

## Handout 1: Two Examples of Curricular Maps

## Coding in A Partial Physics Assessment Map

GEN ED SLO	Performance Measures	PHY 1000	PHY 2053	PHY 2054	PHY 2048	PHY 2049	PSC 1121	AST 1002
1. Be able to think critically	a. Identify the validity of collected data.		ILT	EL	IL	EL		
	b. Use graphical and numerical methods to organize, analyze and interpret natural phenomena from collected data.		IL	EL	IL	EL		
	c. Use graphs, tables and charts to summarize, analyze and interpret information to solve problems.		IW	ET	IW	ET		IT
2. Demonstrate facility in written and oral communication	a. Speak clearly, project voice sufficiently, and use appropriate vocabulary.	EP	EC	MC	EC	MC	IC	
	b. Write effective Lab Reports and Project Reports	IP	ELR		ELR			IP
	c. Present information clearly in tables, charts and graphs.	IP	ELR		ELR			

## LEGEND

Level of Attention	Method of Learning	Method of Assessment
I=Introduce	L=Laboratory Experiment	Written document using a scoring rubric
E = Emphasize	C = Class Discussion	Portfolio entry scored with scoring rubric
M = Master	LR = Lab Report	Exam or Quiz scored against benchmark
	P = Project	Oral Presentation using a scoring rubric
	T = Quiz or Test	Rising Junior Milestone Exam using rubric and benchmark score
	W = Homework	Other....

## Coding Used in Curricular Mapping for a Pharmacy Program (Ohio State University)

Connection Codes – Degree or level of connection between course and outcome.

- **Not Applicable or Level 0**
  - Meaning that there is no relationship between the course and the outcome.
- **I – Introductory/Background or Level 1**
  - There is an indirect relationship between the course and the outcome. The outcome itself is not the focus of the course but at least one element of the course serves as a building block to the achievement of the final outcome. For example, course elements may provide the knowledge, skills or attitudes necessary for the ultimate achievement of the outcome.
- **M – Intermediate/transitional or Level 2**
  - There is a more of a direct relationship between the course and the outcome than at Level 1. A mixture of course elements supports the final achievement of the outcome, but the final integration of the knowledge, skills, and attitudes necessary for its achievement is not accomplished in this course. For example, knowledge, skills and/or attitudes (at least 2 of the 3) required for the achievement of the outcome may be the focus of the course or course element, but the integration of all three is not.
- **E – Emphasized or Level 3**
  - There is a direct relationship between the course and the outcome. At least one element of the course focuses specifically on the complex integration of knowledge skills and attitudes necessary to perform the outcome.
- **Pedagogy codes – How outcome is taught**
  - **L** = Lecture
  - **LD** = Lecture/discussion
  - **C** = Cases – any type of problem-based learning, learning applied to realistic scenarios
  - **E** = Experiential – actual practice of the outcome in a real or simulated environment, may include the use of live “subjects” (patients, patient actors, health care practitioner etc.)
  - **I** = Independent study
- **Assessment codes – How the outcome is evaluated**
  - **B** = building blocks – students are assessed primarily on their grasp of basics i.e. recall of information rather than their ability to apply and or synthesize that knowledge and/or skills and/or attitudes
  - **A** = Application/Synthesis – students are assessed on their ability to apply and synthesize knowledge and/or attitudes and/or skills. This includes simulated experiences
  - **D** = Demonstration – students demonstrate their abilities; they are assessed based on their ability to show mastery of the elements of the outcome. The “demonstration” may occur in either a simulated environment (e.g., OSCE or professional practice laboratory) or in realistic setting (e.g., patient care setting).

## Handout 2: Possible Syllabus Format to Identify Outcomes, Pedagogy, Methods of Assessment and Assessment Criteria

<b>Outcomes</b>	<b>How You Will Learn</b>	<b>How I Will Assess Your Achievement of This Outcome</b>	<b>The Criteria and Standards of Judgment I will Use to Assess Your Work</b>
<b>1.Design Period Costumes for Two 18<sup>th</sup> Century Plays</b>	<b>Online design modules; design simulations; critiques of your Design exercises</b>	<b>E-portfolio of Sketches, Journal Documentation of Your Research, Final Designs, and Your Statement of Principles Guiding Your Designs</b>	<b>Costume Design Criteria Sheet Available on Course Website</b>
<b>2.</b>			
<b>3.</b>			
<b>4.</b>			
<b>5.</b>			
<b>6.</b>			

from Peggy Maki



## Handout 3: Some Learner-focused Questions

(May Promote Open Discussion across A Program Aimed at Identifying the Kinds of Barriers or Obstacles Students Face Longitudinally)

### What...

- approaches to learning do students take as they shift from one disciplinary course to another or from introductory courses to higher level courses in their program of study?
- gaps in skill level occur as students transition into subsequent courses or learning experiences?
- kinds of erroneous ideas, concepts, or misunderstandings predictably interfere with students' abilities to learn new content?
- approaches do successful and unsuccessful learners take to solve representative disciplinary problems?
- patterns of weakness continue to surface or persist in students' work, such as weak reading abilities, analytical abilities, or computational skills?
- kinds of processes, problems, tasks typically stump students?
- strategies do successful and unsuccessful students draw up to read and interpret different kinds of visual or written texts in different media?
- kinds of overgeneralizations or over simplifications do learners carry with them as they move to higher-level courses?
- kinds of misunderstandings, misinterpretations, missing steps, or under developed concepts manifest themselves in the work students' produce?
- strategies do students use to restructure naïve or intuitive theories?
- conceptual or computational obstacles inhibit students from shifting from one form of reasoning to another form, such as from arithmetic reasoning to algebraic reasoning?
- successful alternative ways of understanding do learners use or develop to learn a new concept, principle, complex content?
- kinds of mental or visual models do successful learners develop to achieve enduring learning?
- kinds of changes in thinking are taking place when students reposition their understanding—belief revision, conceptual change, restructured knowledge?
- kinds of learning obstacles, such as lack of understanding of vocabulary or lack of appropriate reading strategies (for reading texts or visual material) prohibit students from interpreting, analyzing or summarizing written or visual texts?

### **How or How well do...**

- students represent new learning to themselves?
- students' representations or demonstrations of learning in lower level, prerequisite, or general education courses prepare them to develop increasingly more complex conceptual understanding or cognitive development that is expected in consecutive or upper-level courses?
- skills-based courses prepare students for consecutive or higher-level courses that require students to build on or integrate those skills?
- students chronologically build layers of complexity across the curriculum and co-curriculum, such as cognitive complexity?
- students reposition, modify, or change altogether long-held misconceptions, misunderstanding, or beliefs?
- students integrate new learning into previous learning, draw on previous learning in the progression of their studies, or apply previous learning to new contexts?
- students' professional or disciplinary dispositions develop along the chronology of their studies?
- students' beliefs affect conceptual development?
- students' levels of cognition affect their conceptual development?
- students transfer learning from their general education program of study into their major program of study?
- students transfer their general education or core curricular learning or major program learning into the life outside of the class such as in community service?
- students build their own knowledge based on the use of instructional multi-media designs?
- students initially construct meaning in a field or discipline that enables them to continue to succeed?

## Handout 4: Teacher-focused Questions

### How do...

- time restrictions or demands for increased program “coverage” inhibit students’ abilities to develop deep sustained learning?
- various kinds of pedagogy (problem-based, experiential, didactic, for example) promote complex problem solving?
- various modes of instruction promote complex problem solving?
- experiential learning opportunities offered in the curriculum and co-curriculum promote or deepen learning?

### What...

- kinds of representational models develop complex conceptual understanding?
- forms of animation or non-verbal communication enable students to overcome learning barriers?
- kinds of visual representations are conducive to learning in a particular discipline?
- strategies enable students to transition from thinking arithmetically to thinking algebraically?
- kinds of out-of-course assistance, such as online tutorials or software, promote desired student outcomes?
- kinds of approaches to teaching enable students to overcome typical learning barriers or obstacles?
- kinds of abilities are students developing under current experiential learning opportunities?
- kinds of contexts or content promote creativity?
- kinds of mental images in disciplinary learning do students transfer?

- chronological educational practices promote the following abilities?
  - Recall and recognition
  - Comprehension
  - application
  - synthesis
  - analysis
  - evaluation
  - habits of mind
  - ways of knowing
  - ways of seeing and interpreting
  - transfer
  - integration
  - creativity

### **How or How well do...**

- stand-alone skills-based courses, such as mathematics or writing courses, prepare students to integrate or apply those skills into disciplinary or professional courses?
- digital dialogue games or other forms interactive technology foster students' reasoning or conceptual abilities?
- effective are hypermedia technologies in fostering complex problem solving?
- online interactive discussions help students construct knowledge?

From Maki, P. (2010). *Assessing for Learning: Building a Sustainable Commitment Across the Institution*. Sterling, VA: Stylus Publishing.

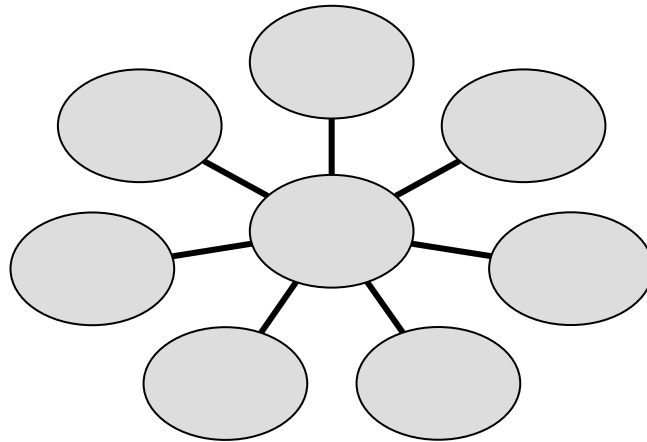


## Handout 5: Some Direct and Indirect Methods, including the Use of Technology, from Peggy Maki in *Assessing for Learning*

- Test of knowledge of facts, processes, procedures, concepts, etc.
- Case Study/Problem that requires students to demonstrate how they have integrated expected learning into their authentic work
- Summary from homework assignment; summary after a segment of lecturing or other pedagogical method
- Description of what one already knows before movement into a new topic or focus
- Discussion of how one may have changed his or her understanding based on learning more about a topic or engaging in research on a topic
- Group work that emerges from material covered with self-analysis and analysis of others
- Student-led Peer Review. See Lowe, A., Cummins, L., Clark, S., Porter, B., and Spitz, L. (2022). *Student-Led Peer Review: A Practical Guide to Implementation Across Disciplines and Modalities*. Sterling, VA: Stylus Publishing, LLC
- Team projects that emerge from material covered
- Self-reflection on what one does and does not understand
- Written assignment that explores a distinctive critical perspective or problem
- Critical incident response
- Representative disciplinary or professional work assignments
- Capstone Project
- Thesis
- Collaborative Project
- Research Project
- Interpretation of unidentified pieces of discourse to ascertain how well students can make inferences about when documents were written and about the beliefs or concepts that underlie each one
- Logbook or journal tasks that explore concepts or problems or situations over time or explores learning against pedagogy such as interactive simulations
- Event analysis
- Interpretation of video clips or visual materials

- Case study or studies examined over time as students move through courses and educational experiences
- Oral examination
- E Portfolio—collection of student work based on selected assignments in the curriculum
- Concept, knowledge or process maps (visual representation)
- Concept inventories, such as in physics and in chemistry
- Knowledge surveys
- Agreed upon embedded assignments or common assignments you will sample such as in a final examination
- Writing, to speaking, to visual presentation
- Observations of interactions, decision making, simulations
- Case study with analysis—use of parallel case studies over time
- Self-reflective writing—especially useful after students have received feedback or have engaged in a sub-task or task
- Flipping your classroom so that either you are in a position to see students performing a task or to see the results of their performance on a task they submit to you before the next class meeting
- Externally or internally reviewed student projects
- Locally developed tests or other instruments
- Standardized exams
- Problem with solution and ask for other solutions
- Mining of data such as learning objects at Merlot: students make inferences about original work from a particular period of time, such as from literature, painting, letters and other historical documents
- Observation of a debate (particularly useful for a focus on ethical issues)
- Virtual simulations
- Milestone exams
- Complex problems that can be approached from many perspectives or disciplines
- Revisiting a problem over time to track learning
- Knowledge, decision, or procedural maps [http://classes.aces.uiuc.edu/aces100/mind/c\\_m2.html](http://classes.aces.uiuc.edu/aces100/mind/c_m2.html)

- Spider Concept Map



- Situated Experiences along the Chronology of Learning
  - Community-based projects (research) launched in the first year
  - Internships
  - Experiments
  - Research launched in the first year to solve a relevant problem
  - Research with faculty
  - Solo or team projects launched in the first year
  - Co-designed projects with a mentor or mentors (curricular-co-curricular projects, for example)
- Chronological use of a case study at significant points in the GE curriculum to assess students' abilities to transfer and apply new knowledge, concepts, etc., to a complex, muddy problem
- Chronological Use of Complex Problems that Necessitate the Integration of Quantitative Literacy
- “Quantitative literacy, the ability to discriminate between good and bad data, the disposition to use quantitative information to think through complex problems—these are capacities that educators across fields should be helping students develop.” From: Burke, Michael C. (October, 2007). “A Mathematician’s Proposal.” Carnegie Perspectives. [www.carnegiefoundation.org/perspectives/sub.asp?key=245&subkey](http://www.carnegiefoundation.org/perspectives/sub.asp?key=245&subkey)
- E-Portfolios that Store Evidence of Integration over Time against the Background of the Curriculum and Co-curriculum. E-portfolios Should also Include Chronological Self-reflection on How One’s Perspectives, Knowledge, Performance, etc., Changed over Time
- Smaller Projects over Time that Lead to a Final “Capstone Project”

### Assessment Via Technology

- Team work across media (digital media and interfaces) and modes of communication
- Authorship of a simulation or a webpage
- Performance in immersive online environments that may provide you with evidence of each student’s performance
- Data mining online

- Threaded discussions online
- Gaming accompanied with one's analysis
  - “critical thinking,” “probing,” “telescoping” From: Holbert, Nathan. (February, 2008). “*Shooting Aliens: The Gamer’s Guide to Thinking.*” ***Educational Leadership***. Vol. 65. No.5.)
- Podcasts
- Online exercises
  
- Online journals
- Interactive computer simulated tasks that provide data on patterns of actions, decisions, etc. (for example, eCollege claims it provides these kinds of data)
  
- Learning Analytics built into LMSs and in many options for courseware that provide evidence of students’ patterns of performance as well as evidence of their behaviors related to learning
- See Maki, P. and Shea, P., Eds. (2021). *Transforming Digital Learning and Assessment*. Sterling, VA: Stylus Publishing, LLC
- See Maki, P. (2022). “Leveraging Technology-enabled Assessment Capabilities to Promote Equitable Student Outcomes,” in Henning, G., Baker G., Jankowski, N., Lundquist, A., and Montenegro, E. (2022). *Reframing Assessment to Center Equity*. Sterling, VA: Stylus Publishing.

### Indirect Methods of Assessment

- Surveys, questionnaires
- Interviews
- CCSSE or NSSE
- SALG—Student Assessment of Learning Gains –[www.SALG.edu](http://www.SALG.edu)
- SGID—small group instructional design
- Institutional data (course-taking patterns, audit of syllabi)

## Handout 6: Example of Continuous Assessment of Student Learning in a Program

1. **Prior to taking courses in the major** students are tested on a set of required competencies. Students and faculty are given feedback on students' areas of strengths and weaknesses.
2. **During each semester** faculty meetings are held weekly to discuss any curricular or student issues in courses. Modifications are made as indicated from faculty feedback.
3. **At Mid-semester** professional behavior assessments (PBA) are completed by faculty on every student in each class and shared with the student. If a student is doing poorly on the PBA, the faculty and student develop goals to improve by the end of the semester when the faculty member completes the PBA again.
4. **At End of the Semester** students and faculty complete specific departmental course assessments. These data are compiled by the faculty assessment committee and presented at the End-of-the-Semester faculty retreat. These data are used to make necessary modifications to the curriculum design, content, scope, and sequencing of courses to assure a quality education program for its students. Professional behaviors assessments are also completed at the end of the semester and shared with students. Those students who do not pass the PBA meet with the Chairperson, fieldwork coordinator, faculty who gave the assessment, and the graduate coordinator if they are in the master's program to develop a behaviors action plan which must be followed through by the student to progress in the program.
5. **End-of-Year** data are gathered from the capstone assignments and the e-portfolios students' complete. Students build their e-portfolios over the entire time they are in the program. They self-select authentic pieces of evidence of their learning they believe meet the program's learning outcomes and upload them into their e-portfolio on Canvas. Faculty and students give and receive feedback on their e-portfolios during their capstone course. Faculty then score the student portfolios with outcome rubrics loaded in Canvas. These data are then compiled and student learning is assessed against the benchmarks set in the program's evaluation plan. This information is shared with faculty at the end-of-the-year summits.
6. **At External Assessment of Student Learning Times** each student in the program develops, implements and presents a research project at a student-run research conference.

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