Integrative Discovery

A Proposal for a New Graduate Interdisciplinary Program

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THE INTEGRATIVE DISCOVERY PROGRAM
AT THE UNIVERSITY OF ARIZONA

INTRODUCTION

Typically, graduate students begin their advanced degree programs with a strong interest in a field of study. For many, the goal of a teaching and/or research position in a prestigious university is the aim of the in-depth exploration of their area of interest. For some students, however, the pursuit of learning and the acquisition of a graduate degree is driven by a deep and abiding concern about a situation they wish to address – a societal issue, a global problem, a technological challenge, or a passion for creating positive change in their community. These students recognize that, to deal effectively with complex issues, they must draw from the knowledge of multiple disciplines, integrate what they learn, and apply it in a way that makes a difference in the world. (See Appendix for three case examples.)

1.) The Nature of Integrative Discovery

In his seminal work, published more than a decade ago, Boyer speaks of the need to broaden our understanding of scholarship to include not only discovery, but to recognize that knowledge is acquired through research AND synthesis, practice, and teaching. He refers to the scholarship of integration as making connections across the disciplines and looking at areas of specialization in a broader context. Further, in a speech to the American Academy of Arts and Sciences in 1995, he calls higher education "one of the greatest hopes for intellectual and civic progress in this country." But then he cautions us:

...for this hope to be fulfilled, the academy must become a more vigorous partner in the search for answers to our most pressing social, civic, economic, and moral problems, and must reaffirm its historic commitment to what I call the scholarship of engagement.

Integrative discovery includes not only research which spans disciplinary boundaries, it focuses that effort on pressing problems which are grounded in the complex society of a global community.

2.) Rationale for a New Graduate Program

The University of Arizona has a reputation among its peer institutions for fostering a strong emphasis on interdisciplinary degree programs. In addition to the potential for undergraduate students to create individualized programs of study, the Graduate College has nurtured the development of nineteen Interdisciplinary programs ranging from "American Indian Studies" to "Insect Science," from "Comparative Cultural and Literary Studies" to "Pharmacology and Toxicology." What is missing is a mechanism for students at the graduate level to tailor a program of study to focus on an issue of import – an issue which the student is committed to addressing for the betterment of society.

PROPOSED STRUCTURE AND OPERATION

1.) Integrative Discovery Program Executive Committee

The GIDP's are each managed by an Executive Committee. For the Integrative Discovery Program, this Executive Committee will be made up of representation from each of the colleges. Their function will be the same as outlined in the IDP Guidelines for Executive Committees with respect to accountability to the Dean of the Graduate College for matters of policy, compliance, development, and review.

2.) Integrative Discovery Program Chair

The Chair of the Integrative Discovery Program will be named by the Dean of the Graduate College based on the recommendation of the Executive Committee and will perform the functions as outlined in the IDP Guidelines. This position will serve for five years initially and may be renewed subject to a satisfactory administrative review.

3.) Faculty Participation

A group of 3-5 FTE will comprise the Integrative Discovery Program core faculty. Additional faculty will be drawn from all colleges and disciplines as appropriate, based on needed expertise and availability of time to commit to an Integrative Scholarship Committee. Faculty participation will be governed by the policies outlined in the IDP Guidelines.

4.) Integrative Scholarship Committees

Each student in the Integrative Discovery Program will be responsible for convening a committee of at least three and up to five faculty who will serve as the Integrative Scholarship Committee providing guidance throughout their course of study.

> A.) Student Role
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> By the end of the first semester of study, each student in the Integrative Discovery Program will identify faculty whose interests are germane to his or her course of study. It is the student's responsibility, with assistance from the core faculty, to determine appropriate members for their scholarship committee who are willing to serve through the completion of the graduate degree.
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> B.) Major Professor Role
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> Each Integrative Scholarship Committee will be headed by a faculty member selected by the student to serve in the capacity of primary advisor. As with other graduate committees on campus, this faculty member will be designated the major professor.
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> C.) Committee Role
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> The Integrative Scholarship Committee functions in much the same way as the

typical graduate committee. The primary difference is that the Integrative Scholarship Committee will be made up of faculty of three or more different disciplines and will have an abiding interest in integrative study or interdisciplinary research.

PROPOSED PROGRAM

1.) Admissions, Evaluation, and General Requirements

All applications for admission to the Integrative Discovery Program will be reviewed by the Executive Committee of the IDP to ensure that the highest standards of academic quality are maintained in the selection process, and all recommendations for admission or denial to the Program will conform to current University policies and procedures. In general, admission to the Integrative Discovery Program will require a cumulative GPA of 3.25 or better and the preparation and acceptance of a formal proposal for scope and content of intended study within the Integrative Discovery Program. Student evaluation will be ongoing and satisfactory progress is required for continuation in the program. The Integrative Discovery Program Executive Committee will have responsibility for determining policies governing admissions, evaluation, and general requirements as outlined in the IDP Guidelines.

2.) Core Curriculum

Suggested core courses might include but are not limited to:

      Integrative Discovery Seminar

      Integrating Leadership and Lifelong Learning across the Disciplines

      Integrative Learning and Social Change

      Writing for Integration and Understanding

      Technology and Integrative Discovery

      Current Topics in Integrative Discovery

3.) Integrative Coursework

At total of 30 hours of graduate credit coursework is necessary to meet the requirements for a Master's in Integrative Discovery. 24 hours of graded coursework is expected with the remainder in independent study or research units. Since the nature of the Integrative Discovery Program precludes the need for a minor field of study, a minimum of 45 hours of graduate credit coursework is necessary to meet the requirements for the PhD in Integrative Discovery. An additional 18 hours of dissertation credit completes the requirement.

The focus of planned coursework will be determined jointly by the student, the major professor and the Integrative Discovery Program Scholarship Committee. Courses will be selected from the appropriate disciplines as outlined in the student's formal program proposal. Evaluation of transferable credits from other institutions will be the responsibility of the Integrative Discovery Program Executive Committee.

4.) Degree Requirements

The Integrative Discovery Program requires students to prepare a comprehensive portfolio of their work which will be evaluated by their committee to determine readiness for admission to degree candidacy. In some cases, the student may be required to successfully complete a comprehensive exam prior to admission for degree candidacy. In the final phase of the graduate program, each student must complete a scholarly project showing a high level of competence in each of the fields of study covered in their plan of study and demonstrating the integration and application of the fields to a problem of interest to which the student is committed. The Master's candidate may do a thesis and the PhD student, a dissertation. Alternatively, the student and his/her Integrative Scholarship Committee may propose a body of work that clearly demonstrates professional expertise and academic excellence and might include the creation and implementation of a project or program, development of a technological application, or a major creative piece.

5.) The Integrative Minor

It is possible that Graduate students in the traditional disciplines will express a desire for a minor in Integrative Discovery. This may be accomplished through completion of six hours of core coursework in the program plus the requisite number of additional credit hours deemed necessary by the home department. The student seeking a minor in the Integrative Discovery Program will need to prepare a proposal and outline a set of courses that meet his/her needs.

APPENDIX

Three Cases for Integrative Discovery:

David Stone

Gretchen Urkov

Judi Moreillion

Update on My Approach to Graduate Study

David Stone

I finished an essay I wrote over a year ago with the following paragraph:

"Students need not wait for those busy with managing the vast ship of a university to find time and inclination to consider putting out some skiffs to explore beyond the horizon. We can do much of the work ourselves and help launch our scouting parties. Much of the thoughts in this essay came together recently for me in a seminar designed to both analyze proposals for alternative approaches in graduate education as well as create our own vision of what could be. It was called "Leading and Learning Across the Disciplines" and was offered by Nancy Huber who has made non-traditional education her subject and her cause. It was through Dr. Huber that I came to understand the distinction between interdisciplinary, as in hybrids, and integrative, as in ecological. The reintegration of science emerges as the highest goal for higher education reform in the 21st century . The transformation toward integrated graduate study in science would need to start at the beginning as the students who are the future scientists reform themselves by the way they approach Nature. Much of what we are comes from what we do and how we do it. To discover new routes through scientific research to a richer understanding of our world some brave souls need to break away from the main trajectories and wander without clear destinations or objectives. I have suggested that, ironically, it is those with the least experience who are most suited for this radical divergence. This is the way it has always been."

Since then my research project, which deals with the electrochemical growth of tubular formations of iron compounds, has been funded by a local technology transfer company and by the University itself. Also, I have applied and been admitted to the Department of Soil, Water and Environmental Science on a Ph.D. track. This despite my love of quoting Norman Metzger and Richard Zare who wrote the following in an essay in Science: "In today's universities, knowledge is typically extracted from an integrated whole by study units, called departments, where that knowledge is disintegrated and disaggregated in a process famous for its turf battles and jurisdictional disputes." They propose a decisive and well-funded step in the interdisciplinary direction toward the eventual "reintegration of the knowledge process." But at least the SWES Department covers a very broad, changing and flexible field. Much of my research fits well within the traditional topics dealt with in environmental science. And I could make some aspects of my life easier by focusing on that part of my research that does fit.

However, there are other parts that do not fit in so well and they are at least as important to me as those that do. For example, I see the possibility of developing some of the processes and products I am studying for commercial applications that are unrelated to environmental concerns. This would involve both entrepreneurial work and the engineering of manufacturing systems. No one within the Department is familiar with this kind of venture. I see this, in part, as a reasonable and appropriate response to the funding I have received from a corporation whose generous help comes from their success in putting viable new products on the market. How better to respond to their support than by considering it an investment in me and my work and to give them some

results in a form most suited to their business? This would take our relationship to a new level beyond one time grantor and grantee. I will strive to transform the relationship into investor and inventor with the ultimate goal of a partnership in which both of us benefit. This is, I suggest, a practical example of an integrated graduate research program.

On the more theoretical side, the subject I am dealing with is, at the most general level, the study of form and the generation of form including both biological growth and human creation. It is morphology in the classic sense, which has been most clearly developed in the modern era in Germany, where the concept of 'bauplan ' (building design) is used in both architecture and embryology . Many fields are relevant to this broad-and deep-approach to the study of form-making. Art, specifically sculpture, is the exploration of new forms for their own intrinsic worth and as a means of individual expression. I, in fact, came to science from art and my work as a sculptor always included experiments with new materials and ways of using them. Building the connection between art and science is a goal seriously pursued by an increasing number of professional participants in both fields. I would think that a more formal acknowledgment of this personal and philosophical connection would enrich my research and catalyze it in unpredictable ways.

Before being an artist I was an undergraduate student of philosophy and I see this field as also relevant in two ways. First, as a rigorous means of developing conceptual meanings and clarifying ideas. Second, as a means of attending to and cultivating the 'inner' processes that are actually the primary drivers of all creative activity. The modern separation of church and state has, in America, seemingly been extended to a

schizophrenic separation of mind and soul, by which I mean the non-intellectual aspects of the human psyche. I am intrigued by the symbolic integration of inner and outer processes in some of the major alchemists as revealed by the great psychoanalyst Carl Jung. The generation of form, the change in form, transformation, is a potent force in psychological growth as well as physical nature. Molding the form of one's own being, the dynamic interrelationships of the aspects of our personality is not only important as a part of the full education of a whole human being, it is vital even for significant worldly accomplishments. The great explorers, discoverers, inventors and creators of history were not mediocre people. Higher education should dare to evoke and stimulate great and noble aspirations in students. The world desperately needs good leaders and will need them only more urgently in the coming decades.

Therefore, my vision of my graduate education extends beyond the confines of any single department. It might be argued that it is not the task of universities to deal with all aspects of a person. Their inner life, other than knowledge or intellectual skills, is their own, to be dealt with in any way they want or not to be dealt with at all. I think that, if nothing else, it must be acknowledged that there are a variety of personality types and that people learn in different ways. Even the worldly corporations, without resources to squander, put significant effort into understanding such differences in order to most effectively put together an efficient and successful team. For those of us who need integration between our outer and inner lives and across the broad range of diversity that comes with modern life, education that is only narrow and linear is less than just unsatisfying. Its fundamental presentation impedes understanding. People who are

strongly integrative ideally require an approach to learning that takes a somewhat different perspective from the start. Rather than being an 'alternative' form of education for 'special' learners, the integrative approach is being recognized by an increasing number of commentators as the most viable change universities can make to adapt to the demands of the 21st century. In every cultural transformation certain aspects of the human personality rise most effectively to face the challenge at hand. That challenge today is to see beyond the boundaries of one's field and to synthesize the diversity of information, ideas and perspectives in an increasingly complex yet ever more tightly interconnected world.

Why an Integrated Discovery Program?

Many friends and family ask why I am still in school. I am nine years out of high school and have yet to finish college. The reason is not that I can't figure out what I want to do in life, but that I can't find a specific department that embodies what I want to do.

After high school, I went to Cochise College in Douglas and Sierra Vista, Arizona. There I received an Associates in General Studies and an Associates in Applied Science. I mainly took classes in the nursing department and received my RN because I have always wanted to be a nurse. At Cochise College, an applied science degree was required to become an RN, but I also wanted to gain knowledge in other areas. For example, I wanted to improve my computer skills, to learn about the Internet, and to take a language class so I could speak something besides English. These weren't required by the Nursing department, but I felt them to be just as valuable as I prepared for a career. Taking these elective classes provided me with the general studies degree. However, a general studies degree is considered a weak degree, sought after by those who don't have a focus for their studies. My friends referred to it as basically a waste of money.

When I started working in a hospital, I actively sought to continue my education and so began taking courses at the University of Arizona. I had really enjoyed learning about human physiology, but now I wanted to know more about human nature. I went on receive my Bachelors in Family Studies with the option in Human Development. Family Studies gave me a deeper understanding of the context for some illnesses. In addition, I had the flexibility to take my electives a variety of other departments. I took a few nutrition classes, studied mind and behavioral medicine, and learned to use experiential education techniques effectively. These electives helped me integrate my knowledge of the physiological and psychological aspects of being human and prepared me to teach and share my learning with others.

Near the completion of my undergraduate degree, I met Dr. Nancy Huber. She helped to nurture the seeds of learning, leadership, and teaching within me. Nancy is a great teacher and has helped me to become a more effective teacher, to understand how leading and learning are interwoven, and to seek ways to empower others to lead and to learn. However, working with her as a TA meant becoming a graduate student in the Agricultural Education department as I studied for my masters degree. I love the department even though it feels like a strange home for someone with my interests and goals. And I love learning more about leadership and experiential education while helping teach Nancy's classes. In addition, I will be getting a minor in health psychology, as health has always been a main focus of mine. But, how can I teach a community to become healthy if I don't know how to teach, lead, learn, and grow. How can I teach others if I don't know the physiological, psychological, and sociological aspects of people? What I need is a broad base of understanding and a way to synthesize learning and research across several disciplines or departments. I don't feel that a single department can provide what I'm looking for in pursuit of a PhD.

I know what I want to do. I have always had the goal to work within a community. I have always wanted to help people improve the quality of life by gaining an education, raising a sound family, making good decisions, and staying healthy. This simply is not covered in one department and therefore the proposed Integrated Discovery Program will allow me to individually design a program of study that will meet my needs and make my goal a reality.

Gretchen Urkov
Graduate Student and TA
Agricultural Education

Integrated Discovery Program -- A Proposal for Admission
Judi Moreillon

This study and research proposal for admission at the Ph.D. level to the Integrated Discovery Program (IDP) is an attempt to clarify the general and specific ways in which an interdisciplinary approach will support my educational goals and my growth as a student and researcher. The IDP is a framework in which I can individually design a course of study and research agenda to meet the changing needs of my areas of interest. I believe my educational background and work experience, my philosophical stance toward learning, and my research interests each contribute to my justification for admission into this program.

I am a certified and experienced K-8 classroom teacher. I entered the profession in the late 1980s and soon after studied to become a school teacher-librarian; I earned a master's degree in library science in 1992. In my work as a teaching librarian, I utilize the theories and instructional practices of both classroom teachers and librarians. Although education and librarianship are the foundation for my work, I have assumed a leadership role in integrating technology within the schools where I have served, with the librarians in my school district, and as a graduate teaching assistant and adjunct instructor in university-level teaching assignments. This role has added two more overlapping disciplines to my study and research interests. Leadership and its application to integrating technology innovations in educational settings are critical to achieving 21st-century learning goals for learners at every level, K-20 and beyond. My work involves the disciplines of education, librarianship, applied leadership, and technology. There is no one single department or college within the University that can address my learning needs.

My core belief about learning is based on the principles of constructivism. It defines my stance toward teaching and learning; it guides my work with students and shapes my attitudes toward my own educational endeavors. Constructivist theory asserts that the learner must construct or build his/her own knowledge, that he/she controls learning. Student choice, hands-on engagement with new information, real world problem-solving, multiple and alternative perspectives, multiple modalities for learning and presenting knowledge, and collaborations with

peers and mentors form the curriculum that is driven by the students' own questions. The student is charged with the responsibility for his/her own learning in an interdisciplinary learning environment. In this model, the process of learning and its products are equally important. This is the model of learning that I strive to create with my students; this is the environment in which I need to be a student.

Leadership in technology integration to support constructivist learning is the focus of my research interest. Hypertext and Web resources have been touted as "constructivist" in nature. By allowing student-users more choice in directing their own learning, these tools can be viewed as "learner-centered." Learning styles are addressed in the multisensory components of Web sites and other electronic media. Students can negotiate the text in a non-linear way, customize their learning, and create the possibility of a unique construction of knowledge. As students navigate hypertext, they are not only learning information but are also learning how to learn in an electronic environment. For children of the Digital Age, these information literacy tools are critical for their success. It is important, then, that educators and librarians learn to take full advantage of these multifaceted tools and then collaborate in order to utilize these tools to reach instructional goals and improve student outcomes. It is critical that leaders in educational communities plan for and support the integration of technology tools to support constructivist learning goals.

The impact of introducing a "constructivist" tool into a student-centered learning environment is particularly exciting. I believe, on one hand, that any tool can be used to support the transmission model of teaching, and hypertext is no exception. Some tools, however, have the potential to encourage students to become independent, self-directed thinkers; I believe that hypertext has that potential. Bringing together the established methods of constructivist learning theory with the as-yet-uncharted potential of the World Wide Web is a timely endeavor. Considering the educational and personal needs of today's students, it is critical that the Web be purposefully and meaningfully integrated into all learning environments.

I intend to research strategies to support student-centered teachers as they offer their students

opportunities to engage with Web-based technology tools and to help teachers and librarians plan, design, and utilize digital resources for constructivist purposes. This knowledge can then be used to support educational leaders as they move beyond hardware and software issues to address the critical learning needs of the educators within their communities. "Our moral responsibility is not to stop the future, but to shape it . . . to channel our destiny in humane directions and to ease the trauma of transition." (Alvin Toffler, American futurist)

The Integrated Discovery Program will allow me to individually design a program of study and a research agenda that meet my interdisciplinary needs. Mentors from within the academy and the larger community from the disciplines of education, librarianship, applied leadership, and technology integration will each contribute to my educational experience and guide me in my research agenda. The IDP will create a framework in which my experience as an educator can strengthen my academic pursuits. Student-centered, interdisciplinary, mentor-supported, praxis --- the IDP will support me as a constructivist learner as I prepare for a 21st-century interdisciplinary career.

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"Example is not the main thing in influencing others, it's the only thing." Albert Schweitzer