

LDC *Lately...*

Learning Development Center

Volume 2 No. 1 Fall 2000
Bloom's Taxonomy Issue

★ Workshop and
Lunch 'n' Learning
Schedule enclosed

Strategic Teaching & Learning

We know that LEARNING is . . .

- DEVELOPMENTAL, not linear, with various stages occurring simultaneously
- RECURSIVE, building on foundations already in place
- REFLECTIVE, allowing new learning to change and deepen perception of previous learning
- ONGOING, for both student and teacher.

Strategic teaching integrates knowledge of two vital elements, content material and the learning process. How does that happen? Of the myriad helpful models developed by cognitive and educational experts, one of the most widely accepted is Benjamin S. Bloom's Taxonomy of Educational Objectives.

Developed in 1956, Bloom's hierarchy (and its variations) has informed decades of instructors in planning curriculum and assessment, and it has guided students in becoming increasingly autonomous learners.

Bloom describes six stages in the cognitive domain: knowledge, comprehension, application, analysis, synthesis, and evaluation.

KNOWLEDGE, the most basic level of cognitive development, forms the foundation for all other stages. Key tasks are recall of specific terms or facts, familiarity with conventional classification systems or methodologies, and memory of principles and theories. Knowledge also includes finding appropriate signals or cues to retrieve stored information. Knowledge tasks include naming, defining, listing, recognizing, and identifying.

Examples:

- List all the countries in Africa, and name their capitals.
- Define the term *endocrinology*.
- Label all the parts of the cell illustrated in the diagram.

COMPREHENSION begins the process of organizing and reorganizing material. Information is manipulated through translation, interpretation, and extrapolation. *TRANSLATION* changes the form of communication, while maintaining faithfulness and accuracy to the original. Tasks include understanding figures of speech, symbolic statements, and examples. *INTERPRETATION* explains or summarizes information. Tasks include recognizing main ideas or themes. *EXTRAPOLATION* extends a trend or tendency beyond the given information. Tasks include drawing inferences and determining implications.

Examples:

- Give an example of a deciduous tree in your area.
- In your own words, restate the content of the article on racism in America.
- Convert 65 inches to centimeters.

APPLICATION calls for the use of abstract concepts in concrete situations. Ideas, procedures, methods, and principles are applied in real-life settings. Tasks include application of a principle and transfer of knowledge to a new situation.

Examples:

- Find the area between the two curves labeled in the diagram.
- Suggest the possible causes of the forest fires in the western United States in the summer of the year 2000.
- Interview 30 students to determine their most serious concerns about the RIT calendar.

ANALYSIS is the disassembly of elements, relationships, or principles in order to look closely at the component parts. Analysis clarifies ideas by examining organization, methods of delivery, and basic assumptions. Tasks may include distinguishing fact from opinion, recognizing patterns and relationships, and identifying persuasive techniques.

Examples:

- Divide the events of World War II into three stages: beginning causes, significant military battles and activity, concluding battles and results of the war.
- Indicate the evidence used to support the conclusion in this article on medical research on AIDS treatment in Africa.
- Analyze the chemicals present in the water sample taken from the Genesee River.

“Bloom’s theory helps take the surprises out of exams.”

--RIT student

SYNTHESIS puts elements together to form a new whole, to create a structure or pattern that did not previously exist. Tasks may include invention of an original model, proposition of a new way to test a hypothesis, and creation of a plan to achieve a major goal.

Examples:

- Design an experiment to study the presence of the mosquito carrying the West Nile virus in your county.
- Develop a model of the diesel motor you have designed for your senior project.
- Using the three software packages learned in this class (Excel, Word Perfect, and Power Point), create a presentation of your research project.

EVALUATION makes judgments on the value of materials and ideas. The measure of appraisal is criteria that have been either developed by the student or selected from external sources. Tasks may include judging accuracy, debating a topic, or deciding between proposals for reaching a goal.

Examples:

- Write a paper on your trip to the Galapagos Islands to study the unique animal species. Describe what you liked best and least, with supporting reasons. Describe what you learned and what methods of exploration worked the best for you.
- Rate the effectiveness of the different methods used to breed the near-extinct species of animals in Africa that we studied this quarter. Support your ratings with a rationale.
- State your position on the possible emergence of a viable third party in the United States by the year 2004. A viable political party will be one that captures at least 20% of the vote.

◆ Writing Good College Test Questions: Difficulty Versus Complexity ◆

It’s week three of the quarter and you’ve just given your first exam. As the students hand in their tests, you notice their long faces. You hear them murmur and complain about how hard the test was. They felt like they were being tricked. They studied for hours, they recognized the terms, yet the way the test questions were phrased, it was as if you, the teacher, were plotting against them. Later you hand back the exams. The top grade is 63% and the average for the class is 48%. What happened? Don’t these students study?

Professors often expect students to understand the material more deeply than mere memorization. They expect students to see relationships between ideas and to apply what they’ve learned to new situations. They want students to be able to analyze, evaluate, and make informed judgments. They want students to demonstrate how to handle the complexity of ideas. However, when creating test questions, sometimes professors confuse *complexity* with *difficulty*.

Writing good test questions is an art. First we have to make a distinction with different types of thinking.

Consider the following questions:

1. Who was the second president of the United States?
2. What are the similarities and differences between the post-Civil War and post-Vietnam War periods?
3. Defend why we should or should not have capital punishment.

The first question requires the learner to recall a piece of information from long-term memory. The second question requires the learner to recall information about both wars, separate it into two lists, then analyze the lists for similarities and differences. The third question requires retrieval of information about capital punishment, analysis of its impact on society, and a judgment as to whether it serves its rightful purpose or not. Each question requires thinking, but the *complexity* of thinking increases (Sousa 110).

Complexity refers to the thought process that the brain uses. *Difficulty* refers to the amount of effort the student expends within the level of complexity. Learning can become more difficult without becoming more complex. Consider the following questions:

1. Name the states of the Union.
2. Name the states of the Union and their capitals.
3. Name the states and their capitals in order of their admission.

Here the difficulty of each question increases. The learner must expend more effort, but the level of learning remains that of surface knowledge. There is no analysis, synthesis, evaluation or judgment involved (Sousa 121). The key is to be clear about the learning objectives. Thinking in terms of a real life job situation may help clarify whether test questions tap (primary) complex cognitive processing or (secondary) difficult details that most professionals would access through resources. Certain people have an enormous capacity for remembering facts and particulars, but most of us operate better when we keep our working memory uncluttered so we can focus on problem-solving, analysis and evaluation. Professionals are valued for these higher order thinking skills; college exams should provide an opportunity to engender these skills with our students. Sousa, David A. *How the Brain Learns*. Reston, VA: NASSP, 1995.

◆ Study Skills Using Bloom's Taxonomy ◆

Students can use Bloom's Taxonomy to design effective study approaches that "fit" the levels at which they will be asked to perform tasks.

Knowledge

- Create outlines of important information
- Use flashcards to review important terms/definitions
- Complete objective practice tests
- Recite and memorize lists using mnemonics
- Create formula sheets to memorize formulas
- Label diagrams

Comprehension

- State ideas in your own words
- Create examples of key concepts
- Summarize information into verbal or visual summaries
- Color-code different types of problems
- Design 1-page Concept Sheets that explain concepts in your own words and provide an example
- Create visual representations of verbal information
- Explain charts, graphs, and visuals in your own words
- Rehearse and recite information aloud or to a friend

Application

- Do example problems from the course/text
- Redo problems without referring to notes/text
- Combine problems to make them more complex and solve them
- Apply concepts to case studies
- Relate information to your own life

Analysis

- Compare and contrast ideas using a 2-column format
- Show relationships between ideas using a network or mindmap
- Write a critical analysis of several points of view including assumptions, facts, opinions, and conclusions
- Write a case predicting the outcome of a theoretical situation using deduction, induction and hypothesizing
- Write an essay indicating techniques used to create a situation or tone, or to arrive at conclusions
- Use graphic organizers, such as time-lines, hierarchies, categories, and/or flow charts to show relationships

Synthesis

- Create a model of a new design or product
- Develop a plan of action
- Combine elements from several original designs into a new creation
- Design an experiment to study a particular phenomenon

Evaluation

- Make a checklist of objective criteria and use it to evaluate a process
- Write an evaluation of an approach, design or product including your opinion and supporting arguments
- Take a position in an argument and defend it
- Rate the effectiveness of different methods for solving a problem

"By including as many of Bloom's levels as possible, I am encouraging my students to think on a deeper level."

-- RIT Professor

◆ Bloom in Action ◆

Computer Science/ Local Area Network (LAN)

Knowledge : What is a Local Area Network (LAN)?

Comprehension: Create a schematic chart illustrating the main parts of a LAN.

Application: Describe how you would assemble a final document by retrieving pieces of that document that are located on different computers connected to the LAN.

Analysis: Identify the major differences among the products of the leading manufacturers of LAN software and hardware.

Synthesis: Design a LAN for use by a new department in your division.

Evaluation: Devise a plan to determine which LAN manufacturer would provide the best hardware/software solution or for use by a new department.

Engineering

Knowledge: Physical quantities are called vectors if they have ___ and ___.

Comprehension: Give an example of *deformation* of a body as a result of force.

Application: Is a soccer player kicking the ball demonstrating surface force or body force? Explain your answer.

Analysis: A recent news article describes a bridge that collapsed during rush-hour traffic. What factors do you think may have contributed to structural failure?

Synthesis: You are part of a post-flood engineering team. One of your major projects is to construct a temporary replacement bridge that can be in use as soon as possible to maintain traffic until a permanent bridge can be constructed. Develop a design and implementation plan for the temporary bridge.

Evaluation: Alternative designs for the new permanent bridge call for either a suspension bridge or a trestle bridge. Which plan is more suitable for the location?

Literature

Knowledge: Who wrote *The Sweet Hereafter*?

Comprehension: Draw a timeline that includes the major events in the novel's plot.

Application: Find three metaphors in your next reading assignment.

Analysis: Discuss the author's patterns of imagery and explain how they contribute to the novel's theme.

Synthesis: Where do you think Zoe will be five years from the end of the novel? Create a page from her diary in which she talks about herself and shares her thoughts.

Evaluation: Some critics have called *The Sweet Hereafter* a masterpiece of American literature. Do you agree? Why or why not?

Mathematics

Knowledge: What is the Pythagorean Theorem?

Comprehension: Draw a figure that illustrates the Pythagorean Theorem.

Application: Mary lives 3 miles north of the corner of Elm Street and Ivy Avenue. Ralph lives 6 miles east of the same corner. How far does Mary live from Ralph if she takes the most direct route to his house?

Analysis : Even though the Pythagorean Theorem, the Law of Sines, and the Law of Cosines are all based on triangles, they differ in theory and use. Explain the differences between these theories and their applications.

Synthesis: We know that the Pythagorean Theorem works in two dimensions. Construct a proof of the Pythagorean Theorem for right triangles in "n" dimensions.

Evaluation: Jacob Bronowski has suggested that Pythagoras based his theorem on the mere shuffling of tiles that existed in abundance where he lived. (*The Ascent of Mathematics*, Raymond Coughlin and David Zitarelli. McGraw Hill 1984, 174.) Review Bronowski's research and evaluate the appropriateness of his statement. Support your argument.

"The sign of a profound theory is that you can learn it in 10 minutes and spend a lifetime understanding and applying it."

-- W. Flammann

Profiles...



Bernadette Lynch

Academic
Accommodations
Coordinator



David McLuckie

HEOP
Academic Counselor

Bernadette has worked at RIT for the past eight years. She has held a variety of positions within Residence Life, including working with Greek Affairs. Her most recent position was Area Coordinator. Bernadette has taught Freshman Seminar in the College of Business and will be a First Year Enrichment instructor. Bernadette places a high value on volunteerism and community service and will be the chairperson of RIT's United Way Campaign. She is excited and enthused about joining the Learning Development Center staff as the Academic Accommodations Coordinator.

David joined RIT in August 2000 as a HEOP Academic Counselor. He will be advising students, coordinating the HEOP tutoring program, assisting with the HEOP summer program, recruiting and working as an admissions liaison. Prior to joining RIT, David worked as a Job Developer and Placement Coordinator for Monroe Community College. He also worked at Niagara County Community College as an Admissions Technical Assistant and served internships at Mansfield University, Medaille College and Monroe Community College. David holds a B.S. in Educational Studies and an M.S. in Student Personnel Administration.

LDC Lately Reader Response....

The Spring 2000 edition of LDC Lately discussed obstacles to learning. Five scenarios described major issues faced by students, then offered effective and ineffective ways in which students cope. A sixth category was offered by John Burr, COAS Assistant Professor:

DEALING WITH PARENTS

Effective: Educational decision made by the student (academic institution, major, timing) in consultation with parents.

Ineffective:

- The Victim – Parent directs the institution, the major, and the timing of goals, e. g. "You will become a doctor because I am one and my father and my grandfather were doctors."
- The Relier – Relies on parents for assistance in doing homework, establishing schedules, meeting deadlines and establishing social connections.

If YOU have comments or ideas for LDC Lately, send them to Susan Donovan at SSDLDC@rit.edu. We welcome your response!

Resources....

<http://209.130.2.183/strategi.htm> Information About Strategic Teaching, Strategic Learning and Thinking Skills

<http://www.muskingum.edu/~cal/database/database.html>
Learning Strategies Database

<http://chiron.valdosta.edu/whuitt/col/cogsys/bloom.html>
Bloom et al.'s Taxonomy of the Cognitive Domain

<http://www.enc.org/topics/inquiry/ideas/documents/1,1341,FOC-000716-index,00.shtm> "Students Questioning Students" Leads to Better Learning

<http://www.kcmetro.cc.mo.us/longview/ctac/blooms.htm>
Critical Thinking Across the Curriculum Project

TEXTS:

Bloom, B.S., Englehart, M.D., Furst, E.J., & Krathwohl D.R. (1956). *Taxonomy of Educational Objectives: Cognitive Domain*. New York: David McCay.

Halonen, J. & Santrock J. (1999). *Your Guide to College Success*. Belmont, CA: Wadsworth Publishing pp. 205-211.

LDC Workshops...

All workshops are free to RIT students, faculty & staff

Learning Support Services Workshops

Howard Gardner's Theory of Multiple Intelligences 12:00-1:00 on Mondays in room 01-3320

9/25, 10/2, 10/9, 10/16

This workshop will introduce participants to Howard Gardner's intriguing theory and provide examples of how it might enhance classroom performance. It is not necessary to attend all sessions; each session stands on its own. (However, those not familiar with the theory should attend Session I as a prerequisite to the others.)

Mega Memory by Kevin Trudeau 12:00-1:00 on Fridays in room 01-3320

9/15, 9/22, 9/29, 10/6, 10/13, 10/20

This six part audio program facilitated by an LSS Learning Specialist assists participants in the development and rehearsal of retention skills and strategies.

Mindmapping 12:00-1:00 on Wednesday 9/20 in room 01-3320

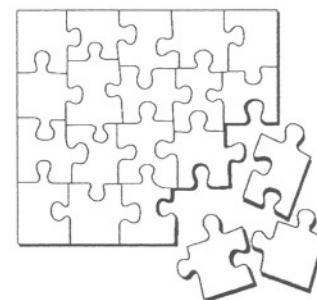
Start the quarter by learning a "whole brain" notetaking strategy based on M. Gelb's Mindmapping audio tape series. You'll learn how to improve your memory and notetaking skills by utilizing space, shape and color.



Lunch 'n' Learning Series

(all Lunch 'n' Learning sessions run from 12:00-1:00 in room 01-2358)

Getting Organized	M, 9/11	or	F, 10/6
Goal Setting for Study	R, 9/14		
Effective Time Use	M, 9/18	or	F, 10/13
Attacking A Text	R, 9/21		
Techniques for Better Concentration	M, 9/25	or	F, 10/20
Increasing Motivation	R, 9/28		
Textmarking & Notemaking	M, 10/2	or	F, 10/27
Taking Good Lecture Notes	R, 10/5		
Preparing For Exams	M, 10/9	or	F, 11/3
Studying Lecture Notes	R, 10/12		
Memory Improvement	M, 10/16	or	R, 11/2
Stress Management	R, 10/19		
Stopping Procrastination	M, 10/23		
Effective Test Taking	R, 10/26	or	M, 10/30



Math Workshops

Calculus I Review* T 9/12 12:00-1:00 (Room 01-2383) and 4:00-5:00 (Room 01-2372) same session offered twice.

Differentiation techniques for students who have completed Calculus I (214, 241, 251 and 420)

Calculus II Review* W 9/13 12:00-1:00 (Room 01-2383) and 4:00-5:30 (Room 01-2372) same session offered twice.

Integration techniques for students who have completed Calculus II (242, 252, 421)

Are You Ready for Calculus? Precalculus Review M 3:00-4:00 9/11-11/13 Location TBA

Strengthen your algebra and trig skills: graphing, factoring, exponents, inequalities, inverse functions, logarithms, trig identities, etc. at your own pace.

Intensive Precalculus Review S 12:00-5:00 pm 9/16 & 9/23 Location TBA
 Get a strong start in calculus. Strengthen your precalculus skills in 1-2 afternoons. Preregistration required.

Tools for Math Success T 9/19 - 11/14 3:00-4:00 Location TBA
 Call Special Services at 475-2833 for specific topics offered each week.

Math Video Series R 9/21 - 11/9 3:00-4:00 Location TBA
 Choose from a wide selection of algebra, trig, contemporary math, calculus, statistics and more.

Individualized Math Classes* W 9/13 - R 11/14 (meets M,T,W,R) 9:00-10:00 (room 01-2371) or
 10:00-11:00 (room 01-2372) Students must speak with Gail Gucker at 475-6944 before registering.

Math Review for Returning Adults* (course # 1710-011-96) M 9/11- W 11/15 6:00-7:20 01-2372
 Tuition: \$520 (students must register through the Registrar's office)

Using your TI Graphing Calculator (for 83, 86, 89 and 92 models) W 9/20-11/15 3:00-4:00 Location TBA

* For information about these workshops, contact Gail Gucker at 475-6944 or ghglc@rit.edu.
 For information about all other math workshops, contact Karen Quinn at 475-2833 or kjqspr@rit.edu.
 If you are unable to attend any of these workshops, you may stop in the Math Lab (01-2371) and pick up a packet of materials used in these presentations. In addition, there is a packet available on "How to Create a Study Group."

Special Services Workshops (open to all students)

Personal Development



Think Tank #1 Getting Connected/Effective Networking	M	9/18	4:00-5:00	SAU M-2
Think Tank #2 Introduction to Tai-Chi	M	9/25	4:00-5:00	SAU M-2
Think Tank #3 Getting Acquainted with the VAX	M	10/2	3:30-5:00	SAU M-2
A Red Barn Afternoon	F	10/6	1:00-5:00	Red Barn
Think Tank #4 Motivation: Discovery & Development	M	10/9	4:00-5:00	SAU M-2
Self-Advocacy: Secrets to Success	T	10/17	4:00-5:00	SAU M-1
Basic Money Management	M	10/30	4:00-5:00	SAU M-2
Ups and Downs	T	11/7	4:00-5:00	SAU M-1

Career Seminars

Starting the Job Search & Preparing Your Resume	M	10/16	4:00-5:00	SAU M-1
The Corporate Challenge: Having the Skills to Make It	M	10/23	4:00-5:00	SAU M-1



Academic Power Series & Other Academic Programs



Time Management	R	9/28	1:00-2:00	SAU M-1
Study Habits & Learning Styles	R	10/5	1:00-2:00	SAU M-1
Grad School, Why Not?	R	10/5	4:00-5:00	SAU M-1
Textbook Reading Seminar	R	10/12	1:00-2:30	Interfaith Center
Lecture Notetaking	R	10/19	1:00-2:00	SAU M-1
Test Preparation & Test Taking	R	10/26	1:00-2:00	SAU M-1

LDC Walk-in Lab Hours....



Math Lab (01-2371)

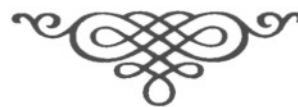
Monday	10:00 am - 7:00 pm
Tuesday	10:00 am - 9:00 pm
Wednesday	10:00 am - 9:00 pm
Thursday	10:00 am - 4:00 pm
Friday	10:00 am - 2:00 pm

What the Math Lab can do for you:

Help with questions from:

- homework
- lecture notes
- textbook
- practice quizzes and tests

(But we can't help with take-home quizzes or tests, and questions not from your text.)



Writing Lab (01-2358)

Monday	9:30 am - 12:00 pm 1:00 pm - 4:00 pm
Tuesday	9:30 am - 12:00 pm 1:00 pm - 7:00 pm
Wednesday	9:30 am - 12:00 pm 1:00 pm - 7:00 pm
Thursday	9:30 am - 12:00 pm 1:00 pm - 7:00 pm
Friday	9:30 am - 12:00 pm

Services of the Writing Lab:

- Writing instructors work with students at every stage of the writing process.
- Students come to the lab to practice for the Liberal Arts Exit Exam or to seek help writing papers, research projects or resumes/cover letters.
- Instructors will read up to five pages of a Master's thesis for structural and mechanical errors.
- A computer is available for students working with an LDC writing instructor.

(But instructors will not work with take-home essay exams.)

How to contact LDC:

Web site: www.rit.edu/SA/LDC

Phone: 475-6682 v/tty

Location: George Eastman Building (01) Room 2309

FAX: 475-5832

Director: Susan Donovan