

Mapping out learning outcome objectives

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Taxonomy of Cognitive Objectives

- ▶ 1950s– developed by Benjamin Bloom
 - ▶ Means of expressing qualitatively different kinds of thinking
 - ▶ Adapted for classroom use as a planning tool
 - ▶ Classifies thinking skills into six levels, from the most basic to the higher order levels of thinking
 - ▶ 1990s– a team lead by Lorin Anderson (former student of Bloom) revisited the taxonomy
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What was revised

- ▶ Evaluation
- ▶ Synthesis
- ▶ Analysis
- ▶ Application
- ▶ Comprehension
- ▶ Knowledge

- Creating
- Evaluating
- Analysing
- Applying
- Understanding
- Remembering

Original taxonomy

Revised taxonomy

Change in Terminology

- ▶ The names of six major categories were changed from *noun* to *verb* forms
- ▶ The taxonomy stresses that **thinking** is an *active* process; the reason why verbs were more accurate
- ▶ The subcategories of the six major categories were also replaced by verbs
- ▶ Some subcategories were reorganised
- ▶ Since “knowledge” is a category not a process, in the revised taxonomy this category was replaced with the word *remembering*
- ▶ Following the same reasoning: Comprehension became *understanding* and synthesis was renamed *creating* in order to better reflect the active nature of the thinking process

Why the changes?

- ▶ Easier applicability in schools at all levels
 - ▶ Easy tool for planning of teaching and assessment of learning outcomes
 - ▶ Useful for a larger audience
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BLOOM'S REVISED TAXONOMY

Higher-order thinking

Creating

Generating new ideas, products, or ways of viewing things
Designing, constructing, planning, producing, inventing

Evaluating

Justifying a decision or course of action
Checking, hypothesising, critiquing, experimenting, judging

Analysing

Breaking information into parts to explore understandings and relationships
Comparing, organising, deconstructing, interrogating, finding

Applying

Using information in another familiar situation
Implementing, carrying out, using, executing

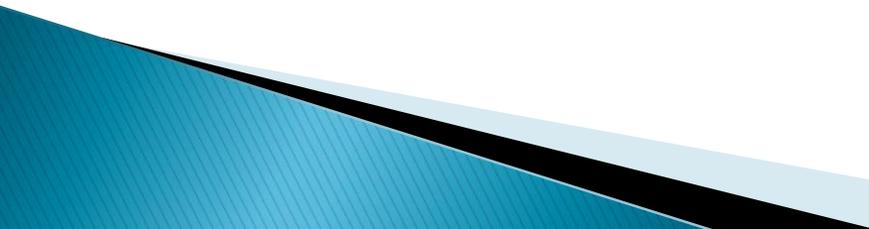
Understanding

Explaining ideas or concepts
Interpreting, summarising, paraphrasing, classifying, explaining

Remembering

Recalling information
Recognising, listing, describing, retrieving, naming, finding

Remembering

- ▶ *Can the student recall or recognize the learned information?*
 - ▶ List, define, memorize, repeat, quote, select, match, reproduce, group select, record, underline, cite, etc.
 - ▶ Thinking process involves mostly memorization, recall of information, or recognition
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Assessment for remembering

- Quiz
 - Definition recall
 - Factual listing
 - Worksheet
 - Matching items test
 - Label
 - List of information
 - Workbook
 - Reproduction
 - Vocabulary
 - Concept map of the topic
 - Chart
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Understanding

- ▶ *Can the student explain, interpret, and translate ideas that were learned?*
 - ▶ Restate, classify, explain, discuss, give examples, reorganize, observe, research, associate, describe in own words, review, summarize, identify, locate, recognize, report, select, translate, paraphrase
 - ▶ More than a strict recall of factual knowledge
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Assessment for understanding

- ▶ Report to class
 - ▶ Write or retell in own words
 - ▶ Write a brief outline
 - ▶ Summarize the main ideas
 - ▶ Prepare a flow chart
 - ▶ Illustrate and describe
 - ▶ Brief description and explanation of main ideas
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Applying

- ▶ *Can the student use the information in a new context different than the one learned?*
- ▶ Implementing and carrying out a task
- ▶ Using tools and executing
- ▶ Translate, manipulate, calculate, exhibit, demonstrate, collect, solve, adapt, apply in non familiar context, change, interpret, operate, choose, demonstrate, dramatize, employ, illustrate, schedule, sketch, solve, write

Assessment for applying

- ▶ Demonstration
 - ▶ Simulation
 - ▶ Illustration
 - ▶ Presentation
 - ▶ Interview
 - ▶ Journal
 - ▶ Diary
 - ▶ Performance
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Analysing

- ▶ *Can the student distinguish between the different parts?*
 - ▶ Compare, contrast, criticize, organize, differentiate, discriminate, distinguish, examine, experiment, question
 - ▶ Investigate, research, revise, make a diagram, dissect, categorize, order, group, survey, test, inspect, arrange, separate
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Assessment for analyzing

- ▶ Graph, diagram
 - ▶ Spreadsheet
 - ▶ Chart, matrix, checklist
 - ▶ Outline
 - ▶ Database
 - ▶ Survey
 - ▶ Report
 - ▶ Prototype test
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Evaluating

- ▶ *Can the student make decisions based on reflection, critical thinking, and assessment to justify a stand or decision?*
 - ▶ Make a hypothesis, check, critique, experiment, judge, test, monitor, appraise, argue, defend, select, support, value, evaluate
 - ▶ Rate, validate, predict, score, revise, determine, debate, rank, reject, probe, criticize, discriminate
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Assessment for evaluating

- ▶ Report a study
 - ▶ Panel of discussion
 - ▶ Evaluation of a project
 - ▶ Investigation
 - ▶ Persuasive speech
 - ▶ Debate
 - ▶ Verdict, conclusion
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Creating

- ▶ *Can the student create a new product or point of view?*
- ▶ Design, assemble, construct, plan, create, develop, formulate, devise, make, write
- ▶ Forecast, predict, set up, compile, originate, imagine, invent, organize, improvise, act, blend

Assessment for creating

- ▶ Project
 - ▶ Plan
 - ▶ New game
 - ▶ Audio- visual and media
 - ▶ News cast
 - ▶ Advertisement
 - ▶ Painting
 - ▶ New design or prototype
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Lower level thinking

- ▶ Remembering, understanding, and lower level applying
- ▶ Used for:
 - Evaluate student preparation, understanding of concepts, general conceptual learning
 - Diagnostic of strengths and weaknesses
 - Revisions and summary of topics learned

Higher order thinking

- ▶ Complex application, analysis, evaluation, and creation
- ▶ Used for:
 - Increase critical thinking and analysis
 - Problem solving skills
 - Discussions and debates
 - Presentations and research
 - Project creation and completion

Using Bloom's taxonomy

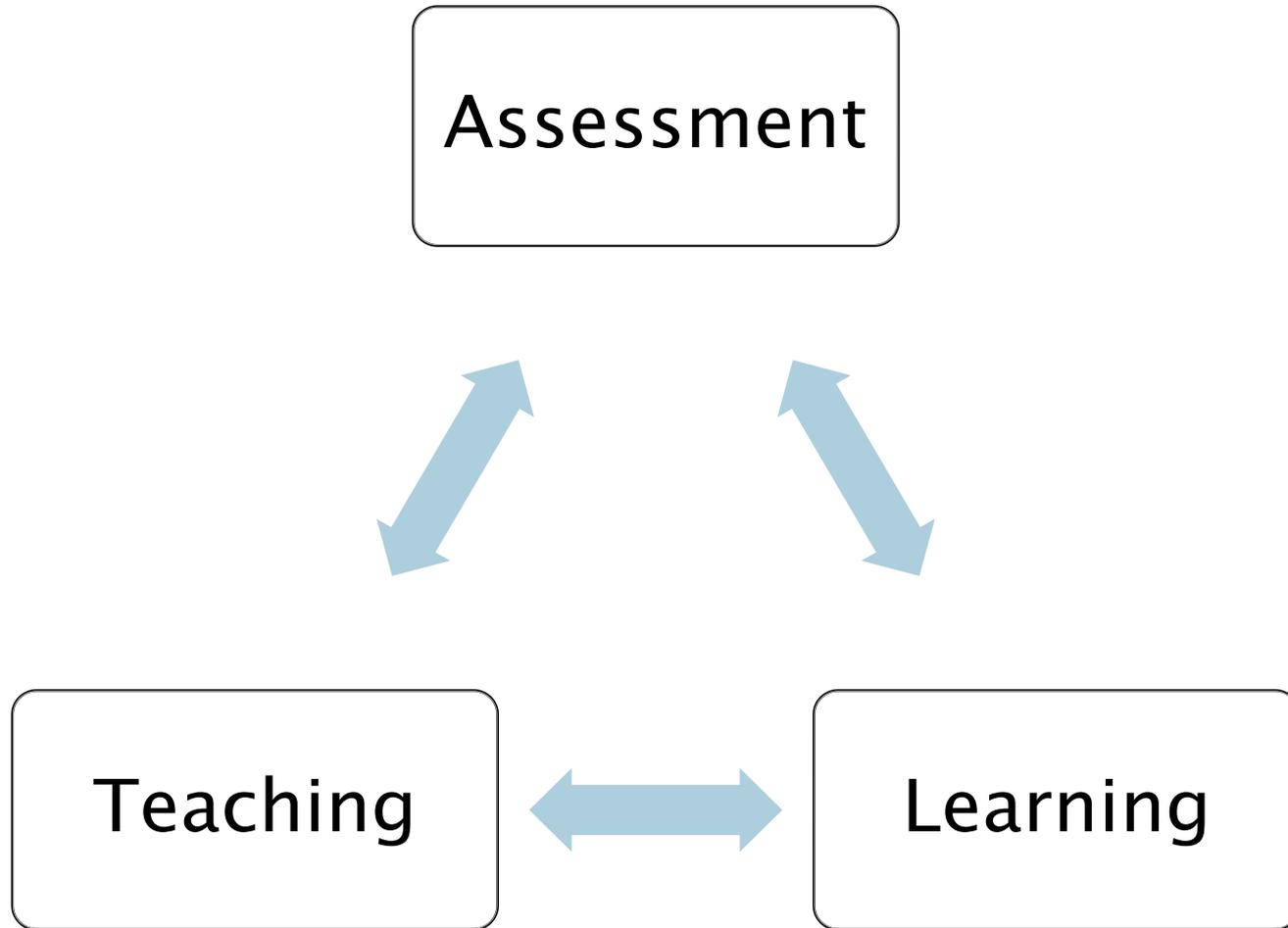
- ▶ **Teaching – learning – assessment loop**
 - Mapping out student learning outcome objectives
 - Mapping out assessment methods for each objective
 - Evaluating the outcomes and revising the course objectives
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Learning outcomes map

*“The student will learn to **apply** the **concepts** of angle, speed, and acceleration thru **building** a tennis ball launcher”*

Knowledge dimensions	Cognitive processes					
	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Factual						
Conceptual						
Procedural			<i>Team project:</i>			
Metacognitive			Tennis ball launcher			

The assessment loop



Success via Collaboration

