CHEST
AMERICAN COLLEGE of CHEST PHYSICIANS

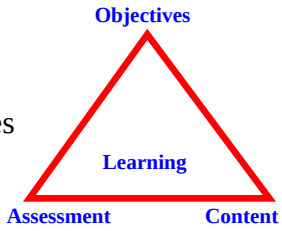
EFFECTIVE USE OF PERFORMANCE OBJECTIVES FOR LEARNING AND ASSESSMENT
(For Use With Fink's and Bloom's Taxonomies)

What is a learning objective?

A learning objective is an outcome statement that captures specifically what knowledge, skills, attitudes *learners* should be able to exhibit following instruction. A common misapplication of objectives is for the teacher/presenter to state what he/she is going to do (e.g., "My plan this morning is to talk about…"), rather than what the student is expected to be able to do (e.g., "After this session, you should be able to…").

Why have learning objectives?

Creating clear learning objectives during the planning process of a unit/week/individual session serves the following purposes:



- Helps unit planners integrate across a day/week/unit of learning
- Serves to connect content and assessment around learning
- Guides selection of teaching/learning activities that will best achieve objectives
- Gives learners a clear picture of what to expect and what's expected of them
- Forms the basis for evaluating teacher, learner, and curriculum effectiveness

What are the key components of a learning objective?

Learning objectives should be "***SMART***"

Specific
Measurable/Observable
Attainable for target audience within scheduled time and specified conditions
Relevant and results-oriented
Targeted to the learner and to the desired level of learning

How do I create a useful learning objective?

To create *specific, measurable/observable, and results-oriented* objectives:

- It's helpful to finish the sentence, "After this unit/week/individual session, you should be able to…"
- Start with an observable action word that captures what the learner should be able to do (see examples in Table 1 of Attachment A-Fink's and B-Bloom's).
- Avoid ill-defined terms that are open to variable interpretation (e.g., understand, learn, grasp); use instead terms that describe directly observable behaviors. (Even though some elements of Fink's Taxonomy, such as the human dimension, caring, and learning to learn, may be difficult to measure/observe, they are still worth identifying as objectives and striving to achieve in teaching/learning activities.)
- When necessary, specify criteria concerning expected standard of performance (e.g., "Describe a mechanism in support of your hypothesis from the organ system down to level of cells and molecules.").

To create *attainable* learning objectives:

- Consider the beginning level of understanding/skill of your learners and craft your objective to move them to the next level.
- Consider and specify when appropriate the conditions under which performance will take place (e.g., "On a written exam, describe…" or "With a standardized or actual patient, demonstrate…")
- Limit number of objectives to major learning points you would like students to walk away with.

To create objectives *targeted to the audience and desired level of learning/thinking:*

- Ask yourself whether you want learners to be able to: know, apply, integrate, consider the human dimension, care, or learn to learn (Fink's Taxonomy – Attachment A); or know, comprehend, apply, analyze, synthesize, or evaluate (Bloom's Taxonomy – Attachment B). These outcomes represent different levels/kinds of thinking.
- Match your action verb to the desired level (Table 2 in Attachment A & B).
- Match learning objective with appropriate teaching/learning strategy (Table 3 in Attachment A & B).

ATTACHMENT A

FINK'S TAXONOMY (Fink, *Creating Significant Learning Experiences,* 2003)

Table 1: Example Action Verbs for Each Dimension of Learning

Dimension	Action Verbs				Objects
FOUNDATIONAL KNOWLEDGE – What key information, ideas, perspectives are important for learners to know?					
Understanding and Remembering (developing a full understanding of the concepts associated with a subject to a degree that allows explanations, predictions, etc.)	Associate Compare Contrast Define Describe	Explain Give example Identify Illustrate Indicate	List Name Paraphrase Predict Recite	Recognize Repeat Restate Tell	Facts, concepts, theories, relationships, models, perspectives, structures, organizations, purposes, proposals, problems, results, conclusions, plans
APPLICATION – What kinds of thinking, complex projects, and skills is it important for learners to be able to do/manage?					
Critical Thinking (analyzing and critiquing issues and situations)	Analyze Assess Audit Catalog Categorize Classify Compare	Contrast Decipher Deduce Derive Determine Diagram Differentiate	Dissect Distinguish Examine Formulate Hypothesize Infer Interpret	Label Locate Measure Organize Query Separate Trace	Ideas, issues, situations, proposals, processes, results, conclusions, theories, assumptions
Practical Thinking (developing problem-solving and decision-making capabilities)	Advise Answer Apply Calculate Certify Choose	Consult Debate Decide Determine Diagnose Evaluate	Give evidence Judge Justify Predict Prescribe Propose	Prove Rank Select Solve Suggest Test	Problems, issues, conundrums
Creative Thinking (creating new ideas, products, and perspectives)	Abstract Adapt Amend Author Compose Construct	Convert Create Design Develop Devise Discover	Draw Envision Experiment Fabricate Imagine Improve	Refine Reform Sketch Theorize Transform Write	Ideas, plans, products, objects, premises, perspectives, models, theories
Managing Complex Projects (being able to coordinate and sequence multiple tasks in a single project/case and/or multiple projects/cases)	Administer Assign Coach Communicate Complete Conduct	Coordinate Delegate Develop Evaluate Facilitate Follow Up	Guide Implement Manage Organize Plan Prioritize	Strategize Supervise Summarize Teach Time-line Train	Tasks, timelines, cases, projects
Performance Skills (developing capabilities in carrying out psycho-motor activities)	Conduct Demonstrate Do	Employ Execute Exhibit	Operate Perform Produce	Set up Use	Procedures, routines, processes, maneuvers, interviews
INTEGRATION – What connections should learners be able to recognize and make within and beyond this learning experience?					
Interdisciplinary Learning (connecting ideas, disciplines, perspectives, contexts) **Learning Communities** (connecting people) **Learning and Living/Working** (connecting different realms of life)	Associate Combine Compare	Concept map Connect Contrast	Correlate Differentiate Integrate	Link Relate Synthesize	Ideas, disciplines, perspectives, contexts, people, domains, realms
HUMAN DIMENSION – What should learners learn about themselves and about interacting with others?					
Interpersonal Relationships (with peers, supervisors, patients, others) **Self-Authorship** (learning to create and take responsibility for one's own life) **Leadership** (becoming an effective leader) **Ethics, Character Building** (living by ethical principles) **Multicultural Education** (being cultural-ly sensitive in interactions with others) **Working as a Member of a Team** (knowing how to contribute to a team) **Citizenship** (of one's profession, com-munity, nation state, other political entity) **Environmental Ethics** (having ethical principles in relation to nonhuman world)	Acquire Advise Advocate Balance Be aware of Behave Collaborate Communicate Comply Cooperate Critically reflect Decide to Demonstrate Describe	Educate Embody Empathize Express Feel confident Give feedback Help Influence Initiate Inspire Interact with Involve Lead Mediate	Mobilize Motivate Negotiate Nurture Offer Promote Protect Reconcile Reform Resolve conflict Respect Respond sensitively	See oneself as Serve as role model Settle Share Show Suggest Support Suspend judgment Sustain Take res-ponsibility Unite	Ethics, morality, principles, attitudes, values, beliefs, premises, conflicts; personal, social, cultural, and environmental implications

Table 1: Example Action Verbs for Each Dimension of Learning (cont.)

Dimension	Action Verbs				Objects
CARING – What changes in learners' feelings, interests, values are important?					
Wanting to Be a Good Learner (wanting to master, achieve high standards) **Becoming Excited About a Particular Activity/Subject** (developing a keen interest) **Developing a Commitment to Live Right** (i.e., deciding to take care of one's health/well-being, live by a certain code)	Agree to Be ready to Commit to Decide to Demonstrate	Develop Discover Explore Express Get excited about	Identify Pledge Recognize value of Renew interest	Revitalize Share State Take time to Value	Attitudes, beliefs, feelings, interests, opinions, values
LEARNING HOW TO LEARN – What should learners learn about learning, engaging in inquiry, and becoming self-directed?					
How to Be a Better Learner (engaging in self-regulated learning or deep learning) **How to Inquire and Construct Knowledge** (how to engage in the scientific method, historical method, other forms of inquiry) **How to Pursue Self-Directed or Intentional Learning** (developing a learning agenda and plan, becoming an intentional learner, becoming skilled in autodidaxy, being a reflective practitioner)	Construct knowledge about Describe how to Develop a learning plan Frame useful questions Generalize knowledge Identify sources and resources Identify your learning style & barriers Identify what you need to know Inquire		Predict performance Reflect Research Self-assess Self-regulate Self-monitor Set a learning agenda Take responsibility for Transfer knowledge		Learning, acquisition of knowledge and skills, self-improvement, self-direction, accountability

Table 2: Levels of Thinking/Learning

Category	Dimension	Definition	Example Objectives
Foundational Knowledge	Remembering & Understanding	Knowing common terms, specific facts, methods and procedures, basic concepts, principles; understanding to a degree that allows for explanations, predictions	• Name the major bones of the leg. • List five causes of joint pain. • Define "deep fascia." • Explain the autoimmune mechanism. • Restate the present problem in your own words. • Describe the process of differential diagnosis. • Give an example of the term consanguinity.
Application	Critical Thinking	Analyzing and critiquing issues and situations	• Diagram the mechanism leading to shortness of breath in interstitial lung disease. • Compare and contrast the basic functions of the sympathetic and parasympathetic divisions of autonomic nervous system. • Differentiate between findings which are and are not significant to the presenting problem. • Distinguish between acquired mutations and inherited mutations as causes of cancer. • Determine whether a particular problem is familial, has a definable inheritance pattern, or appears to be multifactorial. • Assess the reliability and validity of research claims/statistics.
	Practical Thinking	Solving problems and making decisions	• Select the most effective treatment from an array of options. • Decide which candidate is most qualified for a position. • Choose lab tests which should be done based on patient symptoms, history, and physical exam. • Rank order your hypotheses concerning the cause of this patient's symptoms. • Diagnose the patient's problem. • Solve population genetics problems, including the calculation of allele frequencies. • Apply basic pharmacokinetic principles to estimate drug concentrations in the patient at any time. • Determine pain level reported by patient using Analog Pain Scale.
	Creativity	Creating/refining/ inventing new ideas, products, and perspectives	• Create a care map for the treatment of a diabetic patient. • Write a journal article describing your research project. • Construct a theory about how people learn. • Adapt x protocol to accommodate people with disabilities.

Category	Dimension	Definition	Example Objectives
Application (continued)			• Design a research proposal that meets HRRC's criteria.
	Managing Complex Projects	Coordinating and sequencing multiple tasks in a single project/case and/or multiple projects/ cases	• Develop a strategic plan for x. • Prioritize treatment based on life-threatening potential of multiple traumatic injuries. • Conduct a research experiment to test the x. • Manage treatment activities of your health care team. • Delegate patient care responsibilities appropriately to HO1s.
	Performance Skills	Communicating and performing psycho-motor activities	• Perform a physical exam per established procedure. • Conduct a motivational interview per established procedure. • Use appropriate instruments to perform x procedure. • Demonstrate the appropriate use of x.
Integration	Interdisciplinary Learning	Connecting different ideas, disciplines, perspectives, contexts	• Relate the patient's symptoms to potential side effects of the medicine she is taking. • Concept map the various elements involved in x. • Explain how x affects the major organs of the body. • Synthesize current literature & implications for treatment of x.
Human Dimension	Interpersonal Relationships	Establishing effective working relationships with supervisors, peers, patients, and others	• Greet and show interest in knowing the patient as a person. • Show care and concern verbally and nonverbally. • Demonstrate empathy through reflection and nonverbal cues. • Offer statements of support.
	Self-Authorship	Creating and taking responsibility for one's own life	• See yourself as a healthcare professional. • Feel confident about your ability to successfully x. • Take responsibility for your mistakes and for correcting them.
	Leadership	Being an effective leader	• Acquire input for decisions from those you lead. • Make, explain, and take responsibility for difficult decisions. • Act on results and feedback from others to improve future outcomes. • Advocate for quality patient care and assist patients in dealing with system complexities. • Apply skills for effectively resolving conflict. • Serve as a role model.
	Ethics, Character Building	Developing character and living by ethical principles	• Describe the legal, social, and ethical issues raised by the power of genetic technology and our increased understanding of human genetic disease and variation. • Comply with hospital regulations for x. • Protect patients' privacy. • Respect patient choices, values, and need for confidentiality.
	Multicultural Education	Becoming culturally sensitive in one's interactions with others	• Be aware of your own biases related to the care and treatment of people who are different from you. • Elicit patient's beliefs, concerns and expectations about treatment. • Motivate patient compliance by developing culturally-sensitive treatment options and follow-up. • As appropriate, include patient-identified non-traditional healers.
	Working as a Member of a Team	Knowing how to contribute to a team	• Collaborate with a multidisciplinary team to provide the best patient care for a stroke patient. • Share information & understanding with other team members. • Give appropriate & constructive feedback to team members. • Receive and act on feedback from other team members. • Apply strategies for optimal consultation and collaboration. • Involve interpreters appropriately in patient care.
	Citizenship	Being a responsible citizen of one's profession, local community, nation state, and other political entity	• Describe issues of access and barriers to health care. • Balance patient care and comfort with research imperatives. • Design community-based research that responds to important cultural and international issues. • Describe the demographics, socio-cultural beliefs & practices that impact the health of your community.

Category	Dimension	Definition	Example Objectives
Human Dimension (continued)	Environmental Ethics	Having ethical principles in relation to the nonhuman world	• Comply with ethical principles for use of animals in medical research. • Dispose of biohazardous materials in appropriate receptacles.
Caring	Wanting to be a good learner	Wanting to master material, achieve high standards	• Commit to professional excellence and personal well-being. • Develop metacognitive habit of identifying gaps and working to fill them. • Review outcomes and identify strategies for improvement.
	Becoming excited about a particular activity or subject	Developing a keen interest	• Revitalize your interest in teaching. • Identify areas of personal interest in daily activities for further study. • Share enthusiasm for your interests with others.
	Developing a commitment to live right	For example, deciding to take care of one's health and well-being, to live by a certain code	• Commit to taking care of yourself through proper diet and exercise. • Take time to stay abreast of relevant scientific advances. • Identify ways you are able to help others fulfill their educational and other needs.
Learning How to Learn	How to be a better learner	Engaging in self-regulated learning or deep learning	• Identify and acknowledge your own limitations in performing x • Identify steps for preparing yourself to deliver bad news. • Recognize when more information is needed and seek help and resources. • Value and develop the skills of life-long learning.
	How to inquire and construct knowledge	How to engage in the scientific method, historical method, and/or other forms of inquiry	• Identify and access resources useful for obtaining information regarding human and medical genetics. • Develop & prioritize hypotheses relating to patient's problem. • Research questions related to evidence-based medicine. • Describe and apply the fundamental scientific principles necessary for the practice of medicine.
	How to pursue self-directed or intentional learning	Developing a learning agenda and plan, becoming an intentional learner, becoming skilled in autodidaxy, being a reflective practioner	• Reflect on your performance on x and develop an action plan for continued growth and development. • Identify factors (such as your upbringing, culture, life experience, stage of professional development, values, etc.) that might make interactions with some patients challenging. • Use evidence-based medicine to guide self-education.

Table 3: Teaching/Learning Strategies Best Suited for Each Dimension of Learning

Desired Dimension	Suggested Teaching/Learning Strategies
Foundational Knowledge (understanding, remembering)	Presentation, lecture, question-and-answer, large and small group discussion, development of learning issues, independent study, review session, teaching others, game, web-based instruction
Application (critical & practical thinking, creativity, managing projects, performance skills)	Hands-on procedure, lab, live or video demonstration, simulation, case study, role-play, action plan, teaching others, question-and-answer, brainstorming, problem-solving, trouble-shooting, journal club, developing research questions, theory and model building, project, critical review, direct patient contact, precepting, guided practice with feedback
Integration (connecting ideas, disciplines, people, realms)	What if…, compare and contrast, concept mapping, cross-disciplinary teams, cross-disciplinary cases, multiple examples within & across contexts, theory & model building, integrated curriculum
Human Dimension (leadership, ethics, teamwork; social, cultural, political, environmental implications)	Case study, simulated patients, patient presentations, working in diverse teams, authentic project, group project, direct patient contact, assigned leadership role, debate, journal club (e.g., using ethics articles)
Caring (wanting to succeed, developing a keen interest, making a commitment)	Authentic project, role modeling, self-selection activity, debate, reflective writing, positive reinforcement, learning prescription
Learning to Learn (becoming a better learner, inquiring & constructing knowledge, being self-directed)	Self-assessment, self- and peer-feedback, teaching others, reflective writing, formative assessment, self-awareness exercise/inventory

ATTACHMENT B

BLOOM'S TAXONOMY (Bloom, *Taxonomy of Educational Objectives Handbook*, 1956)

Table 1: Example Action Verbs for Each Level of Learning

Category	Example Action Verbs				
Knowledge (Recall and Understanding)	Associate	Describe	Indicate	Recognize	Show
	Compare	Differentiate	List	Repeat	State
	Contrast	Distinguish	Name	Restate	Summarize
	Define	Identify	Paraphrase	Review	Tell
Application	Calculate	Estimate	Measure	Record	Trace
	Demonstrate	Give example	Operate	Set up	Use
	Draw	Illustrate	Perform	Sketch	
	Employ	Locate	Prescribe	Solve	
Problem-Solving (Analyzing, Synthesizing, Evaluating)	Advocate	Conclude	Decide	Formulate	Propose
	Analyze	Construct	Defend	Infer	Rank
	Assess	Create	Derive	Judge	Recommend
	Challenge	Critique	Design	Organize	Select
	Compose	Debate	Evaluate	Plan	Suggest

Table 2: Levels of Thinking/Learning

Category	Dimension	Definition	Example Objectives
Knowledge	Recalling	Rote recall: Know common terms, specific facts, methods, procedures,concepts, principles	• Name the major bones of the leg. • List five causes of joint pain. • Define "deep fascia."
	Compre-hending	Interpolation or interpretation: Understand, estimate future implied consequences, justify methods and procedures	• Explain the autoimmune mechanism. • State the present problem in your own words. • Describe the process of differential diagnosis. • Given x symptoms, compare & contrast y & z approaches to treatment. • Provide example of appropriate use of x treatment.
Application	Applying	Using a concept in a new context: Apply theory, solve problems, construct graphs, demonstrate procedure	• Use chart to calculate appropriate dosage for a 45-pound child. • Apply genetics concept to determine potential outcomes in a pregnant woman with x disease. • Perform a physical exam according to established procedure.
Problem-Solving	Analyzing	Breaking something down and understanding its structure, the relationship between parts, the organizational principles: Recognize unstated assumptions and logical fallacies, distinguish between facts & inferences, determine relevance	• Diagram the mechanism leading to shortness of breath in interstitial lung disease. • Determine which of the patient's symptoms can be explained by the primary diagnosis. • Select lab tests which should be done based on patient symptoms, history, and physical exam. • Relate the patient's symptoms to side effects of the medicine she is taking. • Distinguish between findings which are and are not significant to the presenting problem.
	Synthesizing	Building a structure/pattern from diverse elements: Write well-organized essay, propose research question, develop plan for solving a problem, formu-late a classification scheme	• Rank order hypotheses concerning the cause of the patient's symptoms. • Diagnose the patient's problem. • Construct a flow chart which ties together all elements of patient's findings. • Create a care map for the treatment of a diabetic patient. • Write an article describing a research project.
	Evaluating	Judging the value of ideas, works, solutions, materials: Judge logical consistency, adequacy of data in support of conclusions, value of work by internal & external standards	• Select the most effective treatment from an array of options. • Select the most qualified candidate for a specified position. • Evaluate the reliability and validity of research claims/statistics. • Assess peers' and your own SOAP notes based on established criteria. • Critique research proposal and provide suggestions for improvement.

Table 3: Teaching/Learning Strategies Best Suited for Each Level of Learning

Desired Dimension	Suggested Presentational Strategies
Knowing and comprehending	Presentation, lecture, question-and-answer, small group discussion, development of learning issues, self-awareness exercises/tests, review sessions, teaching others, independent study, web-based instruction
Applying	Hands-on, lab, demonstration, case study, live or video demonstration, simulation, role-playing, action plan, teaching others, direct patient contact, guided practice with feedback, precepting, role-modeling
Analyzing	Question-and-answer, brainstorming, case study, problem-solving, trouble-shooting, role-playing, article discussion
Synthesizing	Case study, writing, concept mapping, theory and model building, teaching others, developing research questions, direct patient contact
Evaluating	Case study, critical review, self and group assessment/reflection, reflective writing, direct patient contact