship. A report by

BankBoston concluded that "if the companies founded by MIT graduates and faculty formed an independent nation, the revenues produced by the companies would make that nation the 24th largest economy in the world" (BankBoston, 1997). It should come as no surprise, then, that governing boards across the country often push for entrepreneurship activities on campuses. And a number of funding agencies committed to higher education have recognized that entrepreneurial activity is absolutely central to American global competitiveness and economic health, and they have responded accordingly with funding to advance and promote entrepreneurship across the curriculum.

The Kauffman Foundation is prominent among funding agencies that have recognized the degree of social good that comes from entrepreneurship and from entrepreneurship education. In 2003, the Foundation launched the "Kauffman Campuses" initiative, which sought "to increase and strengthen entrepreneurship in America by transforming campus life so that entrepreneurship is an integral and natural part of the college experience" (Howard University, 2003). The initiative was designed to "unleash the power of entrepreneurship on campus," said Carl Schramm, president and CEO of the Kauffman Foundation. "We want all students—not just those enrolled in business or engineering schools—to have access to the skills, orientation and networks that lead to greater opportunities for them and result in more jobs, innovation and prosperity for America" (ibid.).

Unleashing the power of entrepreneurship on campus, however, may require more than just external funding, and more than organizational or structural changes that facilitate business start-ups. Some believe it may require significant cultural change within the academy itself. First, we know that some academics may resist any kind of teaching that strays from the pure academic subject matter. They may find the "profit motive" out of place in the laboratory or the classroom, and may not like to think of themselves as "vocational" educators. Secondly, the curricula in the more professionalized disciplines, particularly at the graduate level, are at least arguably too crowded to accommodate new courses in entrepreneurship, partly because of standards laid down by accreditors and disciplinary associations and partly because of time-honored traditions. And thirdly, faculty in the various disciplines may not be competent to teach entrepreneurship, and yet at the same time they may be reluctant to bring in professors of business to teach their own students.

In spite of the obstacles, entrepreneurship education continues to grow, primarily at the undergraduate level. There is mounting evidence, though, that the power of entrepreneurship in the academy cannot be fully

3

unleashed unless graduate education is involved. Graduate education is typically aimed at knowledge creation, and the ideas necessary to run our knowledge-driven economy, particularly in the high-technology sector, most often come from graduate-level research. One study suggests that "the most important spin-offs from universities are by postgraduate doctoral students and staff. If this is so, then entrepreneurship courses for mature graduates in employment or pursuing academic careers may be more important, and perhaps more cost effective, than teaching undergraduates basic entrepreneurial skills" (Rosa, 2003, p. 452).

But the benefits of entrepreneurship education, whether at the graduate or undergraduate level, are not limited to the "high-tech," or science, technology, engineering, and mathematics (STEM) fields. The Rosa study also reports that graduates from the creative arts are more likely to start a business than engineering students, even though entrepreneurship courses have long been a feature of undergraduate engineering curricula. And in any case, it may not be true that business start-ups are the best measure of success in entrepreneurship education. It can be argued that innovation by graduates within existing businesses, or within any kind of enterprise, including non-governmental organizations, is just as productive of social good as business start-ups, even those in high-tech fields. And the value to students themselves of entrepreneurship education is not limited to improved incomes or business ownership. Entrepreneurship courses can enhance the value of graduate education by helping students learn to use their expertise in a variety of employment venues and decide themselves which of these venues they want to enter, for personal, economic, or social reasons.

The current entrepreneurship education literature focuses on higher education generally. The CGS dialogue on entrepreneurship is the first opportunity to study entrepreneurship education at the graduate level. For that reason, we felt a need to go directly to the graduate dean community to learn about their first-hand experiences with entrepreneurship programs. We conducted focused interviews with the deans, asking each a series of questions designed to understand their vision of entrepreneurship and how its teaching could be most effectively addressed at the graduate level.

PERSPECTIVES OF GRADUATE DEANS ON ENTREPRENEURSHIP: RESULTS OF FOCUSED INTERVIEWS

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DEFINITIONS OF ENTREPRENEURSHIP IN AN ACADEMIC CONTEXT

A comprehensive review of the literature reveals that "there is still much debate about the theoretical assumptions underpinning the field of entrepreneurship" (Henry, Hill, & Leitch, 2005, p. 165; see also Kirby, 2004, p. 511). Consequently, there is a "lack of good solid theoretical bases upon which to build pedagogical models and methods" for teaching entrepreneurship (Kuratko, 2005, p. 583). The result is that educators often have different meanings in mind for the terms "entrepreneurship" or "entrepreneurship education," and some have turned completely away from using them. Thus we began with questions of definitions.

What do you consider "entrepreneurship education" to be in the context of graduate programs that are not business programs?
　　The lack of consensus about even the meanings of the basic terms shows itself in the diversity of approaches to entrepreneurship education. For several institutions, including some of the "Kauffman Campuses" (University of Arizona, University of Cincinnati), entrepreneurship is understood traditionally as the enterprise of business start-up. And though business start-up is fundamentally a different activity than business management, the subject is still often taught as a part of the business management curriculum.
　　For other institutions, though, the word "entrepreneurship" is taken in a broader sense to cover all kinds of creative enterprises, including social and civic activities that have no "profit motive." The Wake Forest University Web site, for example, says, "By entrepreneurship we mean

the process through which individuals and groups take advantage of their knowledge and resources to identify and pursue opportunities, initiate change and create value in their lives and the lives of others" (Wake Forest University, 2006). And, at a presentation at the 2006 CGS Summer Workshop, Richard Wheeler (University of Illinois at Urbana–Champaign) described entrepreneurship education as "finding a way to provide an orientation that enables students to gather a context for the kind of skills that they have and identify the potential usefulness of those skills in a broader world than just the academy without doing anything to compromise the integrity of the work that gives them their distinctive feature" (CGS, 2006, p. 83).

Other broad definitions of entrepreneurship education emerged among CGS member deans. Victoria Rodriquez (University of Texas at Austin) described entrepreneurship education as "a way of motivating students to use skills outside of academia"; Bruce Jacobs (University of Rochester), as "transforming ideas into enterprises that generate value, whether economic, social, or cultural"; and Delcie Durham (University of South Florida), as "providing a background in technical skills to move an idea forward." But a number of deans were not comfortable with the word "entrepreneurship" itself, whether broadly defined or not, because its inevitable association with profit motives makes faculty buy-in difficult in some departments. Many of the skills taught in entrepreneurship courses, they thought, could perhaps be less problematically taught under the category of "professional development."

Another way to characterize entrepreneurship education is to characterize the students at whom it is aimed. Some programs are aimed at industry professionals, often as certificate programs, suggesting that the programs are skill-oriented. Some programs are aimed at students who have ideas for business ventures, suggesting more standard business education. And even other programs are aimed at motivating students in liberal arts fields to consider self-defined careers, including all kinds of social engagements, suggesting a broader kind of education than that available within business schools.

PROGRAM ORGANIZATION AND COURSEWORK

An excellent study by researchers at Cornell classifies entrepreneurship programs into two general types: magnet programs and radiant programs (Streeter, Jaquette, Jr. & Hovis, 2002). Magnet programs are by far the most common, usually housed in business schools and designed to attract

students from all disciplines who already have entrepreneurial ideas or impulses. This model is consistent with the position that entrepreneurship should be supported, but not promoted, since not all students will have the characteristics common to entrepreneurs. (There is no consensus on what these characteristics are. See Kirby, 2004, p. 511.)

Radiant models, whereby teaching is done within disciplines, often using disciplinary faculty who have either been specially trained or who are team-teaching with business faculty, are aimed more at developing and motivating students who previously might not have thought of themselves as entrepreneurial. The purpose of these programs often is to increase the number of business or other creative ventures by graduates across the campus, particularly by those who are generating research products that have business or social potential.

There is some evidence to suggest that MBA students, taken alone, are less entrepreneurial than either those who teach them or those who already own or manage businesses (Kirby, 2004, p. 517). Indeed, it is sometimes argued that MBA programs teach students how to be good employees, and not how to become successful businesspersons (ibid., p. 514). Both magnet and radiant programs on campus can help to attract students who may not typically be drawn to traditional MBA programs, and may infuse those programs with new life and new ideas.

In an effort to gauge the underlying assumptions behind the various types of entrepreneurship programs, we asked:

Do you think that entrepreneurship education should be aimed at developing skills or at understanding the basics of business?

Deans interviewed universally answered "both." This is consistent with research suggesting that "the skills traditionally taught in business schools are essential but not sufficient to make a successful entrepreneur" (Rae, 1997, as cited in Kirby, 2004, p. 515). That is, in addition to the skills necessary for applying the principles of business, entrepreneurs need skills related to communication, decision-making, organization, conflict-resolution, ethical deliberation, leadership, etc.—skills not limited to business education and not exclusively the domain of business professors. Indeed, as one researcher claims, "Entrepreneurship is not distinguished as a specific subject but permeates all the activities of the university concerning courses, research, and external activities" (Gibb, 1987, as cited in Kloftsen, 2000, p. 338).

Nor is it sufficient for would-be entrepreneurs to know *about* business principles or *about* entrepreneurship in any merely objective way. Knowing about entrepreneurship is not the same as knowing how to

become an entrepreneur. What is needed is variously prescribed as "action learning," "opportunity-centered learning," "situation-learning," or "integrative learning"—that is to say, hands-on learning provided by internships or other co-curricular activities.

Because both skills and the knowledge to contextualize them are seen as optimal for entrepreneurship education, it may be argued that a "two-tier" approach is best—core courses taught by business experts and disciplinary applications taught in the individual departments, using some form of "action learning." This is one reason why institutions such as the University of Arizona use either a "dual degree" model for teaching entrepreneurship (MBA plus a master's in the relevant discipline) or a certificate (in entrepreneurship) to supplement traditional disciplinary education.

When colleges of business are called upon to supplement programs in other colleges, however, problems can arise. In the first place, business programs often function with a minimum number of faculty, since business faculty salaries are high and positions are difficult to fill, and business faculty may not be available to teach students from other programs. In fact, "sustained growth of universities' undergraduate and MBA offerings in entrepreneurship has far outstripped the supply of doctoral-trained entrepreneurship faculty available to deliver those programs and courses" (Brush, et al., p. 316). Moreover, arts and sciences faculty may resist courses taught by business faculty because they are perceived as merely "vocational" and as not related to the disciplines being taught. Training disciplinary faculty to teach entrepreneurship courses can be expensive and time-consuming. Some entrepreneurship centers on campuses, such as the one at Wake Forest, offer seminars to prepare faculty for teaching, but such centers are the exception, not the rule.

ROLES FOR THE GRADUATE DEAN

Whether the objectives of a program are skills or knowledge or both, a key question probed opinions on the specific role of the graduate dean and the graduate school:

What role does the graduate school play in promoting entrepreneurship education in non-business graduate programs? Do you believe that you as graduate dean have a responsibility to encourage graduate instruction in entrepreneurship on your campus?

Graduate deans' involvement in entrepreneurship education is as varied as the entrepreneurship programs themselves. Institutions such as Wake Forest entrepreneurship centers provide the administrative support

to develop and oversee graduate offerings. At other institutions, the graduate dean must play a central role in organizing core courses and advancing curricular proposals through the approval process. How active a dean should be may depend upon institutional culture.

The graduate school may play a central role in entrepreneurship programs simply because they are typically interdisciplinary in structure, and interdisciplinary programs are often housed in, or at least overseen by, graduate schools. Faculty from different colleges are often involved in program delivery, and their workloads in entrepreneurship programs outside of the business school may have to be negotiated by the graduate dean. Moreover, many graduate schools house or support "Preparing Future Professional" programs, or sponsor professional development seminars and workshops for graduate students, which can be excellent venues for entrepreneurship education.

Graduate deans can play a supportive role in other ways than curricular oversight and advancement. The graduate dean may sit on various advisory boards with members from local business and industry, and the graduate school may have its own advisory board, with members who are particularly alert to the needs of graduate students. The graduate dean can thus be well-situated to promote the development of internships and other kinds of co-curricular community engagements essential to the active learning often characteristic of entrepreneurship programs.

Business incubators and research parks associated with university campuses can provide excellent opportunities for internships and mentoring for graduate students. Such enterprises are typically connected organizationally to offices of research, where technology transfer specialists are also available to graduate students to assist in the advancement of business ideas. Those graduate deans who also serve as their university's senior research officer are in a particularly good position to "lubricate" entrepreneurship programs for graduate students.

Graduate deans can also pursue funding for graduate students participating in entrepreneurship programs or courses. If entrepreneurship courses or certificates add to the time-to-degree, they may impose a financial burden on students, particularly students in professional master's degree programs, where financial aid is not common and where entrepreneurship training may require one or more extra semesters.

Finally, graduate deans are well-situated to advance graduate entrepreneurship programs, both by using the bully-pulpit of the graduate council to advance and support entrepreneurship education proposals, and by the dean's capacity to lend intellectual standing to entrepreneurship as an academic pursuit.

EFFECTIVE LOCATION FOR ENTREPRENEURSHIP EDUCATION: UNDERGRADUATE, MASTER'S, OR DOCTORAL LEVEL

Having established that graduate schools are positioned to advance entrepreneurship education, the next question is: What is the advantage of graduate-level entrepreneurship education?

Is there any evidence that entrepreneurship education is more useful at the graduate level than at the undergraduate level? Do you believe it is more important to provide courses or programs in entrepreneurship to master's students than to doctoral students?

The graduate deans interviewed largely agreed that entrepreneurship education is most effective at the graduate level, particularly at the level of master's education, though the relative effectiveness will depend upon institutional resources and strengths, and institutions without doctoral offerings may be just as effective in entrepreneurship education as research institutions. Many deans believe that entrepreneurship education, in any case, should be available at all levels, bachelors through doctorate.

The most appropriate level of instruction may depend on the discipline. In fields such as business and engineering, a person can be a successful entrepreneur without a graduate degree. However, to be an independent consultant—to cite just one example—one may need a Ph.D. The degree level for instruction may be determined by the credentials required for being considered a member of the profession.

The reasons for holding that entrepreneurship education is most effective at the graduate level are varied. One dean felt that undergraduates are typically at an age when they do not distinguish between accomplishing social or economic good, which may depend on factors beyond their control, and applying their learned skills and knowledge to social or economic problems. The latter, the dean argued, is necessary for long-term success as a social or economic entrepreneur. Other deans voiced the view that most new and marketable ideas come from advanced students and often are direct outgrowths of graduate research, particularly in the STEM fields. This view is supported by current research (Rosa, p. 452).

OBSTACLES AND STRATEGIES FOR ENTREPRENEURSHIP EDUCATION

Since there was general agreement among deans for an appropriate role at the graduate level, CGS probed their thoughts on obstacles they faced and strategies that worked.

What obstacles do you face on your campus to the advancement of entrepreneurship education as a component of graduate education in non-business programs?

The two obstacles mentioned most frequently in dean interviews and in the relevant research were: 1) entrepreneurship education may increase time-to-degree, and 2) funding for students pursing entrepreneurship degrees, certificates, and courses may be difficult to secure. Both obstacles are more pronounced at the master's level than at the doctoral level. Doctoral students are more likely to have flexible course requirements and more likely to have financial support through the duration of their studies.

The difficulty of winning faculty buy-in has also been an obstacle on many campuses. One institution reports that there is a "mind-set" against entrepreneurship among faculty, presumably because the "profit motive" associated with entrepreneurship is not seen as consistent with the pure pursuit of knowledge, to which most faculty are dedicated. This "mind-set" exists even though many universities embrace broad definitions of entrepreneurship that include social entrepreneurship. At the University of Texas at Austin, the entrepreneurship program was renamed the program in "Professional Development and Community Engagement" in order to reduce faculty resistance.

Another obstacle has been the lack of qualified faculty to teach in the programs. As noted above, business faculty are expensive and hard to hire, and at mature programs such as that at the University of Arizona, courses in entrepreneurship are extremely popular among students, and there are not enough spaces available in entrepreneurship courses for interested students from across campus. One expert reported in a telephone interview that there are currently fifty entrepreneurship chairs unfilled in U.S. institutions.

Moreover, most entrepreneurship programs are interdisciplinary, and interdisciplinary programs are sometime difficult to sustain. Not only are programs often dependent on particular faculty members for course delivery—faculty members who may themselves be highly marketable and disinclined to remain—but allocation of resources for interdisciplinary programs is always problematic and subject to change when budget problems arise. Furthermore, budgeting can be particularly complicated when differential tuition is charged by the business school and entrepreneurship programs are "dual degree" or certificate programs requiring significant course work in the business school.

Finally, there is the above-mentioned challenge of the lack of a theoretical ground for entrepreneurship pedagogy. Entrepreneurship

11

pedagogy has been developed mostly as an add-on to business education, yet the aim of the Kauffman Foundation and also of many graduate schools is to institutionalize entrepreneurship education across the graduate curriculum. This aim is more difficult because entrepreneurship still lacks the credibility of a separate discipline (Kuratko, 2005). And there is still no consensus about what kind of student entrepreneurship education should target—working professionals, non-business graduate students who already have entrepreneurial ideas, or students generally, in whom entrepreneurial impulses might be seeded to produce more student-initiated ventures in the long run.

What can be done on your campus to improve the climate for entrepreneurship other than offer courses or workshops to students?

There is evidence that the climate for entrepreneurship education is already positive for students coming into the university. "More than 60% of 18- to 29-year-olds say they want to own their own businesses," according to one study (Kuratko, 2005, p. 579). Yet the news is not entirely good. There are those who argue that "education in the sense of a formal academic training dulls the cutting edge of commerce" (Bartlett, 1988, p. 26, as cited in Kirby, 2004, p. 514), and traditional MBA programs may not attract many of those students most inclined to be successful entrepreneurs.

Deans can support and encourage students' instinctive entrepreneurial impulses by raising the profile of entrepreneurship programs on campus. This can be done in traditional ways, such as sponsoring evening programs, bringing in speakers, and publicizing success stories. One dean who was interviewed suggested providing an awards ceremony at the end of the year to highlight successes. Deans can also encourage departments to track graduates, which many departments need to do in any case to provide data for outcomes assessment, so that longer-term success stories can be uncovered and publicized.

Model programs can be rewarded and publicized. Programs in the performing and creative arts, which for a variety of reasons typically produce more entrepreneurs even than business programs, can be particularly useful as models, given their focus on audience. International students, too, are generally more successful as entrepreneurs than domestic students, and successful entrepreneurship programs can be profitably spotlighted as a recruitment strategy. Efforts should be made to draw in African-Americans and other minority groups, typically underrepresented as entrepreneurs, who may also bring unique perspectives to entrepreneurship programs.

Graduate deans can serve as leverage points for developing internships for students pursuing entrepreneurship programs, as mentioned above, and can improve the climate for students by seeking internships that pay well and reduce the financial burden of graduate school. Graduate deans can also develop synergies among business incubators, research parks, and offices of technology transfer, to support ventures by students or graduates that emerge from their studies. And finally, graduate deans can sponsor or encourage training and stipends for faculty wishing to develop entrepreneurship courses. (Faculty can be sent to development workshops, for example, like those provided by Babson College, in the "Price-Babson College Fellows Program and Lifelong Learning for Entrepreneurship Education Professionals.")

EVALUATION AND ASSESSMENT OF ENTREPRENEURSHIP PROGRAMS

Next, we turned to the assessment and funding of entrepreneurship programs and asked:

How should entrepreneurship programs be evaluated? How do you determine the benefit of the program to the university, the local community, and the nation?

We knew that the assessment question would be difficult because entrepreneurship programs in most instances were in fairly early stages of development. Therefore, in this discussion, the interviewers shared substantial information about the current status of assessment. We explained that a number of researchers have observed that "only a few studies have investigated the effects of entrepreneurship education" (Henry, et al., 2005, p. 159). Standard program evaluations measure student knowledge and teacher effectiveness and, occasionally, employment and income status of graduates. Satisfaction surveys are sometimes used as well, but they cannot serve as a proxy for measuring program performance, at least not if that performance is understood as depending upon economic factors such as the number of business start-ups produced, or the number of employees hired in businesses established by graduates. And even the economic products of entrepreneurship education, when tracked, are difficult to evaluate in the absence of control groups, which would require tracking activities of graduates who have not self-selected themselves into entrepreneurship programs.

There are other good reasons not to stake program assessment solely on economic outcomes. Many entrepreneurs are consultants, or perform-

ers, or run very small family businesses with few employees. Ventures producing large, high-tech companies that result in transformative effects on the regional and national economy are rare exceptions. Moreover, many graduates do not become entrepreneurs until much later in life, beyond the time-frame for tracking. And finally, the large majority of start-ups fails, and those who have tried them often migrate back into the employment sector.

Still, there are other options available for evaluation. Students can be pre- and post-tested using instruments such as the Durham University General Enterprising Tendency Test (Kirby, 2004, p. 517). Programs can be evaluated by observing the number and success of student teams entering entrepreneurship competitions, either those held at universities or those held by business and industry (for example, Honeywell Aerospace University Growth Challenge). The latter kind of competition, one of the Kauffman Campuses' graduate deans believes, is an especially good indicator of quality. The number of patents received by students or graduates might be a good measure as well, though deans interviewed noted that patents are the end result of a process, and the process itself is what is important.

Standard assessment measures may also be useful. Time-to-degree and employment (including self-employment) outcomes are no less important in entrepreneurship programs than in other programs. Credentials of the faculty, particularly non-business faculty, can be considered. The quality of the required internships or capstone experiences can be good indicators of program substance. But given the lack of a consensus about the definition of entrepreneurship education, and the diversity of kinds of students targeted in entrepreneurship programs, program assessment is likely to remain problematic for the foreseeable future.

In your mind, what is the relationship between entrepreneurship education and technology transfer, and how does intellectual property policy intersect with entrepreneurial activity among graduate students?

Because most deans interviewed were not also chief research officers and therefore did not oversee technology transfer efforts at their respective institutions, answers given to this question were brief. In general, deans agreed that technology transfer efforts should be coordinated in some way with entrepreneurship programs. At one institution, a course on technology transfer was actually created by the research office and made available to students in the entrepreneurship

program. At others, there was no connection whatsoever between technology transfer and entrepreneurship programs. But deans thought that research offices or technology transfer offices where they exist were a potential source of both curricular and financial support.

On questions of intellectual property deans agreed that policies need to be clarified and made accessible to graduate students and faculty. These policies vary widely from institution to institution, and no consensus emerged about what the best kind of policy might be, that is, what kind of intellectual property policy most stimulates entrepreneurship. At one institution, where the legislature recently allowed the university to take a larger share of the profits from internally developed ventures, the dean thought that the change was healthy for the entrepreneurship program, because the resulting funds could be used for program support. At other institutions, a smaller share of profits taken by the institution is considered more likely to motivate students to launch ventures, particularly when there is university support in the form of technology transfer offices, research parks, and business incubators.

Do you have any relationships (funding or partnerships) with organizations other than the Kauffman Foundation?

Deans were not always aware of sources of funding for programs not under the direct supervision of the graduate school. One institution had applied to the Coleman Foundation and the National Science Foundation (NSF) for funding, and one institution had external funding for faculty development in entrepreneurship, but there was generally little knowledge of sources of funding for entrepreneurship education among the deans interviewed.

INTERVIEWS IN CONCLUSION

These structured interviews were designed specifically to learn from senior officers responsible for graduate education at a number of campuses. These interviews are important because up until now the entrepreneurship literature lacked a broad university focus at the graduate level. While the interviews provided enormously rich information from the perspective of individual graduate deans embedded in a particular context, they inevitably failed to provide the kind of point-counterpoint generated in a less structured and more broadly-based discussion. In order to generate that type of discussion and expand the number of perspectives, the next phase of our research convened four categories of stakeholders: graduate deans, current and recent entrepreneurship students,

entrepreneurs, and leaders of academic/research programs in entrepreneurship. Our objective was to glean insights from the dynamic interaction between and among these diverse groups. The following section reflects what we learned from this rich conversation.

PERSPECTIVES ON ENTREPRENEURSHIP ACROSS STAKEHOLDER GROUPS

RECURRING THEMES ACROSS STAKEHOLDERS

Recurring Themes

- Significant culture differences exist between entrepreneurship and academia that are obstacles to entrepreneurship education. These differences relate to the profit motive of entrepreneurship and faculty teaching, mentorship, and career paths.

- The graduate school must undergo a culture change to embrace entrepreneurship education.

- Faculty can promote entrepreneurship on campus by learning about the benefits to students and by modeling entrepreneurship.

A recurring theme across all stakeholder groups was that graduate schools must undergo a "culture change" in order to embrace and capitalize on entrepreneurship programs. Perhaps the greatest conflict between the cultures of graduate school and entrepreneurship relates to the profit motive of entrepreneurship. As one dean from a public university in the South said, "Don't mention anything about customers, consumers, what your market is because that doesn't stand true to the values that underlie the academy." Another dean reinforced that thought based on her experiences as a senior vice president for research: "We find when the investor is coming to talk to the faculty, the clash of cultures becomes unbelievable."

There are other significant culture differences relating to faculty teaching, mentoring, and career paths. For example, the current graduate school model for faculty is built on research, publication, and teaching—all contributing to advancement within the discipline. A number of participants observed that faculty spend little time on "outside

interests," including the application of research in a business or social context, which is a primary goal of entrepreneurship. One faculty participant noted that typically faculty and administrators emerge in leadership positions through a vertical rise in their disciplinary silo over the course of a 30-year plus academic career, and faculty mentor their students to follow the same path. Entrepreneurship faculty, on the other hand, may come to the university after years in the business world, bringing those connections and modeling entrepreneurial behaviors for their students.

Today's graduate students will have very different career paths than previous graduate students, partly because of changes within institutions and the national economy. One distinguished science faculty participant stated, "[Students] know that they're going to have four or five career start-ups" and he believes that graduate training can help students develop entrepreneurial skills to handle those transitions. He introduced a recurring theme that entrepreneurship education may provide the skills students need to be competitive in today's economy.

The culture difference also extends to the teaching goals of graduate education. The prevailing culture of graduate school encourages research and a reasoned defense of a position based on that research. But a dean from a large research university in the West explained, "We don't teach people how to learn to fail; we teach them how to prove their point." That culture runs counter to entrepreneurial thinking that encourages the identification and assessment of risk and the pursuit of opportunities. That dean went on to describe a recent student panel she attended where students said they do not feel comfortable taking intellectual risks in their work. One student commented: "My advisor says get a job first, flights of fancy can come later." While graduate school may be an ideal time for exploration, perhaps through entrepreneurship, those benefits are balanced against the time costs. Entrepreneurship activities may take students outside their traditional coursework and research path, potentially increasing their time-to-degree.

> "If we cannot create space at this particular point in the young scholar's career, to follow a passion and an interest and a hunch, when in the world do we think we'll find the opportunity for innovation?"
>
> *(Graduate dean participant)*

Today's graduate school culture may be suppressing entrepreneurial activities on campus. Faculty and students who perceive signals from the

graduate enterprise indicating a lack of support may be dissuaded from entrepreneurship, even if they are entrepreneurial. A dean participant observed, "Entrepreneurship is context-dependent. You could be very entrepreneurial in spirit and intellectual proclivities, but if you are in an organization that is risk-averse, or an economic or socio-political environment that is risk-averse . . . it would not matter." Graduate schools that change their culture to actively support entrepreneurship may unleash this hidden potential.

One of the graduate deans, who is also a scientist, noted that there are a range of faculty dispositions, from being gung-ho about starting a new company to having no interest whatsoever. Regardless of their opinion of entrepreneurship, "[faculty] are all role models for the next generation of students." In fact, faculty may already be entrepreneurial without even recognizing it. Another participant, a long-time faculty member, commented that she realized she has been entrepreneurial throughout her academic career: generating research topics, soliciting students to participate, and pursuing funding for herself and her students. Graduate deans and faculty can encourage entrepreneurship on campus by recognizing and valuing their own entrepreneurial qualities and potential.

Deans can also be agents of change, facilitating a new view of graduate education that can embrace non-traditional approaches for teaching, mentoring, and motivating budding entrepreneurs. Other duties of the graduate dean may include administrative support, organizing courses and curricular innovations, providing neutral oversight, and building linkages to related units. New entrepreneurship programs will require resource development, program evaluation, and program promotion and advertising, in which the graduate dean can be involved.

In addition to these themes, on which there appeared to be broad-based consensus, each stakeholder group also voiced unique perspectives. In the following section, we summarize the views on entrepreneurship programs as reflected by each stakeholder group: students, program leaders and researchers, and graduate deans.

SUCCESSFUL ENTREPRENEURIAL PROGRAMS: PERSPECTIVES OF STUDENTS AND RECENT GRADUATES

Entrepreneurially-oriented students may enter graduate school deliberately, seeking opportunities to gain business skills to launch an enterprise. But other students may be unintentional entrepreneurs, not expecting an opportunity to move them out of the discipline until some event becomes

a catalyst for new, entrepreneurial thinking. The student panelists represented both types of entrepreneurs and came from a variety of institutions and degree programs. We note that no student panelists represented the field of social entrepreneurship; however, many of the student perspectives also apply to that field. Students spoke to the key elements of successful programs and to the direct benefits they received from their entrepreneurship programs and/or activities.

Lessons Learned—Student Perspectives

- Graduate students need time and encouragement to explore entrepreneurial opportunities.

- An interdisciplinary approach seems to work best in cultivating entrepreneurship.

- Business skills are essential, but may be acquired through a multi-discipline team or through business school classes in specific areas.

- Flexible curricula including speakers and workshops outside of the discipline are effective—especially when they include an aspect of applied learning.

- Successful programs include components of networking with the business community and mentoring by entrepreneurs to supplement or enhance the formal curriculum.

Students identified three elements of successful entrepreneurship programs: business knowledge tailored to the student's needs, applied or experiential work, and networking outside the academic institution. In their view, business knowledge is essential to entrepreneurship, but they downplayed the importance of formal business education as a required part of an entrepreneurship curriculum. While students recognized the need for a broad business sense, they saw how this could be met through business courses specific to students' interests or participation in a multi-discipline team project. Students who participated in team projects reported that the projects simulate real-business experiences and teach valuable skills like teamwork, multi-tasking, and interdisciplinary thinking. These projects allow them to learn from and utilize the personal and academic strengths of the other team members. Students described how they learned entrepreneurial behaviors through their participation in applied or experiential work, like team projects.

"It's not necessarily the [learning of business] skills . . . you can hire somebody to run the books, you can hire somebody to do the marketing, but it's an experiential learning of certain specific entrepreneurial behaviors."

(Student participant)

Networking opportunities with successful entrepreneurs are also valuable. Students described how networking helped them learn about the passion for an idea, the commitment of time and resources, the need for a plan, and the obstacles to putting ideas into practice. Students added that networking can be especially beneficial when they receive feedback on their own entrepreneurial ideas. They discussed both one-time-only and recurring interactions; one student reported that she gained valuable insights during a business plan competition. But she emphasized that the benefits of networking can be long-lasting if entrepreneurs provide funding or further connections, enabling students to transform their ideas into full-fledged businesses.

Students reported that two of the recommended program elements, applied learning and networking, may alleviate fears as students anticipate or initiate a move from academia to the business world. They discussed their shared fears of business classes, of entering the business world for the first time, and of failure given the risk inherent in entrepreneurial ventures. Students believe that the graduate school can provide networking opportunities to help them anticipate these challenges, and incorporate applied learning into courses to encourage them to take risks in a controlled environment.

Benefits to the Student

Entrepreneurship opportunities are a source of empowerment for students who sometimes feel they are powerless over their education, according to several students. For example, entrepreneurship courses and opportunities may bring out leadership skills and true passion among those who seek an entrepreneurial dimension to their education. One science faculty participant commented on the value of entrepreneurship: "For me, the entrepreneur, the 'E' word is really about self-empowerment." Entrepreneurship education can also be about self-discovery. One graduate student participant had no desire to be an entrepreneur when he entered graduate school, but he has started three businesses and plans to launch another business with ideas developed through his Ph.D. program. Students believe that entrepreneurship education has broadened their perspective by encouraging them to make connections across disciplines and to consider

the potential benefit their idea or product can have to society. One student observed, based on his own experience, that programs that integrate entrepreneurship throughout students' education experience can provide these benefits without lengthening the time-to-degree.

PERSPECTIVES FROM ENTREPRENEURS

CGS invited two entrepreneurs to discuss the qualities that drive and sustain them as entrepreneurs. Both have extensive business experience and embody the entrepreneurial spirit that may motivate graduate students to succeed. The first, a serial entrepreneur, has created and sold several different businesses, while the second, a single-business entrepreneur, developed his business and continued to be a leader after its merger with another company. In recounting their different paths to entrepreneurial success, the entrepreneurs identified behaviors and attitudes that are characteristic of entrepreneurs.

Characteristics of Entrepreneurs

Entrepreneurs can sometimes be identified by these characteristics:

- Willing to take risks
- Passionate
- Interested in money and success
- Interested in self-destiny/control
- Motivated to work hard, sacrifice
- Iconoclastic
- Ambitious to succeed/averse failure
- Look to other entrepreneurs as role models

Entrepreneurs couple great ambition with unfailing confidence that they will succeed. For example, the single-business entrepreneur described how co-workers discouraged him from pursuing a project for the 1996 Olympic Games in Atlanta, but he ignored their advice and beat 170 major firms to win the project; he simply decided that his company would not fail. Academics who turn to entrepreneurship may wonder whether this confidence will conflict with the academic researcher's training to ask questions throughout the research process. In fact, a successful entrepreneur asks important questions while remaining confident of the project's eventual success.

An entrepreneur may pursue entrepreneurship projects early or late in life. One of our participants displayed an early interest in "turning pennies to nickels and dimes" and started his first business at age 24, while the other waited until the age of 37. The entrepreneur participants discussed other characteristics of entrepreneurs such as a drive to succeed, an aptitude for hard work, sacrifice, and, very importantly, instinct. One entrepreneur emphasized that we should not train out good instinct lest we encourage a "herd mentality." He warned academics against an approach to problem solving that doesn't reward good instincts and doesn't encourage risk.

The entrepreneurs also discussed other disadvantages of traditional business education. One identified two types of entrepreneurs: those who can build a process to make someone else's idea a market success and those who are true inventors. He explained: "Both are valid. Both are valuable. I believe the former is easier." Therefore, in his view, traditional graduate business education only serves one type of entrepreneur.

The other entrepreneur participant highlighted the connection between entrepreneurship and American competitiveness. He believes entrepreneurship education provides students with entrepreneurial skills and behaviors that allow them to succeed either in their own business or in the job market. These skills and behaviors are important in today's increasingly competitive economy.

In response to that observation, one graduate dean reflected that not all graduate students are destined to be entrepreneurs, but "the best graduate students . . . are the ones that have really very much the same qualities that [the entrepreneurs] were describing—passion and creativity, all those things." The entrepreneurs identified several ways that graduate schools can improve the chances that students will become successful entrepreneurs. Both entrepreneurs believe that students effectively learn from others who embody the spirit of entrepreneurship, reinforcing the student panelists' suggestions about the value of networking. If the faculty members do not have entrepreneurship experience, the entrepreneurs recommended that the graduate school supplement the faculty with business people.

Furthermore, to encourage entrepreneurship, the entrepreneurs advised that the university should recruit some portion of students into graduate school with "real world" work experience, as many business schools do. The university should also look for individuals who have passion and who want to be engaged for the entire process. One

entrepreneur believes that individuals who are willing to contribute their own money and pursue their project all the way through completion are the true entrepreneurs.

PERSPECTIVES FROM DISCIPLINARY EXPERTS

In addition to hearing from deans, students, and entrepreneurs, CGS also sought perspective from leaders of entrepreneurship programs who also do research within the field. We asked them to respond to a series of questions about how entrepreneurs develop, how programs should be structured, and what program directors need from their universities.

What makes an entrepreneur? In response to this question one researcher stressed, "There's a lot of elasticity in this concept and it depends on the situation, the context, the era, the time, and so on; and incentives and disincentives matter a lot." He continued: "If the incentives are in place, they're going to think about it; some will do it." Panelists noted that entrepreneurs are also affected by experiences in childhood and early education. One researcher pointed to findings that suggest that educators need to start thinking about entrepreneurship during K–12 education to develop students' confidence and encourage them to think creatively. Nevertheless, panelists concurred that undergraduate education is less important to entrepreneurship than a technical master's degree or doctoral education.

All panelists seemed to recognize that the definition of entrepreneurship is expanding from a core concept, provided by Schumpeter (1950) and other classical thinkers, based on new company starts and growth to a much broader definition that incorporates "social and non-profit entrepreneurship, entrepreneurship in the arts, public sector, law, medicine, etc." Another trend is "intrapreneurship," which refers to entrepreneurship within an organization. Researchers noted potential for entrepreneurship in liberal arts areas and also great opportunities in teaching about entrepreneurship.

Characteristics of Successful Entrepreneurship Programs

- Students from diverse disciplinary backgrounds
- Interdisciplinary coursework
- Integration of team experiences
- Faculty and administration buy-in and support, and presidential leadership
- Entrepreneurship skills taught in context of research

Program Characteristics

Entrepreneurship programs in graduate education come in many forms, ranging from Ph.D. programs and Ph.D. tracks to master's degrees and concentrations to certificate programs. One distinctive feature of entrepreneurship programs is the high degree of interdisciplinarity and integration of team experiences. For example, Georgia Tech's Technological Innovation: Generating Economic Results (TI:GER) program is a two-year certificate program that engages four-member multi-disciplinary teams to look at potentially commercializing the research of doctoral students. The program brings together graduate students in science, engineering, and management from Georgia Tech, as well as law students and doctoral students in economics from Emory University.

Students' diverse disciplinary backgrounds may be beneficial for team projects, but a potential challenge in the classroom. One program director described students in his program, "They're very intelligent, they're very motivated . . . but they're learning a new language." This is a challenge when students come from many different disciplines. Another program director recognized this problem as it applies to her students: "One problem is if you've got these different disciplines, they learn in different ways, research methods are different, and so if you're thinking of the materials, one group of students can understand, the other two typically don't."

> "We focus on increasing graduated levels of monitored responsibility under the close direction of experts with significant knowledge breadth and domain depth and with academic and applied expertise and experience. We teach the basic business skills, but we also teach and integrate entrepreneurial behaviors . . . creativity, opportunity recognition, leadership, particularly for change. . . ."
>
> *(Program director participant)*

The program directors identified the departmental silo problem as a challenge to the development of entrepreneurship programs and also to interdisciplinary thinking on campus more generally. One observed, "The biggest issue within the academy is the silo. Until the silos are broken down and people are able to talk and work and focus on projects or possibilities, these problems are going to continue." Graduate deans may reach out to individual faculty members to develop buy-in. However, faculty support may be difficult to obtain for similar territorial reasons.

One program director's students reported that faculty members don't want students to take entrepreneurship-type classes because it could

25

"distract them and take them away from their commitments." Another program director indicated that she prevents this potential problem by integrating entrepreneurship education into the graduate student's existing coursework and research: ". . . the whole idea behind this program is you're not going to divert these guys if what you do is teach them these skills in the context of their research." She further recommended that faculty should receive credit for team-taught modules that are common in entrepreneurship education to encourage faculty participation.

The existing entrepreneurship programs have already addressed some of the greatest obstacles to entrepreneurship education, such as funding and assessment. For example, one entrepreneurship program receives funding through the National Science Foundation's (NSF) Integrative Graduate Education and Research Traineeship (IGERT) program. The program director explained that "part of the purpose of the IGERT . . . is to get Ph.D. students out of the box and to unchain them from their advisor and let them do something in an entirely new area." The IGERT program requires program assessment. Another concern about entrepreneurship programs is that they often depend on case studies that may go out of date. The program director and her colleagues used Kauffman funding to update their case studies, which will be publicly available this fall.

Role of the University

Entrepreneurship program directors agreed that the time may be right for graduate deans to get more involved in an entrepreneurship program because a successful one may have the added benefit of bringing additional funding to the university. One program director commented, "There is a drive from the universities because they want to license these technologies." But they also saw direct benefits of entrepreneurship programs to students who gain both technical skills and professional skills, such as communication, teamwork, management, and the ability to think and solve problems. Broadening the skill sets of graduate students through an entrepreneurially flavored curriculum may prepare them for more career options over a lifetime.

Program directors called on administrators to help entrepreneurship students by advocating a way to change the workload for graduate students. Students should have time for sponsored research, as well as exploratory research and "flights of fancy," as discussed earlier. One director allows his students to spend fewer than 20 hours per week working in the lab, and this approach produces a better outcome for students and the lab. The graduate school can also contribute to entrepreneurship programs by providing

outreach to the community and businesses in the areas of regional development, technology, and international development.

CASE STUDY—MULTIPLE STAKEHOLDERS WITHIN ONE UNIVERSITY: UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN (UIUC) PANEL

CGS believed it was important to learn what is happening in detail at one institution that has made a serious commitment to entrepreneurship. The University of Illinois at Urbana-Champaign (UIUC) is one of eight Kauffman Campuses. In 2004, the university received a grant for $4.5 million from the Kauffman Foundation, the largest grant to a Kauffman Campus; the university matched the grant two-to-one for a total of over $13 million towards entrepreneurship. The Academy for Entrepreneurial Leadership (AEL) leads the university's entrepreneurship efforts. The AEL strives to "Establish an understanding, appreciation and credibility for entrepreneurship on our campus." CGS invited the executive director to report on the development and activities of the AEL and also an AEL Faculty Fellow and a student participant to report on UIUC's entrepreneurship initiative from their diverse perspectives.

Features of the UIUC Entrepreneurship Program

- Research-based approach creates stakeholder awareness and buy-in.
- Umbrella description of entrepreneurship is broad and inclusive.
- Faculty engagement produces creativity and momentum.
- Programs foster student creativity.
- Multidisciplinary approach has broken down silos and advanced entrepreneurship education.
- Student recruitment is key to success.
- Program is open to assessment and course corrections as necessary

The AEL executive director first described the diagnostic phase of the university's entrepreneurship initiative, which consisted of interviews with over 50 top administrators and a survey of all 2,000 faculty and 10,000 graduate students. These information-gathering activities gave the AEL staff an opportunity to "look at the landscape, determine where the opportunities were, where the challenges were, and where the barriers

could possibly be in instituting a cross-campus initiative for entrepreneurship." Next, the AEL staff defined entrepreneurship as it would be used at the university, which the executive director summarized as "a process of channeling creativity and innovation—channeling it in a way that you can produce ventures in your community that create value . . . economic, social, or intellectual value."

After the diagnostic phase, the AEL staff developed a wide range of entrepreneurship programs and activities, beginning with the successful Faculty Fellows Program. The executive director described this radiant, multidisciplinary program, which engages faculty who both "know their discipline (and) know how entrepreneurship will work within that discipline." He explained that fellows participate in monthly meetings, national conferences on entrepreneurship, and workshops on incorporating entrepreneurship into courses; they also receive support and team-teaching assistance from the AEL. The executive director reported that applications to the Faculty Fellows Program doubled each year for the first two years, and there are currently 32 faculty fellows developing "never-before offered courses."

The AEL also provides entrepreneurship workshops for students who cannot fit semester-long entrepreneurship coursework into their schedules. The executive director noted that workshops are often scheduled in the late afternoon, when students can more easily leave their labs. He said that workshops have been successful in attracting students and spreading the word about AEL programs. For example, the executive director told of student workshop participants who encouraged their faculty to apply to the Faculty Fellows Program in order to develop entrepreneurship coursework in their discipline.

Several members of the UIUC team acknowledged that the program's start-up was not smooth. For example, one UIUC participant said that initial workshop attempts were not entirely successful, as they featured "people from the outside who didn't really understand how we defined entrepreneurship and what we were trying to accomplish." However, they agreed that the workshops have improved and they now cover a range of topics, including recognizing and assessing opportunities, and the one-page business plan. In fact, one UIUC participant remarked particularly on the success of a networking workshop for Fine and Applied Arts students that attracted over 50 students.

The Visiting Scholars Program brings scholars from around the world to address different issues related to entrepreneurship. The executive director commented that in some disciplines entrepreneurship may be a new concept and "[The visiting scholars program] adds to the

credibility because our faculty do respond very positively to names that they recognize in their field." The AEL also offers funds to students and faculty to explore entrepreneurship within their discipline. For example, the Graduate Scholars Program (GSP) provides graduate students with up to $5,000 for entrepreneurship projects. The executive director reported that the program is now in its third year, and the AEL receives approximately 50 proposals each year for 10 project slots. In partnership with the vice chancellor for research and the campus research board, the AEL also established a research fund for faculty called "Creativity, Innovation and Entrepreneurship."

A typical entrepreneurship course in the AEL program is "Creating Value in the Life Sciences: A Personal Roadmap." The faculty participant who developed the course said he had been inspired by Daniel Boorstin's book *Discoverers:* "I'm trying to train my students to be great discoverers." He shares with students the book's point that not all individuals are making that "seminal discovery," but there is great importance in being the person who understands the value of the discovery and "contributing to the value proposition." He described the course content, which includes business principles and concepts along with experiential learning, development of a one-page business plan, and exposure to role models with varied experience who can assist students in career discovery. The faculty participant explained, "I try to bring in people who have lived a different lifestyle . . . people who (have taken) different paths using their knowledge as a discipline-based scientist to create an exciting career."

Clearly the AEL program is having an impact on a doctoral student in animal science who observed, "Entrepreneurship has transformed how I look at my career path." The student explained that she has reassessed her career goals after taking the "Creating Value in the Life Sciences" course where she heard from speakers who had experience outside of the lab. While she plans to stay in science, she has decided to look for a path that fits her personality and allows her to be passionate and creative. The student has found the idea of value creation to be an exciting part of her entrepreneurial studies. She recognizes the time pressures on students who opt to add an entrepreneurial track to their education, but ultimately, she sees a path to combine lab work, business understanding, and an entrepreneurial spirit to create success.

The UIUC panelists believe the institution has made significant progress over the past three years and the executive director expects that entrepreneurship will have a strong institutional presence at the end of the grant period. In fact, he anticipates that the entrepreneurship activities

will continue on campus through commitments from the university. The executive director expressed his hope that successful entrepreneurship education at UIUC will provide opportunities for all students on campus. He explains, "We're really about multi-discipline entrepreneurship. And success for me will result in curriculum initiatives so you'll be able to look at our curriculum and see a wide range of opportunities for our students, regardless of their major or their primary field of study."

PERSPECTIVES FROM GRADUATE DEANS

The final stakeholder's perspective comes from our graduate deans whose recommendations focus on four main areas: 1) organizational commitment and culture change; 2) the evolving role of the graduate dean in facilitating entrepreneurship initiatives; 3) the bridge between the academy and new career opportunities for graduates; and 4) opportunities in social entrepreneurship. In each case, participants have provided concrete examples of actions that support these practices.

Establish organizational commitment to entrepreneurship and promote culture change.

The graduate deans agreed that institutional commitment is essential for the development and continuation of entrepreneurship programs, and that the graduate dean can build support by promoting entrepreneurship personally among deans and department heads. As campus leaders, graduate deans can spread the message "that [entrepreneurship] is something that the administration is in fact in favor of—and would like to reward and incentivize . . . that message alone is probably a breath of fresh air in many quarters of the university." Understanding the value of entrepreneurship and committing to incorporating entrepreneurship on campus are the first steps towards culture change.

Graduate deans expressed concern that entrepreneurship programs may lengthen, derail, or delay the Ph.D.-bound student, and one element of culture change may be to consider the purpose of graduate school. One dean asked: "Which is better [for the student and the university]—a student who completes his or her Ph.D., or a student who becomes a successful entrepreneur, given the time demands of graduate school?" This led to an interesting discussion about the core purpose of graduate education. Does the graduate school exist to produce graduate degrees? Is the graduate school still succeeding if it helps students discover a passion, even if it takes them away from the graduate school? Students recommended that deans consider introducing flexibility to allow students

to pursue entrepreneurial opportunities, leave the graduate school if necessary, and perhaps even return, as one student panelist chose to do.

All deans recognized that one effective way to influence the culture and motivate Ph.D. students and faculty to embrace entrepreneurship is to incorporate the products of entrepreneurship into the tenure and promotion policy. Two participants reported that their institutions have altered their policies to recognize the production of patents. They believe these policies clearly demonstrate the institution's commitment to entrepreneurship and encourage faculty participation in entrepreneurship education.

Culture change may be accelerated by structural change, such as the creation of an office, academy, or institute of entrepreneurship that leads the entrepreneurship activity on campus. Culture change may also begin in the technology transfer office; at two universities represented, the technology transfer offices encourage and foster entrepreneurship. Ultimately, culture change may only occur with continued, dedicated efforts over a long period of time.

Focus efforts on pointing graduates toward fulfilling jobs and careers, by building curricula that expand and extend capabilities of graduates. Make academic offerings market sensitive and innovative, and connect them to job creation.

Increasingly, institutions are finding creative ways to bridge the gap between the academy and new career opportunities. One graduate dean commented, "No longer do we just teach students, but we have this obligation to connect what we learn to society." The Eastman School of Music at the University of Rochester helps its students cope with the tremendous competition for positions in top-tier orchestras. In addition to core strength musical instruction, they offer students entrepreneurial instruction in areas like orchestral management, media management, press relations, education, and intellectual property and law. The Eastman School also makes direct connections to business through a Web site for music students nationwide (www.polyphonic.org).

Graduate deans can develop new degree programs that are market-sensitive, with the added benefit of providing new revenue streams for the graduate school. One graduate dean of a public university described two certificate programs developed by his university and approved by the state commission for higher education. These programs are market sensitive because they are essentially templates for programs that can be easily changed. The graduate school, the office of professional studies, and the department providing the specific expertise share the profits.

Provide opportunities in the growing field of social entrepreneurship.

Frequently, the entrepreneurship opportunities are in the science and technology areas or are extensions of traditional business education. However, substantial student interest may center on the field of social entrepreneurship. Two institutions represented have identified this trend on campus. One academic participant even referred to social entrepreneurship as "one of the new waves on campus." He shared the results of a recent survey of incoming freshman that suggests that "probably 60 percent of our freshmen want to have real purpose in their life, and this whole idea of social entrepreneurship really resonates." Older students have also demonstrated a strong interest in social entrepreneurship through participation in the social division of the university's business plan competition. This year, the competition had more applicants in the social division than in the commercial division. Participants from those institutions described a variety of recent and upcoming social entrepreneurship projects.

Graduate deans should model entrepreneurial behavior in managing resources, developing programs, building teams, fostering curriculum change, and promoting outreach.

Interestingly, the entrepreneurship workshop discussion even moved to focus on entrepreneurial behavior of the graduate dean him- or herself. Graduate deans who operate their graduate schools in an entrepreneurial manner can learn about the climate for entrepreneurship at their university and the challenges of being an entrepreneur. One graduate dean recommended that graduate deans be entrepreneurs with their available resources. He believes that "a very important thing for a graduate dean to do is conceive of his or her resources not as a static pool to be allocated out, but actually as a dynamic tool to leverage additional resources."

> "We need to be entrepreneurs in every sense of the word with our actual resources, which is to say funding, and with our other resources, which is to say personnel, ideas, imaginations—which is, of course, the most valuable resource of all."
>
> *(Graduate dean participant)*

Creative approaches to funding may be slow to catch on, as shown by one graduate dean's experiences. He challenged faculty to think in an entrepreneurial manner and develop proposals that would extend a pool of graduate support and fellowship funding through external matches and

donor involvement, ensuring that the initiative would last several years. The dean was disappointed by the majority of the proposals; however, he has funded several proposals and recommends this approach to other graduate deans: "If you can get your hands on just a little bit of money to do this, or take some of your existing fellowship money, it's a great way to learn who knows what and how, even within the confines of the university."

Graduate deans play an important role in making university members aware of the entrepreneurship opportunities available on campus, and encouraging collaboration between university members. However, those deans who are truly entrepreneurial will even pursue opportunities beyond the graduate school. One graduate dean even recommended that deans "participate in a start-up venture . . . get yourself on the board of a local company." These activities will help the graduate dean build credibility and gives him or her real business experience or entrepreneurial perspective.

LOOKING FORWARD: GUIDING PRINCIPLES FOR THE NEXT PHASE OF ENTREPRENEURSHIP EDUCATION IN GRADUATE SCHOOLS

SUMMARY

Graduate schools across the country have recognized the value of entrepreneurship education and the results of this CGS-convened conversation on entrepreneurship education suggest that more graduate schools would be well served by following their lead. Not all graduate students will be interested in entrepreneurship, and of those students who do pursue it, not all will develop profit-making businesses as entrepreneurs. However, entrepreneurship education can provide significant personal, academic, and professional benefits for all students. Graduate students may be empowered to take control of their education and make connections across disciplines and beyond the academy. They may have time to pursue research ideas and other "flights of fancy." Lastly, students may develop valuable professional and entrepreneurship skills that will benefit them in a competitive job market. One graduate dean ended with a most expansive suggestion: "Maybe what is needed is some kind of broad exposure to everyone. Just like we expose everyone to responsible conduct of research, conflict resolution, and conflict management." But whether entrepreneurship in graduate education is restricted to a particular curriculum or sponsored by all of graduate education, all participants agreed on one point: The characteristics of successful graduate students in general—passion, risk-taking, perseverance, and trust in oneself—will also make them successful entrepreneurs.

GUIDING THOUGHTS AND CONCLUSIONS

As the organization that serves graduate schools nation-wide, CGS has a unique vantage point in this discussion. We see our involvement in entrepreneurship partly through the door of American competitiveness. By taking a leading role in fostering entrepreneurship, graduate education can produce highly skilled graduates for the twenty-first-century workforce and support and promote economic and social growth. However, while the U.S. has a greater national aptitude for risk-taking compared to other countries, some U.S. graduate schools exhibit a risk-aversion approach, which may hamper entrepreneurship initiatives on their campuses.

CGS initiated the conversation about entrepreneurship in graduate education as one of our "best practice" initiatives. We believed that sharpening the focus of entrepreneurship in higher education, particularly graduate education, posed a potential opportunity to improve the preparation of graduate students by capitalizing on the historic contribution of graduate education in the knowledge creation and innovation vital to expanding the country's economic prosperity. Our strategy in "best practice" efforts is to summarize our current understanding of the challenges and opportunities of particular phenomena and, when possible, provide some preliminary recommendations, or "guiding thoughts." In some cases, these guiding thoughts also lead to the creation of a new conversation about implementation. In other situations, they stand alone to provide the needed direction for the graduate community. Time and discussion determine what specific "next steps" follow, so for now, we conclude with guiding thoughts for institutions interested in pursuing an entrepreneurship program in the graduate school.

Guiding Thoughts

1. Define entrepreneurship in a way that is understood within your institution and is flexible enough to promote creativity and innovation.

2. Evaluate the current graduate school culture to determine if it is accepting of entrepreneurship education. If not, work to change the culture of your institution.

3. Solicit faculty and administration buy-in and support, and even presidential leadership.

4. Recruit students into the graduate school who are potential entrepreneurs—both the idea generators and those who can take an innovation and bring it to life as a business enterprise.

5. Foster and promote an interdisciplinary curriculum and work with faculty to make them successful collaborators and mentors for entrepreneurial graduate students. Give students time to pursue entrepreneurial ventures, while looking for ways to have their experiences support the pursuit of the Ph.D or master's degree.

6. Expand the role of the graduate dean by taking a lead role in promoting and facilitating entrepreneurship.

7. Promote opportunities both in the traditional (STEM, business) and non-traditional (liberal arts) departments. Look for case studies that demonstrate successful entrepreneurship programs in all areas of the graduate school.

8. Increase linkages to the business community for venture funding, networking, curriculum and faculty support, and career opportunities for graduates.

9. Create sustainable programs.

10. Measure results, celebrate successes internally, and share them with counterparts across the country.

ENTREPRENEURSHIP AND GRADUATE EDUCATION WORKSHOP, MEETING ATTENDEES

Ronald Atlas
Dean of the Graduate School
University of Louisville

Robert Bolla
Associate Provost, Research
Dean of the Graduate School
Bradley University

Clarence Brown
Director, Entrepreneurship
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39

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