Problem-Based Learning approach to teaching Educational Psychology course – Syllabus
Note: 6 problems (one included here
Online at:
http://gallery.carnegiefoundation.org/collections/castl_he/bcerbin/Course_Overview/course_overview.html

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In order to promote students' understanding of key concepts related to learning and teaching, I adopted a problem-based learning (PBL) approach in my educational psychology course. The course is organized around six problems. In the second problem, I ask students to explain why reciprocal teaching (RT), an approach to teaching reading comprehension, works. In theory, the students have all the knowledge they need to understand why RT works, but in practice initially they can't develop an effective explanation of it. The reciprocal teaching exercise tests students' ability to explain why RT improves reading comprehension in terms of use newly learned ideas about learning and metacognition. Basically students try to explain the mental processes involved in questioning, clarifying, summarizing, predicting lead to comprehension. To facilitate their understanding, I conduct the class in four parts. Click on each button below to see how this class session promotes student understanding.

Summary of student performance. I have used the RT exercise in both PBL and non-PBL classes. Overall, the results are encouraging. In effect, the PBL students were better able than the non-PBL students to transfer relevant concepts to the new problem—to carry out "intentional, mindful abstraction of something from one context and application in a new context" (Salomon and Perkins, 1989). PBL students used relevant disciplinary concepts and established plausible connections to explain why RT improves comprehension. Non-PBL students failed to make causal connections, and also resorted to intuitive beliefs as the basis for their explanations. More… *(pdf, 68k)*

Analysis of Students' Understanding of Reciprocal Teaching

I assessed students' understanding of RT both by assessing students' individual writing, and by recording their responses in the small group and large group discusssion. The RT exercise is a "performance of understanding," an activity through which students develop and demonstrate their understanding (Wiske, 1998). The activity tests students' ability to transfer ideas about learning and metacognition to explain why reciprocal teaching improves reading comprehension. Students try to analyze and explain how specific reciprocal teaching skills (i.e., questioning, clarifying, summarizing, predicting) promote better understanding of reading material, and why children continue to understand what they read even after the

reciprocal teaching method is no longer used in class. The RT exercise is a fairly rigorous test of understanding; the concepts are abstract and students have little background in learning theory.

Types of student responses. Explanations differ in their strength or quality based on a variety of factors such as coherence and logical reasoning. To evaluate the quality of students' explanations, I focused on a single factor—the type of connection between RT and comprehension—and disregarded other factors such as overall completeness or quality of formal writing. My primary concern was students' ability to make a causal connection between RT and comprehension. Students' responses contained three types of connections:

Causal Connection:

A causal connection explains how the mental activities in reciprocal teaching influence the development of new meaning. The following example illustrates a causal connection.

"Summarizing involves identifying main ideas and also putting ideas into your own words, which helps you make sense of the material."

In this case, the student grasps the idea that composing a summary is a sense-making activity. These types of causal connections constitute "true" explanation.

Generic Causal Connection:

A generic connection asserts that RT influences comprehension but does not explain how. For example,

"Summarizing forces the child to understand the material."

Or,

"Reciprocal teaching is a method that makes children think about what they read."

Generic connections typically asserts that RT "forces," "makes," or "allows" a person to understand or think about what they read, but do not go the next step to explain how the mental activity influences the development of understanding.

Descriptive Response:

These responses simply describe some aspect of reciprocal teaching. For instance, the student says,

"Summarizing involves selecting main ideas and paraphrasing material."

There is no further explanation of how the skill relates to understanding.

These three types of connections reflect different levels of understanding. The causal connection is a plausible explanation in which the student elaborates on the cognitive consequences of using a specific mental skill. Generic connections explain RT in terms of an unanalyzed force that makes understanding happen. Descriptive responses do not explain why RT improves comprehension; they merely describe some aspect of RT. Only the causal connection is a viable explanation.

Analysis and summary of student performance. I have used the RT exercise in both PBL and non-PBL classes. In a non-PBL class, students focused on motivational factors to explain reciprocal teaching (e.g., puts responsibility on student, group learning increases interest, peer pressure, forces everyone to be involved, etc.). These students solved the RT problem with ideas they already had before they entered the class and disregarded the learning theory principles relevant to the problem.

The students used learning theory principles to explain RT; all 60 students in the two classes treated the problem as one of explaining how people learn when they read, rather than as a motivation problem. This is in contrast to earlier years, when I didn't use a PBL format and students focused on motivation. However, the quality of students' explanations this year still varied considerably. Thirty-four percent in the fall 1998 class and 43% in the spring 1999 class used one causal connection between reciprocal teaching and comprehension in their answers. This indicates a rudimentary understanding of how reciprocal teaching skills influence reading comprehension processes. Moreover, 28% and 35% of the fall and spring classes respectively, had multiple causal connections in their answers, indicating a more complex grasp of the cognitive processes involved in reciprocal teaching.

In my Problem Based Learning classes, the students used relevant disciplinary concepts and established plausible connections to explain why RT improves comprehension. In prior years, non-PBL students failed to make causal connections, and also resorted to intuitive beliefs as the basis for their explanations. In effect, the PBL students were better able than the non-PBL students to transfer relevant concepts to the new problem—to carry out "intentional, mindful abstraction of something from one context and application in a new context". In addition, the follow-up study suggests that student understanding persists; students were able to make causal connections

Syllabus:

Educational Psychology 370 Section 004 (Writing Emphasis Section)

Spring, 1999

Instructor: Dr. William Cerbin **Phone**: 785-6881 **Email**: cerbin@mail.uwlax.edu

Office: 145 Main Hall. I am available daily to meet with students, however my schedule is unpredictable so it is best if you call or email to make an appointment.

About this class: Educational Psychology focuses on how and why students learn, think and develop in school, and how teachers can enhance students' educational development. We will examine a broad range of concepts, principles and theories related to teaching and learning during the semester.

There are several distinctive features about this class you should know:

1. Psychology 370 is designed for teacher education majors, and is required by the Department of Public Instruction in Wisconsin. You are welcome to take the class if you are not an education major, but you should realize that the class is geared toward applying psychological knowledge to educational settings and solving problems related to teaching and learning.

2. The class is offered for writing emphasis credit. I believe the course can be of value for all students, but it is not a good idea to take the class only to satisfy a writing emphasis requirement especially if you are not interested in the goals and subject matter of the course.

3. This class requires significant work at the computer. You do not need special computer expertise to do the work, but you will use the computer to write assignments, submit course work electronically, and participate in group and class discussions on the course web site.

4. The most distinctive feature of the class is the Problem-Based Learning format. Problem-based learning is different from many teaching approaches. Many classes are organized so that you learn the subject matter by moving from one topic to the next during the semester. Assignments and examinations cover the topics chronologically, and you might experience four, evenly spaced exams during a semester with each one covering one-fourth of the lectures and readings. In contrast, a problem-based learning (PBL) format begins with multifaceted, authentic and open-ended problems—the kinds of problems that people encounter in "real-life" settings. You learn the subject matter by working through the problems, following various paths through readings and class discussions to develop an understanding of the issues and solutions to the dilemmas.

Why PBL? I believe that a PBL approach can deepen your understanding of the subject and develop your ability to use the subject matter in new situations. To understand something deeply

means that you can use it flexibly in new problem situations. PBL engages you in this activity throughout the course, and your understanding should develop as a result of working through problems with the subject matter. This is an extremely important goal for teachers. It is not enough to simply know about theories and principles; you need to be able to turn them into effective strategies and practice in the classroom.

PBL also motivates the subject matter of the course. In other words, the subject matter of the class becomes important in order to understand and solve problems. In PBL the reason to learn the subject is to solve problems that have important meaning and consequences separate from just getting a grade.

Course Objectives. By the end of this course you should be better able to:

1. understand and use important ideas, theories, principles and concepts to solve or resolve problems related to teaching and learning.

2.communicate more effectively in writing and use writing more effectively as a way to understand the subject matter of the course.

3. appraise your own learning, thinking and ideas.

Texts. The texts for the course are available from Textbook Rental.

1. Blythe, Tina et. al. (1998). The Teaching for Understanding Guide. Jossey-Bass Publishers. San Francisco.

2. Damon, William (1995). Greater Expectations: Overcoming the Culture of Indulgence in Our Homes and Schools. Free Press. New York.

3. Kohn, Alfie (1996). Beyond Discipline: From Compliance to Community. Association for Supervision and Curriculum Development, Alexandria, VA.

4. Stevenson, Harold & Stigler, James (1993). The Learning Gap: Why Our Schools Are Failing and What We Can Learn From Japanese and Chinese Education. Summit Books. New York.

5. Tishman, Shari, Perkins, David N., & Jay, Eileen (1995). The Thinking Classroom: Learning and Teaching in a Culture of Thinking. Allyn and Bacon, Boston.

Learning Activities. This class includes the following types of learning activities:

1. Problem-based learning. You will work on a number of problems and cases during the semester. Most of these will extend beyond a single class session.

2. Interactive learning. A good deal of the course work will take place in small groups or teams.

3. Electronic Discussions. We will use the course web site to carry on electronic discussions outside of class.

4. Writing. You will write regularly throughout the course, both as a way to learn the course material (i.e., writing-to-learn) and as a way to communicate ideas to others (i.e., formal writing).

5. Reading. Reading is a very important part of the class, and will constitute your first exposure to much of the material.

Evaluation and Grading. Your course grade will be based on:

1. Discussion Assignments. These are written responses to questions about the readings and problems.

2. Problem analyses and solutions. Some assignments are specifically related to analyzing and developing solutions to the course "problems.

3. In-class exercises and presentations. There will be exercises and presentations in class that will contribute to your course grade.

4. An authentic writing project. This is a significant formal project which I will describe in a separate handout.

I use a "criterion-referenced" grading system, judging work against a set of criteria and standards and not in relation to other students in the class. I will give you advance notice about what activities will be evaluated for grading as well as the criteria and standards for the evaluations. You will have an opportunity to decide on the relative weights for graded material. For example, you may decide to count the authentic project anywhere from 10% to 40% of your course grade.

How to do well in this class. You would be well served to approach this class as a kind of adventure! It will be a different way to learn, and I believe the problems, cases, projects and subject matter will always be interesting and sometimes even fascinating.

Given the PBL format it would also be helpful to approach the material not as information merely to be memorized, but as ideas that can help you better understand and solve problems and dilemmas. The problems and cases will push you to rethink and revise your ideas repeatedly. There will be no "easy" answers, and that's as it should be—since educational problems rarely have easy answers. Perhaps the best way to prepare yourself is to adopt an inquiring mind. As we explore the problems we will engage in systematic inquiry—hypothesizing, collecting evidence and information, proposing solutions, testing solutions against the evidence, accepting, rejecting or revising our hypotheses and so on.

I hope you learn a lot during the semester, but most importantly I hope that you develop greater depth of understanding and a better capacity to use what you learn with skill and good judgment. To do this you need to read thoughtfully and use writing to develop your ideas, challenge yourself to go beyond the information given, ask questions, look for reasons to support your ideas, rely on your fellow classmates as resources and serve as a resource for your fellow classmates, be prepared for the unexpected, and be prepared to change your mind.

Always contact me if you are confused, have problems or need help. Don't let problems develop into bigger ones. If you have special needs, please discuss them with me.

Educational Psychology 370 as a Writing Emphasis Course

Spring, 1999

According to UW-La Crosse guidelines, writing emphasis courses require at least 50 pages of writing over the entire semester, at least 10 pages of which should be revised, polished prose. The remainder of the writing in the course is intended to enhance students' understanding and thinking. Typically, in a writing emphasis course students write frequently, and the writing may vary in length from a paragraph to a few pages. Instructors do not necessarily read or evaluate every piece of students' writing during a semester. Formal assignments that require polished prose usually involve more than one draft.

Writing enables you to formulate, discover and improve your ideas, thus making learning more personally meaningful and memorable. And, of course, writing is an important means of communicating ideas to others. A college educated person should be able to communicate clearly, precisely and cogently in writing. I hope this writing emphasis class contributes to your ability to learn and communicate through writing.

Writing activities and assignments in this class. In this class writing is an important way to learn, think and communicate your ideas. There are two major categories of writing in this course—one is **writing to learn**, and is intended to help you develop knowledge and understanding. For example, before class you may write about the reading material in order to organize and develop ideas in preparation for class discussion. The purpose of the writing is not to demonstrate how much you know, but to develop ideas about the topic. The second category, **formal writing**, is intended to communicate ideas to others. Formal writing should conform to acceptable standards and rules of style, usage and mechanical correctness, and must be adapted to the audience. Consequently, revision is an integral part of formal writing since it is important to shape and adapt your ideas to the audience. Some major differences between writing to learn and formal writing are:

	Writing to Learn	**Formal Writing**
Primary	To develop	To develop understanding,

Purpose	understanding and improve thinking.	improve thinking and communicate ideas effectively.
Audience	Ideas may be shared with others but the primary goal is to develop understanding.	Writing is adapted to an audience.
Revision Thinking	Ongoing thinking to develop ideas, but not polished prose.	Revised to improve quality and effectiveness of communication.
Evaluation	May or may by not be evaluated	Evaluated by instructor.

Writing will be used as an integral part of learning and interacting in the course. The major types of writing will be:

1. Discussion Assignments (DA's). These writing-to-learn assignments involve you in thinking about reading assignments and how the concepts and ideas might apply to problems in the course. Some DA's will be responses that you post to the web-based Discussion Forums, and others will be responses you send to me. I read DA's quickly to determine whether you have incorporated ideas from the readings, and responded thoughtfully to the questions or problems or whether the response is off the cuff and simply slapped together to complete the assignment. I look for thoughtfulness and careful reflection in response to the questions, problems or issues, and incorporation of concepts and ideas from the reading assignments. Discussion Assignments are not "opinion pieces" that state what you already know or believe; they are assignments in which you show the development of your ideas and thinking in light of the course material.

2. Portfolio assessments (PA's). Several times during the semester you will assemble a portfolio of your course work and write an analysis of your learning. The portfolio is a culminating demonstration of your understanding and ability to use the concepts and ideas in the course, and reflects your progress toward the course goals. Each portfolio includes specified coursework (never throw away an assignment that you have done) and a portfolio analysis or problem. I do not grade the individual pieces in the portfolio, but the portfolio must contain all the relevant material to receive full credit. I will evaluate the portfolio analysis for a grade.

3. Authentic writing project. The project is a substantive piece of formal writing, due at the end of the semester. You will be able to select a topic of interest, and develop the project in one of several formats that I will describe in a separate handout.

Feedback and Guidance on written work. Feedback is an important part of learning. In some cases I will provide individual feedback; however, it is simply impossible to give detailed

individual feedback on every assignment. Much of the feedback will be directed to the class as a whole and based on patterns of thinking and ideas I see in your work.

Guidance is also important for learning. Guidance is advice intended to help you improve your work. It is impossible to give detailed guidance on every assignment, and sometimes unproductive. For example, suppose you hand in a final copy of a paper, and the instructor grades it and also gives you detailed information about how to make it stronger. It seems to me that the guidance is a little late, especially if you have no intentions of rewriting the paper.

To be most effective, guidance needs to be well timed so that you can use it in the development of your work. Moreover, it needs to make sense to you. In the past I have provided detailed written comments on drafts of papers only to find out that many students did not understand the comments or know how to use them. Consequently, I will set aside class time during the semester for feedback and guidance on important work. In these cases, I will consult with individuals or groups of students. In addition, I will try to clarify the criteria and standards for written work so that you can use them to adjust your effort. And, occasionally we will use peer review by other students as a source of feedback and guidance.

Course summary:

In this course students worked through a series of six problems designed to teach them about contemporary learning theory and also how to apply theory to analyze and solve common teaching and learning dilemmas.

The first problem involved a 7th grade science teacher whose pupils were performing poorly. After analyzing the problem, students developed strategies intended to help the science teacher improve learning in her classroom. My students showed an overriding tendency to base their strategies on personal models of learning rather than on new course concepts, and many could not use the new model of learning. In a second problem, the class had to explain why the Reciprocal Teaching method improves reading comprehension. Most students incorporated relevant learning principles but had difficulty explaining how Reciprocal Teaching affects the way children interact with text and influences comprehension processes.

The third problem presented episodes of flawed thinking in which children or adults demonstrated poor cognitive performance due to lack of effective metacognitive activity. About 40% of the class was able to explain that metacognition was the concept behind the flawed thinking episodes, but most relied to some extent on their own "common sense" notions to analyze the episodes. In the fourth problem the class analyzed the learning strategies of two 12-year-olds who were trying to learn material from a science text. Overall performance in the class was very strong and a large majority of students successfully interpreted the youngsters' learning activities in terms of relevant course concepts.

Two problems came at the end of the semester. One depicted a college classroom in which the instructor was having mixed success with a group learning exercise. My students had to recommend ways to modify the class in order to promote better understanding of the subject. Nearly 60% of the class proposed reasonable strategies to develop understanding in the group setting. However, 40% of the class interpreted the group learning activity as an instance of poor cooperative learning, and focused on ways the instructor could make the groups work better even though such changes would not necessarily produce better understanding of the subject matter.

The final problem in the sequence was a teaching for understanding project. Students designed instructional materials and activities to teach a topic for understanding, and wrote a companion paper to explain how and why their project would build understanding. Students were adept at designing materials and activities, but only a small number adequately explained why these would promote understanding. In some cases, students seemed to resort to their prior knowledge of teaching methods and proposed materials that were not conducive to building understanding.

What do the results of these episodes say about the development of student understanding? Did students advance their understanding of learning theory? Did they learn how to apply theory to classroom learning dilemmas? Did the PBL approach help students overcome their prior and inert knowledge?

In general there are some encouraging signs that students did learn something in the course. First, in the daily writing assignments and class discussions students demonstrated they were familiar with the course material and could "think about" the theoretical principles of learning they had studied. Based on this traditional measure of learning, one could conclude that students did a lot of work and acquired a large body of information during the semester. Second, PBL fostered better understanding of the subject than my previous approach to teaching the course; the PBL students used the course material as a basis for their thinking much more than the non-PBL students, who relied more extensively on their personal theories. Moreover a follow-up study with PBL students four months after the course demonstrated that most were still able to think with the course concepts.

On the other hand, "thinking with" the course material proved to be a formidable challenge. Even the best students did not consistently incorporate relevant course concepts in the problem solving episodes. There is no detectable linear progression of learning across the problem episodes in the course; student performance varied from underdeveloped to relatively sophisticated. For example, the solutions to the 7^{th} grade science problem were quite limited and underdeveloped. In contrast, the analysis of learning strategies in the 12-year-olds was quite well developed. It also seemed that students revised their understanding of individual concepts but these were isolated changes resulting from encounters with specific problems rather than fundamental conceptual changes in their models of learning. Consequently, a student could produce an advanced explanation in one instance and a naïve one in another.

The road to deep understanding is a long one. The ability to use complex ideas develops in degrees rather than suddenly and all at once. Student performance in the course is consistent with the way people develop complex skills. As novices, students used new concepts tentatively and fell back on previous models and strategies. Most advanced beyond a purely naïve perspective, but did not fully develop expert understanding. They went beyond what they already knew, and employed disciplinary concepts in new contexts some of the time, but often produced underdeveloped and fragmented ideas.

Students came to the course with a model of learning quite different from the one they were expected to learn during the semester. As they read and discussed the course material, students could talk about the new model, but were not always able to use it to analyze and solve learning problems. Sometimes—even at the end of the semester—they resorted to their personal models. It seems that their experience in the course altered their conceptual understanding of individual concepts, but it is not clear to what extent students' models of learning now include the disciplinary concepts and principles they encountered during the semester.

An Analysis of Students' Learning Through Problem Solving:

The Middle School Science Problem

In the second week of class, I introduce a problem that depicts a seventh grade science classroom in which a large number of children are doing poorly. The problem description includes information about the teacher's learning goals, her teaching methods, and student performance on quizzes, tests and experiments. My students investigate the situation, identify a specific problem and then propose ways to help the teacher deal with the specific dilemma. This open-ended problem situation can be approached in a variety of ways. For instance, if students focus on how the seventh grader's performed on an experiment, they might pursue a problem about scientific thinking. Or, if they focus on the misconceptions depicted in test answers, they might pose a problem related to conceptual development and change. However, once they define a manageable problem, their goal was to devise ways to help the teacher deal with the specific dilemma.

Intended learning outcomes. This problem is the focal point for studying concepts and principles related to learning and cognition. (see handout.) As a result of working through the problem, students should:

1.understand concepts and principles related to learning as a constructive process, higher-order thinking, thinking dispositions, strategies for learning, and metacognition.

2. be better able to apply these concepts and principles to analyze and solve typical classroom learning dilemmas.

Instructional sequence. Students worked on the problem for approximately three weeks in four overlapping phases:

1. Engagement. Students read the problem, proposed questions and hunches about what the problem is about, and identified additional information they wanted about the situation.

2. Problem framing and inquiry. Students gradually narrowed the possibilities based on new information about the situation, and eventually defined a manageable problem.

3. Development of solutions. Students proposed ways to solve or resolve the problem.

4. Presentation of solutions. Students presented their solutions.

In conjunction with direct work on the problem, students also completed reading and writing assignments, and we spent part of the each class session discussing fundamental concepts and principles of learning theory and relevant concepts in cognitive psychology.

Learning Outcomes for the Middle School Science Problem

This portion of the course involves working on "Now What?", a rather complex classroom problem. As you know, class time is divided between working on the problem, and additional activities intended to improve your understanding in the areas of learning, thinking and motivation.

It is important to understand what we are trying to accomplish. Two major objectives of the course are particularly important as we work through this problem. One objective is to learn to understand and use important ideas, theories, principles and concepts to solve or resolve problems related to teaching and learning. A second important objective is to learn how to appraise your own learning and thinking.

Your work in this portion of the course should lead to significant progress on these two objectives. Specifically, this means that you should be able to demonstrate that you:

1.understand key concepts and principles related to: a) learning as a constructive process, b) higher-order thinking, c) thinking dispositions, d) strategies for learning, e) motivational influences on learning, f) intrinsic motivation, g) characteristics of motivation-enhancing learning activities, and h) the role of assessment in promoting students' learning.

2.can apply your understanding of the key concepts and principles to analyze and solve typical dilemmas students encounter in trying to learn in school.

3.can evaluate changes in your own understanding of the material and problems, and also identify strengths and weaknesses in your own learning.

The first problem portfolio in the course will focus on part of the "Now What" problem as well as Discussion and Forum assignments you have completed. The purpose of the portfolio is to demonstrate your learning and progress with respect to the course objectives. The portfolio will contain hard copy of the written work you have already completed and several assignments yet to be assigned (but no killer assignments of great length).

On Tuesday, March 2, I will give you detailed instructions about the content and format of the portfolio, as well as how I will evaluate it. The portfolio will be due before spring break.

Assignments Corresponding to the Middle School Science Problem

February 9. Next week we will begin to focus on the broad topics of learning and thinking. An overarching goal of this course is to better understand how and why students learn or do not learn what they are taught. By the end of this course you should be better able to explain the nature of learning and apply that knowledge to solve or resolve students' learning problems. Tuesday we will begin to examine the nature of learning and thinking. Your assignment is:

Reading Assignment:

1. Chapters 1 and 2 in TC (The Thinking Classroom)

2. Chapters 1 and 2 in TfU (Teaching for Understanding)

Discussion Assignment questions (due via email as indicated above):

1. In TC the authors describe a "culture of thinking in the classroom." Using their notion of culture, identify the ways, if there are any, in which you have experienced a culture of thinking in your own education. Here's a harder follow-up question to that. Finish this idea and elaborate, "For the most part in my educational experience my classrooms have been cultures of . . .(elaborate).

2. In TfU the authors explain the concept of "understanding." Using their definition of understanding, identify one or two examples of assignments or activities in any of your current classes (except this one) which you think promote understanding. Explain how it promotes understanding.

3. To what extent do you think your teachers use understanding as an important goal in your classes? What's the basis for your judgment?

February 11. There is NO Discussion Assignment for Thursday. However, read chapters 4, 5, 6, 7 in The Thinking Classroom. These are fairly brief chapters. Get a good fix on the concepts of, "thinking dispositions" and "mental management."

February 16. On Tuesday, February 16 we will start to analyze the problem, "Now What?" In preparation, please do the following:

1. Read the problem-several times.

2. Answer the following questions and send them via email by Monday, February 15. On the Subject Heading of your email use your last name followed by NW#1.

A. What are your initial impressions of Arlene Thompson as a teacher?

B. What are Arlene's learning goals for her class?

C. What are your initial impressions of Arlene's students?

3. Reading assignment. In The Thinking Classroom Read chapters 8, 10, 12. When you have time, go back and read

chapters 9, 11, 13 in TC.

February 18. The assignment for Thursday, February 18 is to read the article, "The Six Facets of Understanding," and to catch up in The Thinking Classroom. We will continue to examine the "Now What" problem in class.

February 23. There is NO CLASS on Tuesday, February 23. There is a web assignment due by 11:00 a.m. Tuesday. To Read the assignment go to the Learning Links page, and look at the Discussion Forum called, "Reading to Learn."

February 25. By Thursday you should have read all of The Thinking Classroom. By Thursday you should have read the article, "The Six Facets of Understanding." By Thursday you should have read all of the postings to the Discussion Forum, "Reading to Learn." Come to class prepared to defend and support the best ideas.

March 2. Below is a description of the in class activity from Thursday, February 25 and the assignment for Tuesday, March 2.

In class activity. The goal is to propose specific ways that Arlene could use the text more effectively in her class. Remember she wants students to be able to read on their own and get something out of the reading. You should review what you think are the best ideas from the discussion forum, "Reading to Learn," and then as a group come to some consensus on several specific recommendations. HOWEVER, it's not enough to simply make a recommendation. You need to carefully explain how and why the strategies you recommend actually facilitate student learning and understanding. Remember, we have been examining this idea of learning as a constructive process in which the learner makes or develops meaning from new information. Try to explain how and why your recommendations will result in this. In class we will examine some of the ideas developed in the groups.

In addition, elect someone from your group to post a summary of your group's ideas to the Discussion Forum by 4:00 p.m. Friday (tomorrow). The summary should be thorough-not a list of ideas-but a narrative that really explains how and why your recommendations influence student learning.

Assignment for Tuesday, March 2

1. Read or reread chapters 6 and 7 on mental management in The Thinking Classroom.

2. Read the postings from each group.

March 4. I posted comments to the class and to the groups on the Reading to Learn discussion forum.

Thursday, I will introduce "Reciprocal Teaching" as a strategy to help students understand what they read. This class session will give you a chance to start on the portfolio assignment.

March 9. Analysis of Two Students. This assignment is due via email by 4:00 p.m. Monday, March 8. Be sure to include a copy of your responses in your portfolio. In class you received an article, "Analysis of Two Middle School Students' Cognitive Strategies, Memory and Learning,"

which describes a study that examined how two 7th grade students try to remember and understand subject matter. Read the article thoroughly and answer the following questions.

1. Based on the interviews and Table 1, compare and contrast Sharon and Andrew in terms of the strategies or tactics they use to learn the material

2. Based on the interviews, compare and contrast Sharon and Andrew in terms of their mental management-awareness and regulation of their own learning and thinking.

3. We have defined learning as a sense-making, constructive process in which the learner builds new understanding. Evaluate Sharon and Andrew with respect to this model of learning.

4. Why do you think both students did more poorly on the transfer questions than the recall task?

5. Based on your analysis of the interviews and tables (and the wealth of knowledge you now have about learning and understanding) what are the implications for teaching? You can easily imagine that these two students are in Arlene Thompson's class. What would you do if you were the teacher of these two students? Your discussion should include the concepts of understanding, metacognition, and transfer of learning. Remember to keep a copy of the assignment for your Portfolio.

March 11 Your portfolios are due in class, Thursday, March 11.

Appendix A:

Middle School Science Problem

I used the Middle School Science Problem to teach learning theory. Students worked on the problem for several weeks in conjunctions with reading and writing assignments relevant to the problem.

Arlene thumbed through the papers on her desk, glancing at the scores on the top of each page. She wondered what was happening, why so many students had done poorly on the science test. Here she was in the middle of her first year of teaching and students weren't getting it. Of course a few students did well on the test, but many did not.

She looked at the paper before her. Question three read, "Draw and label a diagram to show how the water that falls as rain in one place may come from another place that is far away." The student had written, "I do not remember this from the book." She looked through the stack of papers. Another student had drawn a sewer pipe emptying into a pond. Another had actually, shown a truck hauling bottled water. Seven students had left the item blank, and many of the drawings were incomplete and confused. Only 4 of 25 students had answered correctly.

Suddenly, a loud voice boomed from the doorway. "Hey, Arlene! Time to go home!" Arlene jumped but then realized who it was, " Oh, hi Melissa. I was just finishing up. I'll walk out to the parking lot with you."

Melissa asked, "So, how's it going?

"Well, I'm just getting accustomed to the idea that when the school day is over I will spend all evening planning lessons for the next day. Does it ever get better?"

"Arlene, eventually you get your life back, not all of it mind you—but someday you will have some time to yourself."

"I'll look forward to that. . . Melissa, I was wondering. You've been at this several years now. Can you tell me whether you have had to change your expectations of students?"

Melissa looked puzzled, "What do you mean?"

Arlene thought for a moment, "Well, I just read a set of tests that I gave today, and so many students did poorly. This isn't the first time it has happened this term—it has become a pattern. Suddenly, I'm wondering whether my expectations aren't out of line, whether I'm expecting too much."

"I have the same feeling sometimes. It's a real challenge to get kids to understand even basic concepts."

Arlene responded, "Well, what do you do about it? I mean, this test shows that most of the students learned very little in the last three weeks. Now what do I do—go back over the topic? If I do that we lose ground and get behind in the class. And, even if I go over the topic, what's to say that the outcome will be any different? I really want to get this figured out soon."

Melissa stopped walking and said, "Arlene, it sounds like your situation is perfect for our new 'Learning Enhancement Forum.' Last year the Student Learning Task Force recommended that teachers set up weekly sessions to examine student learning issues. Anyway, we just got started, and we meet Thursday afternoons for two hours. Your situation might be a good problem to bring to the group."

"You mean other teachers would actually be willing to listen to this and help out?"

"Well, that's the theory—haven't seen it in practice yet. Tell you what, why don't you put together a description—maybe a couple of pages of what is going on in your science class. Tell us what you are trying to accomplish and how students are responding. Make six copies and I'll distribute them to the group. Then next Thursday we can use this as our topic for the session."

"Melissa that would be great. I'll put something together and get it to you by Tuesday. Thanks a lot."

Report from Arlene Thompson's 7th Grade Science Class

The 7th grade science curriculum covers many of the traditional areas of science such as life science, earth science, chemistry, and some physics. The main objective is to prepare students for more advanced work in these subject areas. There are a lot of facts to learn, but that is not the sole aim. The curriculum also focuses on improving kids' understanding of science concepts and their ability to think scientifically. So a lot of what we do in the class is not just learning about science, but learning to do science.

I thought the best way to describe the difficulties in my class is to show some of the types of questions, activities and problems I use, and summarize how students do on them. I can also describe some of the ways I teach the class.

First, I have noticed a problem with basic comprehension of material. I have been giving some short quizzes. The goal is to make sure the kids keep up with the assignments, and become familiar with the basic concepts. The quizzes usually have 10-20 questions that test simple comprehension of the material. Attached are a few examples of some quiz items, and the distribution of scores from the last quiz. It's amazing to me how many students don't even grasp the basic ideas from the readings.

Second, I really do want these kids to get beyond the simple facts, and begin to understand how to do science or think scientifically. This calls for something beyond rote learning of facts. Students have to make connections, analyze, put things together, and so on. On the second page I have included some examples of questions that require a little more thinking from them, and some of the students' answers. As you can see, a few students are able to develop good ideas, but most of them are far from the mark.

Third, in order to learn about science you need to do more than read about it. It is important to become involved in scientific investigations and inquiry. Science is about discovering new knowledge through a process of scientific inquiry. It is difficult with 12 and 13 year-olds, but I think students can learn important ideas by carrying out science experiments. So, in the class we do a variety of experiments and investigations that put the students in the position of asking questions, testing their ideas, collecting and analyzing evidence and so on. One of the experiments in life science is included on the last page.

These three types of questions and activities represent the range of goals in the class—to help students understand scientific concepts and principles and also to develop some capacity to investigate questions scientifically. As you know this is my first year of teaching, and I'm really interested in understanding these problems better. I want these kids to learn about science and also to experience some of the wonder and gratification that comes from working in science.

So here it is--I hope you can help me develop more effective ways to teach and to help these kids learn.

Some examples of quiz questions that test for basic understanding of the material followed by some student responses. The distribution of scores for the last quiz is at the bottom of the page. Students take the quiz after reading several pages from the textbook.

From what materials are fossil fuels formed?

fossils (6)

sea water (1)

oil and gas (1)

dirt and rocks (4)

dead plants and animals (4)

don't know (9)

Write down one reason why the ozone layer is important for all living things on earth?

It protects living things from over exposure to the sun's harmful rays.

Living things need it to breathe.

It keeps the atmosphere from going into space.

It creates rain.

It keeps water from going too deep in the ground.

Distribution of scores on the last quiz. There were 20 questions and 25 students in the class.

20(1) 19(0) 18(0) 17(1) 16(0) 15(1) 14(2) 13(0) 12(2) 11(2) 10(0) 9(0) 8(1) 7(0) 6(0) 5(0) 4(4) 3(4) 2(4) 1(3) 0(0)

Some examples of questions that require a little more thinking from the students. These questions appear on tests, but not quizzes.

Why is it cold in the winter and warm in the summer?

Most of the students in the class said that in the summer the earth is closer to the sun than in the winter.

A few said that the days are shorter in the winter and longer in the summer.

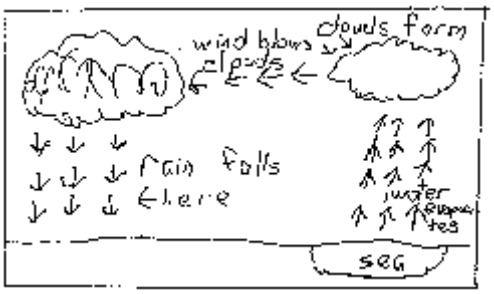
Several said that it's colder in the winter because it snows!

Only three students explained the change of seasons in terms of the tilt of the earth on its axis, and the

angle of the sun's rays.

Draw and label a diagram to show how water that falls as rain in one place may come from another place that is far away.

Below is one of the drawings that is a fairly good answer to the question. Only 4 students produced this kind of drawing.



Other answers included such things as a drawing of a (n)

sewer pipe emptying into a river.

truck loaded with bottled water.

an underground river.

hurricane with no labels or description

Below is an example of science experiment students had to design. Students worked in groups of three to design and explain their experiment. They worked on this for an entire class period.

A nursery received a shipment of unmarked seeds from a seed supplier. The head florist called the company, but no one remembered what the seeds were. Rather than waste the seeds, the florist decided to grow them even though she did not know how much sunlight the plants needed. Design an experiment the florist could do to determine the relationship between exposure to sunlight and plant growth.

Several groups said to grow one plant in light and another one in the dark.

Several groups said to grow one plant in light for a week then in half the light for a week.

A few groups just did not know how to begin.

One group figured out a reasonable experiment, growing groups of plants with each group getting different amounts of sunlight, but the same amount of water and nutrients.

As the class worked on the Middle School Science problem I provided additional information to their questions. My answers insured that they focused on learning theory and did not drift into other areas.