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**The Future of Undergraduate Research, Creative Scholarship, and In-depth Studies at Davidson College**

*Submitted by Verna Case, Program Director of the Davidson Research Initiative and the 2007 DRI Summer Research Program Research Fellows and Faculty Mentors*

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**Introduction**

During the inaugural year of the Davidson Research Initiative's (DRI's) Summer Research Program, faculty and students gathered in small groups at lunch to discuss the future of undergraduate research and in-depth studies at Davidson College. The DRI Program Director, Verna Case, provided program participants with a collection of readings that served as starting points for discussion. The student-faculty groups were charged with the tasks of enumerating the costs and benefits of maintaining a rich, active undergraduate research program and making suggestions for the future of undergraduate research at Davidson. This white paper, based on notes taken during group discussions and recent literature on undergraduate research, advocates significant expansion of in-depth studies, creative scholarship and undergraduate research at Davidson College.

The DRI participants and program director hope that the ideas presented in this document will be useful to our new president, Tom Ross, and to Vice-President for Academic Affairs, Clark Ross.

**Defining undergraduate research or in-depth studies**

For many years, the term "research" has been used to describe the creative scholarship activities of undergraduates. No doubt this activity was called "research" because it originated in research laboratories in the sciences. Today, the term "undergraduate research" encompasses not only "research" in the natural and social sciences, but "scholarly activities" in the humanities, and "creative activities" in the arts (Merkel, 2001). Any activity that engages students in the discovery process can be included under the broad "research" umbrella. These activities may occur in a wide variety of settings -- from libraries to research laboratories, from African mission hospitals to policy-setting agencies (Cantor, 2004).

This summer's DRI faculty and students represented a variety of disciplines. Because of this diversity, most of the discussion groups attempted to characterize what "undergraduate research" means at Davidson College. The groups found number of definitions in the literature. For example, the Council for Undergraduate Research (CUR) defines undergraduate research as "an inquiry or investigation conducted by an undergraduate student that makes an original, intellectual, or creative contribution to the discipline" (Wenzel, 2000). Kinkead (2003) argues that undergraduate research includes scientific inquiry, creative activity, and scholarship under the guidance of a faculty mentor. One of this summer's discussion groups drafted their own definition of undergraduate research as "a theoretical and/or empirical investigation or exploration of an issue that produces an original product relevant to that issue."

After four weeks of discussion, many DRI participants concluded that the term "in-depth studies," as used in Davidson's 2007 Quality Enhancement Plan (QEP), is a good descriptor of the variety of experiences that allow students to pursue specific questions in a field of study (*Redefining Rigor: Learning in Breath and Depth at Davidson College*, Davidson College Quality Enhancement Plan, Part III. Depth Studies Across Academic Departments, 2007). According to the QEP, research opportunities are a major way for students to gain an in-depth experience.

As difficult as it is to find a single term or definition that satisfies all forms of creative scholarship, this summer's student-faculty discussion groups did agree that undergraduate research and in-depth studies are learning activities that:

1. Teach students to think critically, to problem-solve, and to ask and to answer questions;
2. Require the aid of the faculty mentor to bridge gaps between ideas and projects;
3. Result in the creation of an original product (publication, performance, presentation, exhibit, etc.);
4. Often involve collaboration or teamwork for completion.

### **Why is undergraduate research important?**

Our world is replete with challenges and problems that need to be addressed in order to improve the quality of our lives. In order to solve complex problems, such as the HIV/AIDS pandemic, global warming, and political unrest, we need innovative thinkers from a wide variety of disciplines. The next generation of creative problem-solvers, today's undergraduates, will find novel solutions to problems if we give them opportunities to explore questions and to experience the excitement of discovery now. The value of undergraduate research in developing young scientists has been recognized for many years (Conn, 1887; Loudon, 1902; Goodrich, 1927). Recent publications call for the expansion of undergraduate research opportunities, not only in the sciences...but in all disciplines across the curriculum (NRC, 2003; NSB, 2003; Malachowski, 2003; Ellis, 2006; NSB, 2006; Mateja, 2006; Mateja and Otto, 2007; Russell *et al.*, 2007).

A number of organizations promote and support undergraduate research in the sciences, including the Council for Undergraduate Research (CUR), Project Kaleidoscope (PKAL), the National Science Foundation, and private foundations, such as the Howard Hughes Medical Institute (HHMI) and the PEW Charitable Trust. The National Conference on Undergraduate Research (NCUR), which has been held annually for the last fifteen years, showcases scholarly and creative activities in all academic disciplines and serves as an advocate for the research-across-the-curriculum movement.

When undergraduates engage in creative scholarship, the benefits are felt throughout the institution. First and foremost, active participation in research and creative scholarship generates a greater understanding of principles and interrelationships than passive absorption of information from a lecture or a book, regardless of discipline. Many authors find that in-depth studies play a vital role in the active learning process by:

- a) teaching the value of learning from the past to build a future (Chapman, 2003);
- b) promoting student intellectual independence and maturation (Elgren and Hensel, 2006);
- c) teaching students "to think quickly, to simulate possibilities, to test ideas, and to work in groups" (Cantor, 2004);
- d) stimulating "critical and creative thinking, the habits of mind that nurture innovation; creates a sense of intellectual excitement and adventure; and provides the satisfaction of real accomplishment" (Ellis, 2006);
- e) giving students "the ability to work with the ambiguity of open-ended questions, an ability to apply skepticism to the daily flow of information, and an appreciation of what it takes to create new knowledge" (Merkel, 2001);
- f) increasing student confidence and encourages graduate and professional study (Merkel, 2001). Research experiences in science were found to sustain or increase interest in postgraduate education in 91% of individuals surveyed by Lopato (2004) and the NSF survey demonstrated that 29% of those taking the survey had a new expectation of obtaining a Ph.D. Undergraduate researchers report additional learning gains, including gains in understanding of the research process, in specific research, writing, and oral skills, and an appreciation of what scientists do (Lopato, 2004; Russell *et al.*, 2007).

Additionally, undergraduate research experiences are now required for admission to many by graduate and professional schools and the most elite graduate programs expect published research, in hand, at the time of application. Prospective Davidson students with an interest in pursuing advanced degrees are aware of the expectations of graduate schools and, as savvy consumers, they are demanding opportunities for in-depth studies often and early in their undergraduate studies. Indeed, many of these prospective students have had research experiences while still in high school.

Faculty gain numerous benefits from the collaborative process, as well. Elgren and Hensel (2006) refer to the "enlightened self-interest" of faculty who include undergraduates in their research efforts. Assistance from undergraduates:

- a) can increase faculty productivity and keep faculty apprised of new knowledge in their discipline. This benefits may be particularly valuable at primarily undergraduate institutions (PUIs) where there are many competing demands on faculty time (Elgren and Hensel, 2006);
- b) can result in the generation of new knowledge. (Elgren and Hensel, 2006).

Finally, an academic institution that is rich in undergraduate research experiences will gain regional, national, and international recognition, and the levels of student and faculty satisfaction will rise (Elgren and Hensel, 2006). Malachowski (2003) argues that a lack of undergraduate participation in research may be detrimental to both student learning and institutional quality. **Success begets success.** Institutions that are creatively productive will grow in reputation and will attract more innovative, highly qualified faculty and students, increased support from alumni, funding agencies, and the public at large (Merkel, 2001).

### **What are the costs associated with undergraduate research?**

As Mateja and Otto (2007) point out, "undergraduate research is not free!" They list four categories of resources that are required for a successful undergraduate research program:

1. faculty and student time;
2. financial support for equipment, supplies, and travel;
3. support for library and computer needs; and
4. physical space.

It is not surprising that **time** is the number one cost associated with providing in-depth studies for undergraduates. In order for undergraduates to delve deeply into a subject and to pursue an

original question, faculty must patiently guide the process. Because student needs vary, faculty must work beside each student in order to know when and how much assistance is needed. In addition, creative scholarship by inexperienced undergraduates can often lead to dead-ends or side-tracks. Using such "digressions" as learning tools, mentors play a major role in helping students gain insight and perspective, rather than becoming frustrated, lost, or disenchanted. Hence for faculty mentors, research involving undergraduates requires a greater time commitment than doing research alone or with graduate students. Further, other demands on faculty time, such as committee work or roles in professional societies, can make it difficult for faculty to give priority to undergraduate research.

While time is a major limiting factor when trying to involve undergraduates in research, the pursuit of knowledge is easier than ever before. Information technology and scientific instrumentation have transformed scholarship and increased access to information. Knowledge seems to accumulate at an exponential rate, as the internet and other technologies give us access to current information at the touch of our fingertips. To meet the growing demand for information and to feed our curiosity, new generations of technology are constantly evolving. Academic institutions must keep pace with and adapt to the changing paradigms for gathering and sharing information. Clearly, the financial costs required to stay up-to-date in our technological world is high. There are the obvious purchase costs associated with new technologies, as well as the less obvious costs of training for faculty, staff and students and the physical plant changes needed to support new technologies.

It is not only new technologies that demand an institution's financial resources; the entire creative scholarship enterprise is costly. If the goal is to provide in-depth study opportunities for every undergraduate, institutions will need to invest in the personnel and the infrastructure to make that goal possible. More faculty will be needed to lead undergraduates through the discovery process, more staff will be needed to provide technical and administrative support, and more spaces will be needed to provide an environment for exploring many types of questions.

Bettison-Varga (2006), president of the Council on Undergraduate Research states, "It is CUR's message that the synergy of research and education that occurs through collaborative student/faculty research must be recognized as part of faculty workload, valued by institutions, and supported by enhanced governmental funding. The pipeline for innovation capacity at advanced levels is dependent on the support of our work with undergraduates."

### **What does Davidson need to do to nurture undergraduate research as we move forward to meet the demands of the 21<sup>st</sup> Century?**

The culture for undergraduate research and in-depth studies is growing and expanding at Davidson (*Redefining Rigor: Learning in Breath and Depth at Davidson College*, Davidson College Quality Enhancement Plan, Part III. Depth Studies Across Academic Departments, 2007). In the last ten years, the number of research students working with faculty mentors in the summer has more than tripled.

- In the summer of 1997, Davidson's Howard Hughes Medical Institute (HHMI) grant supported eight Davidson Summer Research Fellows in biology and neuroscience. That same year, the Faculty Study & Research (FS&R) committee received requests from individual faculty for 11 summer undergraduate research assistants.
- In the summer of 2007, there were 60+ students participating in on-campus research supported by the Howard Hughes Medical Institute, by the Merck/AAAS Undergraduate Science Research Program in Biology and Chemistry, by the Davidson Research Initiative, by FS&R grants, and by individual faculty member's external grants (from NIH, NSF, etc.). Other students, engaged in projects that could be defined as research, were supported this summer by the Kemp and Abernethy funds.

By far the largest and most recent increase in the number of funded research opportunities for Davidson undergraduates comes from the Davidson Research Initiative (DRI), funded by the Duke Endowment. This initiative not only provides money for individual student fellowships for summer research, but also funds group investigation opportunities for “research” experiences associated with Davidson courses, and monies to support release-time for faculty whose research includes undergraduates.

As a result of the growth of in-depth opportunities at Davidson, the college decided to focus a part of the final the Quality Enhancement Plan (QEP) for the recent SACS review on in-depth studies. The QEP states that research experiences should be accessible to more students on campus and suggests that continued growth of research opportunities will be achieved by “substantially increased financial support for student research over the next five years.” By increasing funding and other support for students and faculty doing creative scholarship, the number of departments, faculty, and students participating in in-depth experiences will increase. Also, increasing the visibility of research programs on campus and creating of an “ethos that encourages learning in depth” will help Davidson achieve the QEP objective.

The 2007 DRI participants suggest that specific efforts be made to increase creative scholarship collaborations among faculty and students in the humanities and social sciences. Further, DRI participants suggest that recruited faculty and students should expect to become engaged in collaborative research when they become part of the college community. New faculty should be committed to mentoring undergraduates in research and first year students should be given opportunities to have discovery experiences early in their Davidson career. Finally, Davidson faculty and students should share the expectation that their original work will result in a “product” (e.g., a research article, painting, performance) that will make a contribution to their field of study.

### **What will it take for Davidson to become a national leader in undergraduate research and in-depth studies?**

In her pilot study for the Association of American Universities, Patricia Merkel (2001) argues that creating a culture for undergraduate research requires a commitment to develop the components of the undergraduate research culture over the long term. It requires:

1. promotion of the enterprise;
2. regular communication of the importance and value of the activity; and
3. celebration of success and achievement.

Merkel (2001) recommends that undergraduate research be included as a component of an institutions strategic plan or central mission. As such, there should be “an articulation of an overarching vision for undergraduate education and the role of undergraduate research within it.” Specific goals must be delineated (e.g., number and types of creative scholarship opportunities available) and adequate financial resources must be allocated for achieving each of the goals. Faculty must be rewarded for mentoring undergraduates in meaningful ways, including stipends and release time. Providing in-depth opportunities for all students will require an increase in the number of faculty positions across the institution. In addition, facilities, library resources, technology, and equipment that encourage and stimulate the discovery process must be readily available and easily accessible to students and faculty.

If Davidson’s vision is to attain national prominence in undergraduate creative scholarship, then steps must be taken to formulate a strategic plan for in-depth studies and to pursue the resources necessary to achieve that plan. A strategic plan will provide the necessary detail and direction to achieve the goals suggested by the QEP. Also, a detailed plan will provide justification for fund-

raising efforts and could, as suggested by DRI participants, play a significant role in Davidson's next major campaign.

***DRI participants suggest that a new Office of Undergraduate Research or a Center for Creative Scholarship will provide the leadership for developing a strategic plan for in-depth studies at Davidson.*** At least 55 undergraduate institutions in the U.S. have established an Office of Undergraduate Research or a Center for Creative Scholarship and many more are considering formalizing and centralizing their undergraduate research programs (Crowe and Sienerth 2006). Although structures may vary among institutions, most offices have a full-time director (usually from faculty ranks) and fall under the administrative umbrella of the VPAA, Dean or Provost.

Centers for Creative Scholarship increase awareness of undergraduate research and serve as advocates for in-depth studies on campus. In addition to coordinating the strategic planning process for in-depth studies, a center could increase the visibility of creative scholarship, by:

1. encouraging in-depth studies across the curriculum;
2. forming partnerships or affiliations with off-campus research programs;
3. assessing and tracking the institutions undergraduate research programs;
4. helping to raise funds for the undergraduate research programs;
5. organizing public celebrations of research (research poster sessions, performances, exhibits);
6. publishing an on-campus research journal;
7. providing information on wide range of on- and off-campus research opportunities to prospective and enrolled students and parents through a variety of media, including the web;
8. centralizing administrative support for research programs to avoid duplication of effort and coordinating with other offices on campus (Residence Life, Career Services, Grants and Contracts, Controller, etc.).

In conclusion, DRI faculty and student participants in the 2007 Summer Research Program firmly believe that ***Davidson College is ready to move to a new level of academic excellence and leadership. Creating a culture that supports and nurtures undergraduate in-depth study on a broad scale will be a major factor in moving our institution to that new level.*** Our recent position in *U.S. News and World Report* is due, in part, to our current student-faculty research activities. We believe that a careful, considered institutional plan for growth and expansion of our in-depth study opportunities will enhance our position among the leading liberal arts institutions in this country.

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