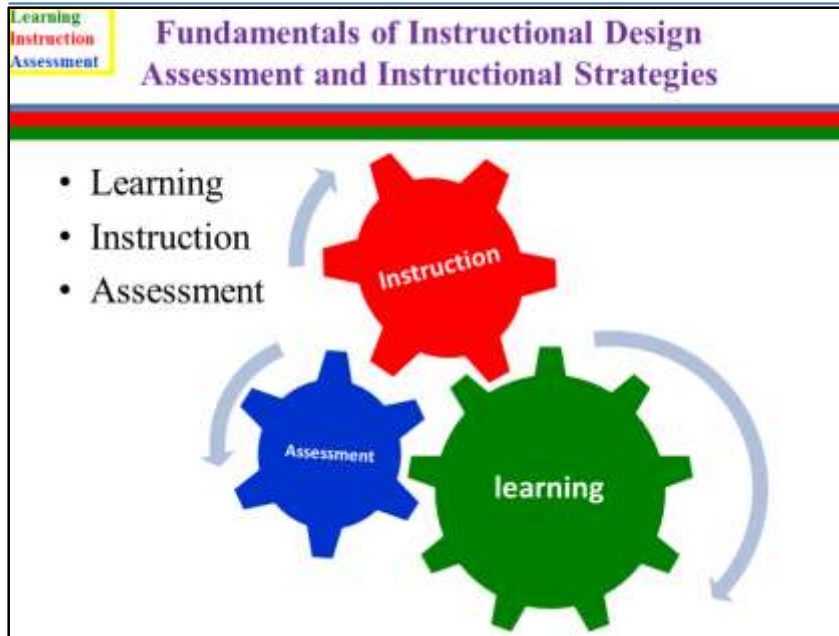


Assessment and Instructional Strategies



There are interconnections among creating successful and effective instruction and having a deep understanding of learning and assessment (measuring progress in learning)... critical to successful instructional interventions is the alignment of the instructional goals, learning objectives (outcomes) and assessments (tests of new knowledge, skills, and/or attitudes)

Learning
Instruction
Assessment

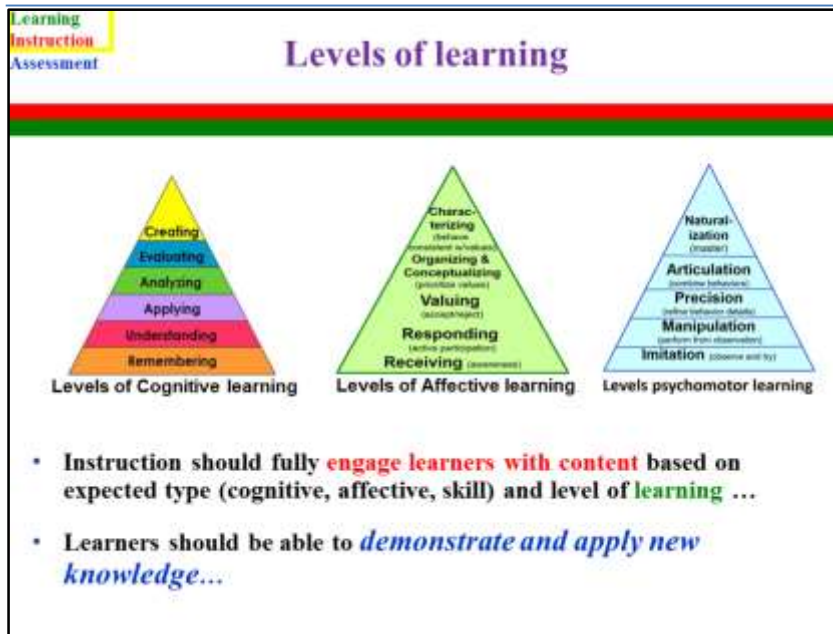
Informing instruction... Types of learning

LOTS
(lower)
↓
HOTS
(higher)

- **Declarative Knowledge** --“knowing that” thinking skills
 - Learning outcomes: recall in verbatim, paraphrased or summarized from facts, lists, names or organized information
- **Intellectual skills** – higher order thinking skills
 - Learning outcomes: concept and principles learning, procedural learning, applying analyzing, problem solving, creating, evaluating
- **Cognitive Strategies** -- self-efficacy/goal setting
 - Learning outcomes: personal strategies for learning how to learn, meta-cognitive
- **Attitudes (Affective)** – predisposition towards or away from something
 - Learning outcomes: a combination of cognitive (beliefs), affect (feelings), and behavioral (intent) constructs that interact with each other
- **Psychomotor skills** – specified, purposeful movement
 - Learning outcomes: muscular actions, with or without equipment to, achieve specified results.

As we start to think about designing instruction it is important to think about the types of learning we are hoping to facilitate. There are 5 types of learning... cognitive process of thinking/knowing (declarative knowledge, intellectual skills, cognitive strategies), attitude, and psychomotor perspectives. Each of these, knowledge, attitude, and psychomotor skill are learned responses... meaning that instruction can be designed and offered to develop knowledge, attitude, and skill.

Assessment and Instructional Strategies



We also know that each type of learning is a progression from lower order to higher order thinking, affect or skills development. Instruction should fully engage learners with content based on expected type and level of learning... The goal is for the learners to be able to demonstrate and apply new knowledge, affect, or skills based on participating in the instruction

Assessment and Instructional Strategies

Learning
Instruction
Assessment

With content in mind... Start to design instruction...

- **STEP 1:** Develop general or broad instructional goals to address the identified learning gaps... instructional goals help guide curriculum development (content for instruction)
- **STEP 2:** Develop specific measurable learning objectives that address each of the goals ... learning objectives become the guides for assessments and instructional strategies



Once the type and level of learning is determined the first 2 steps in designing instruction include developing instructional goals FOR the instruction that define the purpose of the instruction ... and developing measurable learning objectives FOR the instructional goals.

It is important to begin with defining instructional goals... and then developing the learning objectives for those goals... later these goals and objectives will be used to define learning assessments for each objectives... and choose appropriate instructional strategies that align the goals, objectives, and assessments.

It is the alignment of these critical aspects of instructional goals and learning objectives that instructors (or instruction) to help learners achieve success in closing a knowledge, attitude, or skill gaps.

Learning
Instruction
Assessment

With content in mind...
design assessments and instructional strategies...

- **STEP 1:** Develop instructional goals
✓ **What will instructor do to involve learners?**
- **STEP 2:** Define measurable learning objectives (outcomes) for each goal
✓ **What are learners expected to learn, at what level?**
- **STEP 3:** Define learning assessments (measurements)
How will you know learners are learning?
- **STEP 4:** Choose instructional strategies that align content, expected learning outcomes, and assessments...
How will learners interact with content and engage in learning?

Once Steps 1 and 2 are completed There are 2 additional steps that help lead learners to closing knowledge, skill, or attitude gaps.

STEP 3 is about creating learning assessments or tests to see how learners are progressing in the learning objectives. In other words, defining how the instructor will know that students are learning.

STEP 4 is about choosing the instructional strategies that will help learners meet the expected learning outcomes...

Let's look a little more closely at steps 3 and 4...

LEARNING
Instruction
Assessment

Designing Assessments

With content sequenced, instructional goals established, and learning objectives defined...

- **STEP 3: Define learning assessments (measurements)**

Instructional goals	Learning objectives	Assessment
<i>Prepare students to operate a microscope.</i>	To describe the 8 major parts of a microscope.	Label a diagram of the microscope. Write a brief description of the function of each part.
	Focus the microscope, at 3 different strengths, on a cell slide with enough clarity to draw the features of a cell.	Given 4 different slides, examine them under the microscope at 3 focus strengths and draw what is seen.

In a previous example were completed STEPS 1 and 2 for instruction on teaching middle school students about using a microscope. As presented the Instructional Goal is to instruct students in the use of science laboratory equipment, specifically microscopes.

The expected learning in this instruction is for learners to be able to describe the major parts of a microscope and to actually develop the skills to see cell slides using the microscope.

As presented, the learning objectives support or align with the Instructional goal. Next, it is important to identify how students will be able to demonstrate that they have mastered the learning objectives, thus... STEP 3 in the designing process.

STEP 3: Defining learning assessments for the objectives...

There are many ways to assess learning .. In this case for the first objectives learners should be able to describe the parts of the microscope after the instruction... a fairly straight forward way to 'see' learners demonstrate this outcomes is by having them label a diagram and write descriptions... other assessment might be for them to verbally describe each part as they physically point to it on the microscope... or have the students draw their own microscope and label it... or teach each other about the parts of the microscope and what they do... it depends on your preferences, time, and resources...

In the case of the second learning objectives an effective measure is to give the learners slides and ask them to draw what is on the slide... again, there could be many other ways to assess or test this skill depending on preferences, time, and resources... for example, the microscopes might have cameras... having the learners take pictures of the slides in focus is a good measure of whether they can focus slides to different strengths.

This third step aligns with the instructional goal and learning objectives... the question remains, how do you help learners to progress in learning how to use the microscope?

Learning
Instruction
Assessment

Designing or selecting Instructional strategies

With content sequenced, instructional goals established, learning objectives defined, and assessments determined...

- **STEP 4: Choose Instructional strategies that align with content, expected learning outcomes, and assessments.**

 Skills

- **EXAMPLE: Skill learning (psychomotor)** is best learned through **modeling activities and hands-on practice** rather than lecture ...

 Knowledge

- **EXAMPLE: Knowledge development (cognitive)** may require a series of activity types to help learners memorize terms (remembering), explain features or describe functions and relationship (understanding), and troubleshoot situational problems (applying or evaluating or creating) ... **note taking, essay writing, presentation, problem solving activities, team work, etc.**

 Affect

- **EXAMPLE: Attitude development** may require exposure to multiple perspectives of an issue ... through **debating activities, investigating different sides of a problem and its possible solutions**

The next step in the process is STEP 4: Choosing appropriate instructional strategies that aligns with the goals, objectives, and assessments.

Remember to think about the types of learning expected ...

- Psychomotor skills are best learned through hands-on types of activities...
- Knowledge outcomes are best learned through a variety of activities focused on progressing through the levels of learning (e.g., fact, concepts, etc.)
- Attitude development / learning is best through exposing the learner to multiple perspectives on the content ... from fact through higher order learning strategies and/or hands-on activities with the content or issue.

Assessment and Instructional Strategies

Learning Instruction Assessment			Cognitive objectives and strategies		
LEVEL	Instructional Strategies	VERBS FOR OBJECTIVES			
Creating	model design/development, reflection, collaboration	assemble, construct, create, design, develop, formulate, write			
Evaluating	troubleshooting, problem-solving, role play, debate	appraise, argue, defend, judge, select, support, value			
Analyzing	experiment/inquire, data/situ analysis, simulation, de-construction activities	appraise, compare, contrast, differentiate, discriminate, examine, experiment, question			
Applying	hands-on/generative, problem-/ case-based, team work, role play	choose, demonstrate, dramatize, illustrate, interpret, schedule, solve, use, write			
Understanding	concept mapping, inquiry, Q/A, review & identify, collaboration, debate	classify, describe, discuss, explain, identify, recognize, report, select			
Remembering	Lecture, didactic, reading, notetaking, worksheets	define, duplicate, list, memorize, recall, repeat, reproduce, state			

Emerging from the level of learning and list of appropriate verbs ... a list of sample instructional strategies were created to guide the development of sound instruction that aligns, objectives with sample instructional strategies ... these are only a few ideas, however you can see how the types of instructional activities help move the learner towards mastery at each level of thinking.. A similar chart can also be developed for the affective and psychomotor domains. In this case... beginning with the lower order thinking to the higher order thinking...

- **Remembering:** can the student recall or remember the information? Sample verbs: define, duplicate, list, memorize, recall, repeat, reproduce, state... **Lecture, didactic, reading, notetaking, worksheets**
- **Understanding:** can the student explain ideas or concepts? Sample verbs: classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase.... **concept mapping, inquiry, Q/A, review & identify, collaboration, debate**
- **Applying:** can the student use the information in a new way? Sample verbs: choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write. **hands-on/generative, problem-/ case-based, team work, role play**
- **Analyzing:** can the student distinguish between the different parts? Sample verbs: appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test. ... **experiment/inquire, data/situ analysis, simulation, de-construction activities**
- **Evaluating:** can the student justify a stand or decision? Sample verbs: appraise, argue, defend, judge, select, support, value, evaluate. ... **troubleshooting, problem-solving, role play, debate**
- **Creating:** can the student create a new product or point of view? Sample verbs: assemble, construct, create, design, develop, formulate, write. ... **model design/development, reflection, collaboration**

Adapted From: (Lorin Anderson) http://www.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm

Assessment and Instructional Strategies

Instructional goals	Learning objectives	Assessment
<i>Prepare students to operate a microscope.</i>	To describe the 8 major parts of a microscope.	Label a diagram of the microscope. Write a brief description of the function of each part.
	Focus the microscope, at 3 different strengths, on a cell slide with enough clarity to draw the features of a cell.	Given 4 different slides, examine them under the microscope at 3 focus strengths and draw what is seen.

Instructional strategies:
Presentation showing parts of microscope/describing functions. Learners in pairs **explore/draw/label/describe** microscopes; **Demonstration** on how to load slides, focus, adjust lighting, etc. **Hands-on** activity with students focusing on different slides, **drawing what is seen** and comparing with exemplar diagram of each slide and peers' drawings

In the microscope example... choosing appropriate instructional strategies means aligning the types of strategies with the defined goals, objectives, and assessments. It is the alignment of these critical aspects of instruction that help learners achieve success in closing a knowledge, skill, or attitude gap.

The instructional strategies thus might look like this... begins with a short presentation (e.g., teacher lecturing and pointing out parts of the microscope, showing a short video or slide show of microscope parts) and describing each parts function. Perhaps a handout is provided to the learners to follow or take notes on during the presentation. Then, grouping the learners to explore the microscope and draw or label each major part adding a brief description.

This group work is followed by a demonstration on how to properly operate the microscope. Then learners are tasked with a hands-on activity to practice using the microscope with a variety of slides with the assessment being learners drawing what they see and comparing it to exemplar drawings of each slide.

Each instructional activity provides either content, practice, or an assessment to help learners meet the overall goals of the instruction and master the learning outcomes.

In this case the instructional goals, learning objectives, assessments, and instructional strategies align with each other and provide a clear path for learners to meet expected learning outcomes.

As you visualize this instruction and think about how it is designed, it may be apparent that there are several critical tasks occurring in this instruction that makes the design effective. To analyze this example and develop an understanding of why it is effective it may help to go back to the basics of learning and how learning can inform instructional design and events of instruction...

Assessment and Instructional Strategies

Learning
Instruction
Assessment

In summary... Assessment and Instructional Strategies

- **Learning domains are cognitive, affective, or psychomotor - each with lower to higher levels of thinking or processing**



The image shows three pyramids representing different levels of learning. The first pyramid, 'Levels of Cognitive learning', has five levels: Remembering (bottom), Understanding, Applying, Analyzing, and Creating (top). The second pyramid, 'Levels of Affective learning', has five levels: Receiving (bottom), Responding, Valuing, Organizing & Conceptualizing, and Characterizing (top). The third pyramid, 'Levels psychomotor learning', has five levels: Imitation (bottom), Manipulation, Precision, Articulation, and Naturalization (top).

- **STEP 1: create instructional goals...**
STEP 2: write learning objectives...
STEP 3: determine assessments...
STEP 4: choose instructional strategies...
- **Instruction should prompt learners to physically interact with content and engage in expected type (cognitive, psychomotor, attitude) of learning and at the appropriate level (lower → higher functioning) of learning ...**

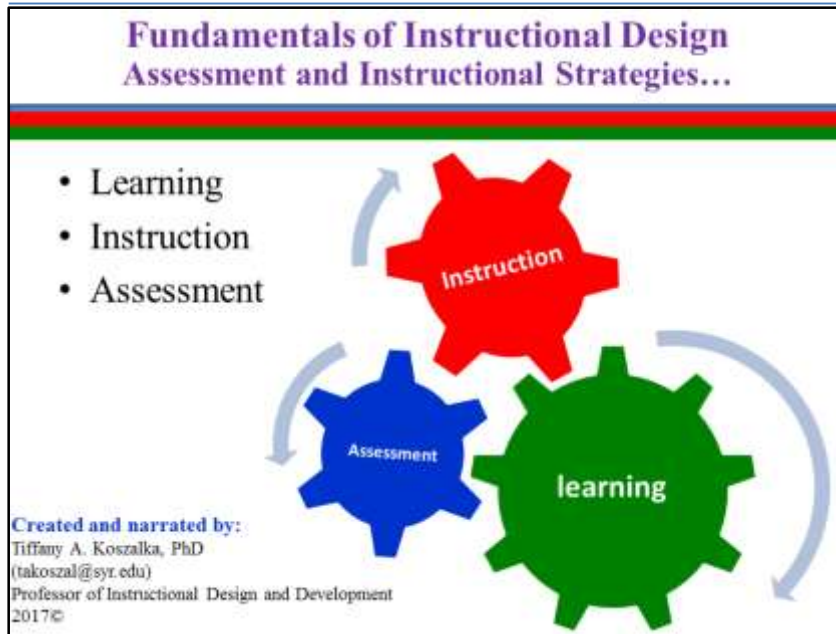
In summary...

Learning is based on our experiences in the world and how we process them...

Designing instruction is best done by starting with the content and **Defining** instructional **goals** and learning **objectives** that are aligned with **assessments**... and then **determining** the best instructional **strategies** to help the learner close the identified gap....

It also is important that learners be given the opportunity to demonstrate and apply their new knowledge and skills within the lesson, as it relates to the next lesson or class and as it relates to the world of practice outside of the classroom or learning environment.

Assessment and Instructional Strategies



In the end, it is the interconnections among creating successful and effective instruction and having a deep understanding of learning ... This begins with establishing instructional goals and learning objectives that engage student in deep learning about your subject area... these must be aligned and supplemented with resources to scaffold the learning process and engage learners in thinking, connecting, analyzing, creating, etc.

The next step will be to use the learning objectives as a guide to create learning assessments and then define the instructional strategies that will lead learners to successfully accomplish learning objectives.