Student Learning Outcomes and Related Assessment Practices

~ Information for Faculty, Program Directors, Department Chairs, and Deans ~

In 2012, the IUPUI campus will be evaluated by a visiting team representing the Higher Learning Commission (HLC) of the North Central Association as part of the re-accreditation process that we experience every ten years. HLC minimum requirements specify that "programs, majors, degrees and general education have stated learning outcomes" and that processes for the "assessment of student learning are in effect." The purpose of this document is to provide information that may be helpful in guiding the development of program-level student learning outcomes for each of our academic programs that leads to certification or a degree, and to identify some effective methods of assessing student attainment of the outcomes.

Student Learning Outcomes

Student Learning Outcomes (SLOs) are statements that define what students will know, be able to do, or be able to demonstrate when they have completed or participated in academic program(s) leading to certification or a degree. Outcomes are often expressed as knowledge, skills, attitudes, behaviors, or values. Faculty and instructors will benefit from working together to develop, emphasize, and assess specific program-level SLOs that meet the desired learning objectives of their students. Pursuit of these learning outcomes is expected to enhance the likelihood of academic success for all IUPUI students. It will also support more transparent demonstration of student academic success.

Developing student learning outcomes can assist faculty and instructors by:
- Increasing understanding of how to facilitate student learning.
- Communicating to students explicitly and precisely what is expected of them.
- Providing a template or guide for the design of effective materials describing their program.
- Providing departments with feedback to answer such questions as: What skills are students learning? Are these the skills that we want students to learn? Are these the skills that we are teaching our students?

Student learning outcomes can improve student learning by:

- Strengthening academic programs so that students are more likely to achieve integrated, higher learning skills that they can demonstrate to others.
- Enabling students to articulate what they are learning and have learned at IUPUI, inside and outside the classroom.

Students perform better when they know exactly what is expected of them, including what they will be required to do and how it will be evaluated.

Developing Student Learning Outcomes at the Program Level

Student learning outcomes describe the knowledge, skills, abilities, or attitudes that a student can demonstrate *upon completion of his or her program of study*. They focus on what students can DO with what they have learned, rather than on content or coverage.

- How will students demonstrate their knowledge and skills?
- What can students produce to show faculty members and advisors that they have learned to apply their knowledge?

Getting Started…

1. Work with colleagues to draft SLOs for your *program*. Incorporating different perspectives is helpful. Beginning by sharing *course*-level outcomes may be helpful.
2. Ask: What are the most important things a student should know, be able to do, or demonstrate, after completing the courses in this academic program?
3. Make a list of these outcomes and try to write them as SLO statements, using the information and examples provided below.
4. Focus on a small number of high-priority outcomes.
5. When possible, relate the SLOs to IUPUI Principles of Undergraduate Learning (PULs), (http://faa.iupui.edu/pul/). (Examples are provided in Appendices A & B.)
6. Make outcomes as specific, focused, and clear as possible–overly general outcomes will be difficult to measure (see examples below).
7. Don't try to cover every student learning domain. Focus on learning outcomes that are most important.
8. Clearly differentiate SLOs (*which are measures of what students have learned)* from assessments of student satisfaction, program evaluations, and process measures such as attendance.
9. Consider involving students, program graduates, and employers of program graduates in the process of developing student learning outcomes. For example, it may be worthwhile to host a forum (electronically or in-person) in which faculty members, students, program graduates, and employers, as well as members of the larger community have the opportunity to contribute to the development of SLOs. As a result, the statements of learning outcomes will reflect what members of the campus and external community think students should develop in each academic discipline. This process may provide a rich source of information as SLOs are developed and refined.

Student Learning Outcomes statements specify an action that is *observable, measurable, and capable of being demonstrated; thus, they should begin with action verbs*.

The Center for Teaching and Learning (CTL) offers a wide variety of resources and support for this work on student learning outcomes (http://ctl.iupui.edu).

An important idea to remember in the development process is that a student learning outcome *demonstrates* that the student has learned. Shortcomings can typically be revealed by asking two questions: "**Can it be measured?" and "Is learning being demonstrated?"**

~ Please consult the planning matrices provided in Appendices C & D ~

Consider the following examples:
- Students <u>will understand</u> the six steps of the "order of operations" (Mathematics).
  - Learning is demonstrated, but this SLO will be difficult to measure.
- Students will read chapters 1-10 in the text.
  - This is a content-related objective that can be measured easily, but it does not demonstrate what students know or can do.

These student learning outcomes have deficiencies. We can rewrite these statements to make the student learning outcomes measurable and demonstrative of learning.
- Students <u>will list, explain, and use</u> the six steps of the "order of operations."
- Students <u>will synthesize diverse issues and responses raised in collaborative discussion of texts</u>.

Methods for Assessing Student Learning Outcomes

A multiple methods approach is recommended to assess student learning outcomes indirectly and directly. **Direct** measures of student learning require students to demonstrate their knowledge and skills. They provide tangible, visible and self-explanatory evidence of what students have and have not learned as a result of a course, program, or activity (Suskie, 2004; Palomba and Banta, 1999). Examples of direct student learning measures include objective tests, essays, presentations, classroom assignments, and portfolios. **Indirect** measures capture students' perceptions of their knowledge and skills; they supplement direct measures of learning by providing information about how and why learning is occurring. Students' perceptions of the extent to which courses and assignments have enhanced their achievement of the stated learning outcomes may be obtained by using the following methods: self-assessment, peer-feedback, end-of-course evaluations, questionnaires, focus groups, or exit interviews. Employment of these methods will allow for student involvement not only in the creation of the SLOs, but also in evaluating their perceived success in achieving the SLOs.

References:

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Appendix A

Examples of Student Learning Outcomes and Action Verbs

Examples – TOO General and VERY HARD to measure:
1. …will appreciate the benefits of exercise science.
2. …will understand the scientific method.
3. …will become familiar with correct grammar and literary devices.
4. …will develop problem-solving and conflict resolution skills.

Examples – Still General and HARD to measure:
1. …will appreciate exercise as a stress reduction tool.
2. …will apply the scientific method in problem solving.
3. …will demonstrate the use of correct grammar and various literary devices.
4. …will demonstrate critical thinking skills, such as problem solving as it relates to social issues.

Examples – SPECIFIC and relatively EASY to measure:
1. …will explain how the science of exercise affects stress.
2. …will design a grounded research study using the scientific method.
3. …will demonstrate the use of correct grammar and various literary devices in creating an essay.
4. …will analyze and respond to arguments about racial discrimination.

Academic Program Outcome Example (Psychology)

- Upon graduation students will speak and write effectively in the discourse of psychology.

Course Outcome Example (Psychological Measurement)

- Upon course completion students will prepare a written report that summarizes and interprets standardized test results accurately.

The importance of action verbs
- Action verbs result in overt behavior that can be observed and measured (see list below).
- Certain verbs are unclear or relate to covert, internal behaviors that cannot be observed or measured. These types of verbs should be avoided (e.g., appreciate, become aware of, become familiar with, know, learn, and understand).

Action Words from Bloom's Taxonomy (Bloom, B. (1956) *A Taxonomy of Educational Objectives, The Classification of Educational Goals-Handbook I: Cognitive Domain.* New York: McKay**.)**

Knowledge	Understand	Apply	Analyze	Evaluate	Create
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize

<u>**Appendix B**</u>

Examples Specific to IUPUI's Principles of Undergraduate Learning (PULs)

Listed below are the official definitions and outcomes associated with IUPUI's Principles of Undergraduate Learning (PULs). Examples of student learning outcome statements are included below each PUL. These examples are intended to model effective SLO statements that are both measurable and demonstrative of student learning. Examples are intended to describe what students will know, be able to do, or be able to demonstrate upon graduation from an academic program. Possible related program areas and major fields are included in parentheses. Some examples were chosen from existing SLO statements from IUPUI academic schools and programs. Please note that *connecting SLOs to the PULs may be helpful, but it is not essential.*

Core Communication and Quantitative Skills

The ability of students to express and interpret information, perform quantitative analysis, and use information resources and technology – the foundational skills necessary for all IUPUI students to succeed.
Outcomes*: Core communication and quantitative skills are demonstrated by the student's ability to:*

1. *Express ideas and facts to others effectively in a variety of formats, particularly written, oral, and visual formats;*
2. *Comprehend, interpret and analyze ideas and facts;*
3. *Communicate effectively in a range of settings;*
4. *Identify and propose solutions for problems using quantitative tools and reasoning;*
5. *Make effective use of information resources and technology.*

Examples of Student Learning Outcomes:
- Students will demonstrate that they are effective communicators who can share accurate information. (Nursing)
- Students will demonstrate the ability to communicate effectively with a range of audiences. (Computer Graphics Technology).
- Students will prepare a written technical document and deliver an oral presentation relevant to physics. (Physics)
- Students will demonstrate effective speaking skills and writing skills. (Psychology)
- Students will identify, define, analyze, and solve specific computing problems by stating the requirements appropriate to its solution. (Computer Graphics Technology)
- Students communicate orally in their own language using the terminology and techniques accepted in the historiographical profession. (History)
- Students communicate effectively in written and spoken form with clients, colleagues and interdisciplinary health team members through the use of multiple expressive caring modes and through the use of advanced information and communication technologies. (Nursing)
- Majors will analyze and interpret statistical data as they support decision-making processes throughout an organization. (Business)
- Students demonstrate a conceptual and aesthetic awareness of the relationship between audience and artwork. (Art History)
- Given a problem situation students will use calculus to determine whether it is a rate of change problem or a total change problem; and use the appropriate method to accurately solve the problem. (Mathematics)
- Students will demonstrate and apply knowledge of mathematics, science, and engineering that includes:
  - Knowledge in chemistry and calculus-based physics in depth
  - Mathematics through multivariate calculus, differential equations, and linear algebra
  - Probability and statistics
  - Mechanical Engineering sciences: solid mechanics, fluid-thermal science, material science, dynamics. (Engineering and Technology)

Critical Thinking

The ability of students to engage in a process of disciplined thinking that informs beliefs and actions. A student who demonstrates critical thinking applies the process of disciplined thinking, remaining open-minded, reconsidering previous beliefs and actions, and adjusting his or her thinking, beliefs and actions based on new information.
***Outcomes**: The process of critical thinking begins with the ability of students to remember and understand, but it is truly realized when the student demonstrates the ability to:*

1. Apply;
2. Analyze;
3. Evaluate, and
4. Create knowledge, procedures, processes, or products to discern bias, challenge assumptions, identify consequences, arrive at reasoned conclusions, generate and explore new questions, solve challenging and complex problems, and make informed decisions.

Examples:
- Students will demonstrate the critical thinking skills of retention, comprehension, application, analysis, synthesis, and evaluation. (Psychology)
- Students will be critical thinkers who demonstrate intellectual curiosity, rational inquiry, problem solving skills, and creativity in framing problems. (Nursing)
- Students will explain and classify evidence. (Forensic and Investigative Sciences)
- Students will explain, evaluate, and identify characteristics of fingerprints. (Forensic and Investigative Sciences)
- Students can apply principles of scientific inquiry, differentiate a theory from a hypothesis, and differentiate fact from opinion in regard to biological sciences. (Biology)
- Students will read and analyze texts and other primary sources, both critically and empathically, while addressing questions of genre, content, perspective and purpose. Primary sources include visual and material sources like topographical evidence, paintings, coins, medals, cartoons, photographs and films. (History)
- Graduates will apply basic research methods in psychology, including research design, data analysis, and interpretation (Psychology).
- Students will analyze current research findings in the areas of physiological psychology, perception, learning, abnormal, and social psychology. (Psychology)

Integration and Application of Knowledge

The ability of students to use information and concepts from studies in multiple disciplines in their intellectual, professional, and community lives.
***Outcomes**: Integration and application of knowledge are demonstrated by the student's ability to:*

1. Enhance their personal lives;
2. Meet professional standards and competencies;
3. Further the goals of society; and
4. Work across traditional course and disciplinary boundaries.

Examples:
- Students will demonstrate the ability to apply their skills to other areas or problems. (Physics)
- Students will demonstrate the ability to conduct accurate, comprehensive and focused scientific investigations and apply appropriate rules of evidence. (Forensic and Investigative Sciences)
- Students will generate applications of psychology to individual, social, and organizational issues. (Psychology)
- Students will apply knowledge of forensic science to case scenarios. (Forensic and Investigative Sciences)

- Students will assess and describe aspects of sustainability, including economic, societal and environmental factors, especially in relation to biological systems. (Biology)

- Students will use an appropriate analytic frame to predict the impact of policy proposals on social welfare. (Economics)
- Students will identify and define the social, political, and economic institutions that influence modern society. (History)

Intellectual Depth, Breadth, and Adaptiveness

The ability of students to examine and organize disciplinary ways of knowing and to apply them to specific issues and problems.
Outcomes: Intellectual depth, breadth, and adaptiveness are demonstrated by the student's ability to:

1. Show substantial knowledge and understanding of at least one field of study;
2. Compare and contrast approaches to knowledge in different disciplines;
3. Modify one's approach to an issue or problem based on the contexts and requirements of particular situations.

Examples:
- Students will demonstrate that they can apply the major concepts, theoretical perspectives, empirical findings and historical trends in psychology. (Psychology).
- Students will design, implement, and evaluate computer-based systems, processes, components, or programs to meet desired needs (Computer Graphics Technology).
- Students will apply principles of forensic science in crime scene investigation. (Forensic and Investigative Sciences)
- Students will compare and contrast the meaning of major texts from both the Western and non-Western cultures.(English)
- Students will apply the humanistic perspective to values, experiences, and meanings in their own lives. (English)
- Graduates will use a variety of performance-based assessment tools and techniques to inform instruction. (Education)
- Students will apply a body of anthropological theory to the analysis of a linguistic, cultural, or archeological phenomenon. (Anthropology)
- Students will describe how the techniques and methods of processing images are used on photographic evidence obtained at a crime scene. (Forensic and Investigative Sciences)

Understanding Society and Culture

The ability of students to recognize their own cultural traditions and to understand and appreciate the diversity of the human experience.
Outcomes: Understanding society and culture is demonstrated by the students' ability to
1. Compare and contrast the range of diversity and universality in human history, societies, and ways of life;
2. Analyze and understand the interconnectedness of global and local communities; and
3. Operate with civility in a complex world.

Examples:
- Students will demonstrate that they are culturally competent persons who provide holistic nursing care to a variety of individuals, families, and communities. (Nursing)
- Students will explain diverse opinions in regard to professional, ethical, legal, and social issues in a global perspective. (Computer Graphics Technology)
- Students will demonstrate an ability to analyze and explain the impact of computing on individuals, organizations, and societies in both domestic and international environments. (Computer Graphics Technology)
- Students demonstrate the impact of engineering solutions in a global and societal context. (Engineering and Technology)
- Students utilize leadership skills to critically examine and advocate for the improved health care of clients. (Nursing)
- Students approach problems and issues from multi-ethnic, multi-racial, multi-cultural, and multi-religious points of view. (University College First-Year Seminars)

- Students deal effectively with conflicts among co-workers and friends. (Student Life and Co-curricular Experiences)
- Students describe the relationships among local, national, and global issues. (Student Life and Co-curricular Experiences)

Values and Ethics

The ability of students to make sound decisions with respect to individual conduct, citizenship, and aesthetics.
Outcomes: *A sense of values and ethics is demonstrated by the student's ability to*

1. Make informed and principled choices and to foresee consequences of these choices;
2. Explore, understand, and cultivate an appreciation for beauty and art;
3. Understand ethical principles within diverse cultural, social, environmental, and personal settings.

Examples:
- Students will describe how ethics are applied to the presentation of expert testimony in court. (Forensic and Investigative Sciences)
- Students will develop self-awareness by identifying their own personal strengths, weaknesses, values, goals. (Psychology)
- Students will demonstrate an understanding of professional, ethical, legal, security and social issues and responsibilities. (Computer Graphics Technology)
- Students will explain why there is a constant need to engage in continuing professional development. (Computer Graphics Technology)
- Students will describe the major features of the Code of Ethics of the American Academy of Forensic Sciences and of other major forensic science organizations. (Forensics and Investigative Sciences)
- Psychology graduates will weigh evidence, tolerate ambiguity, act ethically, and reflect other values that are the underpinnings of psychology as a discipline. (Psychology)
- Students will describe the five fundamental values that this academic community expects: honesty, fairness, respect, responsibility and trust. (University College First-Year Seminars)
- Students assume responsibility and accountability for personal and professional behavior, ethical practice, and client advocacy, especially for vulnerable clients. (Nursing)

Appendix C:

Planning for Learning and Assessment
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1. What general outcome are you seeking?	2. How will you know it (the outcome) when you see it? (What will the student know or be able to do?)	3. How will you help students learn it? (in class or out of class)	4. How will you measure each of the desired behaviors listed in #2?	5. What are the assessment findings?	6. What improvements will be made based on assessment findings?

Appendix D
Planning for Learning and Assessment: Student Learning Outcomes in a Themed Learning Community: Psychology Course (Example)

1. What student learning outcome are you seeking?	2. How do you know it (the outcome) when you see it? (What does the student know? What is the student able to do?)	3. How do you help students learn it (in class or out of class)?	4. How do you measure each of the desired behaviors listed in #2?	5. What are the assessment findings?	6. What improvements will be or have been made based on assessment findings?
PUL#1: *Improve Core Communication Skills* **PUL#2:** Improve *Critical Thinking* **PUL#3:** *Improve Integration and Application of Knowledge* *Improve Career Decision Making Sills*	**PUL#1:** *Core Communication Skills*: "Able to express ideas and facts effectively in writing; comprehend, interpret and analyze texts; use information resources correctly." **PUL#2:** *Critical Thinking:* "Able to analyze information and ideas from multiple perspectives; evaluate the logic, validity, and relevance of data; synthesize information in order to arrive at reasoned conclusions." **PUL#3:** *Integration and Application of Knowledge:* "Able to use and apply information and concepts from studies in multiple disciplines to enhance personal, professional, and community life." *Self Assessment*: Students are able to identify success-related competencies that are natural strengths as well as other skills that they need to build. *Exploration*: Students are able to research and develop a realistic, informed, and detailed vision of related academic and career goals. *Evaluation*: Students are able to analyze their academic progress over the semester in terms of academic and career success strategies. *Goal Setting*: Students are able to connect a larger sense of personal values and life purpose to the motivation and inspiration behind their academic and career goals. *Planning*: Students are able to locate programs, information, people, and opportunities to support and reality test their goals. They identify specific short term steps to reach their long term goals.	"Psyched for Success" TLC Integrative Paper. Students use rubrics to self-assess and receive feedback on their papers from faculty members. Co-Curricular Activities (Community Service Activities, Friday Movie Day, Career Fair, Office of Student Life activities). Active learning teaching strategies in psychology course to help students learn to think critically and apply psychology. Online homework exercises that ask students to compare and connect psychology concepts as well as apply psychology to real life by writing essays. Students receive ongoing feedback on their learning. 2-credit Career Development Course – Complete Personal Development Plans (PDPs). English course helps students learn to become better communicators and improve writing skills.	Employed a Pre-Post Design with a Control Group (a non-TLC First-Year Seminar Course) Developed an Integrative Assignment and Rubric (direct measure of student learning) Psychology Exams (direct measure of student learning) Career Decision Making Self-Efficacy Scale - Short Form (Betz and Taylor, 2001)- Composed of Sub-Scales End-of-Course Evaluations - perceptions and self-reported learning outcomes (indirect measure of student learning).	Not all students able to correctly apply psychology concepts (e.g., self-efficacy, self-concept, Marcia's Identity Theory) to career decision-making and defining success. Low to moderate levels of critical thinking. Not all students used APA style correctly Students overall satisfied with course. Students showed significant improvements in all CDMSE scales pre-post	More clarification of psychology concepts and how they apply to self-appraisal and career decision making process – more active group learning processes incorporated. Classroom Assessment Techniques incorporated – consistently obtaining student feedback on instruction. More complete PDP process. Improved faculty communication and collaboration. Omitted busy work and eliminated activities not directly aligned with student learning outcomes.