Assessment Plan

5 Assessing the Effectiveness of the Discovery-Based Learning Initiative

The plan for assessing the effectiveness of the *Discovery-Based Learning Initiative* is designed primarily to establish evidence that our undergraduate students are acquiring the skills and knowledge expected, and secondarily to gather information that will allow the University to effectively target adjustments and improvements to the QEP program components. The Office of Institutional Research and Institutional Effectiveness and the Office of Undergraduate Discovery Programs will partner with faculty to implement the assessment plan.

5.1 Assessment of Student Learning Outcomes

Faculty participation will be a critical part of a successful assessment programs, from identification of standards through administration of assessment instruments and consideration of results. Evidence of students' research skills can be quickly translated to curricular change by faculty, and can be evaluated by the Office of Undergraduate Discovery Programs for possible modification of the course funding criteria. In addition, the course-based measures will lay the groundwork for discipline-specific research measures to be developed over time.

The assessment plan focuses on the student learning outcomes framing the *Discovery-Based Learning Initiative*, referenced in Section 2.5 and reiterated below:

- Students will be able to formulate a research question or problem.

- Students will be able to identify basic principles and knowledge related to their research question or problem.

- Students will be able to develop a research plan to address or resolve a specific question or problem.

- Students will be able to collect and interpret data and information in an attempt to resolve the question or problem.

- Students will demonstrate awareness of the responsible conduct of research.

- Students will be able to articulate their research findings through written, performance and/or oral presentations.

Our QEP provides multiple educational and research opportunities to address these student learning outcomes. Table 17 maps each student learning outcome to the program component in which the outcome is introduced, reinforced, or emphasized. The primary experiences are shown in the shaded area at the left of the map; the secondary experiences are reflected in the area to the right. As the *Discovery-Based Learning Initiative* progresses and student learning outcome data are analyzed, the map will indicate the primary program components where improvement might be needed, or the supporting components to be reviewed for expansion or elimination.

Integrated Assessment Planning

In the spirit of integrated assessment, the *Discovery-Based Learning Initiative* assessment plan is designed to examine data meaningful to UH faculty, who are ultimately responsible for undergraduate education. For this reason, the plan relies heavily on standards outlined by faculty locally. In addition, the plan is designed with full awareness that recent developments in the public accountability discussion may push all universities more toward standardized measures of student learning. Coupled with the locally-developed measures are national instruments or nationally developed standards such as those for critical thinking, information literacy, or the responsible conduct of research.

Given that the operating principles guiding the *Discovery-Based Learning Initiative* are improvement of the undergraduate educational experience at UH and reinforcement of the link between academic skills and the skills needed for success in today's world, the assessment plan is linked to the University's general education assessment plan. For some outcomes, the Discovery-Based Learning and core competency measures are shared; for others, the Discovery-Based Learning outcome has a unique measure but is also tied to a more general measure in the general education assessment plan. The alignment of QEP and core competency measures will provide more robust information for both, and will facilitate examination of the *Discovery-Based Learning Initiative* as a tool for strengthening undergraduate education as a whole.

Embedded Assessment in Research-Intensive Courses

The student learning outcome measures associated with the *Discovery-Based Learning Initiative* are shown in Table 18. As elaborated in Section 3.4, the cornerstone of our QEP is the development of a research-supportive curriculum through enhancement or creation of new research-based courses at three levels: core, intermediate, and advanced. The advanced level research-intensive courses provide students with the opportunity to further develop and apply their research-related skills in project-based or capstone experiences. Accordingly, assessment of student learning outcomes is located primarily within research-intensive courses.

The funding criteria for development of new research-intensive courses and the criteria for designating existing courses as research-intensive will stipulate faculty engagement in Discovery-Based Learning outcomes assessment activity. Depending on the level of the course or the stage of program implementation, funding criteria may include participation in rubric development or inclusion of assessment instruments in course requirements. Since student learning outcomes assessment is tied to the funding of research-intensive courses, implementation is ensured.

Table 17

QEP Curriculum Map

QEP Student Learning Outcomes	Primary Research-Supportive Curriculum			Supporting					
	Core	Intermediate	Advanced	Mentored Research Programs[a]	Work-Study Research Internship Program	Workshops and Tutorials	Graduate Student Near-Peer Mentors	Awareness Opportunities[b]	Dissemination Opportunities[c]
Students will be able to formulate a research question or problem.	I	R	E	E	I	I, R	R	I, R	
Students will be able to identify basic principles and knowledge related to their research question or problem.	I	R , E	E	E	I	I, R	R	I, R	
Students will be able to develop a research plan to address or resolve a specific question or problem.	I	R , E	E	E	I	I, R	R	I, R	
Students will be able to collect and interpret data and information in an attempt to resolve the question or problem.	I	I, R	E	E	I	I, R	R	I, R	
Student will demonstrate awareness of the responsible conduct of research.	I	R	R	R	I	I, R	R	I	
Students will be able to articulate their research findings through written, performance and/or oral presentations.	I	I	E	E	I	I, R	R		E

Research/Educational Experiences

I = Introduced   R = Reinforced   E = Emphasized

[a] Mentored Research = SURF, PURS, AGEP, H-LSAMP, faculty grant-funded Research Assistant positions, credit-bearing thesis/independent study research course

[b] Awareness = Attendance at Reality Chats, College/Dept. Undergraduate Research Showcase, Undergraduate Research Summit, and reviewing of Undergraduate Research Journal and Online Portal

[c] Dissemination = Presentation at College/Dept. Undergraduate Research Showcase, Undergraduate Research Summit, and publication in Undergraduate Research Journal; presentation at regional or national venue facilitated by Student Travel Fellowships for Undergraduate Research

Table 18   Student Learning Outcomes Assessment Plan

QEP Student Learning Outcome	Related General Education Outcome	Assessment Methods	Implementation
Students will be able to formulate a research question or problem.	Critical Thinking	Course embedded assessment against a simple rubric.	Funding criteria for research-intensive courses will require research-related skills instruction and assessment to be included in the course.
Students will be able to identify basic principles and knowledge related to their research question or problem.			Assessment staff will work with faculty and Office of Undergraduate Discovery Programs to establish criteria and will provide faculty with resources for developing simple course-embedded assessment of the outcomes.
Students will be able to develop a research plan to address or resolve a specific question or problem.			Assessment instruments may be placed in WebCT so that courses using WebCT may include QEP assessments easily. Courses not using the WebCT platform will be able to direct students to WebCT for the sole purpose of QEP assessment.
Students will be able to collect and interpret data and information in an attempt to resolve the question or problem.			Instructional Technology staff to assist with QEP assessments in WebCT.
		Locally-developed rubric for cross-sectional assessment. National Instrument for longitudinal or cross-sectional implementation.	Rubric developed by UH faculty assessing critical thinking as a core competency across disciplines. Student work to be sampled from embedded assignments and stored on shared server or e-portfolio system. Subsequent implementation will assess students at beginning and end of undergraduate career. Data collection, analysis, and reporting to be conducted by assessment and Writing Center staff. National instrument for assessing critical thinking will be chosen by UH faculty as part of QEP and general education assessment, and participation in the Voluntary System of Accountability. Implementation and reporting to be coordinated by assessment staff.
	Critical Thinking (Quantitative Reasoning)	Locally-developed standards applied to data embedded in core mathematics courses.	Student work including objective and free response questions embedded in core mathematics courses scored against locally developed quantitative reasoning rubric. Questions to be embedded by mathematics instructors; results to be analyzed and reported by assessment staff.
	Information Literacy	Assessment of modified ACRL Standards.	The Association of College and Research Libraries provides Information Literacy Competency Standards for higher education. A faculty committee will be formed to select and modify the five ACRL standards and associated outcomes to effectively articulate the expected outcomes for UH students. Assessment staff will develop measures for the stated outcomes.
Student will demonstrate awareness of the responsible conduct of research.		Problem-based questions embedded in research-intensive courses.	Using federal guidelines for the responsible conduct of research in multiple disciplines, a faculty committee will articulate a multidisciplinary code of conduct appropriate for undergraduate researchers at UH. Assessment staff will develop questions to assess awareness which faculty will embed in research-intensive courses. Results will be analyzed and reported by assessment staff.
Students will be able to articulate their research findings through written, performance, and/or oral presentations.	Communication (Writing)	Scoring of student writing products against locally-developed assessment rubric.	Using 2006 results of undergraduate writing assessment as a baseline, student writing will be sampled and analyzed against the existing writing rubric on a biennial basis by assessment and Writing Center staff. Each discipline will establish and communicate to faculty and students expectations for research writing in that discipline. Assessment staff and Office of Undergraduate Discovery Programs will facilitate assessment of upper level research writing products against discipline-specific rubrics.
	Communication (Speaking)	Locally-developed rubric utilized at selected QEP-related performance opportunities.	Assessment standards for presentations to be developed by faculty and communicated to students participating in any QEP-related presentation opportunity. Presenters will be scored by 2-3 faculty or industry experts in attendance and provided feedback. Office of Undergraduate Discovery Programs will coordinate scoring. Results will be analyzed and reported by assessment staff.

Performance Criteria	Schedule
Students who have taken research-intensive courses will be able to formulate a research question or problem with adequate or advanced proficiency by AY 2010-2011. The proportion of students reaching advanced proficiency will increase every year. Students who have taken research-intensive courses will be able to identify basic principles and knowledge related to their research question with adequate or advanced proficiency by AY 2010-2011. The proportion of students reaching advanced proficiency will increase every year. Students who have taken research-intensive courses will be able to develop a research plan with adequate or advanced proficiency by AY 2011-2012. 70% of students who have taken research-intensive courses will be able to collect and interpret data with adequate or expert proficiency by AY 2011-2012.	Funding criteria for research-intensive courses to be completed summer 2008. First proposals funded Fall 2008. Courses supported by funding scheduled beginning Fall 2009, with additional courses implemented every semester. Assessment staff to work with faculty before and during first semester of course to establish assessment instrument.
Upper-division students will show evidence of advanced critical thinking skills compared to lower division students. Upper division students with greater levels of engagement in research opportunities will show greater critical thinking skills when compared to upper division students with minimal engagement in research opportunities. Performance criteria for national test to be set by UH faculty in alignment with decision for longitudinal or cross-sectional assessment.	Pilot assessment completed March 2008. Refinement of rubric and subsequent assessment to be conducted and reported biennially by May 31. Selection by faculty of national instrument to be completed by July 31, 2008. First implementation to take place AY 2008-09.
Students will demonstrate competency on all quantitative reasoning outcomes by Spring 2009. Students will demonstrate improved quantitative reasoning skills each year.	Pilot assessment to be completed March 2008. Baseline data to be collected and analyzed Fall 2008 or earlier. Subsequent analyses to be conducted annually and reported biennially.
All students will demonstrate minimum competency.	Outcomes identified by December 31, 2008. Assessment methods identified by April 30, 2009. Initial assessment to begin AY 2009-2010.
All students in research-intensive courses will demonstrate awareness of responsible conduct of research.	Questions to be embedded in all research-intensive courses beginning Fall 2009.
Students will demonstrate improved writing skills in comparison to prior years. Students at the same level who have enrolled in more research-related courses will demonstrate stronger writing skills than students who have enrolled in fewer research-related courses. Upper level research writing products will meet minimum criteria established by discipline.	Disciplines will publish standards for quality research writing in the discipline by Spring 2009. Undergraduate student writing will be analyzed and results reported once each academic year. Upper level research writing products will be analyzed against discipline-specific rubrics annually, beginning AY 2009-10.
Students will demonstrate improved speaking skills each year.	Assessment standards to be developed Fall 2008 and implemented each spring semester, beginning 2009. Reports will be completed annually by June 30.

Assessment of Critical Thinking

Many of the skills needed for research – formulating questions, identifying relevant principles, collecting and interpreting data – call on the family of critical thinking skills we uphold as a core competency. The University of Houston has launched its own critical thinking assessment initiative, and will soon begin participation in a national test of critical thinking. We expect the two means of assessment to provide rich and actionable information on students' core skills. Furthermore, the quantitative reasoning measure associated with critical thinking will aid interpretation of evidence regarding students' ability to collect and interpret data in quantitative disciplines.

Assessment of Information Literacy

Similarly, the information literacy assessment will shed light on the ability of students to identify principles and knowledge related to their research question. The Association of College and Research Libraries (2007) has developed five information literacy competency standards, which have been operationalized into 22 performance indicators and 87 outcomes. Some of the standards overlap in significant ways with our *Discovery-Based Learning Initiative* outcomes as well as our core competencies. For example, the fifth standard, addressing economic, legal and social issues surrounding the use of information, contains a performance indicator discussing responsible acknowledgement of information sources. For Discovery-Based Learning assessment, this standard would fall under the outcome regarding the responsible conduct of research. In response to these overlaps, our process will begin with a faculty committee examining the ACRL information literacy standards to identify the outcomes that should be assessed at UH, given what is already being assessed elsewhere on campus and given the University's established general education competencies.

Assessment of Responsible Conduct of Research

The responsible conduct of research outcome is defined by awareness rather than measurable skill, because undergraduate students will rarely be conducting research in a way that leaves them alone in these decisions. Moreover, the manifestation of ethical issues may vary among disciplines. As with information literacy, a faculty committee will be charged to examine federally defined standards such as those found in the Office of Research Integrity's *Introduction to the Responsible Conduct of Research* and *On Being a Scientist: Responsible Conduct in Research*, a document produced from a project approved by the Governing Board of the National Research Council. Using these federally defined standards as references, the UH faculty committee will identify the domains of emphasis for undergraduates engaging in research. Based on the outcomes selected, assessment staff will develop appropriate measures to be included in research-intensive courses.

Assessment of Communication Skills

Finally, the outcome addressing research dissemination has strong ties to assessment of core skills. Assessment of oral presentations will be accomplished with standards set by our faculty and implemented by faculty and industry experts at on-campus assessment forums and research-intensive courses. Our well-established Writing in the Disciplines (WID) program provides a strong foundation for writing assessment and for developing rubrics and standards targeting research writing in specific disciplines - an approach which will be readily adapted for Discovery-Based Learning writing assessment.