



teaching learning committee  
Montana State University Bozeman

**Non-Traditional Teaching & Learning Strategies**

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Since fall semester 2001 Harris and Johnson have provided faculty development workshops at Montana State University entitled “Developing a Mentorship Program for Non-Traditional Teaching and Learning Techniques.” Forty MSU faculty representing all seven colleges have completed 15-20 hours of continuing education to assist them in understanding and implementing a broad variety of non-traditional teaching and learning techniques. In 2002 Harris and Johnson presented a workshop on this model at the International Conference on Problem-Based Learning in Higher Education in Baltimore, Maryland. In addition they have received national and international recognition for their insightful teaching strategies and methodologies that provide and support an enhanced teaching and learning environment in higher education.

**Introduction**

The traditional teaching approaches are generally teacher-directed and follow cookbook steps of activities and demonstrations. This approach may not provide students with valuable skills or even with a body of knowledge that lasts much beyond the end of the term (Udovic, Morris, Dickman, Postlethwait and Wetherwax, 2002). To enhance the quality of teaching and learning in the classroom non-traditional strategies such as active, cooperative, collaborative and problem-based learning can be utilized.

We must, however, begin with a disclaimer in regards to the utilization of non-traditional teaching and learning strategies. According to Herreid (1998) and the experiences of Harris and Johnson, faculty not trained in establishing non-traditional goals and objectives, implementation methodologies, and assessment techniques are not effective in utilizing these new strategies in the classroom. Traditional university expectations and department philosophies as well as the historical experiences by which faculty have traditionally learned to teach have driven the continuation of the lecture-based model. Under these circumstances it is very challenging for faculty to successfully initiate and sustain non-traditional teaching and learning techniques. It is imperative that faculty utilize specialized training workshops, newsletters, websites, and centers for teaching excellence to obtain the necessary knowledge, training, and support required to successfully adopt these strategies in the classroom.

Before faculty can consider non-traditional teaching and learning (NTTL) strategies the first step in developing an active learning environment is to determine where you want your classroom and students to be. Instructors must reflect on their personal goals, their goals for the students, students' needs, and the level and purpose of the course. Next, the instructor must consider the specific knowledge, skills and attitudes each student should acquire during the course (Tanenbaum, Cross, Tilsons, and Rogers, 1998).

### **Bloom's Taxonomy of Learning Objectives**

The faculty members' objectives must be integrated with those of their academic program, department, college and university. It is only from the awareness of these goals and objectives that appropriate non-traditional teaching and learning (NTTL) strategies may be selected. The link between strategies and learning objectives resides in an understanding of Bloom's Taxonomy of Learning Objectives (Bloom 1956). This will assist the professor in developing and directing students in logical steps of learning. Bloom's taxonomy of learning objectives identifies, within the cognitive domain, a hierarchy of six categories (Bloom 1956).

<b>Cognitive Domain</b>	<b>Behaviors or Outcomes</b>
<b>1. Knowledge</b>	Recall of specific facts
<b>2. Comprehension</b>	Grasping or understanding meaning of informational materials
<b>3. Application</b>	Make use of the knowledge
<b>4. Analysis</b>	Taking apart the known & identifying relationships among them
<b>5. Synthesis</b>	Putting things together in creative manner
<b>6. Evaluation</b>	Makes judgments about the value of materials or methods

The first two categories of Bloom's Taxonomy, **knowledge** and **comprehension** focus on a recall of facts that students can attain by reading the material or attending lectures. Typically students are assessed by true/false and multiple choice questions for **knowledge** and short essays for **comprehension**. In the **application** category students' use previously learned information in new and concrete situations to solve problems that have single or best answers. In general introductory college courses emphasize teaching and learning by focusing on **knowledge, comprehension** and **application**. This most often places students in a passive role regarding their learning.

Upper division courses hopefully strive to build on the **analysis, synthesis** and **evaluation** levels of learning. These are the characteristics of teaching and learning that most engage the students and faculty because they are "**ACTIVE**". These are the categories that deal with the issues that inspire us to

learn and reveal the creative potential within each faculty member and student. It has been Harris and Johnson's experiences that when introductory courses begin with issues of **analysis** and **synthesis** students become engaged in their own learning. During this process students assume responsibility for acquiring the **knowledge** necessary to respond creatively and evaluate outcomes. This is the basis for non-traditional teaching and learning strategies regardless of the academic course level. Less emphasis is placed on information transmission and greater emphasis placed on developing skills, attitudes and values. This will lead students to engage in higher order of thinking such as **analysis, synthesis, and evaluation**.

Educators need to decide if their courses are intended to require the regurgitation of facts and figures or assist students into developing critical thinking skills with regard to the subject at hand. A lecture format may be entertaining and efficient delivery of information, but does it facilitate the best way to learn! Do you want to be "*The sage on the stage or the guide by the side*" (Bosworth and Hamilton, 1994)?

### **You must decide now if education is about your teaching or student learning!**

If you are ready to challenge students with the issues and concepts that inspire you and you are willing to share the stage with students then you are ready to pursue non-traditional teaching and learning strategies. The following strategies are examples of NTTL techniques that have been included in the MSU NTTL workshops since 2000. They are presented in alphabetical, non-hierarchical order and serve as an introduction. We strongly suggest you utilize the websites and references we have identified to assist you with the specific procedural steps of implementation and assessment. Remember what works for one educator may not work for you but through discipline, dedication, preparation, analysis, perfection and self-evaluation you can develop the non-traditional teaching and learning strategies that work for you.

## **STRATEGIES**

### **I. Case-Based Learning or Case Method Teaching**

The case-based approach to teaching and learning utilizes real or imagined scenarios to teach students about their field of study. Barnes (1994) describes the case as "an account of events that seem to include enough intriguing decision points and provocative undercurrents to make a discussion group want to think and argue about them." According to Harris and Johnson the key in utilizing this technique is to capture the imagination of the students. In this manner students are challenged to learn by doing, develop analytical and decision making skills, internalize learning, learn how to grapple with real life problems, develop skills in oral communication and team work. As Herreid (1998) states, "It's a rehearsal for life!"

The significance of case-based learning is that it links theory and application to real or possible circumstances. Students must acquire knowledge and understanding from required readings before attending class in order to apply the information in small discussion groups. Cases prepared by the instructor from textbooks, professional experience, websites, current issues, etc. are then presented to the students with specific questions or issues to be resolved. These questions are designed to reveal a required answer or may be open to a creative response for which there is no right or wrong. In all cases the intention is to create questions that guide the students through appropriate **analysis**, **synthesis** and **evaluation**. In this manner the students are aided in exploring possible solutions and recognizing the consequences of their answers by the instructor. Additional websites to support case-based learning can be found at the <http://www.cdtl.nus.edu.sg/Ideas/iot24.htm> and <http://ublib.buffalo.edu/libraries/projects/cases/teaching/teaching.html>.

## II. Concept Mapping

A concept map is a graphic representation for organizing and representing the pieces and parts of knowledge. They include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts or propositions, indicated by a connecting line between two concepts (Novak). The principle goal of concept mapping is to have your students discover, define and develop an understanding of the interrelated parts of a complex set of ideas. Cognitive psychologists postulate that learning is a process that new knowledge is added to an existing knowledge web/network by creating associations to existing knowledge (Anderson 1992). For further information and steps on how to construct a concept map see the following website by Novak at Cornell University: <http://cmap.coginst.uwf.edu/info/printer.html>.

## III. Discussion Questions

Discussion questions engage students by challenging them to think by **analyzing**, **synthesizing** and **evaluating** the subject matter. These are critical questions conceived to utilize group discussions in a manner that will move the student from **knowledge** of facts to the **evaluation** of outcomes. When designing class discussion questions we recommend utilizing Bloom's cognitive levels by beginning with a **comprehension** question (what) followed by an **analysis** question (why) and end with a **synthesis** question (how). This methodology develops the skills necessary to be a critical thinker and assesses the student's learning based on the six different levels specified in Bloom's Taxonomy. One of the great benefits of this method is that students must come to class prepared because class time is devoted to upper level learning.

You can develop your own discussion questions or save time by utilizing previous exam questions or questions at the end of the textbook chapters. Encourage your students to review the questions at the end of the textbook chapters in preparation for class. Remember this assignment is about learning!

According to Harris and Johnson the time designated to discussion questions ranges from 10 to 30 minutes in a 50 minute class and up to 75 minutes in a two hour class. Generally the class begins with the distribution of clearly worded questions, relevant to the topic, to a small group (3-4 students) of their choosing or yours. Each group discusses their critical questions, using their required readings and notes. A reporter or scribe must be selected to document the group's discussion and specific responses to the questions. It is imperative that at the conclusion of the group process that the faculty member solicits responses and offers accurate analysis, commentary, and insight. It is possible that a group will agree on an inappropriate response and this closing discussion allows the faculty member to further assist in their learning and supplement the discussion questions with a brief (10 minute) lecture. An additional annotated bibliography of resources on effective questioning for teachers is available at <http://www.ael.org/rel/quilt/biblio.htm>.

#### **IV. Debate**

Classroom debate is a form of empowered learning in which students become involved in researching, teaching, and recognizing alternative points of view. The benefits of a formal classroom debate include: 1) reducing the biases of both students and the instructor; 2) enhancing student research and analysis skills; 3) promoting logical and critical thinking; 4) increasing oral communication skills; 5) motivating students; and 6) building effective team work skills. Most significantly, to be successful, the students involved in debate must master all six levels of Bloom's Taxonomy (1956).

Debate revolves around the debate proposition, which should be a carefully worded one-sentence statement, calling for some new position or change in the present. Although the proposition should be worded to avoid excessive ambiguity, they are often normative in style and offer the opportunity to argue both issues of fact and belief. This allows debaters, considerable flexibility in building arguments. The affirmative team argues in favor of the proposition while the negative team tries to refute the arguments of the affirmative team and in essence argues to maintain the status quo (Payne).

Debates should focus on topics for which there is no "right answer" or too which a marginal view is valuable. Recreating historic debates is also an excellent learning model. Websites that could assist you in organizing, executing and assessing a debate as one of your active learning strategies are as follows:

[http://www.actdu.org.au/archives/actein\\_site/basicskills.html#adebate](http://www.actdu.org.au/archives/actein_site/basicskills.html#adebate) ;

<http://debate.uvm.edu/pdf/empower.pdf> ; and

<http://www.nssa.uhttp://www.nssa.us/nssajrnl/18-2/pdf/13.pdf/nssajrnl/18-2/pdf/13.pdf>.

## **V. Quizzes & Exams**

Typically educators have utilized quizzes and exams as assessment tools. Harris and Johnson have found that collaborative learning can occur through preparation, execution, discussion and review of examination questions. The authors have utilized a variety of testing strategies that emphasize teaching and learning such as: individual and group quizzes, multiple test opportunities, and first day final exams. The principle behind these strategies is to move beyond regurgitation of facts to Bloom's higher levels of learning such as **application, analysis, synthesis** and **evaluation**.

### **A. Group Quizzes and Exams**

Tanenbaum et.al. (1998) described a process by which group quizzes were utilized to increase learning during the test-taking experience. Harris and Johnson have utilized this process and extended it to include examinations. It is a efficient way to get students to read the textbook before class and to learn basic course content according to Herreid (1998).

First, tests are taken individually. After the students have finished the test and marked their individual answers they are put into small groups to take the test again. In the small groups the students must interact collaboratively to justify their answers and complete the exam a second time. Who would expect that the noise level during an examination would far exceed any other sounds in the classroom? The individual and group scores for the test are then averaged either as equal scores or with individual score carrying two-thirds of the weight (Tanenbaum and Tilson, 1998). The quiz process becomes less a means of assessment and more of an integrated part of the learning process.

### **B. Multiple Test Opportunities**

When it is essential that students master a subject matter one of the most effective tools in achieving a high degree of mastery is multiple tests. This testing method allows the educator to cover a great deal of breadth with minimum lecture time. If your class demands the mastery of facts, figures, formulas, dates, names, etc. and typically utilizes multiple choice or short essays examinations consider multiple testing.

The process by which multiple exams are given is to establish a period of time such as a week and specific proctored hours for testing. No class time is used for testing. Johnson allows his students to take the exam a maximum of three times, however a minimum score is required on the first exam. This prevents students from merely using the first exam as a study guide. The exams are not returned to students, but their scores are posted on a daily basis. The exam should be inclusive and if so your students will demonstrate the commitment to acquiring all of the **knowledge** necessary to be successful on the examination. If it is not mastery of the subject matter, but a bell curve you are seeking, then your aspirations are for testing not learning and this method is not for you.

### C. First Day Final Examinations

Johnson has utilized the first day final examination in honors courses, and an architectural history course. This is intended for classes in which the faculty seeks **comprehensive**, **synthesis** and **evaluation** the highest level of cognitive domain.

Numerous final essay examination questions and sources for answering the questions are given to the student on the first day of class. Throughout the semester these questions serve as the benchmarks and reference points for guiding student learning. Prior to the final examination date Johnson reiterates that the final examination is, in fact, selected questions from those given on the first day of class. He recommends that the students get together in study groups to do further research and preparation for the exam. Students are encouraged to write their answers and assist each other in **synthesizing** and **evaluation** the course content. On the final examination day, students are given blank blue books and each student is required to address a different set of questions.

### VI. Jig Saw

The jigsaw learning technique is drawn directly from a jigsaw puzzle. The faculty member's goal is for the students to see and understand the big picture, problem or issue. As in a jigsaw that picture consists of numerous interrelated parts. First students are asked to become masters of specific parts of the big picture. After developing this mastery they are required to work as a team to integrate and link their specific **knowledge** and **understanding** in a manner that promotes an **analysis** and **synthesis** of the big picture. Students learn a subject best when they have to explain it and the jigsaw structure creates a setting in which students will become teachers who explain concepts and procedures to one another (Colosi and Zales, 1998). For additional information and steps in creating and utilizing jigsaw methods see the following website by Aronson <http://www.jigsaw.org/>.

### VII. Peer Instruction

Harris and Johnson, according to their review of literature and experiences have identified three principle types of peer instruction. These include concept testing, peer teaching and student critiques all of which place the student in the position of engaging higher levels of cognitive domain by taking on the role of teaching. Peer instruction offers the faculty member timely feedback during classroom sessions in regard to the students understanding and the faculty's expectations.

#### A. ConcepTests

In 1991 Eric Mazur, Harvard University, developed the peer instruction model utilizing *ConcepTests*. In this 90 minute model Mazur assigns students pre-class readings for each lecture and begins each lecture with a short multiple choice quiz over the required readings. Then the remaining class time is divided into fifteen minute time periods, each devoted to one of the main points of the reading. Each of these is

followed by a conceptual question, *ConcepTests*, which tests the students' understanding of the idea or point presented. These questions are multiple-choice and are taken individually. Each student is given one minute to select an answer. This is followed by group discussions in which students are peer pressured to think through their responses and defend their answers. Then the students are asked to respond to the question a second time individually. Mazur has found the proportion of students who chose the correct answer always increases after the discussion, suggesting that students are successfully explaining their reasoning, and in the process are teaching each other. The following websites will provide additional material on peer instruction:

<http://www.psrc-online.org/classrooms/papers/pdf/mazur.pdf>

<http://mazur-www.harvard.edu/education/pi.html>, <http://hea->, and [www.harvard.edu/~pgreen/educ/PIA.html](http://www.harvard.edu/~pgreen/educ/PIA.html).

## **B. Peer Teaching**

This collaborative learning and peer teaching model is student-centered by encouraging student involvement, discovery, manipulation, and personalization of research based information (Rubin and Hebert, 1998). Student presentations can be done by groups of three to five students or individually based on the size of the course.

Harris has utilized peer teaching in a senior seminar course where each student is responsible for an entire 50-minute class. The student is required to research a current topic or issue with the approval of the instructor. Generally the class is divided up to include an oral PowerPoint Slide presentation usually 20-25 minutes on the cutting edge research followed by small groups of two to three students discussing critical questions on this topic. If the audience has little prior knowledge about the topic beginning presented, the peer student teacher will have difficulties engaging the class in discussions. Consequently, each student is required to read, prior to the class, and bring, at least, two current research articles on the topic. This encourages all students to be engaged in researching the topic and prepared for class. The peer student teacher is responsible for developing three discussion questions for the class. Refer to the section on discussion questions for assistance on how to develop engaging questions that support higher level learning. Students are teaching students with the teacher in the background, as a member of the student audience.

Since Harris has utilized a variety of non-traditional teaching and learning strategies in all of her food and nutrition courses, her students have experienced these models numerous times in the classroom. It is critical that if an educator believes in utilizing non-traditional teaching and learning strategies in the classroom then it only seems logical that we offer students the same format when peer teaching. Students have rated the experience of peer teaching as one of their most educational experiences during their college careers.

### **C. Peer Critiques**

Peer critiques are a common methodology utilized in studio and lab based courses, as well as courses emphasizing writing and language development. Johnson has found that it is possible to utilize the principles of peer critiques in practically any course because peer critiques promote **understanding** and **analysis** by placing one student in the position of critiquing the work of another student. Determining whether the work is “good or bad”, “right or wrong” is not the purpose of the critique. Analysis of the peer’s work and a demonstrated understanding of the subject matter are the focus of this teaching strategy. As faculty we realize that we often clarify our own learning of a given subject by trying to understand and express the qualities and characteristics of our students work. This methodology is intended to transfer this learning experience to the student.

The faculty member’s responsibility is to evaluate the critique, clarify, and perhaps expand and on the critiquing student’s analysis. As a by-product of this teaching and learning strategy students learn to trust and seek collaborative learning opportunities, challenge the mythical authority of faculty, and become better able to analyze their own work.

### **VIII. Problem-Based Learning**

Problem-based learning links theory and practice by engaging students in real life problems. Higher order skills such as **application**, **analysis** and **evaluation** can only be achieved through a more active approach to learning. The purpose of the problem is to motivate students to learn by providing a real-world context for examining the issues involved. PBL is thought of as a high risk educational strategy because of its lack of structure. This lack of structure is a by-product of open ended problems which have many ways of resolving or answering the problem at hand. When learning is in context rather than as a series of isolated facts and theories, the concepts are better retained. The underlying belief of PBL is that learning is more meaningful and enjoyable when it occurs in small active groups which are self-directed. This process encourages students to take responsibility for their own learning and that of their learning group (Lieux and Luoto, 2000).

PBL is a time hungry method of learning. Class time, once reserved for lectures, must be exchanged for group, problem-solving activities according to Wu and Fournier (2000). The faculty member must be actively engaged in coaching and critiquing the problem solving process that students are utilizing. It is important to find to a balance between the breath of material covered in the course and learning effectiveness as neither learning effectiveness nor teaching quality can be equated with the sheer volume of information delivered (Wu and Fournier, 2000).

According to Savoie and Hughes (1994), the following six steps can be utilized to organize the PBL experience in the classroom: 1) begin with a problem; 2) ensure that the problem connects with the students' world; 3) organize the subject matter around the problem, not the disciplines; 4) give students the major responsibility for shaping and directing their own learning; 5) use small teams as the context for most learning; and 6) require students to demonstrate what they have learned through a product or a performance. Students construct knowledge; they do not take it in as it is disseminated, but rather they build on knowledge they have gained previously (Cross, 1998). When students are addressing the problem it is recommended that the three-step problem-solving process suggested by Stephen, Gallagher and Workman (1993) be utilized. What do we know? What do we need to know? What are we going to do?

For a list of discipline specific example problems in undergraduate courses refer to Edens (2000). The University of Delaware (PBL Clearinghouse: [www.mis4.udel.edu/Pbl](http://www.mis4.udel.edu/Pbl)) and Samford University ([www.samford.edu/pbl](http://www.samford.edu/pbl)) have been instrumental in providing leadership and workshops on PBL. Their websites are very helpful with suggested techniques and articles to support faculty in this endeavor.

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