

From Inquiry to Discovery: Developing the Student as Scholar in a Networked World

Learning Through Enquiry Alliance (LTEA)

Conference 2008

“Inquiry in a Networked World”

*Wednesday 25th – Friday 27th June 2008
University of Sheffield*

**David Hodge, Miami University
Carolyn Haynes, Miami University
Paul LePore, University of Washington
Kira Pasquesi, Colorado College
Marissa Hirsh, Miami University**

During the past decade there has been an amazing degree of change in our approach to higher education. Much of this change stems from the seminal work of Barr and Tagg (1995) who brought coherence and energy to the study of collegiate education, launching the Learning Paradigm into the mainstream of higher education. Tagg's (2003) subsequent book, *The Learning Paradigm College*, both solidified the fundamentals of this approach and provided a wealth of examples of the application of the paradigm from colleges and universities throughout the nation. At a minimum, the Learning Paradigm calls for a more open approach to student learning, with an emphasis on engaging students, adopting multiple learning formats, and assessing outcomes.

Three years after Barr and Tagg published their original piece, the Boyer Commission (1998) issued its report, *Reinventing Undergraduate Education: A Blueprint for America's Research Universities*, that both took research universities to task for their neglect of undergraduates and pushed for a "radical reconstruction" of the approach to undergraduate education focused on research-based learning. The Commission offered ten suggestions for changing undergraduate education that directly draw from the research mission of research universities, and build on Learning Paradigm by emphasizing an inquiry-based freshman year.

The Boyer Report offers a powerful vision of undergraduate education, but as presented and implemented, its recommendations fall short in three critical ways. First, research-based learning is not just for research universities as they imply; rather, if properly conceived, it should structure undergraduate education at almost all four year institutions of higher education. Second, in response to the Boyer Commission most universities have conceived of the undergraduate research experience only as an isolated component of the student's education, or as suitable for only some of the most advanced students. Third, both the Learning Paradigm and the research-based learning proposed by the Boyer Commission overlook the importance of student development theory in helping us to position research-based learning appropriately in the progression from first year to senior status.

In this paper we argue that technological advances have made research-based learning possible now in ways that were unimaginable in previous generations. Such learning can, and should, be at the center of the total undergraduate experience and across most institutions of higher education. We combine research-based learning with student development theory to offer a more comprehensive model for effectively organizing undergraduate education. Our aim is not simply to advance undergraduate research and creativity, but more importantly, to cultivate the "Student as Scholar," where scholar is broadly conceived as an attitude, an intellectual posture, and a frame of mind derived from the best traditions of an engaged liberal education. Although some students will produce original scholarship in their discipline or field, what is more crucial is that they gain the internal value system, maturity, and foundational competencies of their discipline and a liberal education to succeed in today's complex, ever-changing world.

Developing the Student as Scholar Model requires a fundamental shift in how we structure and imagine the whole undergraduate experience. Not only does it transcend the boundaries of the traditional classroom by leveraging the vast amounts of raw material now available to

undergraduates, but it also requires a culture of inquiry-based learning infused throughout the entire liberal arts curricular and co-curricular experience that starts with the very first day of college and is reinforced in every classroom and program. Put another way, the Student as Scholar Model represents the far end of the educational spectrum, specifically progressing from an *instructional paradigm* that emphasizes telling students what they need to know, to a *learning paradigm* that emphasizes inquiry in shaping how students learn what they need to know within the traditional academic context, and culminating in a *discovery paradigm* that encourages students to seek and discover new knowledge, emphasizing inquiry with no boundaries.

At its core, this is a vision of undergraduate education that offers students sustained and consistent emphasis on their identity as learners and as scholars, gradually blurring the distinction between the two; and it provides opportunities to develop meaningful connections to faculty, staff, and other students in campus environments that establish and support vibrant learning communities. Yet, sustaining this emphasis on students as scholars and meaningful connections among faculty and students, we must understand the way that students develop and design our learning environments to assist their movement from a more passive, externally motivated learner to the active, internally-motivated posture of a scholar.

In this paper we first examine how the changing context of technology and scholarship makes the Discovery Paradigm *possible now* and increasingly so in the future. We then define the Student as Scholar Model and position it in the context of a liberal education, describing how the model creates a natural and highly effective focus for a liberal education framework. We conclude by exploring how an understanding of student development can purposefully guide curricular and co-curricular activities to build student capability progressively throughout the college years and offer concrete examples of practice.

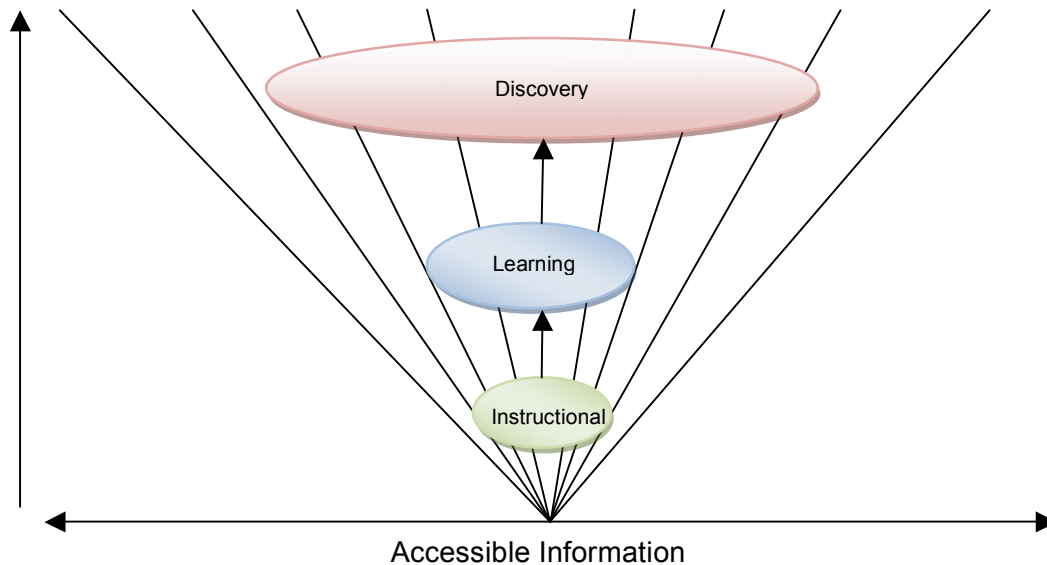
Technology as the Enabler of the Student as Scholar

The adoption of the Discovery Paradigm and the Student as Scholar Model as frameworks for education is possible now, in ways that were nearly impossible before, because the nature of scholarship, and access to the raw material of scholarship, have changed so dramatically in the past few years. Quite simply, the ability of students to access, process, and explore primary source material has taken a quantum leap forward, primarily because of enormous changes in technology.

The most obvious technological changes revolve around the development of the internet and the concomitant increases in the amount of raw data readily available to students. Whether it is the Human Genome or images of rare documents, digital output from the Sloan Digital Sky project or galleries of art, vast sets of demographic data or collections of historic maps, students today can readily access original materials that in years past were available only to the most advanced scholars who had privileged physical access to those materials. For students of only a generation or two ago, learning occurred by reading summaries or conclusions that others put forward, and they had at best very limited access to the raw data underpinning journal articles and books. Thus the possibilities of encouraging student research were highly constrained, and student involvement in original research, especially research authored by them, was the exception.

Figure 1 displays the connection between technology change and the evolution of educational paradigms. With the availability of information limited and heavily filtered, the Instructional Paradigm provided a reasonable approach to education. With increases in information availability, and improvements in the tools to examine that information, the Learning Paradigm, with its emphasis on inquiry-based education (even if constrained by prepared sets of data) became both more plausible and more effective. The explosion of technical capability in the past decade has dramatically changed the foundations for learning, with exponential increases in access to significant raw material for research purposes. Thus it is more possible, than ever before, for the motivated student to feel excited by a question posed in a class, generating new questions and seeking answers that realistically might also turn out to be new.

Figure 1
Technology and the Evolution of Educational Paradigms



Technological change has also dramatically altered the availability of research equipment. It is now common for sophisticated equipment, such as a DNA synthesizer, to be available in advanced undergraduate courses, and it is not unusual for undergraduates to have access to high-end NMR's as part of a research team. Through the use of this sophisticated equipment in controlled environments, the students gain the knowledge of how to use cutting edge devices, but even more importantly, how to imagine questions that require their use. We do not mean to over-emphasize the experience of students in the sciences in this regard. Certainly, new technological advances, such as global positioning systems and new electronic design and multimedia software have revolutionized other disciplines such as geography, communication, creative writing and architecture. The changes in what is now possible for students to undertake in a wide range of disciplines and fields is simply breath-taking

Although the availability of new technologies and equipment does not automatically lead to student-generated scholarly work, we argue that technology *enables* a sophisticated and successful adaptation of the Discovery Paradigm and the Student as Scholar Model by making it possible for students to create knowledge and to collaborate and communicate effectively with peers.

Perhaps the most important effect of a Discovery Paradigm fueled by technological advances is that the student *believes* that original scholarly and creative work is a possibility and thus is more motivated to cultivate the traits and competencies needed for independent thinking and scholarship. This is the frame of mind we seek to achieve in the Student as Scholar model which is described in more detail in the next section of this paper.

The Student as Scholar

As noted above, “scholar” is conceived principally in terms of an attitude, an intellectual posture, a frame of mind. Many of the attributes of a scholar (Table 1) are similar to those of a learner, most notably accepting personal responsibility for learning, engaging in inquiry-driven study, and thinking critically from multiple perspectives. Others focus on elements of how to conduct scholarship, such as laying out appropriate methodologies. Several attributes, however, focus on the core aspects of the “frame of mind” critical to the student as scholar, including internal motivation, a belief in one’s capacity to do original research or creative practice, reliance on personal authority, and the self perception of being a peer in the larger community of scholars. Importantly all of these attributes are critical to the success of the Student as Scholar Model, and they provide a frame through which we can establish specific goals for a curriculum, an individual course or co-curricular activities. In the broadest sense, the Student as Scholar Model provides an integrating vision of student success and development that we explore in this paper.

Table 1
Attributes of the Student as Scholar

Active Critical Thinking

- Accepts responsibility for learning (active vs. passive)
- Uses answers as an opportunity to ask more questions; is not constrained by the specific requirements of a course or project
- Understands multiple perspectives
- Has the ability to self critique

Research Skills

- Lays out appropriate methodologies for scholarship generating or using original material
- Understands how to work collaboratively, even in a geographically dispersed team
- Integrates learning both within and across disciplines

Self-Authorship

- Is internally motivated, not needing external pressures (like grades!) to initiate work
- Believes he/she is capable of authoring new knowledge
- Judges new information based on personal values and belief system, rather than relying on external authorities
- Sees oneself as a member of a larger community of scholars and looks to peers in order to share viewpoints and contribute to the quality of critical dialogue

The Student as Scholar Model, set in the context of the emerging Discovery Paradigm, extends the Learning Paradigm in three significant ways in order to build the attributes of a scholar. First, it obliterates the boundaries of a traditional course, infusing in students the sense that the course is a platform on which they launch their search for understanding, and that it does not define limits on their learning and discovery. Second, it emphasizes the integration of learning across both the curricular and co-curricular environments. Third, and perhaps most essentially, it instills in the student the belief that she or he can be the author of new knowledge. Indeed, as we explore in the following section, the Student as Scholar Model gives additional impetus to the best aspects of a liberal education.

Liberal Education and the Student as Scholar

In recent years there has been a resurgence of interest in liberal education, including the launch of Liberal Education and America's Promise (LEAP) by the Association of American Colleges and Universities (AAC&U). LEAP argues convincingly of the relevance of liberal education to modern society, a position that we most emphatically embrace. Whether a student majors in a liberal arts discipline or not, the skills, perspectives, and self-identity that come from a liberal education are foundational to all advanced education and success in life.

LEAP (AAC&U, 2007) identifies several aims that

collectively include both the most venerable goals of liberal arts education – critical inquiry and reasoning; written and oral communication; ethical judgment; civic responsibility – and goals that prepare students for the realities of the contemporary world – scientific and technological literacy; quantitative analysis; information literacy; cross-cultural and global learning; collaborative problem-solving and experience; and integrative learning.

We build on LEAP by arguing that the Student as Scholar Model both draws on and adds to the impact of a liberal education on durable and long-term student learning. By combining key aspects of the Learning Paradigm - e.g. establishing goals, assessing outcomes, and making learning an active process - and the philosophical foundations of a liberal education through the

mental frame of the Student as Scholar (and the Discovery Paradigm), we can create an extraordinary student experience with superior learning outcomes.

Table 2
Student as Scholar in the Context of Liberal Arts Education

Liberal Education Goal	Student as Scholar Logic
Critical inquiry and reasoning	Evaluate validity of evidence; construct and test hypotheses; seek to understand the perspective of stakeholders
Written and oral communication	Effectively communicate research results; use writing and presentation to interrogate understanding; communicate clearly with respondents during face-to-face research
Ethical judgment	Exercise responsible scholarship; assume personal responsibility for results
Civic responsibility	Understand one's self as the agent of action; analyze personal biases as they impact research and relationships
Scientific and technological literacy	Develop ability to ask meaningful questions and conduct appropriate research
Quantitative analysis	Explore relationships with statistics using standard packages
Information literacy	Determine how to find relevant information, filtering out unwanted material; sort, analyze and describe relevant data
Cross-cultural and global learning	Think creatively, inspired by alternative points of view
Collaborative problem solving	Work productively in diverse teams; develop sense of peer contributions
Integrative learning	Look beyond the obvious boundaries of a problem; think creatively and expansively to synthesize knowledge

Table 2 showcases linkages between a liberal education and the Student as Scholar Model. Without going into detailed elaborations, this table reveals the remarkable complementarities between a liberal education and the Student as Scholar Model. Developing skills to ask important questions and use tools to find, critically evaluate, analyze, and synthesize information are foundational to a liberal education and the Student as Scholar Model.

But perhaps most interesting of all, is the need to understand the role of personal development. Ultimately, the capacity to undertake original research rests not only on the skills achieved and foundational knowledge acquired, but also, and most emphatically, on the extent to which a student understands his or her own capacity to author original ideas. Here, again, the linkages between the Student as Scholar Model and a liberal education are exceptionally strong. One of

the most enduring goals of a liberal education is to create “the educated person.” The Student as Scholar Model provides an organizing framework precisely for this important goal.

Building a Bridge to an Internal Foundation: Using Developmental Theory to Shape the Curriculum

Because students evolve throughout their undergraduate experience, we argue that an understanding of student development should be used to purposefully create developmentally-appropriate curricular and co-curricular activities that build student capability progressively throughout the college years.

We place college student development in the context of personal development theory developed by Kegan (1994). In his framework, individuals can move from the first to the fifth order of consciousness over their lifetime, along the way developing internal foundations that help them make meaning of the world. College students typically make meaning from the second or third order of consciousness within the prototypical time frame of the traditional four-year higher education experience, although the (usually unachieved) goal is to achieve the fourth order of consciousness (Love & Guthrie, 1999).

In the second order of consciousness, individuals have developed durable categories, but view the world through an instrumentalist, self absorption lens, i.e., they look at how the world serves their needs. In the third order of consciousness, students can intrinsically value others’ perspectives; however, they have a strong reliance on external authorities in forming their values and personal identity. In the fourth order of consciousness, students develop a reliance on their own internal authority. *The Student as Scholar Model especially focuses on students progressing from their reliance on external authority in the third order to an internal authority in the fourth order of consciousness.* The Instructional Paradigm, in which students passively receive knowledge, upholds students’ development in the third order of consciousness. With its emphasis on active student engagement, Barr and Tagg’s Learning Paradigm supports students in their developmental crossroad between the third and fourth order, while the Discovery Paradigm which we are advocating challenges students to utilize their critical thinking, research skills, and budding internal foundation in the fourth order to author knowledge.

The challenge for higher education, Kegan (1994) explains, is to consciously build an evolutionary bridge, that “fosters developmental transformation” leading from the third to fourth orders of self consciousness. Kegan (1994, p. 332-33) urges educators to “fashion a bridge that is more respectfully anchored on both sides of the chasm, instead of assuming that such a bridge already exists and wondering why the other has not long ago walked over it.” Put another way, educators must gauge the level of support students need while they are “in over their heads” with challenging and transformative educational experiences.

One effective approach to Kegan’s evolutionary bridge is the Learning Partnerships Model (LPM) that emerged from Baxter Magolda’s (2004a) longitudinal study of college students. The model supports students in learning to construct knowledge and challenges them to achieve self-authorship during college. From a developmental perspective, learning involves actively making

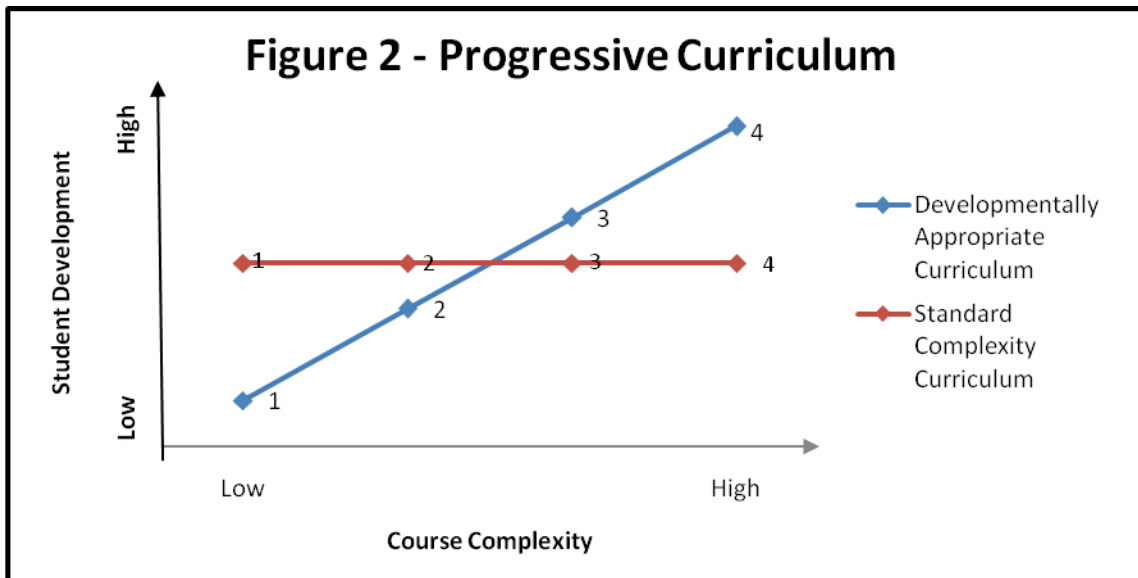
sense of one’s experiences (King & Baxter Magolda, 1996). This sense-making, and concomitant knowledge construction, helps students grow their own personal identity and academic capability. The opportunity for students to author their own educational experience is critical to the development of the Student as Scholar Model. Indeed, Baxter Magolda (2004b) advocates for self-authorship as a central goal of higher education. For her, possessing an internal foundation, that is, a foundation based on internal rather than external motivation and authority, “yields the capacity to actively listen to multiple perspectives, critically interpret those perspectives in light of relevant evidence and the internal foundation, and make judgments accordingly” (2004, p. xxii). We can summarize the college student’s journey to self-authorship by thinking of development in terms of three stages or tiers across the developmental bridge (Table 3).

Table 3
The Developmental Journey of the Student

Developmental Level	Student Traits
Reliance on External References [<i>Foundations</i>]	Knowledge viewed as certain Reliance on authorities (e.g., professors, parents) as source of knowledge Externally defined value system and identity Act in relationships to acquire approval
At the Crossroads [<i>Intermediate Learning</i>]	Evolving awareness of multiple perspectives and uncertainty Evolving awareness of own values and identity and of limitations of dependent relationships
Self-Authorship [<i>Capstone</i>]	Awareness of knowledge as contextual Development of internal belief system and sense of self Capacity to engage in authentic, interdependent relationships

Designing Learning Environments to Cultivate the Student as Scholar

Most faculty and staff tend to view the distinction between lower level and upper level courses primarily as a matter of complexity – more skill and experience are required for advanced courses than for beginning courses – without actively considering, or even recognizing, students’ developmental capacities. As a result, “what teachers expect students to understand might be different from what they are, in fact, capable of understanding...” and thus, “our job as instructors is both to gain a ‘reading’ of where our students are and then to reach out to them in a way that helps them move beyond where they are to where they want to be” (Tinberg and Weisberg, 1998, p. 46). In the Student as Scholar Model, designing a curriculum becomes a two dimensional problem in which both the complexity of the material and students’ developmental capacities are considered (Figure 2).



To achieve this end, educators must let go of their power of authority in traditional educational practices and *empower students to see themselves as authorities and creators of knowledge*. Rather than imposing the educator’s internal authority on the educational curriculum inside and outside of the classroom, we should more consciously support the development of the students’ internal foundations. Indeed, to foster self-authorship, students must consistently be immersed in learning experiences inside and outside the classroom that steadily build in scope and complexity. In short, we educators must cultivate not only an integrated learning environment where all members work toward the same goal of self-authorship, but also a sequenced one where students are steadily offered higher levels of challenge.

To achieve this end, the roles and responsibilities of students as well as faculty and staff must shift. Barr and Tagg have underscored that in the Learning Paradigm College, the roles of all members of a University community “begin to blur. Architects of campus buildings and payroll clerks alike will contribute to and shape the environments that empower student learning.” In particular, they call for faculty to move from perceiving themselves as “disciplinary experts who impart knowledge” to “designers of learning environments” (1995, p. 20). Certainly, the changes in roles they describe must occur to enact the Student as Scholar Model, but we would emphasize the need to conceive all of our roles as a developmental process. Not only do students’ roles and expectations evolve as they become more independent thinkers and learn to engage in mutually interdependent relationships, but so do the roles and expectations of faculty and staff, given that they must be attuned to students’ fluctuating developmental needs.

Historically, Miami University has been known for its student-centered approach to undergraduate education. Our faculty and staff are known for their ability to take care of students, form lasting faculty-student bonds, and provide helpful answers to students' and their parents' questions. Nonetheless, with the student as scholar model, we must imagine new ways to relate to students and each other so that we are promoting in students the maturity necessary for critical thought, research skills and self-authorship. While we intend to maintain our traditional focus on students and their well-being, we now understand that this focus must be adjusted to promote student maturity—an adjustment which sometimes puts us in uncomfortable situations, as we are expected to provide an appropriate balance of challenge and support to assist students in making and accepting responsibility for their own ideas and decisions.

On one level, this model sounds simple. As students gain intellectual and personal maturity, educators relinquish more authority and empower students to assume greater agency over the discovery process and learning environment. Yet, in practice, this model requires intentional design and continuous critical reflection. The next section offers guidelines and concrete examples for how to put the Student as Scholar Model into practice.

Envisioning the Student as Scholar Experience

As we argued earlier, to be truly successful, the Student as Scholar Model should apply to the entire undergraduate experience and take into account the development of students. To illustrate how this might be accomplished, we offer two examples from each of three different points on the “developmental bridge.” Foundational courses anchor one end of the bridge. At the beginning level, students have a limited vision of themselves as legitimate authors of new knowledge and rely on external authority for discipline, guidance and approval. They tend to look at knowledge in absolutist terms, and are learning to ask questions, gain foundational competencies and recognize multiple perspectives. As students move to the middle of the bridge, they are involved in courses and co-curricular activities that include projects that are more open-ended, often involve collaborative work, and draw on multiple skills, methods and points of view. Less external authority is needed, although some structure remains valuable to student success, and they are learning how to engage in authentic scholarly practice, negotiate multiple points of view and become less dependent on others for answers and ideas. At the far end of the bridge, advanced students have the opportunity to create their own research questions and develop their own methodology, believing that their goal is to provide original contributions. They understand that motivation and authority come from within. They see themselves as peers in the larger research and creative community. And, of course, they are more skilled in discovery.

Foundation Courses: Stepping out onto the Bridge

Educators can fail to provide support “by neglecting to build a bridge out of and beyond the old world and by expecting individuals to take up immediate residence in the new world” (Love & Guthrie, 1999, p. 75). The foundation course thus begins with understanding students' current

developmental traits, which include viewing knowledge as certain and viewing parents and professors as the creators and disseminators of knowledge.

Theatre 191 at Miami University is a general education course that introduces non-majors to all aspects of the theatre art. Historically, this course—like many introductory survey courses—used a traditional lecture format focusing on addressing the key moments in theatre history and dramatic literature. Recognizing that the lecture format reinforces the faculty as expert and the student as passive learner, the Theatre faculty decided to transform this course last year into a student-centered, inquiry based class that allows students to understand concepts central to theatre through hands-on activity.

The approximately 200 students enrolled in THE 191 collectively experience a master class once a week taught by an instructional team of professional artists and theatre scholars, and a lead professor who administers the course, mentors the graduate student teaching assistants, and works to synthesize material introduced by the visiting guests. While this master class meeting occurs in a large lecture hall, professors/artists on the instructional team focus on making it interactive. In these weekly meetings, students are introduced to the basic tools used to make theatre as recounted by working actors, directors, designers, and theatre scholars. Weekly reading assignments/video clips reviewed outside of class augment the experiences shared by the artists who come to share first-hand knowledge of their craft. Members of the instructional team discuss their use of the “tools” and then involve the students in an interactive exercise that reinforces basic concepts necessary for creating theatre.

In smaller break-out sections held each week, students work collaboratively in teams of 5-8 on a ten-minute play written and produced by student groups. All course related encounters—outside readings and video review, discussions with guest artists, a backstage “shadowing experience”—provide students with the basic tools to enable them to create theatre with their classmates. A successful play will necessitate critical thinking and creative problem solving because students must essentially construct an original aesthetic “argument” (the meaning students are trying to communicate through their play), supported by evidence (the design elements, the staging, the play text, an actor’s choices about characterization)—and they must do this in concert with their peers. Graduate student teaching assistants serve as instructional guides in these break-out sections, providing assistance to students as they create their projects.

Like THE 191, PSY 111, “Introduction to Psychology,” is a general education course that seeks to have its students acquire basic knowledge of the discipline through active learning approaches. This course introduces scientific and critical thinking and the application of psychological knowledge. For each content module, students engage in a variety of active-learning tasks and then spend time reflecting on what they learned, thinking critically about what they learned, and relating the material to their own lives. Because learning is situated in their experience, they both begin the process of thinking like a scholar – asking questions, collecting evidence, and critically evaluating alternative hypotheses – and they begin the process of learning to “own” the question, the first step in self-authorship.

In the first course activity, students are asked to read about the scientific method and the steps involved in applying the scientific method to answer a research question. Students then work

through each of the steps of the scientific method (formulate a hypothesis, design a study, consider how data will be collected and analyzed, and identify likely venues for reporting the findings) to answer a question they have about human behavior. Students' responses to each of the steps are still fairly naïve at this point in their academic careers, but there is evidence that the activity improves their understanding of the scientific method. In the second activity, students are introduced to critical thinking. They read about the definition of critical thinking and the characteristics of critical thinking. They are then asked to demonstrate their recognition of critical thinking by choosing between pairs of statements, each one arguing a different viewpoint, and indicating which pair is more convincing. One pair contains scientific evidence; the other is based on personal experience. On average, students are about 75% accurate in their selections.

Following these introductory assignments, students are asked to engage in two online discussion boards throughout the duration of the course. In one discussion board, students are asked to post a response to a critical thinking question which is graded using the Washington State University (WSU) Critical Thinking Rubric (which emphasizes the identification and assessment of the problem or question, other perspectives, key assumptions, supporting evidence, and conclusions). In the other discussion board, students are asked to lead the class in a scientific discussion of a question of their choosing. They are asked to respond to other student's contributions with the WSU Rubric in mind. This approach values students' perspectives, invites them to bring their interests into the discussion, and offers opportunities to share authority. In both discussion boards, there is evidence that students improve over time in their demonstrations of scientific and critical thinking. Most importantly students have begun to think like a scholar and to see themselves working with peers to discover new understanding.

In both of these courses as well as other learning experiences in the introductory or foundations stage, faculty model the behavior of a "self-reflecting practicing scholar", design activities to encourage students' active engagement with course material, cultivate a climate where honest exchange of student voices is welcomed, provide multiple perspectives on the topics studied, and provide thoughtful and timely feedback on students' work (Table 4).

Table 4
Faculty Guidelines for the Foundations Stage

Faculty Role	<ul style="list-style-type: none"> • Modeling a Self-Reflective Practicing Scholar
Faculty Expectations	<ul style="list-style-type: none"> • Cultivate safe climate for honest exchange • Build on students' knowledge by connecting learning to their experiences • Explore provocative, multidimensional problems and questions • Provide multiple valid perspectives on topics of study • Help students analyze experts and to explore how experts' views relate to their own views • Offer timely feedback, and engage in dialogic reflection with students.
Possible Activities to	<ul style="list-style-type: none"> • Academic, self-reflective journal

Assign	<ul style="list-style-type: none"> • Role-playing exercises • Multidisciplinary panels • Debates and dialogues • Brainstorming sessions • Concept maps • Analyses of scholarly work
--------	---

Intermediate Learning: Crossing the Bridge

Once students have successfully completed their foundation courses, they should find themselves in the middle of the “bridge” (although research suggests that many are not yet there). At this point in their undergraduate careers, students engage in intermediate-level experiences – experiences which take them “beyond the book” and challenge them to continue their development as scholars. These students are active participants in their learning. They find themselves involved in opportunities that demonstrate how to work collaboratively with others and enable them to feel a part of a larger community of scholars – one where they can look to their peers for help and support. They are more intrinsically motivated since they better understand their capabilities for authoring their own knowledge. Through these intermediate experiences, students develop the capacities necessary to judge new information based on their own personal values; they spend less time looking to external authorities for answers (and may recognize that absolute answers may not exist at all). Students are more likely to develop scholarly work by using original material, and they have a better understanding of how they can integrate their learning within and across disciplines.

The Student as Scholar Model challenges the intermediate student to take on more sophisticated tasks, yet continues to recognize the developmental limitations that, though diminished, still affect the effectiveness of different pedagogical strategies. Tim Greenlee, a marketing professor at Miami University, employs a particularly effective pedagogy in a 300-level marketing course by running an “inverted classroom.” Viewing his course as a discovery experience for his students, Greenlee empowers them to use technology, inquiry, and collaboration to develop as scholars through group research projects. Yet he employs specific strategies to provide sufficient structure and discipline to keep a developmentally-appropriate level of focus.

In the inverted classroom, activities that traditionally take place inside the classroom, such as the course lecture, happen outside the classroom, via technology. Activities that traditionally take place outside the classroom, such as group projects, happen inside the classroom, allowing for more one-on-one interaction with the professor. In this marketing course, students watch the video-based lectures (which are posted online) before each class. With his previous in-class, “by-the-book,” lecture style, Greenlee felt that there was limited interaction between both the students and himself and the students with each other. Viewing the lectures before class allows the students to devote their time in class to collaborating on group projects. The outcomes of this kind of experience are increased critical thinking, communication, problem-solving, and responsibility, all of which align with the outcomes of a liberal education as well as the student as scholar model.

The quality of group collaborations increased substantially when Greenlee began giving his own quizzes – “opportunities” as he calls them – that are designed only to benefit the students. Students work in groups throughout the semester and each group member’s opportunity score is averaged together for a team score. This friendly competition between the teams has fostered camaraderie within each group. This camaraderie, in effect, creates a richer research experience for these students. One of the main attributes of a scholar is taking ownership of one’s learning, and as the students work in their groups on self-selected research projects, they are doing just that. They are intrinsically motivated to successfully do the research for their in-class projects.

Although these students are at a point where they are capable of directing a majority of their own learning, they still benefit from guidance along the way. So, Greenlee provides the teams with a daily agenda, which keeps the students on track. His role has become that of facilitator, rather than solely that of lecturer, but, importantly, a facilitator who structures the experience to the advantage of his students. His willingness to share authority with students provides them practice in developing and using authority appropriately.

The value of providing structure to student research projects is demonstrated in the second semester majors’ organic chemistry course at Miami University. In this course, 4 to 6 person student groups take on a specific research task, namely to produce a new carbon-carbon bond based on a green version of the Suzuki-Miyaura reaction. The process is required to adhere to several chemical constraints, with a limited budget, and produce a coupling that has not appeared in the literature under the proscribed solvent and catalyst conditions.

The student groups develop the project over the course of the semester in carefully sequenced segments. The groups form early in the semester and perform literature searches and prepare an initial draft of the research proposal. The instructor reviews the proposal and may require up to two revisions. However, instructors attempt to play a minimal guiding role in the revisions, so that students understand that the project is drawn from their own reasoning. Not all of the projects turn out to be successful in terms of actually producing the expected outcome, but even highly flawed proposals, when fully executed, have proven to be a great learning experience for the students. The students are given four weeks to run the experiments. In the early part of the project some class time is set aside for the teams to work together on proposal development. Groups create a professional journal-style paper that is due at the end of the semester.

This project provides an exceptional example of a constructive experience in the middle of Kegan’s evolutionary bridge. The problem, as set out, challenges the students to create a process that is both new and potentially valuable, in other words, to be the authors of a discovery. It provides a terrific experience with the whole research process, from problem definition, to proposal, to experiments, to write-ups, each stretching the research skills of the students. The process does not guarantee good results. Yet it can assure a high level of learning because the course is designed in a developmentally-appropriate way. As the instructors describe the project design, “Students at the sophomore level can generate their own ideas, write worthwhile proposals, and perform independent research with substantial results *if they are guided effectively and provided a structure to work within*” (Novak, et al, 2007, p. 417, emphasis added).

The faculty in these intermediate courses have adopted an approach akin to what Palincsar and Brown (1984) and Alvermann and Phelps (1998) have called “reciprocal teaching”, which is a special kind of cognitive apprenticeship where students gradually learn to assume the role of the teacher in helping peers construct meaning from course readings. Instead of focusing solely on reading comprehension, the faculty at Miami are serving more as “reciprocal scholars,” in that they are gradually prompting students to take ownership over the inquiry process, and while they introduce more opportunities for self-authorship into their courses, they maintain some forms of discipline and guidance in recognition of the developmental level of the students (Table 5).

Table 5
Faculty Guidelines for the Intermediate Stage

Faculty Role	<ul style="list-style-type: none"> • Reciprocal Teacher and Scholar
Faculty Expectations	<ul style="list-style-type: none"> • Offer students opportunities to practice authentic research and discovery methods and tasks. • Allow students to make decisions about the learning environment and activities. • Teach student to function productively in research and discovery teams. • Assist students in processing their own problems and generating their own solutions.
Possible Activities & Assignments	<ul style="list-style-type: none"> • Structured, team-based research or creative projects • Data interpretation • Sampling or sample preparation • Research proposal • Mini-ethnography • Peer mentoring and review • Annotative bibliography, review essay

Reaching the end of the Bridge: The Capstone Experience

Along the developmental bridge of the Student as Scholar Model, the capstone experience provides the highest level of freedom and challenge to students. In a capstone experience students extend their learning in a particular area of focus, critique existing knowledge, apply learning across disciplines, and, hopefully, discover new knowledge. Capstone experiences like this, Project DEEP (Documenting Effective Educational Practice) (2005, p. 188) found, “contribute(s) to the high levels of academic challenge.” If properly prepared, students are now at the far end of the developmental bridge, at the fourth order of consciousness, and they no longer need as much outside support or discipline as foundation or intermediate courses.

At Miami University, “each Capstone emphasizes sharing of ideas, synthesis, and critical, informed reflection as significant precursors to action, and each includes student initiative in defining and investigating problems or projects” (<http://www.units.muohio.edu/led/Capstone>).

The core of the capstone experience involves evaluating information according to one's own values and belief system, asking intriguing questions, and authoring responses to those questions. Students with an understanding of their internal authority utilize their self-awareness to be self-evaluating, while learning to share their ideas as a peer of other scholars.

The course "Senior Design Project" is a capstone in the School of Engineering that, as its name suggests, asks students to create a major open-ended project involving a real problem that may be defined by an external client. The professor and clients expect students to model the professional behavior of a design engineer working in a multidisciplinary team. The syllabus makes it clear to students that they will be asked to utilize and stretch the skills they have learned and to reflect on those skills and the process of creation throughout the course. There are no regular lectures, but teams are required to meet weekly with their advisor and to maintain careful logs on their meetings, tasks, and progress. Grades are assigned to the work achieved, presentation of the work, participation, and reflection.

In a recent senior design project, engineering students worked to construct an operational tabletop Inertial Electrostatic Confinement (IEC) Thermonuclear Fusion Reactor, a device that could be used to produce biomedical isotopes useful for detecting cancer in a PET scanner, wherever and whenever they might be needed. Reflecting the level of maturity that we hope to see at the far end of the evolutionary bridge, the team leader and originator of the project idea explained, "I wanted to pursue a project that would be challenging yet achievable, and at the same time relatively impressive and noteworthy. While our faculty advisor did help with suggestions and recommendations as needed along the way, this project is one that we students conceived of and accomplished ourselves. It is our vision and dream that has now come true." Adding to the experience, a second team of students from the business capstone course, "New Product Development", joined forces with the engineering team for the semester. Not only did the two teams learn to communicate their ideas across the disciplinary divide, together they continued beyond the course to pursue venture capital to make the dream a reality. Clearly, these students did not see their capstone course merely as an exercise to be completed. They grasped fully the sense of possibility that comes with self-authorship.

In an even more ambitiously constructed senior capstone experience, the Miami University Interdisciplinary Technology Development Challenge invited teams of undergraduate students to "develop and demonstrate a technology at the laboratory scale, to provide fiscal projections that indicate financial viability, and to identify policy issues that incorporate esthetic and societal concerns." The contest posed a challenge to develop a microorganism-based approach to create biomass for energy. Teams were required to have at least one student each from engineering, science, business, design, and a department that studies societal concerns around new technology, and they were required to solicit a faculty advisor to work with them. The winning teams shared a \$5,000 prize. Five teams entered the competition which were reduced in November to two finalists who were required to construct a working laboratory scale prototype, a business plan that included societal issues along with the normal business plan, and a technical plan that included technical specifications and production data along with scale-up costs and issues.

This capstone contest challenged to students to organize their efforts *outside the friendly confines of a course*. Such a contest demands self-authorship, not to mention self-organization, and it demands an exceptional degree of interdisciplinary collaboration. The problem has been only broadly defined, leaving great opportunity, and uncertainty, to the teams' strategies. At this point students must see themselves as having moved beyond the curriculum. They have become, in the truest sense of the term, scholars. They now possess the habits of mind – critical thinking, research skills, and self-authorship – that have prepared them for a life of inquiry. They have arrived at the far end of the bridge.

The faculty role is now one of colleague, research advisor, and mentor (Table 6). They can propel students to this stage by cultivating learning climates akin to graduate seminars where faculty and students engage in respectful, in-depth dialogue to explore differences of opinion and mutually construct new understandings of topics studied. With ongoing advice from the faculty, students design and implement their own inquiries which includes: formulating the question or problem, articulating outcomes and criteria for quality work, designing a method of inquiry, analyzing data, sharing findings and reflecting on what was learned and how the inquiry relates to one's values and career goals.

Table 6
Faculty Guidelines for the Capstone Stage

Faculty Role	<ul style="list-style-type: none"> • Colleague, Research Advisor, Mentor
Faculty Expectations	<ul style="list-style-type: none"> • Create climates akin to graduate seminars • Empower students to design, implement and reflect on their own inquiries • Help students base their decisions upon their internal belief system • Encourage students to apply lessons learned to future inquiries and career goals • Invite students to integrate ideas and insights from multiple disciplines and domains to address problems and questions
Possible Activities & Assignments	<ul style="list-style-type: none"> • Conference presentation • Published article • Action-based research or community engagement project • Faculty-student co-authored work • Portfolio • Thesis • Personal statement

Conclusion

The Student as Scholar Model provides an especially effective framework for undergraduate education. It places scholarship at the center of the undergraduate experience, shaping the curriculum from the very first class through the capstone experience. It directly addresses the need to incorporate models of student development explicitly recognizing that a student's ability to learn is much different when he or she is 18 compared to 22. It is not, as most of us in the professoriate believe, simply a matter of experience that separates first year students from seniors. Rather, and most importantly, those differences in capabilities also reflect differences in personal development and maturity. The Student as Scholar Model accounts for these differences by purposefully creating a developmental bridge, starting from a perspective in which external authorities prominently prevail, to a level where students are internally motivated, believe that they are capable of producing original knowledge, and see themselves as peers in the world of scholarship. Similarly, the Student as Scholar Model draws from and adds to our understanding of how a liberal education shapes the way students understand the world and position themselves in that world.

The adoption of the Student as Scholar Model has the potential to dramatically improve the impact of universities. First and foremost, it can provide better educated undergraduates, students who have the skills needed to deal with a fluid world. They will not only be better educated, they will also have the confidence, as well as the ability, to perform at a much higher level immediately at graduation, thus positioning them to be life-long learners.

Second, by merging developmental understanding with a liberal education in the context of the Discovery Paradigm, the Student as Scholar Model provides a framework that colleges and universities can use to set goals across the entire curriculum, *with a better understanding of what is necessary to achieve those goals*. As Bok (2006) and others have argued, we can create a much more effective educational system by being more purposeful in setting and pursuing our basic goals.

Third, the Student as Scholar Model offers a powerful path to reducing the boundaries that separate the core higher education missions of teaching, research, and service. The “fusion of learning” brought about by the Student as Scholar Model not only reduces the boundaries, it in fact actively reaches across those boundaries to draw energy for building the attitudes and competencies required to be a successful scholar. We view the integration of these functions as one of the most exciting potential outcomes of the approach.

Having now stated this, the adoption of a Student as Scholar Model poses many significant challenges. The most direct challenge is to construct a curriculum that embraces the Student as Scholar Model. At Miami University, efforts are underway to adopt the Discovery Paradigm in the largest first year and lower division courses. Although the initiatives are generating many exciting approaches to creating inquiry-driven, student-centered, and active education, implementing these ideas is challenging and demands a great deal of the supporting context. Changing one course in isolation is difficult; trying to get all of the relevant moving parts synchronized is daunting at the beginning of this process. Everything from student services to libraries affects the success of the initiatives. Thus it is critical to view these changes as truly foundational, broad-based, and transformative.

One of the key contextual variables contributing to the success of the student scholar approach is developing a deeper understanding of student development in the faculty. Most faculty have little training in pedagogy, let alone student development theory. And yet, the successful adoption of the Student as Scholar Model requires a deep understanding of the bridge needed to move students from the third to the fourth order of consciousness that reflects self-authorship. How do we build that expertise? Additionally, moving to the Learning Paradigm and then to the Discovery Paradigm requires faculty to take on a different and new role in the classroom and staff to adopt a new posture out of the classroom. Instead of holding the power, they are now empowering the students to take control of their education and author knowledge as well. To move in this direction requires difficult self-assessment in how faculty and staff view themselves and their relationships with students; consequently, the usual one-day or one-hour faculty development or staff training workshop will not suffice. Thus, we must re-envision our approaches to faculty and staff development to help them reexamine their roles and relationships.

The successful bridge also requires a better melding of the curricular and the co-curricular realms. Students learn, learn how to learn, and develop the confidence to learn and discover on their own through the full range of college activities. How, then, do we more purposively encourage faculty and staff to partner with one another to develop and link co-curricular activities to the ultimate goal of the student as scholar? What new communication structures and partnership incentives can we invent to spark new synergies among our staff and faculty?

Similarly, as we work hard to spread an appreciation of the power of a liberal education to the broader public, we need to see the Student as Scholar Model as providing a motivating clarity to those values of a liberal education that we hold most dear. The Student as Scholar Model provides a sharper image of what it means to be “an educated person.” While it may not provide all of the breadth that many would associate with this label, we believe that it energizes and coalesces many of the most essential elements of a liberal education.

This is an exciting time in higher education. We have unprecedented opportunities to engage our students in their learning in new ways. We know more about how students develop, what enduring skills are most critical, what motivates students, and how to provide students with virtually unlimited access to original raw material that they can explore with “attitude.” It is this attitude, this frame of mind, that fundamentally changes how students can think about their education. We believe that this attitude can lead to deeper, increasingly motivated, and more enduring learning not only during the years of formal study, but also throughout a lifetime of informal and formal learning in an ever-changing world.

REFERENCES

- Alvermann, D.E. & Phelps, S.F. (1994). *Content reading and literacy: Succeeding in today's diverse classrooms*. Boston: Allyn and Bacon.
- [American College Personnel Association. (1994). *The student learning imperative: Implications for student affairs* [On-line]. Available: <http://www.acpa.nche.edu/sli/sli.htm>.]
- Association of American Colleges and Universities (2007). *College learning for the new global century* [On-line]. Available: <http://www.aacu.org/advocacy/leap/.htm>.
- Barr, B., & Tagg, J. (1995). From teaching to learning: A new paradigm for undergraduate education. *Change*, November/December, 13-25.
- Baxter Magolda, M. B. (2004a). Learning Partnerships Model: A framework for promoting self-authorship. In M. B. Baxter Magolda & P. M. King (Eds.), *Learning partnerships: Theory and models of practice to educate for self-authorship* (pp. 37-62). Sterling, VA: Stylus.
- Baxter Magolda, M. B. (2004b). Preface. In M. B. Baxter Magolda & P. M. King (Eds.), *Learning Partnerships: Theory and models of practice to educate for self-authorship* (pp. xvii-xxvi). Sterling, VA: Stylus.
- Baxter Magolda, M. B. (2004c). Self-authorship as the common goal of 21st century education. In M. B. Baxter Magolda & P. M. King (Eds.), *Learning partnerships: Theory and models of practice to educate for self-authorship* (pp. 1-35). Sterling, VA: Stylus.
- Bok, D. (2006). *Our underachieving colleges*. Princeton, NJ: Princeton University Press.
- Boyer Commission (1998). *Reinventing Undergraduate Education: A Blueprint for America's Research Universities*.
- Kegan, R. (1994). *In over our heads: The mental demands of modern life*. Cambridge, Massachusetts: Harvard University Press.
- King, P.M. and Baxter Magolda, M.B. (1996). A developmental perspective on learning. *Journal of College Student Development*, 37 (2), 163-173.
- Kuh, et al. (2005). *Student success in college: Creating conditions that matter*. San Francisco, CA: Jossey-Bass.
- Love, P. G., & Guthrie, V. L. (1999). *Understanding and applying cognitive development theory*. *New Directions for Student Services*, No. 88. San Francisco, CA: Jossey-Bass.

Novak, M., et al. (2007) "A Research Project in the Organic Instructional Laboratory Involving the Suzuki-Miyaura Cross Coupling Reaction". *Chemical Education*, 20, 414-418.

Palincsar, A. S. & Brown, A. L. (1984) Reciprocal Teaching of Comprehension-Fostering and Comprehension-Monitoring Activities. *Cognition and Instruction*. 1(2), 117-175.

Tagg, J. (2003). *The learning paradigm college*. San Francisco, CA: Jossey-Bass.

Tinberg, H., and R. Weisberger. (1998). "In over Our Heads: Applying Kegan's Theory of Development to Community College Students." *Community College Review*. 26 (2), 43-56.